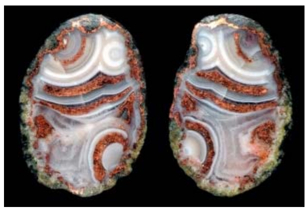
THE NORTHERN VIRGINIA MINERAL CLUB INC
Crystals are the flowers of the Mineral Kingdom

The Mineral Newsletter

Meeting: January 28 Time: 7:45–9:00 p.m.
Long Branch Nature Center, 625 S. Carlin Springs Rd. Arlington, VA 22204

Volume 54, No. 1
January 2013
You can also explore our club website:
http://www.novamineralclub.org/

Next Meeting Program: Red-Gold and Polished Agates



by Wayne Sukow

Editor's note: The program is a slightly abridged version of Wayne's award-winning presentation "Red-Gold and Polished Agates: Upper Michigan's Hidden Treasures."

The program takes you on a treasure-hunting field trip to Upper Michigan's famed Copper Country. You arrive on a sailboat in Copper Harbor, MI, just in time for a gorgeous sunset—a red-gold theme that continues on the drive to the Wolverine 2 Mine.

Then the fun really begins as you view copper replacement agates in four collecting bags. The first bag has showy collector agates, some with detailed and faithful reproductions of portions of fortification bands.

Then comes a bag with both native copper and unusual copper minerals as inclusions. The unusual copper minerals possibly stem from conditions during agate formation.

The third collecting bag, though small, gives an unusual peek inside these marvelous agates, accomplished by etching away calcite with sulfamic acid. The calcite, often water-clear, lets you see all the way through to the back of the agate.

The fourth bag contains marvelous copper agates from a second source, the Kearsarge Lode mines.

These agates have a remarkable combination of pastel colors, including cream, pink, tan, and green bands with diverse forms of copper, ranging from flecks, to pea-size masses, to finely detailed replacement of the agate fortification bands.

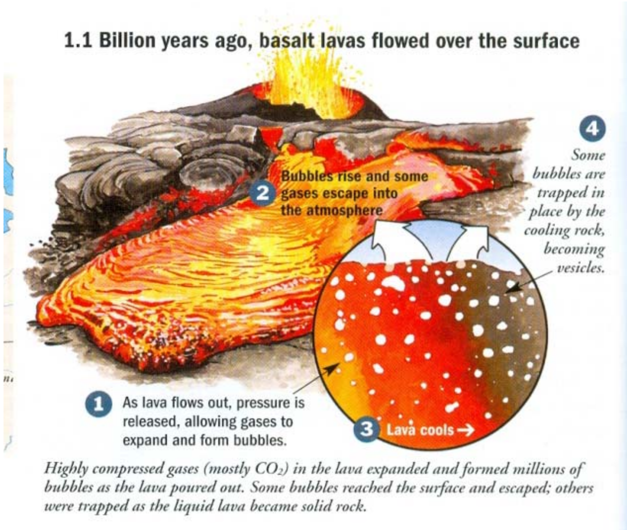
Before the sun sets on the program, there's a final quick look at more collector copper replacement agates. You'll want to add several of these rare copper agates to your lapidary or mineral collection. They are unusual, and the supply is nearing exhaustion as the mine dumps are crushed for roadfill.

Lake Superior Agates

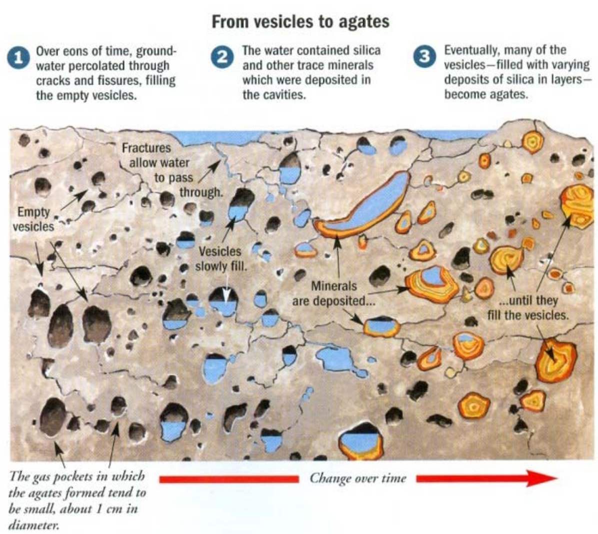
by Kathy Hrechka

The formation of the Lake Superior agates began 1.1 billion years ago during the Precambrian Era. Forces split the crust open and poured out thousands of lava flows.

The rift zone extended from Michigan through Kansas. As the lava flowed onto the surface, both water vapor and carbon dioxide gas rose toward the top of the flow. Millions of bubbles became trapped as the lava slowly cooled. Agates formed in the vacant gas



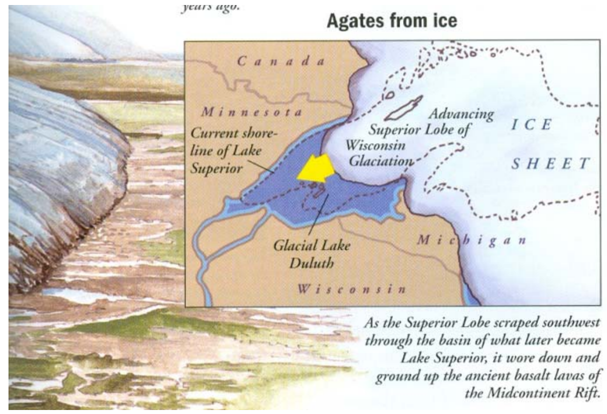
Highly compressed gases (mostly CO_2) in the lava expanded and formed millions of bubbles as the lava poured out. Some bubbles reached the surface and escaped; others were trapped as the liquid lava became solid rock.



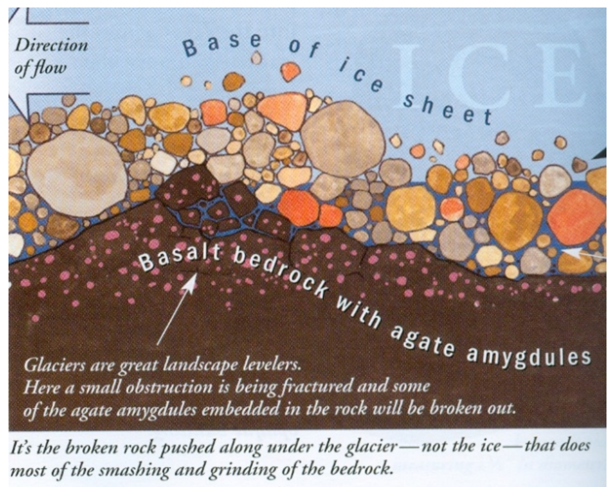
pockets, or vesicles; silica was deposited layer by layer, eventually separating into beautiful banding.

Lake Superior agates began over 2 million years ago with the expansion of a massive glacier. The Lake Superior Lobe followed the trough created by the rifting more than a billion years before. As the ice advanced, it picked up agates for a journey southward.

By roughly 10,000 years ago, the glaciers melted away, depositing massive quantities of mud, sand, gravel, and boulders. Within these glacial deposits were millions of Lake Superior agates, which were spread across parts of Minnesota, Wisconsin, Iowa, Nebraska, and Kansas.



As the Superior Lobe scraped southwest through the basin of what later became Lake Superior, it wore down and ground up the ancient basalt lavas of the Midcontinent Rift.

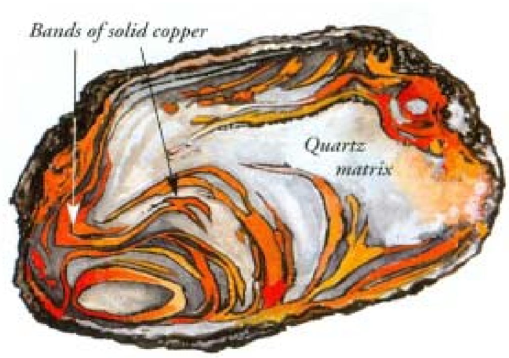


Glaciers are great landscape levelers. Here a small obstruction is being fractured and some of the agate amygdules embedded in the rock will be broken out.

It's the broken rock pushed along under the glacier—not the ice—that does most of the smashing and grinding of the bedrock.

The myriad beautiful banding patterns and colors were revealed by abrasion during glacial transport.

Source: Scott F. Wolter. 2010. Amazing agates: Lake Superior's banded gemstone. Duluth, MN: Kollath+ Stensaa Publishing.



Previous Meeting Minutes: December 16, 2012

by Kathy Hrechka, Secretary

Following a Holiday Party potluck at 6:30 p.m., President Sue Marcus opened the meeting at 8:10 p.m.

Sue presented certificates of appreciation to the junior members who volunteered in the Kids Mini Mines last November. Julia Hrechka graciously accepted her plaque, while Alec Brenner and Talaya Ridgely were not present.

Sue also thanked Julia for serving as editor of The Mineral Newsletter in 2012. She presented Julia with a binder including copies of the newsletter for the entire year.

Wayne Sukow presented the slate of club officers nominated for 2013, including:

- President—Rick Reiber
- Vice-President—Kathy Hrechka
- Treasurer—Kenny Loveland
- Secretary—Dave MacLean

There were no nominations from the floor, so a motion was made to elect the slate of officers.

Sue announced that Hutch Brown had volunteered to be the new editor of The Mineral Newsletter. Club members exchanged gifts while door prize minerals and poinsettias were won by many.

President's Thoughts

by Rick Reiber

Please welcome all the new officers who have volunteered their time to help the club!

I look forward to the year ahead as President. I have never been President of anything before, so advice and opinions are welcome.

The Northern Virginia Mineral Club offers great opportunities to exchange ideas and knowledge by both the professionals and hobbyists in our club. I hope that you will continue to enjoy the company of folks who share your interests at the club's meetings, field trips, and shows.

Field Trip: Mineralogy Laboratories and Museum, James Madison University

February 23, beginning at 9:00 a.m.

by Tom Tucker

Dr. Lance Kearns has again invited the Northern Virginia Mineral Club, along with the Mineralogical Society of the District of Columbia and the Micromineralogists of the National Capitol Area, to visit the mineralogy labs and the fabulous mineral museum at James Madison University (JMU) in Harrisonburg, VA. We'll "pass the hat" so everyone can make a small donation to the mineralogy department for the furtherance of their activities and acquisitions and to pay for the hot coffee and breakfast buns or donuts that Lance will have awaiting our arrival.

The museum alone is worth the trip; it has the finest collection of minerals in the entire state. There are a dozen or so large wall cabinets filled with minerals from around the world, but with an obvious emphasis on Virginia specimens, like turquoise from Lynch Station, apophyllite from Centreville, and aragonite from Buchanan. After your visit, I'm sure you will have your own favorites. There is also a small room with a stunning fluorescent mineral display.

I've asked Lance to explain the main attributes of each identification method—size of specimen required, destructive, nondestructive, information gained, etc. Lance will be available to identify those unknown specimens you have accumulated over the years. I'm sure he will demonstrate the use of the X-ray diffractometer for crystal structure determinations and the Raman spectrometer for specimen identification.

The labs have enough stereo microscopes for everyone to examine their specimens as well as any specimens people might have brought to share on a "freebie" table. Bring anything you have to share. There will be various mineral specimens of all sizes, from micro to cabinet sized, and probably a few books available for purchase at unusually reasonable prices or in exchange for voluntary donations. The books and minerals have been acquired over the years through various donations to the university; arrive early for the best selections. Please remember, the specimens aren't free, so make your donations reasonable—or even extravagant!!

At lunchtime, we will probably go out for pizza and return in the afternoon to visit the "microprobe" and scanning electron microscope laboratory on the other side of campus. We might use the lab to determine the chemical makeup of our unknowns or to take closeup photos of the minute crystals at hand.

The mineralogy labs are in the Geology Department, which is in Memorial Hall (the former Harrisonburg High School building) on South High Street. For a map of the campus, go to the university website at www.jmu.edu, and in the upper right corner click on "directions/map." On the index map, the Memorial Area is an inset at the upper right, just left of the building key. Click the small map, and a detailed area map will appear.

Driving directions: It takes about 2-1/4 hours to reach JMU. From the Beltway, go west on I–66 about 65 miles to I–81. Take the left fork and go south on I–81 about 54 miles to Harrisonburg. Take Exit 245, Port Republic Road, and go right about a mile to High Street. Turn right and proceed north about a half mile to a light at Cantrell Avenue. Memorial Hall will be to the left, with abundant parking. On a weekend, parking passes are not needed, but if you do have a problem, Lance can probably take care of it. Inside Memorial Hall, just follow the signs to the Geology Department. It's easy to get LOST!!

If you would like to include a field trip on Sunday to collect microminerals at various syenite localities about 15 miles south of Harrisonburg or to visit Sugar Grove, about 40 miles away in West Virginia, please let me know, and we will do it.

If you plan to attend the trip to JMU, please let me know the number in your party so we can let Lance know how many to expect for coffee and buns. Send me an e-mail at threedogtom@earthlink.net or call me at 540-347-9098. See you there!

The Hadean Eon, the Earth's First Chapter

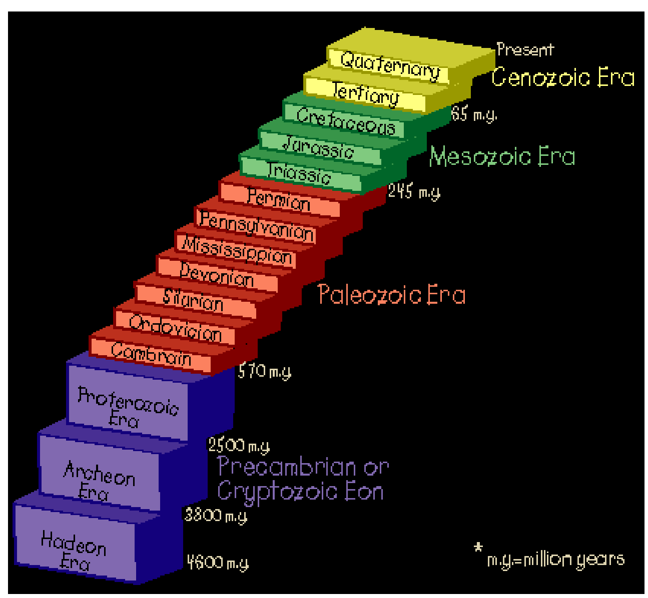
by David MacLean

When we read about the geological history of Earth, we often start with the Cambrian period beginning 542 million years ago (MYA), when life with hard shells appeared; we usually see maps showing where the continents were.

However, Earth is far older, originating about 4,567 MYA. The 4,025 million years of Earth's Precambrian history are divided into three eons: the Hadean (4567–3800 MYA), Archean (3800–2500 MYA), and Proterozoic (2500–542 MYA).

The Hadean eon began the process of differentiating Earth materials into rock and minerals and selectively enriching and concentrating specific minerals. It started with the condensation of gas (mostly hydrogen) and dust to form the sun and protoplanets from a circular nebula. So much gas condensed that the sun's internal temperature rose high enough to ignite the exothermic thermonuclear reaction converting hydrogen to helium. The sun contained 99.9 percent of the mass of the solar system. The solar wind drove the gases to the outer planets beyond Mars.

The protoplanets pulled in smaller planetesimals. After the protoplanets accreted to about 50 miles in diameter, they stayed molten from the decay of short-



lived radioactive elements and heat from collisions with planetesimals. Elemental iron settled to the core of the protoplanets.

Within the first 100 million years of Earth history, a planet with an estimated 40 percent of Earth's mass collided off-center with Earth, throwing some vaporized rock, Earth's atmosphere, and debris from Earth and the colliding planet into space and placing some in orbit about 9,000 miles from Earth's surface. The collision probably tilted Earth's access of rotation about 22.5 +/–1.5 degrees from vertical to the plane of its orbit.

The orbiting debris quickly accreted to become the molten moon. Because the O18/O16 isotope ratios in the rocks of Earth and the moon are identical, we know that the moon came mostly from Earth.

The moon initially orbited Earth every 84 hours, and Earth rotated every 5 hours. The tidal drag of the moon on Earth gradually decreased Earth's rotation rate and angular momentum. Since the earth/moon system rotates as a unit and angular momentum is conserved, the moon's angular momentum increases, speeding up the moon in its orbit. The faster moving moon gradually pulled away from the earth and is still moving away at 1.8 inches per year.

Earth's hot rocks degassed, emitting carbon dioxide, water vapor, nitrogen, the rare gases, and methane. Atmospheric pressure was much higher than today, and there was no oxygen in the atmosphere. The molten crust, 98 percent of which is composed of magnesium, calcium, iron, aluminum, silicon, and oxygen, formed silicate rocks.

The first mineral formed during cooling was olivine, which—being dense—sank into the mantle to form dunite. The next was a mixture of olivine and magnesium pyroxenite, which sank as peridotite into the mantle. Partial melting of the sunken pyroxenite created a liquid depleted in magnesium and richer in the other five elements. Less dense, this molten rock rose to Earth's surface as basalt, made up almost entirely of plagioclase, calcium and aluminum silicate feldspar, and pyroxenes such as augite and enstatite.

During this process, planetesimals punched holes in the crust and lunar tides delayed solidification. Like Venus, the moon, and Mars, Earth was covered with a black layer of basalt. Convection in the molten interior broke through, sending some basalt inward and partially melting it. The melt was enriched in silica and less dense than basalt.

Before 4,400 MYA, water vapor condensed into clouds and rain, forming lakes and oceans on a relatively flat basaltic surface. Constant convection in the earth's molten interior and expulsions and reentries of water acidified with carbon dioxide increased the concentrations of sodium chloride, calcium, magnesium, and ferrous (Fe^{+2}) to higher concentrations in the ocean than now and formed a variety of hydrated minerals, such as clays. Erosion of the basaltic surface formed black sands.

A 4,400-million-year-old zircon crystal ($ZrSiO_4$) found in a 3,300-million-year-old sandstone ridge in west Australia provides evidence for the existence of liquid water 4,400 MYA. Inert, hard, and durable, zircon holds small amounts of radioactive thorium

(with a half-life of 12,000 million years) and uranium(with a half-life of 4,500 million years). Zircon crystals can be dated based on the ratios of uranium and its decay product, lead. The slightly higher O18/O16 ratio in the zircon supports the theory that Earth had cooled enough to contain liquid water, which enhances crystal formation.

Stars like the sun emit increasing energy as they age. About 4,000 MYA, the sun emitted only 70 to 75 percent as much energy as it does now. Apparently, Earth absorbed or kept a greater fraction of the sun's energy it received than it lost; there is no evidence of ice during the Hadean. Carbon dioxide and methane are both greenhouse gases, and their high concentrations in the atmosphere (including 4,000 parts per million of carbon dioxide) held the heat in.

Heat from the young earth provided additional warmth. Ultraviolet rays from the sun probably broke methane at high altitudes into a variety of other organic compounds, creating a gray organic haze, some of which fell to Earth's surface. Lightning possibly created more complex organic compounds from substances in the atmosphere such as water, carbon dioxide, nitrogen, methane, ammonia, and traces of hydrogen sulfide.

Upwelling and downwelling of the molten basalt under a thin crust dragged down wet basalt and partially melted it. Basalt containing water melts at nearly 1,200 °F. Enriched in silica (including quartz and feldspars) and less dense than basalt, the molten rock rose to the surface, forming granite islands and then continents.

Vertical plumes of upward-moving basalt encountered either the protocontinents or asteroid impact points, diverting their flow. Upward-moving plumes ran into the granitic protocontinents, keeping the basalt hot and adding the less dense granitic rock to the bottom of the protocontinents.

About 4,000 MYA, the plumes became organized into cells in which basaltic lava rose and then was subducted. Plate tectonics as we know it became established. Perhaps metamorphic rocks formed at this time. This was the age of gray earth.

The timing and mechanism for the origins of life are much debated. By the late Hadean (4,200–3,800 MYA) or early Archean (beginning 3,800 MYA), life and then photosynthesis and free oxygen appeared. Bacteria and single-celled microorganisms flourished on Earth. Life, photosynthesis, and free oxygen would have a profound influence on Earth's chemistry.

Main source: Robert M. Hazen. 2010. The story of Earth: The first 4.5 billion years from stardust to living planet. New York, NY: The Viking Press.

Happy 94th Birthday!
Fred Schaefermeyer, 1/28/19

by Kathy Hrechka

One of our club's most noted members just celebrated his 94th birthday. One of his greatest mineral accomplishments was to coordinate funding and placement of "The American Golden Topaz" located in Gem Hall of the Museum of Natural History, Smithsonian Institution.

The 22,892.5-carat topaz, roughly the size of an automobile headlight, weighs 12.3 pounds and sparkles from 172 facets. The world's largest faceted golden-yellow topaz gemstone, it was donated to the Smithsonian on May 4, 1988, by William Maloney, Jr., Vice-President of the American Federation of Mineralogical Societies on behalf of the Federation and its six regional federations.

Fred was instrumental in soliciting for the Friends of the Smithsonian Topaz Fund, which raised $40,000 in 7 months in order for the topaz to be cut and delivered to Gem Hall. John S. White, curator of the gem and mineral collection, set the Golden Topaz in the museum's Gemstone Giants case.

Geology became Fred's hobby after retiring from the U.S. Air Force in 1968, then again after a 14-year career at the 3M Company. Fred first joined the Northern Virginia Mineral Club in the early 1980s; later, he joined the Micro club. He has held most club offices as well as Federation offices. He has also exhibited and received awards for his competitive mineral cases at Federation shows.

Many hobbyists know Fred, because he was an active member of almost every mineral club in our area. His micromount collection contained about 7,000 specimens at one time.

Fred's family has been an important part of his life. He celebrated his 50th wedding anniversary in 1999 with his wife, Gerry. They have four children, eight grandchildren, and five great-grandchildren. Gerry has since passed away. Fred later moved back to his native Colorado, where he rekindled a companionship with Muriel, who lives in the suburbs of Denver.

Today Fred and Muriel spend their "Golden Topaz" years enjoying their families and traveling around the world together.

Reprinted from **Rocks and Minerals**, published by HELDREF PUBLICATIONS, 4000 Albemarle Street, N.W., Washington, D.C. 20016.

Billed as the world's largest faceted gemstone, the American Golden has found a permanent home in the Gem Hall at the Smithsonian Institution.

THE AMERICAN GOLDEN TOPAZ

Figure 1: **The 22,892.5-carat topaz, roughly the size of an automobile headlight, sparkles from 172 facets. Photo courtesy Smithsonian Institution.**

FRED C. SCHAEFERMEYER
P. O. Box 10119
Alexandria, Virginia 22310

THE LARGEST FACETED GEMSTONE IN THE WORLD, by weight a 22,892.5-carat (12.3 pounds) golden-yellow topaz, was presented to the Smithsonian Institution May 4, 1988. It has 172 facets, an overall length of 175.3 mm, depth of 149.4 mm, and width of 93.4 mm. It has a table facet that is 105.3 mm long and 93.7 mm across. In other terms, this rectangular cushion-cut topaz is as large as an automobile headlight.

In early 1987, John Sampson White, curator of the gem and mineral collection at the Smithsonian Institution, contacted me and explained that the Smithsonian had lost the Brazilian Princess, now the second largest cut gemstone, to

360 ROCKS & MINERALS

Mineral and Lapidary Portfolio for Wayne W. Sukow

by Wayne Sukow

Editor's note: The Northern Virginia Mineral Club is fortunate to have a rare resource in Wayne Sukow, one of the club's most longstanding members. We asked Wayne to outline his extraordinary mineral and lapidary career.

I was born in 1936. In 1959, I earned a B.A. in physics and biology at the University of Wisconsin in River Falls. I went on to graduate school, earning an M.A. in nuclear physics from Case-Western Reserve University in 1961 and a Ph.D. in chemical physics from Washington State University in 1974.

My mineral and lapidary career began in1960, when my brother-in-law, who taught earth science in middle school, visited me in River Falls, WI, and suggested that we go looking for local Lake Superior agates. We spent a warm October afternoon in a dry wash about 10 miles from where I lived. I still have one of the first Lakers I ever found, a small but flawless oval with classic red-and-white banding and a little red flame in the center.

I went on to join several rock clubs in Wisconsin and Minnesota. One evening, while examining a Laker cabochon that I had cut for a ring, I discovered arborescent copper crystal growths on the white chalcedony layers. This led to an article in the Lapidary Journal, the first of many publications in rock and mineral magazines.

In the late 1960s, while attending graduate school at Washington State University, I collected star almandine garnets from Emerald Creek and faceting-quality garnets from St. Mary's in Idaho. I also collected Priday and Carey Plume agate along with old blue Biggs Jasper.

In the 1970s, I discovered Copper Country on Michigan's Upper Peninsula, where I found copper, silver, and many associated minerals. This led me to study datolite and write articles about it based on my growing collection of the colorful nodules.

In the late 1980s, I moved to Fairfax, VA, only to realize that there was very little lapidary material in

the area. At a Northern Virginia Mineral Club auction, however, I discovered exquisite water-clear crystals of datolite from the trap rock quarries only 20 miles away in Loudon County. This led me to collect and write about datolite crystals from around the world.

Since 1960, I have belonged to various local gem and mineral clubs, often serving as an officer or bulletin editor. In 2003, I became the Assistant Director of the Eastern Federation of Mineral and Lapidary Societies (EFMLS) in Wildacres, and from June 2006 to September 2008 I served as Director. In 2006, I took a 1-year leave of absence to serve as President of the EFMLS, following terms as 2nd Vice-President in 2004 and 1st Vice-President in 2005.

Collections:

- Priday and Carey plume agate
- Old Blue Biggs jasper
- Lake Superior agate
- Datolite crystals from worldwide sources
- Colored datolite nodules from Michigan.
- Volcanic rock with tiny olivine crystals from a cinder cone near Mt. Erebus in Antarctica
- Jade and agate from South Island in New Zealand

Research interests:

- Crystalline datolite structure
- Science education using interactive exhibits
- Formation of copper inclusions in banded chalcedony and Massive Michigan Datolite

Awards:

- August 2002: First Place with highest honors in the education category of the American Federation of Mineralogical Societies slide program competition for program "Datolite: Crystals, Complexity and Color"
- July 2003: First Place with highest honors in the education category of the American Federation of Mineralogical Societies slide program competition for program "Datolite Nodules: Copper Country Color"
- August 2006: First Place in the education category of the 2006 American Federation of Mineralogical Societies slide program competition for program "Color, Copper, Plumes, and Iris."
- September 2010: First Place with highest honors in the education category of the American Federation of Mineralogical Societies slide program competition for narrated program "IRIS Agate"
- April 2011: First Place with highest honors in the education category of the American Federation of Mineralogical Societies slide program competition for narrated slide program "Red-Gold and Polished Agates"

Speaking engagements:

- Invited Plenary Session Speaker at a joint meeting of the American Federation of Mineralogical Societies and the Midwest Federation of Mineralogical Societies in Houghton, MI
- December 2002: Invited speaker at the National Meeting of the American Geophysical Union in San Francisco on "Teacher Participation in Earth Science, Oceanographic, and Physical Science Research"
- July 2007: Invited speaker and weeklong participant at the Teachers Earth Science Institute at Michigan Technological University-Caledonia Copper Mine, Houghton, MI
- September 2010: Invited speaker at the Northwest Federation Rockhound Retreat, Fossil OR
- July 2012: Invited speaker at Lakeland and Mineral club show in Minocqua, WI; programs presented were "IRIS Agate," "Red-Gold and Polished Agates," and "Agates of Copper Country"
- July 2012: Invited speaker at Celebration of Agates Seminar; program presented was "IRIS Agate"
- July 2012: Invited speaker at joint Minnesota Mineral Club show, Midwest Federation Show, and AFS meeting; program presented was "Red-Gold and Polished Agates"

Mineral and Lapidary Publications:

- "Tiny Bubble Theory of Lake Superior Agate Formation—A Post-Formation Phenomenon, Part V," Deposits Magazine, Summer 2011
- "Tiny Bubble Theory of Lake Superior Agate Formation: Part IV," Deposits Magazine, March 2011
- "Tiny Bubble Theory of Lake Superior Agate Formation: Part III," Deposits Magazine 26, April 2011
- "Tiny Bubble Theory of Lake Superior Agate Formation: Part II," Deposits Magazine 25, Winter 2011
- "Tiny Bubble Theory of Lake Superior Agate Formation: Part I," Deposits Magazine 24, Autumn 2010
- Titles of an additional 11 mineral and lapidary publications are available on request

Northern Virginia Mineral Club

Purpose: To promote and 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, http://www.amfed.org/efmls) and the American Federation of Minerological 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.*

Visitors are always welcome at our club meetings!

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

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RENEW YOUR MEMBERSHIP!

SEND YOUR DUES TO:

Northern Virginia Mineral Club
PO Box 10085
Manassas, VA 20108

OR

Bring your dues to the next meeting.

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