



The Mineral Newsletter

Meeting: May 23 Time: 7:45 p.m.

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



[Smithsonian National Mineral Collection](#). Photo: Chip Clark.

Volume 57, No. 5

May 2016

Explore our [Website!](#)

May Program:

Mineral Adventures

In this issue ...

Mineral of the month: Stibnite	p. 2
May program details.....	p. 3
The Prez Sez	p. 3
April meeting minutes	p. 4
The beauty of slag.....	p. 7
EFMLS: Materials for your newsletter	p. 9
AFMS: The AFMS in action.....	p. 9
Editor's corner: Visual cues	p. 10
Tertiary embayments	p. 11
Pseudomorphism.....	p. 14
Another way to collect minerals.....	p. 15
Upcoming events	p. 17

Stibnite

from Shikoku, Japan



Mineral of the Month Stibnite

by Sue Marcus

Wouldn't you love to find a stibnite specimen? Most of us only acquire them with a "silver pick"—that is, by using our money (silver) as a prospecting tool.

Some lustrous stibnite crystals may look slightly blue-gray, as on the cover. The crystals are long and usually thin; they can look like dark, shiny straws sticking up from matrix or like a sheaf of shiny sticks lying in a heap. Some of the lovely specimens from Japan show amazing natural kinks and bends.

If you are searching for a specimen for your collection, look for perfect terminations. Decide whether you want a delicate sheaf or a sturdier single crystal—each type has its appeal. And remember, stibnite is very soft, so treat it carefully. This is also one of those minerals to remember one thing about: Never place your fingers on the tips of the crystals at a dealer's table.

Stibnite is not reported from Virginia or Maryland. The closest location I could find is the [Sterling Mine](#) in New Jersey (Mindat notes: "NOT the Sterling Hill Mine"). However, the samples I found from there were not impressive enough for a photo.

The Ichinokawa Mine in Japan is the source of stunning stibnite single crystals (see the photo below), but the deposit was exhausted and the mine closed in the 1950s. The Romanian Herja Mine is noted for its clusters and sprays of stibnite crystals. China currently produces most of the world's antimony ore and most of its stibnite specimens. Several Chinese localities have lustrous specimens as sprays, intricate groups, and very large pieces.



Stibnite at the Harvard Mineralogical Museum, originally from the Ichinokawa Mine, Saijo City, Ehime Prefecture, Shikoku Island, Japan.
Photo: P. Cristofono; source: [Mindat](#).

Happy May Day!



Northern Virginia Mineral Club members,

Please join our May speakers—Sheryl Sims, Kathy Hrechka, and Sue Marcus—for dinner at the Olive Garden on May 23 at 6 p.m.

Olive Garden, Baileys Cross Roads (across from Skyline Towers), 3548 South Jefferson St. (intersecting Leesburg Pike), Falls Church, VA
Phone: 703-671-7507

Reservations are under Ti Meredith, Vice-President, NVMC. Please RSVP to me at ti.meredith@aol.com.

Technical details (source mostly [Mindat](#)):

Chemical formula.....	Sb ₂ S ₃
Crystal form.....	Orthorhombic
Hardness.....	2
Density	4.63 g/cm ³ (measured); 4.625 g/cm ³ (calculated)
Color.....	Steely metallic gray
Streak.....	Gray
Cleavage.....	Subconchoidal
Fracture.....	Perfect
Luster.....	Metallic

Stibnite is always opaque, and it is the main ore of antimony. Antimony has been known since ancient times, though not distinctly identified until the 16th century. The chemical symbol for antimony, Sb, was not chosen until the 1800s, when chemist Jons Jakob Berzelius named it after the Latin word for stibnite (*stibium*).

The original locality for stibnite is lost in antiquity—that is, no one knows. Cleopatra's mascara may have come from stibnite, since powdered stibnite was used by ancient Egyptians as eye makeup. A Greek physician in the 1st century A.D. recommended it for skin problems.

In the 17th century, European doctors used stibnite to induce vomiting. No wonder it was later found to be toxic, notably when swallowed, and irritating to the skin! Science can improve on past remedies.

Antimony, extracted from stibnite-rich ore, is primarily used to create fire-retardant materials, ranging from firefighters' work clothes to babies' crib sheets. Antimony-based chemicals are also used in the glass of our smart phones and in some of their batteries. Added to ammunition, antimony can increase its armor-piercing ability. In lesser amounts, antimony compounds are used in plastics containing PET (polyethylene terephthalate), such as soda bottles.

In the United States, Idaho has most of our stibnite, mostly in the Coeur d'Alene District. Active mining depends on commodity prices; extraction has fluctuated in the past decade. The United States imports most of our antimony from China.

Most stibnite forms in one of two geologic ways. The Idaho deposits were formed at relatively shallow depths below the Earth's surface (epithermal). They are composed of quartz veins with galena, sphalerite, gold, silver, and other minerals. By contrast, China has carbonate-replacement deposits in which limestone or dolomite has been replaced by mineralized fluids. The replacement deposits are larger and richer than the vein deposits.

My fingers sometimes type stilbite when my brain is thinking stibnite—does this ever happen to you? Stilbite is a zeolite or group of zeolites, but that's another story for another newsletter ...

Sources

Mindat. 2016. [Sterling Mine](#).
Mindat. 2016. [Stibnite](#).
Mindat. 2016. [Yellow Pine Mine](#).
Wintzer, N.E.; Guberman, D.E. 2015. [Antimony—A flame fighter](#). Fact Sheet 2015–3021. Reston, VA: U.S. Geological Survey.

Deadline for Submissions

June 1

So we can send out the newsletter on time, please make your submission by the 1st of the month! Submissions received later might go into a later newsletter.

A Social Night of Mineral Adventures May 23 Program

Please join our fellow club members Sheryl Sims, Kathy Hrechka, and Sue Marcus, who will share some of their personal experiences related to our hobby.

Sheryl will kick things off with a presentation on how much our hobby has enriched her life. Fun and on the light side, her presentation will include reflections on being a rockhound.

Kathy will follow with a PowerPoint presentation on her 30 years of service to the NVMC. A retired flight attendant, she will share stories about some of her favorite travels as testimony to her passion for geology.

Sue will speak about the mineral connections she made in France when she traveled there last year with her husband, Roger Haskins. She will show photos she took of minerals in museums they visited, along with photos of stunning gems and jewels in the Paris Louvre. You will also see pictures of a house they stayed in that was carved into a wall of solid rock!

We will keep it light and informal, with running Q&A along with refreshments such as grapes, cookies, bottled water, and cheese and crackers. ➤



The Prez Sez

by Bob Cooke, President

If I was even more discombobulated than normal at the last meeting, it was because I was still recuperating from the 43rd Annual Atlantic Micromounters Conference (AMC). That conference is the annual "Big Event" of our fellow mineral club, the Micromineralogists of the National Capital Area. It's a 2-day meeting held at the Spring Hill Suites hotel in Alexandria, VA.

About 30 people set up their microscopes to examine minerals that were for sale by vendors, for trade by other collectors, or for taking home from the freebie table. Officially, we were there for three lectures by Tony Nikischer and the two auctions.

But unofficially, I think many people had an undue interest in the free food and drinks. I loved it all.

Of course, thinking about the AMC leads me to think about our own club's big event, the mineral show at George Mason University in November. Normally, the show's two cochairmen handle all the preparations, with Tom Taaffe organizing the dealers and Jim Kostka concentrating on Scouting activities, volunteers, and room setup.

But this year Jim is not available. It will take an army of volunteers to cover what Jim did. We desperately need people to come forward now and for each to sign up for a small part of the tasks that Jim did. Together we can do this, but leaving the show to the last minute and expecting Tom to pull it off by himself is just not possible.

I'd like to thank the club membership for approving the proposed 2016 budget. This will allow your Executive Board to make routine business decisions, within the constraints of the budget, that keep the NVMC operating and continue the programs that make this a great club.

Thank you! ♪

Bob



Scenes from the April 25 NVMC meeting. Photos: Sheryl Sims.



April Meeting Minutes April 25, 2016

by David MacLean, Secretary

President Bob Cooke called the meeting to order at 7:30 p.m. at the Long Branch Nature Center in Arlington, VA.

The president recognized the two past presidents who were present, Rick Reiber and Barry Remer. The president also recognized guests Lisa and Thomas Smyth and David and Tsega Horton.

Tsega Horton, Beck Lynch, David MacLean, and Rick Reiber received door prizes.

Old Business

The minutes of the February 22 and March 28 meetings were approved as published in *The Mineral Newsletter*.

In the April issue of *The Mineral Newsletter*, the editor proposed a change in submissions to the annual federation newsletter contest. He welcomes comments from club members.

NVMC 2016 dues (individual \$15 and family \$20) are past due!

New Business

The club members approved the 2016 club budget. The NVMC board is authorized to spend funds up to the budgeted amount and will bring all increases to the members for approval.

The president said that the budget will not be published; however, as the club gives out grants and/or scholarships, it will report each action in *The Mineral Newsletter*.

The cost of space and services by George Mason University for the NVMC mineral show on November 19–20 are as yet uncertain.

Announcements

The NVMC sent letters requesting nominees for awards from the Fred C. Schaefermeyer Scholarship Fund to George Mason University, James Madison University, and Northern Virginia Community College.

On April 24, Kiersten Hoff was recognized at the Volunteers Appreciation Event in the Gem and Mineral Hall of the Smithsonian Institution's Natural History Museum for "Above and Beyond Service."

On Saturday, April 30, the Long Branch Nature Center held its native plant sale from 1 to 5 p.m.

On April 30, Region IV of the EFMLS held a meeting from 9 a.m. to 5 p.m., hosted by the Southern Maryland Mineral Club.

April 30 was also Maryland Day in the mineral museum at the University of Maryland.

On Sunday, May 1, the U.S. Weather Bureau hosted an open house at Dulles Airport in Virginia.

On Saturday, May 21, the Chesapeake Gem and Mineral Society show will be held from 10 a.m. to 4 p.m. at the Ruhl Armory in Towson, MD.

The 2016 EFMLS convention will be held in Rochester, NY, on October 22–23.

After the business meeting, Caspar Voogt gave a talk about his 2014 trip to the Mindat conference in Madagascar. ↗

Caspar Voogt, April 25 Program The 2014 Mindat-Sponsored Tour in Madagascar

by David MacLean

Every 2 years, Mindat sponsors a tour for interested persons to a country to visit sites for observing and collecting minerals. The 2014 tour was to central and southwestern Madagascar in the Malagasy Republic.

Madagascar has several distinct regions: the north coast; the east coast; the central highland tropical



*Specimens from Madagascar.
All photos: Sheryl Sims.*



forests; the west; and the southern dry forest. The Indian Ocean is to the east.

The country's main industry is subsistence agriculture. Slash-and-burn agriculture is widely practiced. Population growth and the use of fuelwood for heating and cooking has resulted in 90-percent deforestation of the central highlands.

The people of Madagascar are mostly Polynesians who arrived before 800 C.E. and brought the Malagasy language with them. Bantu people from southeastern Africa also came to Madagascar. The French ruled Madagascar from the 1880s to 1960. French is spoken in the cities and Malagasy everywhere else.

During dry season, the Mindat group of 60 drove south from Tana in the south-central highlands in a convoy of 18 cars driven by hired local drivers. The roads, almost all unpaved, and bridges were at best a challenge. The group, accompanied by an armed escort as a precaution, drove through a cloud of large locusts; encountered lots of very fine dust; saw smoke and the glow of fires used to clear forest for farmland; and were feted by dancers in some places.



*Scenes from town of Mahaiza, Madagascar (day 2 of the tour).
All photos: Sheryl Sims.*



Caspar Voogt enjoying the Mindat tour in Madagascar.

In 2 weeks, the group visited about 10 pegmatite areas and 2 national parks, doing more observing than collecting. The participants saw numerous pegmatites with quartz, rose quartz, tourmaline, beryl, spodumene, corundum, sapphire, and other pegmatite minerals. Almost everywhere there were children and adults offering crystals for sale.

The group visited various villages in pegmatite areas. Accommodations ranged from small hotels, to semiluxurious places, to houses in towns such as Ambattonapetraka, Ambositra, and Itremo.

The group noticed spiders as big as a human hand, large moths, and a chameleon as small as an inch long. The participants also saw geckos, lemurs, and tree frogs in a rainforest national park. The drier places had scorpions, termite mounds, and large praying mantises.

The people bury their dead in caves and their cattle in coffins at the cave entrances to keep spirits from stealing the spirits of the dead—they steal the spirits of the cattle instead.

Local people dig out crystals using only picks and shovels. There is no government involvement in or regulation of mining. Some Mindat travelers were lowered by a windlass into underground mines consisting of shafts 40 to 60 feet deep.

Lakaka village has the world's largest alluvial sapphire deposit, discovered within the last 20 years.



Avenue of the Baobabs in Madagascar.

Hundreds of prospectors have dug out the sapphires.

The group visited Small and Big Tsingy National Parks, where the limestone has leached away in places to form canyons with walls and spires more than a hundred feet tall. These areas were described in *National Geographic* magazine 5 to 10 years ago.

The group also saw the Avenue of the Baobabs; 12 of 16 species of baobab trees are in Madagascar.

Mindat obtained export permits to allow the group to take its mineral finds and purchases home.

The next Mindat tour will be to Myanmar (Burma).
λ.

Pink Diamond Expected to Fetch Millions at Auction

Editor's note: The piece is adapted from an [online story by Reuters](#) (7 April 2016). Thanks to Sheryl Sims for the reference!



On May 17, a rare vivid pink diamond will go on auction in Geneva, Switzerland, where auctioneers expect it to fetch up to \$38 million.

The Unique Pink weighs 15.38 carats and has the highest possible color grading from the Gemological Institute of America. It is the largest pear-shaped vivid pink diamond ever to be offered at auction.

In April, a 10.10-carat oval vivid blue diamond sold for \$31.8 million at an auction in Hong Kong. λ.

They Call It Slag—I Call it Beautiful!

by Sheryl E. Sims



I recently visited a friend who told me that she had a couple of rocks that she had been saving for me. She said that they were blue but had no idea what type of rock they were.

When I saw them, I thought that they were beautiful because they showed a brush-stroke effect in varying shades of blue. They reminded me of obsidian, because parts of them looked like glass.

I told my friend that I would ask my rockhound friends what they were. In no time, I learned that the rocks were slag.

Although I had heard the term before, I really had no idea what slag was. It's the byproduct of metal smelting—of making alloys and refining metals.

In nature, iron, copper, and other metals are found in impure states called ores, often oxidized and mixed with silicates of other metals. Smelting exposes the ore to high temperatures, separating out the impurities.

Slag is the collection of compounds that are removed. In many smelting processes, oxides are introduced to control the slag chemistry, helping to remove impurities and protecting the furnace from excessive wear.

Earthquakes in 2016

Thanks to Sheryl Sims for the link!

So far this year, we have seen lots of earthquake activity around the world—Ecuador, Japan, Nepal—the list goes on. Yellowstone could even erupt! You can find the stories [here](#).

Slag comes in shades of brown, orange, green, and blue, and it can be ground up and used in ceramics and dyes. It can be found all over the world, not just in my friend's backyard! 🐾

Source

No author. 2016. [Slag](#). Wikipedia.

Hollywood Theme ... ?

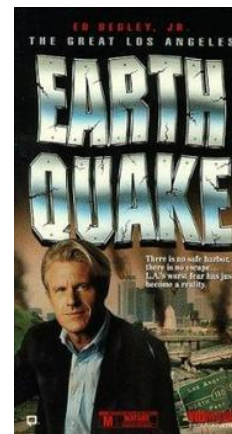
Editor's note: The piece is adapted from [Uncyclopedia: Geology](#).

Ever notice?

Whenever a professional geologist gives advice in a disaster movie, no matter what the scenario (volcanoes going off, earthquakes shattering buildings, superstorms caused by drilling to the center of the Earth), whoever disagrees with the geologist dies.

The death is usually painful and always due to the exact risk the geologist tried to warn about.

Moral: Ignoring the advice of geologists is a terrible idea, especially in the movies! 🐾



Upcoming Field Trips

The GLMSMC has graciously extended an invitation to our club members to participate in the following field trips:

Saturday, May 7: Vulcan Quarry, 1012 Garrisonville Rd., Stafford VA; 8–noon; over 16 years old, full safety gear required, number limit: 20; RSVP to David Fryauff, fryauffd@yahoo.com.

Tuesday, May 24: Medford Quarry, 1111 Medford Road, New Windsor, MD; 9–noon; 16 and older; RSVP by May 20 to David Fryauff, fryauffd@yahoo.com.

Saturday, May 28: C.K. Williams Quarry, Easton, PA. Meet at 10 a.m.; park near the Easton Water Treatment Facility on N. Delaware Dr. (Rte. 611); RSVP to David Fryauff, fryauffd@yahoo.com.

Quake Risk Now as High in Oklahoma as in California

by Thomas Sumner

Editor's note: The piece is adapted from [Science News](#) (28 March 2016).

Northern Oklahoma is just as susceptible to a damaging earthquake within the next year as the most quake-prone areas of California (see the maps below). In its [quake hazards forecast](#) released on March 28, the U.S. Geological Survey for the first time has included artificially triggered seismicity.

An increased risk in the central United States largely stems from sites where fluids, such as wastewater from fracking, are injected underground. Underground fluid pressure can unclamp faults and unleash earthquakes.

From 1973 to 2008, an average of 24 potentially damaging quakes rattled the central United States each year. From 2009 to 2015, an uptick in fracking activity helped skyrocket that number to 318 annual quakes on average, with a record-setting 1,010 tremors in 2015 alone.

Human-caused quakes aren't as powerful as their natural counterparts; the strongest, measured in 2011, clocked in at magnitude 5.6, compared with the magnitude 7.8 San Francisco earthquake of 1906, for instance. But scientists warn that more powerful human-caused earthquakes could come.

↗

Free Fossils for Everyone

by Erin Wayman

Editor's note: The piece is adapted from [Science News](#) (19 March 2016). Thanks to Sue Marcus for the reference!

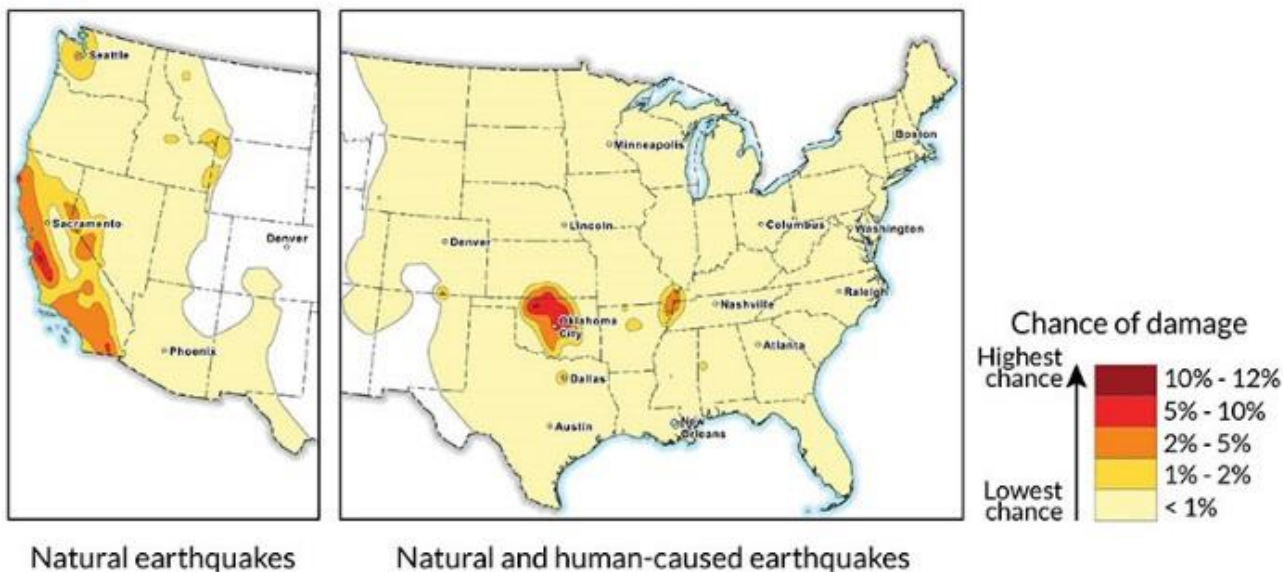


At [MorphoSource.org](#), playing with fossils is not only allowed, it's encouraged. The online database is home to oodles of digital 3-D scans of bones from both extinct and modern-day creatures. Anyone with an Internet connection is free to peruse the images, manipulate and rotate specimens, and even download instructions for 3-D printing them.

So far, scientists have contributed images representing over 200 genera. Among the newest uploads are fossils of the recently discovered *Homo naledi*, the controversial species that may be at the base of the human genus. MorphoSource's collection is primate heavy, but users will also find scans of other mammals, reptiles, fish, and even insects.

The Website, funded by Duke University and the National Science Foundation, offers several ways to search for specimens, such as by taxonomy. But those unfamiliar with animals' Latin names may find the database difficult to navigate. Still, MorphoSource is a great resource for anyone who's always wanted to get their hands on some fossils. ↗

2016 U.S. earthquake risk





Editor's Corner Materials for Your Newsletter

by Mary Bateman, BEAC Chair

Editor's note: The article is adapted from EFMLS News (November 2015), p. 3. Our newsletter is always looking for articles, which can be as short or long as you like! Here are some great suggestions from our regional chair of the Bulletin Editors' Advisory Committee.



Here are some ideas for topics you might write on:

- What did you do on vacation? (Hobby related, of course.)
- What is your favorite mineral? Can you research it and write an article about it? (Include where it can be found, its properties, what it is used for, and so forth—perhaps even a picture.)
- What is your favorite fossil? Can you research it and write an article about it? (Include where the fossil can be found, how the animal lived, where it roamed, how big it was, what it ate, and what it looked like—maybe even a picture.)
- If there was a field trip, where did you go and what did you find? What did others find? Can you write an article about the mineral/fossil you or others found?
- Write a summary of the next meeting's program.
- If you've read an interesting book on the hobby, write a review.
- There are lots of shows now on TV that relate to our hobby—shows on gold mining, mineral hunting, fossils, how the Earth was formed, and so forth. Watch some of these shows and write a review/critique.
- Don't forget the news—whether on TV, in a newspaper, or on the Internet. Write an article about a recent story. It may be about a recently discovered mineral/fossil, an earthquake, volcanic eruption, or anything else.

These are only a few topics to get you started. You can probably come up with many more.

Juniors can contribute by submitting a special drawing, a poem, or an article. They are an invaluable source and are usually enthusiastic about doing something.

If you are a poet or artist, submit a poem or drawing related to our hobby. Some people enjoy creating puzzles; if you're one of them, create a special puzzle for the newsletter.

If you take photos, you can add lots of interest to a publication. Who doesn't like to see pictures—especially if they are in a photo. The expression "One picture is worth a thousand words" is so true.

You don't have to write a tome—a few paragraphs will do! Yes, it would be nice if you could make it longer, but you might not have the time.

Good luck writing articles! And remember to get your newsletter editor to submit your articles, poems, drawings, puzzles, and so forth to the 2016 bulletin editors' contest. Forms and criteria for the various categories are already on the EFMLS Website under [BEAC](#). ↗



The AFMS in Action

by Matt Charsky, President

Editor's note: The article is adapted from A.F.M.S. News (March 2016), p. 2.



I get asked the same question repeatedly—what does the AFMS do?

I would like to think everybody reads every page of the AFMS newsletter and is up to speed on what we do. The following highlights are for people who might have missed an issue or two.

- Lauren Williams and members of the Scholarship Foundation are working to keep scholarship levels the same and our investments on track for 2016. Individuals and clubs can donate to the AFMS Scholarship Foundation throughout the year.
- The Northwest Federation, particularly the Willamette Agate and Mineral Society, is working hard as the host club of the next AFMS Convention in Albany, OR, from July 27 to August 1, 2016! In addition, Doug True is planning an interregional field trip around the convention.
- ALAA (the American Lands Access Association, Inc., affiliated with AFMS through common interests), together with John Martin and Mike Nelson, continue to decipher the new U.S. Forest Service collecting rules, which are likely to affect clubs whose members collect fossils on national forest land. There is similar ongoing work regarding public lands managed by the Bureau of Land Management.
- Jim Brace-Thompson has reached milestones in Junior Activities—the AFMS/FRA Badge

Program has been underway for more than 10 years; 135 clubs and societies have participated; and over 10,000 badges have been awarded to juniors. Congratulations!

- Carolyn Weinberger and Shirley Leeson are working on the upcoming AFMS 70th Anniversary Celebration.
- Endowment Fund Chair Cheryl Neary is collecting donations up to the 2016 AFMS Convention. Individuals and clubs are invited to give donations and to purchase tickets for the drawing.
- BEAC Chair Mark Nelson, Web Site Competition Chair Dan Imel, and All American Award Chair Regina Kapta are beginning work that culminates with award presentations at the 2016 AFMS Convention.
- AFMS Club Rockhound of the Year is a year-round awards program that is always open for submissions. Don't you know someone who deserves a pat on the back for all they do for their club and hobby?
- Ron Carman and the rest of the Uniform Rules Committee approved several updates to competitive exhibiting at the AFMS convention in Austin, TX. These updates will take effect for the 2016 competition and can be found on the AFMS Website.
- Ellery Borow keeps us up to date on field trip safety. In our hobby, safety really does matter!

All these activities are in addition to the day-to-day functions of our officers and committee chairs.

That's a quick summary of what we are currently doing. We are blessed to have dedicated individuals who share our same passion for the hobby. Let's support these individuals and thank them for their efforts! ↗

GeoWord of the Day

(from the *American Geoscience Institute*)

jaspery

Resembling or containing jasper; e.g. "jaspery iron ore" (impure hematite interbedded with jasper) or "jaspery chert" (a silicified radiolarian ooze associated with volcanic rocks in Ordovician strata of southern England). Syn: jaspidean.

(from the [Glossary of Geology, 5th edition, revised](#))



Editor's Corner Visual Cues

by Hutch Brown

Mary Bates, who edits the EFMLS newsletter, has suggestions for articles in her own "Editor's Corner"

above. My purpose here is to begin explaining features of our newsletter's design.

One feature is simplicity. That includes cues for the reader's eye, and we have a few simple visual cues.

One of them is the use of color. Our newsletter uses every color in the rainbow, but the main colors you see are red and blue in various hues.

Just look at the masthead on the cover. Or look at the article titles and intertitles, all in red, whereas every major article starts with a letter in blue. Most sidebars are either in pink or in light blue. The idea is to use color for interest and variety, but in a way that is simple and consistent.

Every article also ends with a rock hammer symbol, like the one below. Visual cues like these, consistently used, are signals for the reader. I hope they make our newsletter easier to read. ↗



"I WOULDN'T WORRY. WITH CONTINENTAL DRIFT, AFRICA OR SOUTH AMERICA SHOULD COME BY EVENTUALLY."

Source: [Earth Science Fun](#).



The Rocks Beneath Our Feet Tertiary Embayments

by Hutch Brown

Tertiary marine deposits from about 66 million years ago to about 1.6 million years ago account for some of the most spectacular formations in our area, notably at Calvert Cliffs in Maryland. People from around the world marvel over cliffs and fossil deposits from the Tertiary Period in both Maryland and Virginia.

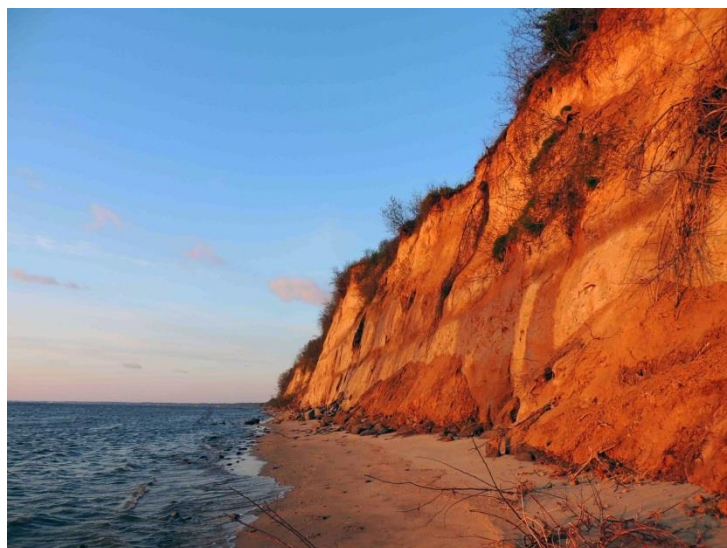
How did the formations get there? Two factors figure in: tectonic activity and sea level rise.

Tectonic Activity

About 230 million years ago, all of the Earth's continents were joined together in a single supercontinent called Pangaea, with our area right in the middle. Over the next 50 million years, Pangaea broke up as what are now Africa and North America pulled apart, forming the Atlantic Ocean. The stretching crust on the continental margin thinned and sank, forming the submerged continental shelf and the contiguous basement for the Coastal Plain (fig. 1).

About 140 million years ago, east-flowing river systems—predecessors of the Susquehanna, Potomac, James, and other rivers—began depositing sediments where they crossed the Fall Line and slowed down enough to release cobbles, sands, and other materials collected from upstream. For the next 40 million years, the Coastal Plain gathered sediments that gradually thickened to the east, forming a wedge of riverine deposits barely above sea level. We know it today as the Potomac Formation.

The Coastal Plain also accumulated sediments during the late Cretaceous and Tertiary Periods (from about 100 million years ago until about 1.6 million



Calvert Cliffs at sunrise (above) and a megalodon shark's tooth (right), collected at Calvert Cliffs.

Source (top): Share (2014); photo: S.J. Godfrey, Calvert Maritime Museum, Solomons, MD. Photo (right): Pat Flavin.



years ago), forming an east-thickening wedge that, together with the underlying Potomac Formation, is about 6,000 feet thick at its outer edge. Some geologists have speculated that the weight of the accumulating sediments has forced the underlying Cambrian bedrock to subside, perhaps facilitated by reactivation of ancient faults in the Triassic basins buried on the Coastal Plain and continental shelf (fig. 1). According to some studies, shifts in the underlying mantle have caused gentle regional uplift in the western part of our area beginning about 45 million years ago. Geologic provinces ranging from the Blue Ridge to the Allegheny

M - Late Cretaceous-Early Cenozoic

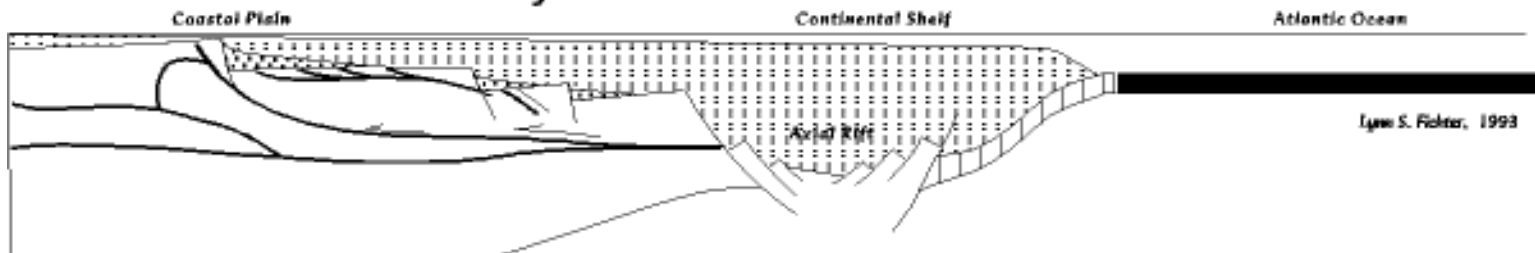


Figure 1—The continental margin of North America about 75 million years ago (late Cretaceous Period). The margin looked the same 100 million years earlier—and it still looks the same today. As the ocean formed, tectonic activity all but stopped as a “passive margin” developed, with all the elements already in place: the Coastal Plain, the continental shelf, buried Triassic basins (fault valleys filled with sediments), and quasi-dormant faults. Source: Fichter and Baedke (1999).

Plateau have showed signs of growing uplift, forcing more erosional downcutting by streams—and even more deposition on the Coastal Plain and continental shelf in what scientists call a positive feedback loop.

Sea Level Rise

But the Coastal Plain itself has not been rising. Instead, sea levels have repeatedly risen over the past 100 million years enough to cover parts of the Coastal Plain all along the Atlantic seaboard (fig. 2). The seas rose and retreated numerous times, a sequence that geologists call marine transgressions and regressions.

The rising seas did not advance in a uniform line, but rather in a series of inlets—what geologists call embayments. The embayments are separated by so-called arches—upwarps in the Cambrian basement rock that loom over the downwarped embayments in between.

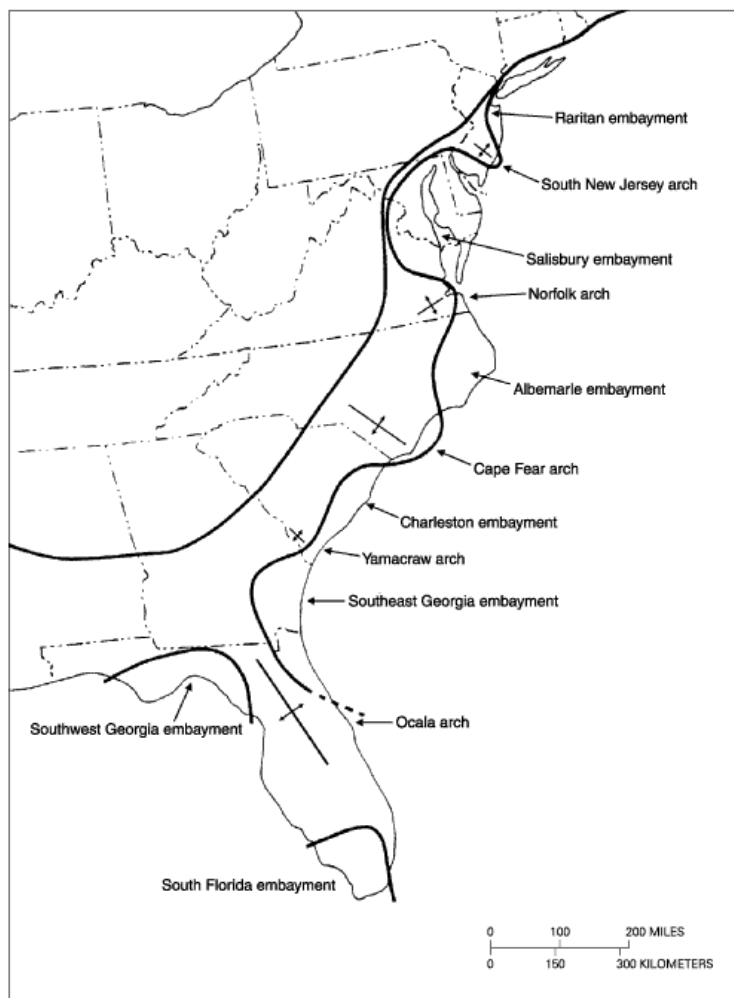


Figure 2—Areas along the Atlantic seaboard periodically covered by shallow seas during the Tertiary Period formed a scalloped pattern of embayments. (The black line to their west is the Fall Line.) Source: Ward and Powars (2004).

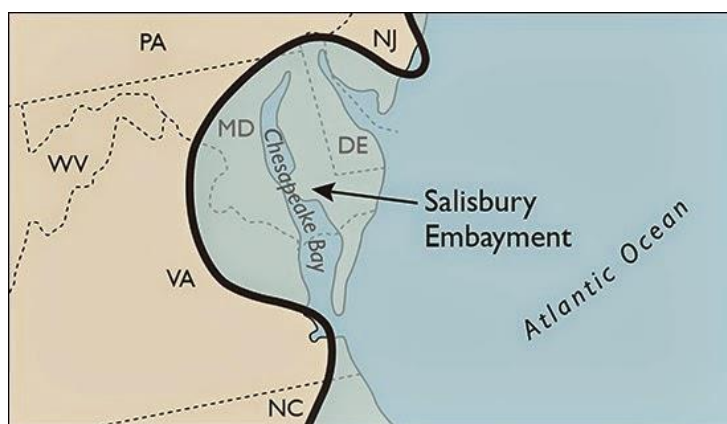


Figure 3—In the Salisbury Embayment, some Tertiary marine transgressions reached all the way to the Fall Line in Maryland and northern Virginia. Source: Share (2014).

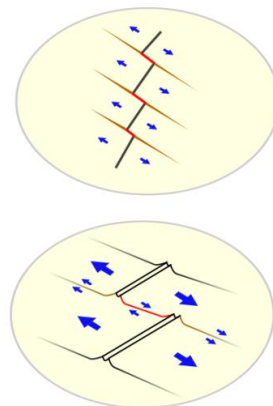
The deepest embayment reaches from New Jersey south to Hampton Roads in Virginia (fig. 3). Known as the Salisbury Embayment, it is bordered in the north by the South New Jersey Arch and in the south by the Norfolk Arch (fig. 2). Rising seas in the Salisbury Embayment at times reached all the way to the Fall Line in Maryland and northern Virginia.

How did the embayments form in the crystalline basement rock? For a possible answer, we need to go back to tectonic activity.

Atlantic Rifting

The downwarps and arches in the basement rock roughly conform to fracture zones along the Mid-Atlantic Ridge. As the continents continue to separate, magma rising from the oceanic ridge pushes against the cold and brittle deep-sea crust, fracturing it along lines perpendicular to the ridge. The fractures move along what geologists call transform faults, forming parallel arches with downwarped crust in between.

The Salisbury Embayment, with its arches on each side, might have formed in the same way as Pangaea broke apart. According to one theory, the South New Jersey Arch and the Norfolk Arch demarcate an ancient pair of transform faults, with the downwarped Salisbury Embayment in between.



In fact, the Norfolk Arch is close to the Central Virginia Seismic Zone (fig. 4). That raises a question: Is the arch, with its ancient transform fault, connected to the seismic zone and the light earthquakes we sometimes feel in our area?

Fossil Treasures

Atlantic rifting might have laid the foundations for the Tertiary embayments by warping the underlying basement rock. But it took sea level rise during the Tertiary Period to deposit the sediments now exposed along the coasts of Maryland and Virginia.

Since the end of the Tertiary Period about 1.6 million years ago, marine regression has exposed the Tertiary sediments to erosion, shaping the spectacular cliffs we see today. Younger layers overlying older ones have also worn away, washing fossils into streams, rivers, and bays.

Especially following storms, many beaches in our area are covered with washed-up treasures for fossil hunters to find. Late winter and early spring, with their storms and lower tides, are an especially good time to look for them. Next year, why not try? ➤

Next issue: The Miocene formations at Calvert Cliffs—where did they come from?

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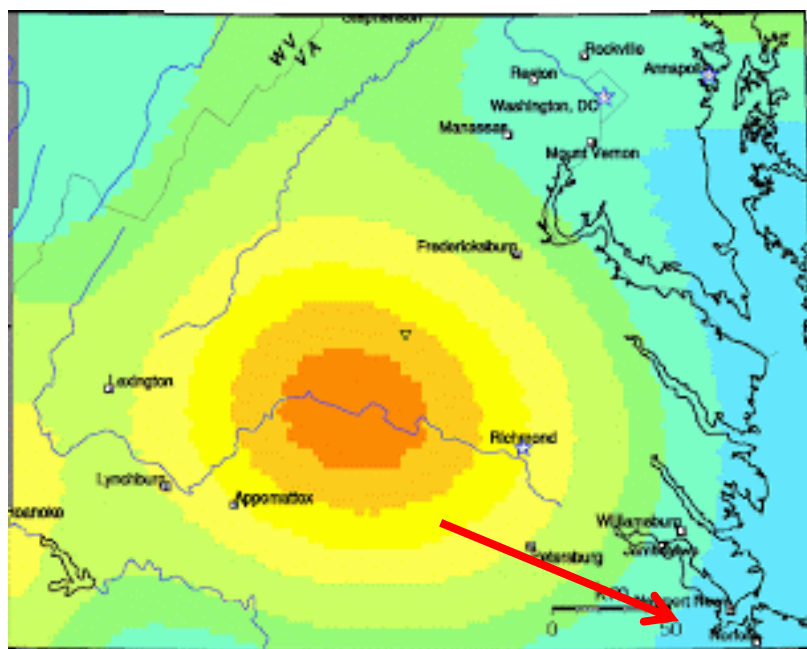


Figure 4—Central Virginia Seismic Zone. The James River turns into the zone and passes through its center on its way to the Chesapeake Bay just north of the Norfolk Arch (red arrow). Source: Christiansen and Hamblin (2007).



Mako sharks' tooth fossil collected at Calvert Cliffs.
Photo: Pat Flavin.

Pseudomorphism

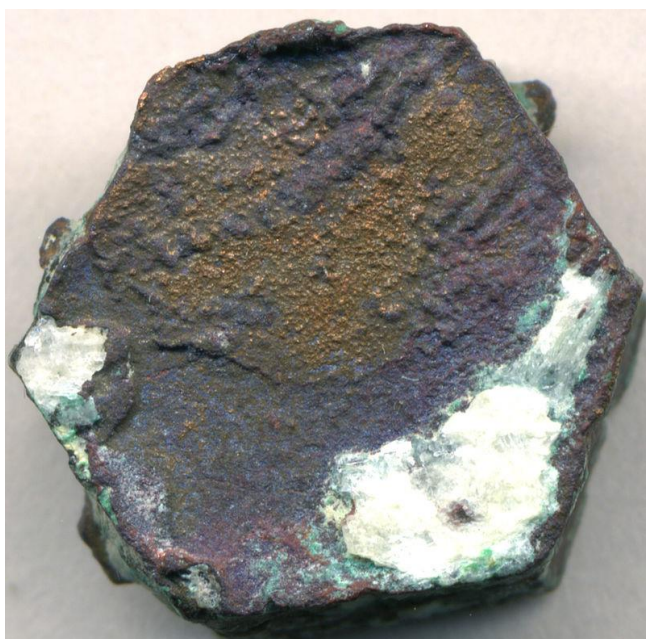
by Stephen A. Nelson

Editor's note: The piece is adapted from a posting by the author, a professor of geology at Tulane University in New Orleans, LA, for a [class in mineralogy](#). All photos are from Wikipedia.

A pseudomorph (SUE-doe-morf) is a mineral that looks like another mineral. ("Pseudo" and "morph" both derive from ancient Greek; the former means "lying," the latter "form.") So a pseudomorph is a mineral trying to fool you by taking another shape.

In pseudomorphism, a mineral's internal structure and chemical composition change but its external form remains. There are three kinds of pseudomorphism:

1. **Substitution.** A mineral's chemical constituents are removed and replaced by other chemical constituents. In petrified wood, for example, wood fibers are removed and replaced by quartz, but the mineral nevertheless looks like wood. Another example is fluorite, which forms isometric crystals; during substitution, the fluorite is replaced by quartz, but the resulting quartz crystals look isometric. The quartz is said to be pseudomorphed after fluorite.



Substitution: Native copper pseudomorph after aragonite, with red cuprite and green malachite alteration.
Source: Wikipedia.

2. **Encrustation.** A thin crust of a mineral forms on the surface of another mineral. The crust takes the shape of the other mineral.



Encrustation: Quartz pseudomorph after calcite.
Source: Reddit.com.

3. **Alteration.** If only partial removal of the original mineral and only partial replacement has taken place, then it is possible to have the space once occupied entirely by the original mineral be partially composed of the new mineral. This results, for example, in serpentine pseudomorphed after olivine or pyroxene; anhydrite (CaSO_4) after gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$); limonite ($\text{FeO}(\text{OH})_n\text{H}_2\text{O}$) after pyrite (FeS_2); and anglesite (PbSO_4) after galena (PbS).



Alteration: Limonite pseudomorph after pyrite (Carratraca, Spain; 6 cm wide).
Source: Mindat.

Another Way to Collect Minerals

by Fred Haynes

Editor's note: The piece is adapted from Wayne County Gem and Mineral Club News (newsletter of the Wayne County Gem and Mineral Club, Newark, NY), March 2015, pp. 2–3.

It is the middle of February in upstate New York, and the weather outside is not particularly conducive to mineral and fossil digs. Even the rocks in the garden remain covered by snow and out of reach.

But there is another way to collect minerals in the winter, and I keep busy doing just that when the spirit moves. They can be collected on postage stamps.

Did you know that there is an international organization of folks who collect gems and minerals on postage stamps? They call themselves the Gems, Minerals and Jewelry Study Unit (GMJSU); they are one of 52 affiliate organizations of the American Topical Association, a philatelic organization with almost 3,000 thematic stamp collector members worldwide.

The GMJSU publishes a quarterly newsletter called *Philagems International* and maintains an Excel spreadsheet listing all stamps depicting minerals, gems, and mining. At last count, there were over 2,700 listings, although many reflect sets of stamps, so the list of actual stamps is larger.

Of those listings, over 1,500 are identified as strictly mineral stamps and over 400 as gem stamps. Over 90 countries are represented on the list.

The United States has issued two sets of mineral stamps. In 1973, four 10-cent diamond-shaped stamps were issued depicting mineral specimens from the Smithsonian Museum of Natural History. The tourmaline specimen (top right) is from the Tourmaline Queen Mine in San Diego County, CA. Since the stamp was issued, the specimen has been affectionately dubbed the Postage Stamp Tourmaline.

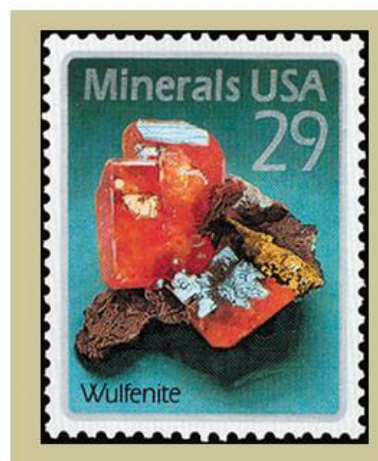
Nineteen years later—and with a postal rate that had almost tripled—a second set of four stamps was issued. One of these, the Red Cloud wulfenite stamp, might be my favorite mineral stamp of all. I have collected at the Red Cloud Mine, without much success, and I believe the thick brilliantly red wulfenite from that mine is simply exquisite.



The Postage Stamp Tourmaline (upper left) and the stamp depicting the famous specimen. The designer benefitted from a pen and ink drawing (upper right) by Wendell Wilson (editor of *The Mineralogical Record*).

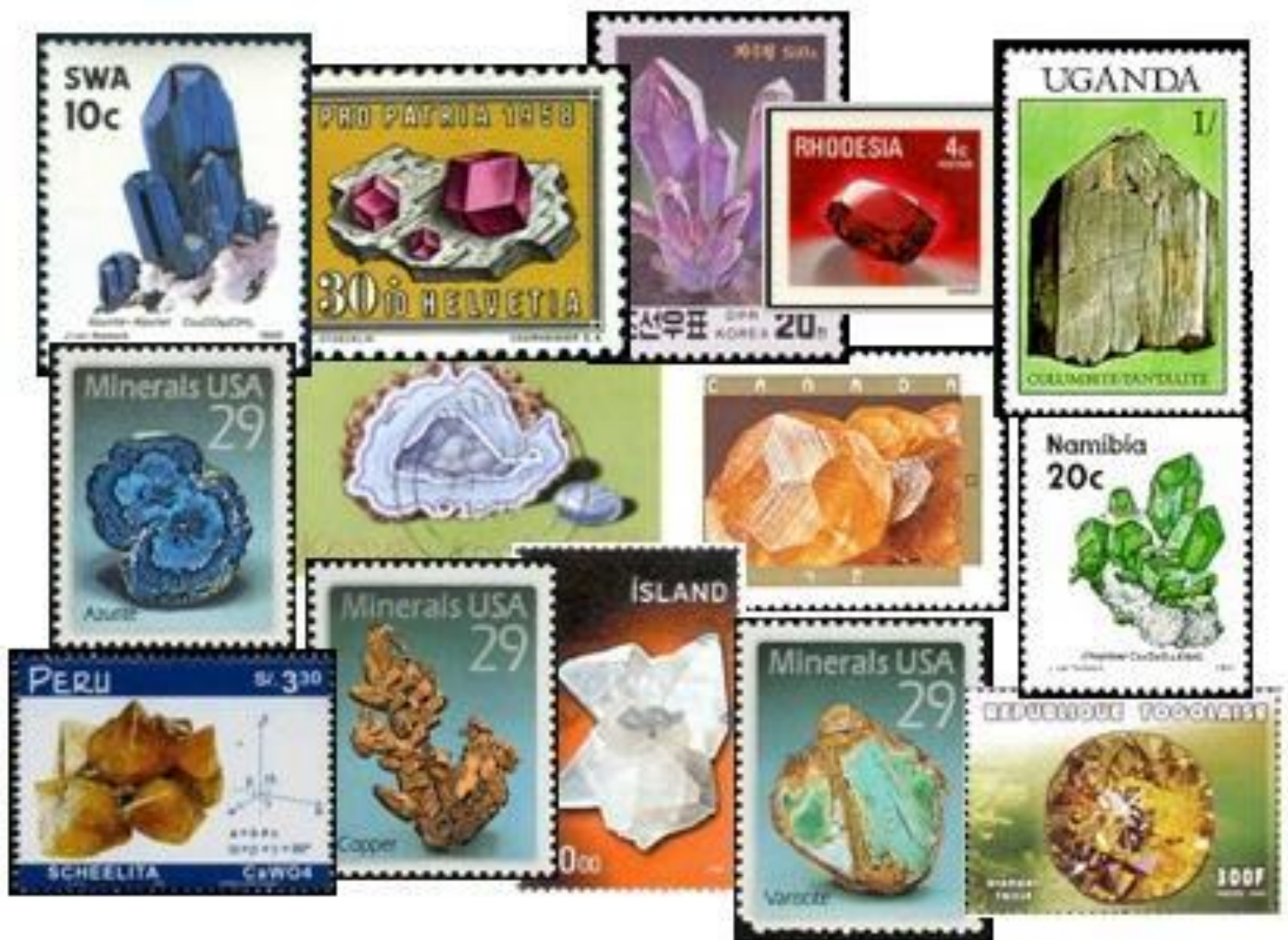
I'd like to have that Red Cloud specimen in my collection, but I have settled for having the stamp and several versions of First Day covers. The other stamps in this set reflect equally famous mineral locations. See if you can pick them out in the collage of mineral stamps on the next page.

By expanding your collecting worldwide, you can obtain an amazing variety of beautiful stamps. Some come in large sets of many denominations and even sizes, others as single stamps. Some commemorate minerals from the issuing country, others simply depict beautiful minerals or gems. I think I will just let some pictures do the talking.



THE ACTUAL SPECIMEN

The Red Cloud wulfenite stamp of September, 17, 1992, was designed by Leonard Buckley from the specimen on display in the Baird Auditorium at the Smithsonian.



Are you short on space? Are your flats of dirty minerals from last year stacked in the corner of the basement or the garage? Not sure where you will put your finds from next summer? Did you make a mess in the sink cleaning minerals?

Well, a good collection of minerals on stamps sits in a 2- to 3-inch space on a bookcase and generally requires no cleaning. I just had to move mine from a 2-inch loose-leaf binder into a 3-inch binder, and now I have room for many more acquisitions. It was not a messy job. I did not need soap and water and chemicals, and none of them broke when I tried to move them.

Another great thing about stamps: with a few notable exceptions, most stamps depicting minerals are much more affordable than the minerals themselves. Whether you collect them in mint condition (with gum, totally unused) or after circulation and therefore cancelled ... or whether you collect just the stamps themselves or prefer First Day Cover envelopes like the American Heritage envelope shown below ... most can be purchased for just a few dollars and many for much less than that.



It is not hard to get started. But be careful! Much like mineral collecting itself, it can be quite addictive! ➤

May 2016—Upcoming Events of Interest in the Mid-Atlantic Region (details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 May Day	2	3	4 MSDC mtg	5 Cinco de Mayo	6	7 Field trip
8 Mother's Day	9 Wildacres GLMSMC mtg	10 Wildacres	11 Wildacres	12 Wildacres	13 Wildacres	14 Wildacres Shows
15 Wildacres Shows	16	17	18	19	20	21 Shows
22	23 NVMC mtg	24 Field trip	25 MNCA mtg	26	27	28 Field trip
29	30 Memorial Day	31				

Event Details

4: Washington, DC—Monthly meeting; Mineralogical Society of the District of Columbia; 1st Wednesday of the month, 7:45–10; Smithsonian Natural History Museum, Constitution Avenue lobby.

7: Stafford, VA—Field trip, Vulcan Quarry; Gem, Lapidary, and Mineral Society of Montgomery County; 1012 Garrisonville Rd; 8–12; >16 only, full safety gear, participant limit: 20; RSVP to David Fryauff, fryauffd@yahoo.com.

9: Rockville, MD—Monthly meeting; Gem, Lapidary, and Mineral Society of Montgomery County; 2nd Monday of the month, 7:30–10; Rockville Senior Center, 1150 Carnation Drive.

9–15: Little Switzerland, NC—Wildacres; \$400 plus materials fee; info: <http://efmls-wildacres.org/>

14: Biglerville, PA—South Penn Rock Swap & Sale; Central Pennsylvania Rock & Mineral Club and Franklin Co. Rock & Mineral Club; So. Mountain Fairgrounds, 615 Narrows Rd (west of Arendtsville, PA); info: tsmith1012@comcast.net.

14–15: Mays Landing, NJ—Cape-Atlantic Rock Hounds Annual Spring Gem, Jewelry, Rock, Mineral and Fossil Show; 2641 Cologne Ave; Sat/Sun 9–5; free parking & admission; info: Billie Brockhum, 609-879-1179.

14–15: Leesport, PA—48th Annual World of Gems & Minerals; Berks Mineralogical Society; Leesport

Farm Market, Rt 61; info: Don Pitkin

pitkind@earthlink.net.

21: Towson, MD—27th Annual Chesapeake Gem & Mineral Show; Chesapeake Gem & Mineral Society; Ruhl Armory, York Rd at I-695; info: chesapeakegemandmineral.org.

21: Fairless Hills, PA—The Earth Science Show & Sale; Rock & Mineral Club of Lower Bucks County, PA; First United Methodist Church, 840 Trenton Road; 9–4; adults \$2, children 12 & under free; info: Brian Schwab, 215-788-3993.

23: Arlington, VA—Monthly meeting; Northern Virginia Mineral Club; 4th Monday of the month, 7:45–10; Long Branch Nature Center, 625 S Carlin Springs Rd.

24: New Windsor, MD—Field trip, Medford Quarry; Gem, Lapidary, and Mineral Society of Montgomery County; 1111 Medford Road, New Windsor, MD; 9–noon; 16 and older; RSVP by 20 May to David Fryauff, fryauffd@yahoo.com.

25: Arlington, VA—Monthly meeting; Micromineralogists of the National Capital Area; 4th Wednesday of the month, 7:45–10; Long Branch Nature Center, 625 S Carlin Springs Rd.

28: Easton, PA—Field trip, C.K. Williams Quarry; Gem, Lapidary, and Mineral Society of Montgomery County; park near Easton Water Treatment Facility on N Delaware Dr (Rte 611); meet 10 a.m.; RSVP to David Fryauff, fryauffd@yahoo.com.



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**MINERAL CLUB
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Crystals are the flowers of the Mineral Kingdom



**Mineral of
the Month:
Stibnite**

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The Northern Virginia Mineral Club

You can send your newsletter articles to:

news.nvmc@gmail.com

**Visitors are always welcome at our club
meetings!**

RENEW YOUR MEMBERSHIP!

SEND YOUR DUES TO:

Rick Reiber, Treasurer, NVMC
PO Box 9851, Alexandria, VA 22304

OR

Bring your dues to the next meeting.

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>).

Dues: Due by January 1 of each year; \$15 individual, \$20 family, \$6 junior (under 16, sponsored by an adult member).

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 22204. (No meeting in July or August.)

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