THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Meeting: February 22 Time: 7:45 p.m.

The meeting will be remote due to the coronavirus pandemic. Details to come.

Chrysoberyl

Lac Alaotra, Toamasina, Madagascar

Source: Wikimedia. *Photo: Rob Lavinsky.*

Volume 62, No. 2
February 2021
Explore our website!

February Meeting Program:

Fluorescent Minerals of Pennsylvania

(details on page 8)

In this issue …

Deadline for Submissions

February 20

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

Mineral of the Month
Chrysoberyl

by Sue Marcus

Our February Mineral of the Month is a real gem—chrysoberyl. The mineral was reported in 1789 (and possibly earlier) from Brazilian placers in Minas Gerais. It was initially called chrysolite. The placer material was found before naturalists of the day had discovered the element required for its composition. By 1789, the name "chrysoberyl" seems to have received acceptance by scientists of the day as the name for this mineral. Beryllium was created in the laboratory in about 1798.

There was confusion over names in the Old and New Worlds. Pliny (Old World) may have used "chrysolite" for golden topaz. Since beryllium had not been identified and since chrysoberyl was unknown in ancient times, Pliny could not have meant chrysoberyl ($BeAl_2O_4$). Other authors of the late 18th century used chrysolite to mean peridot, the gem variety of olivine.

The New World material that came to be called chrysoberyl was the source of intensive research in the late 1700s. René Just Haüy, a French naturalist and professor of the late 18th century, established the science of crystallography and named a form of our mineral "cymophane." (We will come back to cymophane later in this story.)

The naming rights to chrysoberyl go to Abraham Gottlob Werner, who applied the name in 1790. The name combines two Greek words, χρυσός (*chrysos*) and βήρυλλος (*beryllos*), meaning golden beryl.

In 1824, the American mineralogist Henry Seybert reported the results of his examinations of specimens he identified as chrysoberyl from New York, Haddam (CT), and Brazil, noting that the Brazilian samples were the most chatoyant. He wrote that French authors had mistaken the New York material for corundum, easy to do since chrysoberyl has a hardness of 8.5 (versus 9.0 for corundum). Seybert also introduced me to a new word: glucina, an archaic word for beryllium oxide.

I always learn something when I research these Minerals of the Month columns. I had always thought "trilling" was what some birds did—and they do trill. Trilling also applies to chrysoberyl.

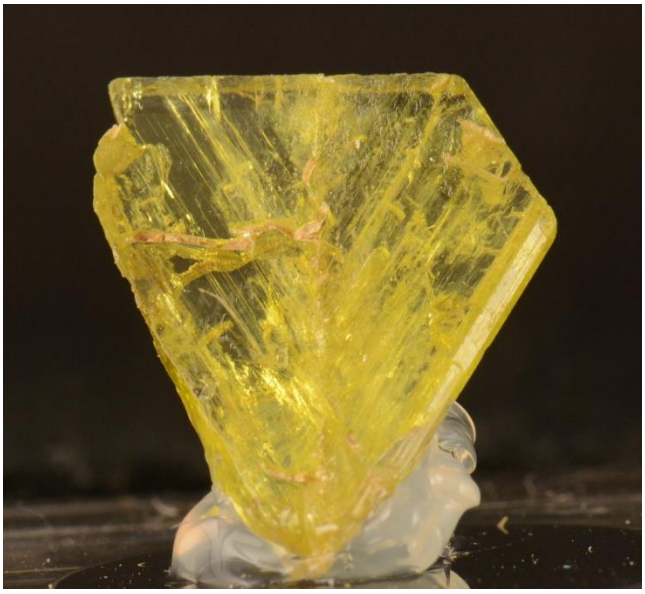
Happy Valentine's Day!

Geode story on page X

March Mineral of the Month:
Elbaite

See your elbaite photos in print!

Send your photos with locality descriptions to Hutch Brown at editor@novamineral.club by March 1 for publication in the March NVMC newsletter.



Chrysoberyl, Haddam, Middlesex County, CT. Photo: Bob Cooke.

Chrysoberyl, Governador Valadares, Doce Valley, Minas Gerais, Brazil.
Source: Wikipedia; photo: Matteo Chinellato.

Chrysoberyl var. alexandrite, locality unknown.
Photo: Bob Cooke.

Chrysoberyl is quite unusual in that it is frequently twinned. Three sets of these V-shaped twins, also called cyclic twins, join to form a six-point star, a *trilling* (or *sixling*). They look hexagonal but are not.

Pegmatites are the primary host rocks for chrysoberyl. These rocks form during the later stages of igneous events, when rarer elements like beryllium and lithium can concentrate. Chrysoberyl may also occur in the metamorphosed zones adjacent to pegmatites, where the pegmatitic fluids altered the surrounding country rock. In these environments, chrysoberyl can be hosted in mica schist or dolomitic marble.

Since chrysoberyl is hard and therefore resistant to erosion, this mineral is often found with other heavy (dense) and resistant gemstones in placer deposits. Weathering and transport cause tumbling and abrasion, leading to the rounded shapes of placer chrysoberyl.

Here is a mineral that excels as a gemstone. Two distinct forms of chrysoberyl are found and used for these purposes. The most coveted and therefore valuable is alexandrite, which is also rare. Alexandrite changes color, turning from blue-green in daylight to red-purple under artificial light for the finest quality. It is also pleochroic, meaning that the color changes when viewed thorough a polarizing lens. Alexandrite is rare because the geologic environment must be just right to form this kind of chrysoberyl, which requires unusual environments anyway. To form alexandrite, chromium is needed, and chromium is more prevalent in mafic rocks like basalt than in pegmatites (which are usually chromium poor). Yet beryllium is also needed, and it is more prevalent in the pegmatites that usually host chrysoberyl. So alexandrite forms only if the geologic conditions are right for chrysoberyl formation in the presence of pegmatite-intruding chromite-rich rocks; the temperatures and pressure must be perfect; and so on. And that's not all: even more conditions must be right to form a gem-quality alexandrite big enough for faceting.

Alexandrite Cushion (26.75 carats).
Source: Wikipedia; photo: David Weinberg.


Chrysoberyl twin, front and back, Espirito Santo, Brazil. Photos: Bob Cooke.

The conditions for alexandrite formation have been synthesized, and synthetic gems are now grown in laboratories. There are also artificial or simulated alexandrites, which can be spinel or corundum that has been treated. Most artificial alexandrites can be readily identified by gemologists. However, it is difficult or impossible, depending on the method of synthesizing, to identify real from lab-grown alexandrite.

Alexandrite may be best known from Russia's Sverdlovsk Oblast (administrative region) in the Ural Mountains. Alexandrite was named in honor of the future Emperor Alexander II of Russia (1855–81). Since the original Russian discoveries, large stones have been found in Brazil, India, Madagascar, Tanzania, and Sri Lanka.

The other form of gem chrysoberyl looks quite different. Cymophane is opaque, forming "milk-and-honey-colored" chatoyant stones also known as "cat's eyes." Microscopic rutile crystals are oriented parallel to one another along the c-axis of the chrysoberyl crystal for the apparently moving chatoyancy. This type of chrysoberyl is usually cut into cabochons to highlight the chatoyant effect.

Chrysoberyl is officially the only mineral with cat's eyes. The same effect in other minerals is also called cat's eye but with a descriptor like "sapphire cat's eye." (I don't understand who made the rule—or who enforces it.) Cymophane is found in most chrysoberyl deposits. Most cymophane is yellowish, though green stones have been cut and even alexandrite can form cat's eyes as opaque green-red color-changing stones.

Although Brazil was the source of the type specimens of chrysoberyl, much finer specimens have been extracted since then. In Espirito Santo, chrysoberyl trillings, twin crystals, and even rare single crystals occur, with a major specimen-producing discovery in 2017. At the Carnaiba Mine in Bahia, Brazil, the alexandrite variety of chrysoberyl occurs with emeralds in mica schist. This is an example of the geologic environment where pegmatites push through chrome-rich mafic rocks (rocks rich in magnesium and iron).

In Zimbabwe, the Novello Mine produced both regu-

Cymophane. Source: Wikipedia; photo: David Weinberg.

lar chrysoberyl, including trillings, and the lovely alexandrite variety. The most treasured specimens from this locality are alexandrite trillings showing both the star shape of the twinnings and the color-change of the variety. Mindat shows one specimen composed of several well-formed alexandrite crystals that is more than 3 inches by 3 inches by 1 inch in size. Mining dates from when Zimbabwe was still called Rhodesia. Minor extraction might be continuing, but (as is true of all chrysoberyl localities) specimens are never abundant.

In 2013, gemmy, well-crystallized chrysoberyl (not alexandrite) was discovered in the Toamasina Province of Madagascar (see the specimen on the cover). Specimens include various types of twinned crystals and trillings; most are small (thumbnails), although a few are significantly larger.

Alexandrite found in Tanzania is valued for its blue tones. Material from this locality is better suited for faceting or lapidary work since crystals are crude or nonexistent, though samples may be translucent or even show chatoyancy. A blue cat's eye would be a prized gem.

There are oddities even for a rare mineral like chrysoberyl. Clear chrysoberyl occurs in Myanmar (Burma). The specimens from Mogok, shown on Mindat, look like fine, well-crystallized though small twinned chrysoberyl crystals. They seem to have been extracted around 2013 and were scarce even then. Pegmatites near Mogok are the likely source, though I could not tie the chrysoberyl specimens directly to them.

Gem-grade chrysoberyl comes from Sri Lanka. Specimens may be waterworn because most are found in placer deposits, along with corundum (sapphires and rubies) and other gemstones. Well-crystallized specimens also come from here, with translucent classic trillings or twins rarely measuring more than an inch.

The United States is not a source of significant collectible chrysoberyl, although it is found in pegmatites from Maine and New Hampshire to Colorado and Alaska. While looking for any notable localities on Mindat, I saw these listed in New York City: 93rd Street & Riverside Drive and 164th Street & Broadway. I don't recommend digging at those localities; at the very least, they are either private property or you could get run over by traffic. There are no photos of

Chrysoberyl sixlings, Jaquita, Bahia, Brazil. Photos: Bob Cooke.

specimens from the New York City sites. The eponymously named "Chrysoberyl locality" at the Brainerd House in Haddam, CT, was the source of twinned though not gem-quality chrysoberyl. It is reported to be the first place where chrysoberyl was found in the host rock (the original chrysoberyl specimens from Brazil were from placer deposits).

Chrysoberyl is valued purely as a gemstone. Although beryl is in the chemical formula, chrysoberyl is not an economic source of beryl or any other mineral commodity. We enjoy chrysoberyl for its rarity and beauty.

Alexandrite gems from Sri Lanka (65.7 and 16.68 carats) and Russia (4.84 carats). Source: Smithsonian Gem Gallery; photos: Chip Clark.

You can purchase chrysoberyl specimens for less than $50, although you get what you pay for; crystals with visible twinning, trillings, or rare single crystals will cost in the hundreds of dollars unless they are less than a centimeter long.

Alexandrite crystals can be ugly, and I'm saying that as one who loves minerals of all types. An alexandrite that stands out from its matrix and shows some crystal form and faces is rare—and will be expensive. I have a few crumbs in my collection, and I mean that literally. They fluoresce, so I keep them for that feature alone; they are otherwise unremarkable.

Alexandrite usually fluoresces red under most wavelengths. The Smithsonian shows off a faceted chrysoberyl behemoth weighing 65.08 carats. The Sri Lankan stone is greenish brown.

Chrysoberyl is an interesting and relatively rare mineral; some specimens exhibit unusual crystallization, and some can be gems. A pretty trilling is a treasure for any collection!

***Next month:* Elbaite!** *If you have photos to illustrate the article, send them to Hutch Brown at editor@novamineral.club.*

Technical Details

Chemical formula ..... $BeAl_2O_4$

Crystal form ..... Orthorhombic

Hardness 8.5

Density ..... 3.5–3.84 g/cm^3

Color ..... Yellow, various shades of green, brown, colorless, red/blue-green (var. alexandrite)

Streak ..... White

Cleavage ..... One distinct; at least one imperfect cleavage

Fracture ..... Uneven to subconchoidal

Luster ..... Vitreous

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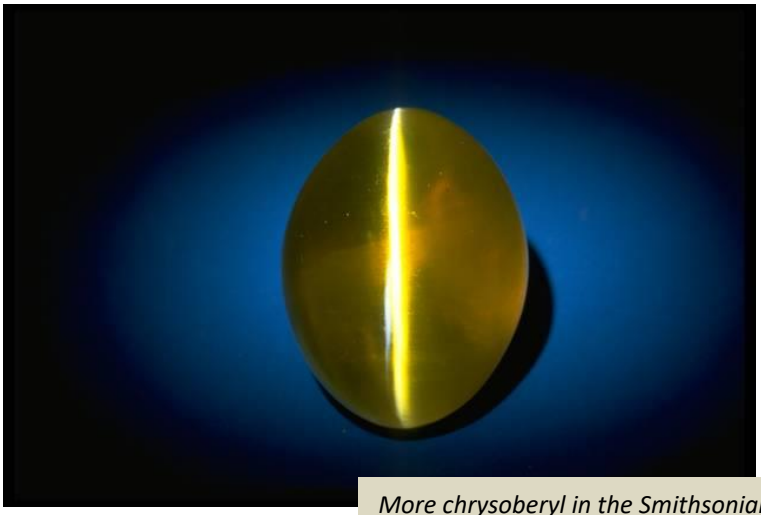


More chrysoberyl in the Smithsonian collection …

Top left: *Maharani Cat's Eye (chrysoberyl) from Sri Lanka.* **Top right:** *Chrysoberyl gem (114.3 carats) from Minas Gerais, Brazil.* **Bottom:** *Chrysoberyl twin from Espirito Santo, Brazil. Source: Smithsonian Galleries; photos: Chip Clark.*

Fluorescent Minerals of Pennsylvania

February 22 Program

by Sue Marcus, Vice President

Our February program is "Fluorescent Minerals of Pennsylvania" by Jim Van Fleet. He will outline the geology of Pennsylvania and some of its mining and quarrying history, describing the surprising variety of fluorescent mineral species found in Pennsylvania.

Jim Van Fleet is a collector who specializes in the fluorescent minerals of Franklin and Sterling Hill, NJ. He is the science and engineering librarian at Bucknell University and the editor of *The Picking Table*, journal of the Franklin-Ogdensburg Mineralogical Society. Members of the Fluorescent Mineral Society might remember his name from a 3-year stint editing the journal of that organization and as a regular attendee and dealer at the annual December "NERF Ball" held in past years by the Northeast Regional Fluorophiles of the Fluorescent Mineral Society. For NVMC members who are unaware of the Fluorescent Mineral Societ, join us to learn about new opportunities to make collecting connections.

President's Collected Thoughts

by Tom Kim

My family recently received a trial subscription of HBO Max. For the month we have it for free, we've been streaming some movies we missed and catching up on recent series of "Dr. Who."

I've also started watching the first series of a reality competition show called "The Great Pottery Throw Down," a British show in the vein of the "The Great British Bake Off" ... but for amateur potters. It's engrossing to see how you can take soft earth, massage it, work it, coil it up, smooth it out, layer and prod it, add a thin glaze, and then—with bated breath—subject it to intense heat to get an "objet d'art," something that can be displayed in a house or gallery for generations or perhaps uncovered by archeologists after millennia.

In the lineup of contestants was Joanna, a geologist from West Sussex. In the second episode, the main project was to make a washbasin, and she made a lovely one embossed with ammonites and trilobites. She seemed a strong contender, so it was a bit of a shock when she mysteriously dropped out after that episode, citing personal reasons.

Our remembrance this month of Jennie Frances Smith, as well as our recent club meeting presentation by Jamison Kilby Brizendine on his acquisition of Clarence Domire's collection, led me to ruminate on how we deal with weird compressions and expansions of time. Years of collecting and culling become a couple of paragraphs or several yards of shelves or perhaps a couple dozen slides. And yet each item in our collection represents thousands or millions of years of forming, squeezing, shaping, combining, or transforming until they jut serendipitously from the eggshell crust of our planet to be picked and passed on and marveled over in our flickering gaze.

What are our lives but an interface between the evanescent and eternal?

Tom

Upcoming Minerals of the Month

See your photos in print!

Send your photos with locality descriptions to Hutch Brown at editor@novamineral.club for the following Minerals of the Month:

Mar 2021	elbaite
Apr 2021	prehnite
May 2021	kyanite
Jun 2021	staurolite
Sep 2021	rutile

Amazing Heart-Shaped Geode Discovered in Uruguay

by Sara Barnes

Editor's note: The article is in My Modern Met, 5 January 2021. Thanks to Sue Marcus for the reference!

Gems and minerals are often given as tokens of affection. But one discovery of a naturally occurring amethyst geode doesn't need any help in expressing love—it's already shaped like a heart! Uruguay Minerals made this amazing find at the border of Uruguay and Brazil when workers broke open a rock that revealed a heart on either side of it. … *Read more.*

Share Your Story in the Newsletter!

Club members appreciate reading stories by other club members, whether it's about a trip they took or a specimen they acquired.

Or tell the story of how you got interested in rocks, minerals, or lapidary. Other members are curious!

Editor Hutch Brown can help. You don't have to worry about style, grammar, and so on.

So why not share your story? Just write it up and send it along with a photo of your trip, our specimen, or youself to:

editor@novamineral.club.

Bench Tip

Little Balls

Brad Smith

I often use little balls of silver and gold as accent pieces on my designs. They can be made as needed from pieces of scrap. Cut the scrap into little pieces, put them on a solder pad, and melt them with a torch. Then throw the balls into a small cup of pickle.

If you need to make all the balls the same size, you need the same amount of metal to melt each time. The best way to do that is to clip equal lengths of wire.

But there's an easier way to get a good supply of balls. Some casting grain comes in nearly perfect ball form. Just grab your tweezers and pick out the ones you need. When you need larger quantities of balls, pour the casting grain out onto a baking pan, tilt the pan a bit, and let all the round pieces roll to the bottom. Bag the good ones and pour the rest back into your bag for casting. Balls can be sorted into different sizes using multiple screens.

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

Membership Fees Due for 2021!

Club membership fees for 2020 are due! The fees are $20 individual and $25 family. For a family membership, please include the form, listing all family members. Send your dues to Treasurer Roger Haskins at 4411 Marsala Glen Way, Fairfax, VA 22033-3136. If you send a check, please make it payable to Northern Virginia Mineral Club.

What Is Wrong With This Picture?

by Neal Immega

Editor's note: *The article is adapted from* The Backbender's Gazette *(newsletter of the Houston Gem & Mineral Society, Houston, TX), December 2020, p. 9.*

Actually, there is nothing wrong with this picture. I missed the key signals that would have immediately helped me identify the rock.

This specimen is another of the hundreds that my friend Clyde has showed us during the outdoor socially distanced lunches we have in his driveway. Many of his specimens have poor or no labels. The usual question is: What is it and where did it come from?

The crystal shape is cubic and the heft of the specimen suggests that it is fluorite. Fluorite is commonly zoned (with graduated coloration across a crystal). I have seen this regular color banding in many Illinois fluorites, but I did not see any zoning in this one.

When I looked at it in the sunlight, I saw blotchy purple colors on a green background. This was very strange to me, and I wondered why the colors did not seem to follow a crystal form. In fact, the purple colors are only in some areas and not in others.

So I rejected the fluorite identification.

What did I miss?

1. I failed to observe that the the purple areas moved when I rotated the rock in the sun.
2. I failed to look at the rock in an area with no sunlight and notice that there were no purple areas.
3. Because I collected fluorite at the famous Cave-In-Rock localities in high school, I think that all fluorite should look like the ones in my collection.
4. The three directions of cleavage that can be seen just scream FLUORITE!

I borrowed the specimen and showed it to my mineralogist wife, who immediately said, "Fluorite *showing fluorescence*." (She emphasized the last two words, maybe for sarcastic effect.)

Ah hah! There is a famous green fluorite locality in England, the Rogerley Mine in the Weardale region,

What is this mineral?

where the green fluorite shows marvelous fluorescence under longwave ultraviolet (UV) light, and there is plenty of UV in sunlight. I even have a nice thumbnail from that mine.

Okay, I am convinced: it is fluorite.

I should get an "F" on this identification exercise, but others helped lead me astray. Sir George G. Stokes, in 1857, named the strange phenomenon of fluorescence after the mineral fluorite because his samples all fluoresced. It turns out that very few fluorites show fluorescence except for those from a few localities in England. Evil mineralogy teachers have bedeviled students forever with this. I can't stress enough how common evil mineralogy teachers are.

This all just goes to show that an old dog can mess up on an old trick.

For more about Rogerley Mine fluorite, you can visit http://www.ukminingventures.com/rogerley.html.

Fluorite specimen from the Rogerley Mine in England showing fluorescence.

The Rocks Beneath Our Feet

Geology of Quartz Crystals in Arkansas

by J. Michael Howard

Editor's note: *The author is a retired geologist from the Arkansas Geological Survey. The article is abridged from* The Hot Springs Bulletin *(newsletter of the Hot Springs Geology Club, Hot Springs, AR), November/December 2020, pp. 10–16. Thanks to Sue Marcus for the reference!*

Most quartz veins in the area around Hot Springs, AR, are restricted to the core of the Ouachita Mountains, a belt about 30 to 40 miles wide that extends about 170 miles west/southwest from Little Rock into eastern Oklahoma (fig. 1).

Productive Veins

The most productive quartz veins are in Paleozoic sandstones and shales. Those in shale are typically massive milky deposits, with a small proportion of clear, well-developed crystals.

Deposits in sandstone can be in single veins or in zones or networks of veins. Sandstone usually contains less quartz than shale but often yields a higher percentage of clear crystals in cavities or pockets.

After the quartz was originally deposited, many crystal-bearing pockets were crushed during the Ouachita Orogeny (mountain-building event). The deformation can cause the veins to show complex fabrics.

Quartz Formed in Cracks

The quartz veins formed in open fissures, with little replacement of wall rock. Milky quartz crystals and the associated vein minerals of the Ouachita Mountains came from hot waters filling fissures during the closing stages of mountain building, ranging from the late Pennsylvanian (300–286 million years ago) to the Permian Period (286–245 million years ago).

The veins, up to 60 feet thick in Arkansas and nearly 100 feet thick in Oklahoma, are concentrated in the central core of the Ouachita Mountains. You can find them in shale, slate, sandstone, and other rock types. On the outskirts of the mountains, the veins are usually confined to sandstone beds encased in thick shale units.

Most collectible quartz crystals come from deposits in the Blakely and Crystal Mountain sandstones (both Ordovician in age (438 million to 505 million years old)). However, attractive quartz crystals can be found in any of the Paleozoic units, which collectively are more than 25,000 feet thick.

Figure 1—*Clear quartz crystals from Hot Springs, AR (top), on the eastern side of the Ouachita Mountains in Arkansas and Oklahoma (bottom). Source: Wikipedia; photo: Sulla55.*

Paleozoic rocks exposed in the Ouachita Mountains have been deformed into complex, gently plunging folds that trend nearly east–west (fig. 1). Steeply dipping fractures closely related to the major folds and

Above: *Quartz vein in Blakely sandstone, origin of some of the finest quartz specimens from Arkansas. Source: Howard (2008).* **Right:** *Rock crystal, Coleman Mine, Hot Springs, AR. Source: Wikipedia; photo: Rob Lavinsky.*

faults of the region controlled the location and deposition of most quartz.

Geologic Environments

Quartz forms in a variety of geologic environments, including:

- magmatic rocks, particularly granites;
- sedimentary rocks;
- from hydrothermal fluids in veins filling fractures in various host rock types;
- from silica dissolving and reordering in metamorphic rocks due to heat, pressure, or chemically active fluids; and
- from water-based solutions in gas cavities, solution and breccia cavities, pockets, and even cave-sized voids in preexisting rocks.

Because quartz forms under so many conditions and resists most weathering, it is the second most common mineral in the Earth's crust, after feldspar.

Magmatic Rocks

In magmatic rocks, quartz crystallizes from a melt that is rich in silica and water. The crystals usually do not express their own crystal form but rather fill voids between minerals that formed earlier. Sometimes they even encase other minerals as inclusions. The grain size is determined by the size of the void being filled and the supply of silica.

Certain types of igneous rocks called pegmatites contain gigantic crystals of various minerals, including quartz. However, very large crystals of quartz tend to be whitish to milky in color due to minute fluid-filled cavities that disperse light and reduce the transparency of the quartz.

Quartz-bearing pegmatites are often associated with masses of granite; you can see them in many places in New England, Colorado, and Canada. Whitish quartz crystals up to 6.5 feet long by 1.5 feet in diameter have come from pegmatites in New Hampshire. A single crystal 8 feet long and 6 feet in diameter was on exhibit in Tucson, AZ, a few years ago. It was from a pegmatite in Africa and was the typical milky color.

Sedimentary Rocks

"Authigenic" quartz crystallizes from silica in a sedimentary host rock (rather than from extraneous liquids). The crystals take shape after the deposition of an original sediment before, during, or after the processes of compaction and lithification. Silica is dissolved and then reprecipitated, crystallizing as quartz. Usually, the crystals are free-floating in the matrix rock and never become very large.

Some quartz crystals in the matrix of dolostone or limestone formed in this manner. They might contain adjacent minerals in the sedimentary rock, such as clay or feldspar. A type of doubly terminated quartz from southern Texas called Pecos diamond and a reddish doubly terminated quartz from Spain both contain iron oxide inclusions from the original sedimentary host rock.

Hydrothermal Fluids

In Arkansas, the best known quartz veins formed from hydrothermal fluids that filled fractures in differing types of host rocks. Minable veins can be in either sandstone or shale. Sandstone-hosted quartz veins normally have a higher percentage of rock crystal (water-clear quartz). Shale-hosted veins are predominately milky quartz and tend to be larger than the veins in sandstone.

Hydrothermal quartz might seem to suggest an igneous parent rock like granite, rich in silica and water. In such environments, the hot water (with its load of dissolved silica) moves through fractures into the surrounding country rock. Many quartz veins, especially those with gold, are in such close proximity to granitic bodies that other sources are rarely considered.

Above: *Shale inclusions (black particles) in quartz, Montgomery County, AR. Source: Howard (2008).* **Right:** *Quartz "phantom" in rock crystal caused by inclusions of tiny bubbles, Garland County, AR. Source: Wikipedia; photo: James St. John.*

Yet in Arkansas, with the greatest concentration of collectible vein quartz in North America, no granitic rocks are associated with the deposits. In fact, igneous rocks in the region are deficient in silica. So what is the source of the silica that formed quartz veins?

Evidence points to the metamorphic sweat-out of water, silica, and metals that are mobile in the metamorphic environment, such as antimony, mercury, lead, and zinc. No gold has been found because none of any consequence was in the original sediments that were metamorphosed. Miners have been digging quartz in Arkansas for well over 100 years, and they have never reported any trace of visible gold.

Metamorphic Rocks

At low grades of metamorphism, quartz is only slightly mobile unless the rocks are water saturated. Then, along with the water, silica becomes relatively mobile. In fact, metamorphism can be viewed as a dewatering process. At lower grades, water and silica are expelled; at higher metamorphic grades, however, water-bearing minerals (such as micas) are dehydrated.

At the higher grades, quartz not oriented properly in relation to the pressure is dissolved, whereas quartz grains with the correct orientation tend to grow. Quartz augen form in this manner. (In German, *Augen* [OW-gun] means eyes.)

In gneisses, quartz actually separates into light-colored bands alternating with dark bands of mafic minerals. Much silica, along with water, is released during reactions that take place at the higher grades of metamorphism. Rarely are collectible crystals reported from metamorphic rocks—which, however, can be the source of many hydrothermal veins.

Large and Complex Veins

Some milky quartz veins in shale in the Ouachita Mountains have measured several hundred feet in outcrop length and 60 to 100 feet in thickness. Only the cores of such veins, along with isolated pockets scattered throughout a vein, produce rock crystal.

The major commercial deposits of rock crystal, usually in sandstone, are typically in complex series of veins that follow fracture patterns in rocks broken and shattered by mountain-building processes. Deposition of quartz took place several times, often interrupted by breakage and refracturing of the host rock.

Iron oxide on quartz, with calcite, Garland County, AR. Source: Howard (2008).

The major veins of quartz in the Ouachita Mountains formed a mile or more underground, so the topography we see today played no role in their formation (a common misconception). In fact, quartz veins—as a cementing agent for sandstones and as an erosion-resistant landform—played a role in how our current topography developed. Quartz deposits in sandstone units are often on the crests of ridges, where they help cement the sandstone fragments and make the entire unit more erosion resistant.

Major faults are commonly filled with quartz veins. The sandstone-hosted quartz veins contain a higher proportion of rock crystal due to the nature of quartz crystallization and the geometry of the deposits. When quartz begins to crystallize, it needs a nucleation site, such as a fractured quartz grain on a sandstone face. Because not all the grains will be oriented in the same direction, some early crystals begin to dissolve, adding their silica to crystals that are oriented properly for the local conditions.

In hydrothermal veins, quartz typically grows as elongate crystals normal (perpendicular) to the wall rock. The crystals are attached at the wall rock and grow inwards from both sides to the center of the fracture. Where fractures in the host rock intersect, an open pocket can result because there is more space for the fluids to pass and supply the crystals with silica necessary for continued growth.

In some simple undistorted veins, you can actually tell the direction of flow from the orientation of most quartz crystals on the wall rockface. The side of the crystal facing the flowing fluids grows faster than the

Smoky quartz, Garland County, AR. The dark tint results from defects in the crystal lattice due to irradiation during or shortly after crystallization. Source: Wikipedia; photo: Rob Lavinsky.

side downstream, so the dominant face on the termination usually faced into the current. The size of individual crystals in hydrothermal veins depends on a number of factors, including the size of the vein and subsequent pockets and the nature of growth conditions.

Early Digging

Until World War II, local diggers for quartz had a major misconception concerning the extent and nature of the Arkansas quartz veins. In the early 1940s, the need for clear quartz for oscillators became critical because the Allies' supply from South America was cut off by German U-boats. Exploration work on the Arkansas deposits proved that the veins extended far deeper than the oldtimers ever thought possible. They had thought that finding the first milky zone in the veins meant that no more rock crystal would be found. We now know that rock crystal can be at any depth in the right rock type.

Clovis point fashioned from Arkansas rock crystal, found in the Ouachita Mountains. Dating to Paleoindian communities that flourished from 14,000 to 10,500 years ago, the artifact is extremely rare because the structure of quartz crystals would have resisted the flaking technology used to work rocks like flint into spear points. Source: Arkansas Archeological Survey, University of Arlkansas, Little Rock, AR.

Source

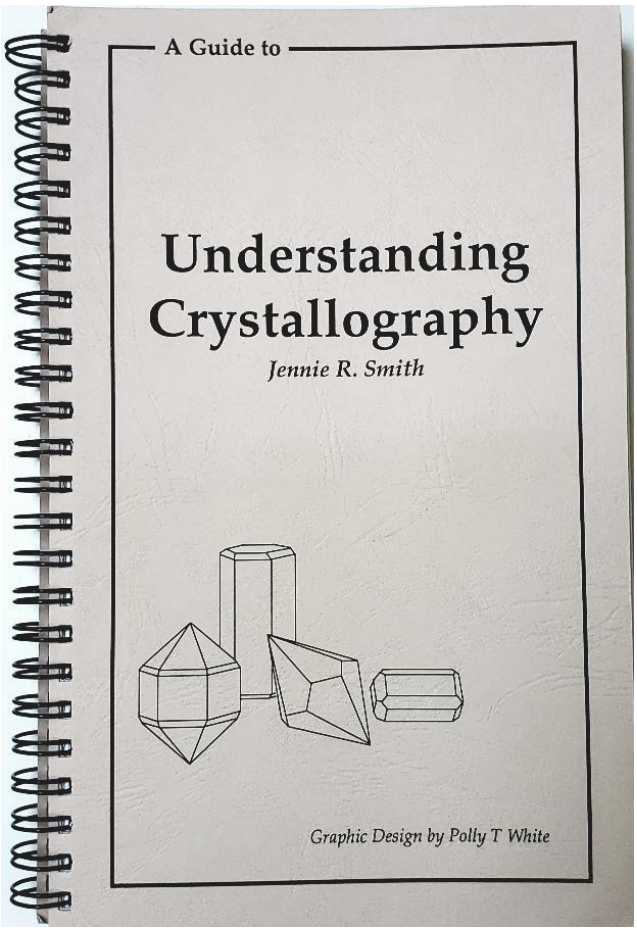
Howard, J.M. 2008. Arkansas quartz crystals. A.G.E.S. Broch. Ser. 001. Little Rock, AR: Arkansas Geological Survey.

In Memoriam

Jennie Frances Smith

July 14, 1922–December 18, 2020

Editor's note: *The article is adapted from multiple sources, including* The Mineral Mite, *January 2021, pp. 11–12.*



Former NVMC member Jennie Smith passed away peacefully on December 18, 2020. A longstanding member of our club as well as of the Micromineralogists of the National Capital Area and the Gem and Mineral Hunters (now defunct) in Prince William County, Jennie is fondly remembered by many club members in our area.

A professional schoolteacher, Jennie used her teaching and creative gifts throughout her life by volunteering in children's community theater, leading a junior stamp club, serving as a 4-H leader, starting an Earth Science Club, teaching silversmithing, helping students of English as a Second Language, and much more. Jennie and her husband Paul Smith were enthusiastic rock, mineral, and fossil collectors, belonging to several clubs in our area in the 1960s–90s. Jennie served as president of the MNCA in 1978–79 and 1991–92 and as treasurer of the NVMC in 1977–79.

Jennie taught a crystallography class for Gem and Mineral Hunters club members over six Saturdays (one session for each crystal system). Eight club members gathered in one of their homes, where Jennie explained the axes of symmetry, mirror planes, Miller indices, and other aspects of crystallography. With her writing skills and love of minerals, Jennie authored *Understanding Crystallography* to help the layperson understand the complexity of crystals. The book became a special publication of the Rochester Mineralogical Symposium in 1991.

Dave Hennessey has an autographed copy of Jennie's book. In signing Dave's copy, Jennie noted wryly that "the unautographed copies are much rarer than the autographed copies." Nonetheless, Dave values his autographed copy and uses it regularly.

Mineral club members in the National Capital Area remember Jennie as a teacher, mentor, and friend. Kathy Hrechka, for example, gives Jennie credit for helping her become a micromineral collector herself. In 1984, Kathy attended a local geology show, where people were viewing minerals under a microscope. Jennie and Paul, together with Fred Schaefermeyer (who was demonstrating micromounting), invited Kathy to join local clubs, including the MNCA.

As an educator, Jennie created slide shows for club programs archived by the EFMLS. She was also active at Wildacres, where she participated in running the auctions that supported the lapidary and minerals programs. Dave Hennesey recalls a traditional auction item of a family-size bag of peanut M&Ms—

Jennie's favorite. Jennie would bid on it no matter what the cost, then tuck her treasure under her seat. Someone would distract her while another took the M&Ms and put them up for auction so Jennie would bid on them again. Jennie would sometimes buy the same bag several times, for the benefit of Wildacres.

Diane Nesmeyer, another friend and member of many local clubs, put it well: "Another great one has moved on to the great collecting grounds in the sky."

Jennie was born in 1922 in Clinton, ME. Always an avid reader, she consumed thousands of books in her lifetime. After graduating from Farmington State Teachers College, she taught elementary school in Maine.

Jennie married Paul E. Smith, and they lived together in Maine, South Dakota, and Illinois before spending 30 years in Fairfax, VA. They were married for 57 years and had two children, Woodrow and Paula. After Paul's death, Jennie moved to Dallas, TX, to be near her daughter, son-in-law, and grandchildren.

A celebration of Jennie's life is planned for the spring in Dixmont, ME. In lieu of flowers, the family suggests donations to the Micromineralogists of the National Capital Area, 270 Rachel Drive Penn Laird, VA 22846 or to North Texas SNAP (Special Needs Assistance Partners), P.O. Box 3294, Grapevine, TX 76099.

Mineral Classification System Needs Revamping, Say Scientists

by Erin Blakemore

Editor's note: *The article is adapted from* The Washington Post, *9 January 2021. Thanks to Bob Cooke for the reference!*

Minerals are physical objects, rooted in time and formed through complex planetary processes. So why don't scientists classify them that way? A philosopher and two Earth scientists recently asked that question in the journal PAS—and proposed a solution that could lead to a new way to categorize minerals.

The International Mineralogical Association publishes a list of minerals similar to the periodic table. But, the researchers say, that classification isn't useful to many scientists because it relies on approved formulas to describe minerals like quartz (formula SiO_2).

That formula represents an ideal that is rarely found in reality, the authors say. It doesn't describe how the mineral was formed, what trace elements it might contain, or when it was formed.

"Ideal quartz does not exist in nature (or in the laboratory)," they write, "because every quartz specimen has myriad trace and minor elements, isotopic variations, fluid and solid inclusions, structural defects, crystal size and shape," and other attributes. And every quartz specimen has a history that isn't represented in the formula.

To solve that problem and make mineral classification more relevant to researchers in paleontology, planetary science, and other fields, they suggest a new classification system rooted in time.

They call for a "bootstrap" approach that involves collecting and analyzing 200 years of research on all known minerals and using it to inform a new, open-access repository that includes hundreds of attributes. It's a bold proposition, and one that could take decades. But it will be worth it, the authors say.

"Minerals are the most durable, information-rich objects we can study to understand our planet's origin and evolution," said coauthor Robert Hazen, a mineralogist at the Carnegie Institution for Science. "They provide a time machine to go back and understand what was happening on our planet and other planets in our solar system millions or billions of years ago."

Quartz crystals

Safety Matters

Communication

by Ellery Borow, AFMS Safety Chair

Editor's note: *The article is adapted from* A.F.M.S. Newsletter *(September 2019), p. 2.*

Why is communication a matter of safety? Sometimes, it is not a matter of what communication is needed but what method would be best.

It used to be a club's bulletin spreading the word about safety, but things have changed. Now, communication is a bit faster. I get it; it's how we live nowadays, and faster is better. But it's only better if the message gets to where it needs to go on time.

Most folks used to have a landline telephone for such messages. Telephones still serve that purpose, but you can't take a landline with you. How does your club contact its members in an emergency?

You can start with landline and cell phone calls, but some members prefer online options—FacePage, Yahoot, Gaggle, Twitting, Link-Out, Swype, D-Mail, Slap Chat, Taxting, WhatsDown … whatever.

Say that one member uses Yahoot exclusively, another only FacePage, and a third only Twitts. Does your club have a list of the internet contact preferences for each member or a reliable cell number?

Is it really necessary to have an emergency contact method for each and every member household? Well, maybe, maybe not. How often might such a list be needed? The answer to that is easy: hopefully, as seldom as possible. Most reasons for contacting members are not urgent.

The main reason for making note of the many ways to contact members is to raise "what if" awareness. Having many options for contacting members is great. However, the one charged with doing the contacting needs to have access to all those many internet options. One way is to have several people do the contacting, each knowing several internet options. Another way is to use a superconnected internet expert.

In an internet-connected world, it's good to have options. Be safe out there on the internet and with COVID-19. Be safe with doing what we need to do to manage in this ever changing world and its new normal. Your safety matters.

Watch Out for COVID Vaccine Scams

Editor's note: *The article is adapted from* EFMLS News *(January 2021), p. 5.*

Although many of us are not at retirement age, we should all heed a recent warning by Medicare.gov.

As the country begins to distribute COVID-19 vaccines, scammers are already scheming. Medicare and the Federal Trade Commission posted the following warnings:

1. You *cannot* pay to put your name on a list to get the vaccine. (If you do, it's a scam.)
2. You *cannot* pay to get early access to the vaccine.
3. Do *not* share your personal or financial information with anyone who calls, texts, or emails you promising access to the vaccine for a fee. (They can use the information to rob you.)

If you come across a COVID vaccine scam like these, report it to the Federal Trade Commission or call Medicare at 1-800-MEDICARE. For information that you can trust, go to www.CDC.gov.

"Impossible" Rocks Found on Remote Volcanic Island

by Stephanie Pappas

Editor's note: *The article is from LiveScience (March 18, 2019).*

Anjouan island, off the eastern coast of Africa, is mostly made up of dark volcanic rocks. On a tiny island between Madagascar and the east coast of Africa, scientists have discovered a motherlode of rocks that shouldn't be there. The island is made up of igneous volcanic rock that hails from the oceanic crust. But the mystery rocks come from continental crust—more specifically, from a river delta or beach. … Funded by a National Geographic Society grant, scientists recently explored the island, guided by scattered reports of the light, sandy rock, which is known as quartzite. They found that the mystery is larger than they realized. In fact, it makes up half of a mountain. … *Read more*.

February 2021—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3 MSDC mtg	4	5	6
7 Groundhog Day	8 GLMSMC mtg	9	10	11	12	13
14 Valentines Day	15 Presidents Day	16	17	18	19	20
21	22 NVMC mtg	23	24 MNCA mtg	25	26	27
28						

Event Details

3: Mineralogical Society of the District of Columbia—meetings via Zoom until further notice; info: http://www.mineralogicalsocietyofdc.org/.

8: Gem, Lapidary, and Mineral Society of Montgomery County—meetings via Zoom until further notice; info: https://www.glmsmc.com/.

22: Northern Virginia Mineral Club—meetings via Zoom until further notice; info: https://www.novamineralclub.org/.

24: Micromineralogists of the National Capital Area—meetings via Zoom until further notice; info: http://www.dcmicrominerals.org/.

Disclaimer

All meetings/shows are tentative during the coronavirus pandemic, and club meetings might well be remote. Check the website for each organization for more information.

Chrysoberyl, Itaquaco, Espirito Santo, Brazil. Photo: Bob Cooke.

Hutch Brown, Editor
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THE NORTHERN VIRGINIA MINERAL CLUB INC
Crystals are the flowers of the Mineral Kingdom

2021 Club Officers

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president@novamineral.club
Vice President: Sue Marcus
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Secretary: David MacLean
secretary@novamineral.club
Treasurer: Roger Haskins
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Greeter/Door Prizes: Ti Meredith
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Tech Support: Tom Burke
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Webmaster: Casper Voogt
webmaster@novamineral.club

Mineral of the Month: Chrysoberyl

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

The Northern Virginia Mineral Club

Visitors are always welcome at our club meetings!

Please send your newsletter articles to:
hutchbrown41@gmail.com

RENEW YOUR MEMBERSHIP!

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

Dues: Due by January 1 of each year; $20 individual, $25 family. Make check payable to Northern Virginia Mineral Club or pay with cash.

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

Meetings: At 7:45 p.m. on the fourth Monday of each month (except May and December)* at **Long Branch Nature Center**, 625 Carlin Springs Road, Arlington, VA. (No meeting in July or August.)

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