Micromineralogists of the National Capital Area, Inc.

MNCA Website www.dcmicrominerals.org

The Mineral Mite

Vol. 58 – No. 4 Washington D.C. A Journal for Micromineralogists April 2025

Meeting: April 28 3-5:30pm Kings Park Library, Burke

Program: Smithsonian Treasures

By Jeff Guerber, Vice President

Kathy Hrechka will present "Smithsonian Treasures: Behind the Scenes in the Dept. of Mineral Sciences". She has had much access through our local geology clubs for forty years and has many memories to share. She also volunteers in GGM and will provide us with a unique look at what goes on behind the scenes. MNCA's April meeting will be Monday, April 28, 3:00-5:30pm in the large meeting room at Kings Park Library, Burke.

Mystery Micro Mineral of the Month

Mineral?? Locality, Foote Lithium Co. Mine, Kings Mountain, Cleveland County, North Carolina. FOV=2.5mm. By Aloha Peter Chin, Honolulu, Hawaii. Answer on page 2.

President's Message:

By David Fryauff, PhD

I think we have all noticed that lately Greenland has been in the news--quite suddenly and frequently. It seems that our current US president is convinced that Greenland, despite its long-term presence, size, proximity, and overabundance of snow/ice/cold is now more vital to our security, strength, wellness, and happiness than we ever realized (Although historical fact records that the US has had a military presence in Greenland, thanks to Denmark being our friend and ally since WWII). One of the big reasons for this new and very keen interest in Greenland seems to be its perceived (or real?) deposits of strategic minerals.

To be more precise, it is the strategic minerals that would yield the coveted 17 rare earth elements (Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu). Where do sensible micromineralogists turn for facts and details when they want to know about minerals in Greenland? To Mindat, of course, because we realize that it is an amazing and virtually free resource at our fingertips, and because we wisely contribute to the existence and upkeep of this wonderful factual reference and the many experts that make it work.

Continued next page.

President's Message continued

In just a few minutes I discovered that despite being largely covered by ice and snow, there is an enormous volume of very current mineralogical information on Greenland that is assembled for our use by Mindat--at least 20 pages worth of data!!!!

Go see for yourself and get smart. Become interested and interesting, possibly even become the "life of the party" somewhere with all that you can easily learn about Greenland's minerals. And while you are at it realize that most of this current, and very public, information is thanks to your charitable contributions to Mindat, to the self-ruling people of Greenland and to its autonomy and protected status within the Kingdom of Denmark.

Briefly, Mindat lists 248 separate sample locations in Greenland, most of which naturally occur along its coast. Despite that geographic limitation, 517 different valid mineral species have been recorded/identified from Greenland, 87 of which are Type Localities (TLs). Mindat allows us to select an REE element of interest, for example Cerium (Ce), and to identify all the known Greenland mineral species with this element in its chemical formula (=35 valid mineral species of which 17 are Greenland TLs).

Mindat also records 125 different rock/sediment types and surprisingly a new tool which records Greenland fossil records, locations, geologic ages, phylogeny, and identifications of plant and animal (invertebrates & vertebrates). Much, if not all, of the Greenland data on Mindat must be attributed to GEUS: The National Geological Survey and Data Center of Denmark and Greenland that carries out independent surveys, research, consulting and mapping. These GEUS studies and survey work are quite outstanding and provide the highest quality of scientific, technical, and interpretive analyses.

Specific full downloads are available through the Mindat website for pertinent survey reports on Lithium (Whole rock Geochemistry and pegmatite occurrences in Greenland....focus on Lithium (Poulsen, M.D. GEUS Report 2024/5) and Critical minerals (Rosa, D., et al. Review of the Critical Raw Material Resource potential in Greenland (GEUS MiMa Report No. 1 vol 2023).

These reports are outstanding in conduct and highly informative. Don't just take my word for it, check these out for yourself and be impressed!

Mystery Micro Mineral of the Month

By Aloha Peter Chin, Honolulu, Hawaii
Answer: Footemineite, Foote Lithium Co. Mine, Kings Mountain, Cleveland County, North Carolina. FOV=2.5mm.

Previous Meeting Minutes 3.24.2025

By John Sanborn, Secretary

Ten members of the Micromineralogists of the National Capital Area (MNCA) gathered in the Kings Park Library large conference room at 3:00 pm on March 24, 2025; President Dave Fryauff, Vice President Jeff Guerber, Treasurer Michael Pabst, Secretary John Sanborn, Editor Kathy Hrechka, Tom Tucker, Robert Clemenzi, George Loud, Dave Hennessey, and Craig Moore.

After general discussions and Mineral viewing, President Dave Fryauff brought the meeting to order at 4:30 PM. Tom Tucker (past President), Robert Clemenzi (past President) and George Loud (past Treasurer) were recognized for their club service respectively. Minutes of the February 24, 2025, meeting were approved as published in the Mineral Mite. Michael Pabst presented the treasurer's report.

Dave Hennessey announced the acquisition of "Two SUV's full" of donated rocks and minerals. He transported roughly a "cubic foot" of the collection to the meeting. Attendees were encouraged to take some specimens and some of the remainder will be given to other local mineral clubs. Dave will continue to bring portions to future meetings for likewise disposition. Thanks to Dave and others that provided excellent "give away" specimens.

The next MNCA meeting will be on Monday April 28, 2025, from 3-5:30 PM in the Kings Park Library large conference room. Note some local club calendars are not accurate with our meeting dates. The Meeting adjourned at 5:30 PM. Continued next page.

Notice: May meeting update by Jeff Guerber
As a heads-up, I've scheduled our May meeting for **TUESDAY MAY 20 (Third Tuesday).** Monday May 26 is Memorial Day and the library is closed, and Monday May 19 and Tuesday May 27 were not available.

L-R Tom Tucker, George Loud, David Fryauff, and Jeff Guerber at our MNCA March meeting.

Previous Program Reviewed 3.24.2025

By Jeff Guerber, Vice President

EXTRATRRESTRIAL UPDATE: **WHAT'S NEW IN THE SOLAR SYSTEM.** This article is based on my MNCA talk on March 24, 2025.

I. 2024 YR4 Won't Hit Us on Dec. 22, 2032, After all. (But It Will Come Close).

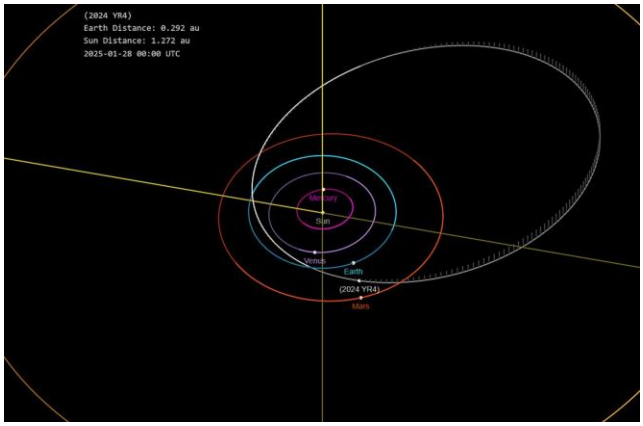


Fig. 1: Diagram of 2024 YR4's orbit (white) and planets in the inner Solar System, with positions on Jan. 28, 2025. The orbit of Jupiter is visible in the corners. Credit: NASA/JPL via Wikipedia.

Note: New observations have become available since my talk in March, so I've updated parts of the text.

Asteroid 2024 YR4 was discovered Dec. 27, 2024, by the Asteroid Terrestrial-impact Last Alert System (ATLAS) from Rio Hurtado, Chile. The closest approach was on Dec. 25, 2024, at 828,800 km (515,000 mi) or 2.156 lunar distances. The initial orbit calculations gave it a significant (though still small!) chance of hitting Earth in Dec. 2032.

Asteroid 2024 YR4 is an Apollo-type (Earth crossing) near-Earth asteroid. It has a 3.991-year orbital period, passing perihelion at 0.8515 AU [1] on Nov. 22, 2024. Aphelion is at 4.180 AU, which is most of the way to Jupiter (5.2 AU).

James Webb Space Telescope observations in the thermal infrared in late March indicate a diameter of 60 +/- 7 m, about the size of the object that hit Earth in Tunguska in 1908, the meteor that caused Meteor Crater, Arizona, or the wingspan of a Boeing 747. Based on its light curve, it appears to be flattened with an equatorial diameter about 3 times its polar diameter. Making some assumptions about size and composition, its mass is estimated at 2.2 x 10^8 kg. It's probably an R- or Sa-type stony asteroid. The recent JWST IR observations suggest a relatively rocky surface. It also rotates fast, making one rotation in only 19.5 minutes.

Initial orbit calculations estimated a 3.1% probability of impacting Earth on Dec. 22, 2032, after 2 more orbits; this was the highest asteroid impact probability ever measured! It was rated 3 on the Torino impact hazard scale, the second highest ever. (More on the Torino scale in a bit.) Subsequent estimates using further observations have reduced this: Based on 460 observations over 71 days to March 6 (NASA Center for Near-Earth Object Studies, https://cneos.jpl.nasa.gov/sentry), the impact probability in Dec. 2032 is 1.9 x 10^-7, or 1 in 5.3 million, and cumulative through 2059 is 1.1 x 10^-5 or 1 in 91000. It's now rated 0 on the Torino scale. Phew! The closest approach is now expected to be 260000 km (160000 mi). There is, however, still about a 4% chance that it will strike the Moon, with a best-fit closest approach there of only 3100 km.

Continued next page.

EXTRATRRESTRIAL continued

The Torino asteroid impact hazard scale was created by Richard Binzel of MIT in 1995, and revised at an international conference in Turin, Italy in 1999. It ranks impact hazards on a 0-10 scale, based on the probability of collision and the estimated impact energy:

0: Effectively zero chance of impact.

1: Routine close pass with no unusual danger

2-4: Merits closer attention, 1% or greater threat of local to regional devastation

5-7: Serious but still uncertain threat of local to global devastation

8-10: Collision is certain with local (8), regional (9), or global (10) devastation Details are available on https://en.wikipedia.org/wiki/Torino_scale. The highest rating ever given so far was the asteroid (99942) Apophis, which was rated 4 for 4 days in late 2004.

[1] The AU, or Astronomical Unit, is equivalent to the mean distance of the Earth from the Sun. It is commonly used by astronomers when discussing distances within the Solar System.

Sources:

https://en.wikipedia.org/wiki/2024_YR4

https://cneos.jpl.nasa.gov/sentry

https://en.wikipedia.org/wiki/Torino_scale

https://science.nasa.gov/blogs/planetary-defense/2025/04/02/nasa-update-on-the-size-estimate-and-lunar-impact-probability-of-asteroid-2024-yr4/

II. This One Did Hit: The Charlottetown Meteorite

Fig. 2: Impact site of the Charlottetown PEI meteorite. Credit: Courtesy of the homeowners via the University of Alberta Meteorite Collection.

On July 25, 2024, at 5:02 pm, a small meteorite hit a walkway in the residential Marshfield neighborhood of Charlottetown, Prince Edward Island. It left a divot of about 2 cm across. Video and audio of the impact were recorded by a home security camera – the first time the actual ground impact of a meteorite has been recorded. (The Chelyabinsk meteorite's aerial burst and shock wave were recorded, but not the ground impact.) It is also the only known meteorite from PEI. After contacting researchers from the University of Alberta Meteorite Collection, who verified that it was likely a meteorite, the homeowners and UAb researchers collected 95 grams (3.4 oz) of 1-7 mm fragments. UAb classified it as a type H5 brecciated ordinary chondrite, which is a common stony meteorite type.

Continued next page.

EXTRATRRESTRIAL continued

Fig. 3: Fragments of the Charlottetown meteorite. Credit: University of Alberta Meteorite Collection.

There are many versions of the video on YouTube. This one from The Canadian Press is the one I included in my talk:

https://youtube.com/watch?v=F_1xInfNMok

It's not readily visible here, but one frame of the video shows the falling meteorite a few feet off the ground, a moment before impact. Sources:

https://en.wikipedia.org/wiki/Charlottetown_meteorite

https://www.lpi.usra.edu/meteor/mebull.php?code=84378

https://youtube.com/watch?v=F_1xInfNMok

https://www.ualberta.ca/en/news/news-releases-and-statements/news-releases/2025/jan/what-does-a-space-rock-sound-like-when-it-hits-the-ground-first-ever-meteorite-to-land-in-prince-edward-island-is-caught-on-camera-makes-auditory-history-and-ends-up-in-u-of-a-collection.html

III. OSIRIS-Rex Results from Bennu Samples

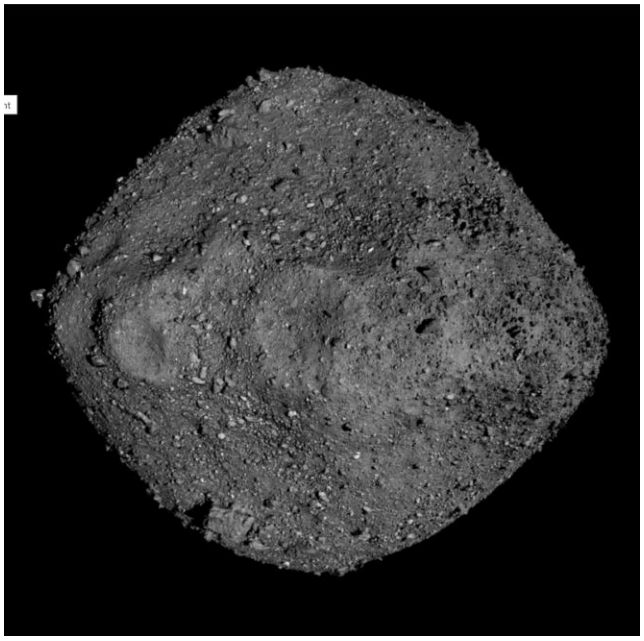


Fig. 4: Mosaic of (101955) Bennu imaged by OSIRIS-REx. Credit: NASA/Goddard/UArizona via Wikipedia.

The Origins, Spectral Interpretation, Resource Identification, and Security-Regolith Explorer, or OSIRIS-REx, was launched Sept. 8, 2018, and rendezvoused with the small asteroid (101955) Bennu on Dec. 3, 2018. It carries 6 instruments, including the TAGSAM Touch-And-Go Sample Acquisition Mechanism sample collection arm and a sample return capsule. After studying Bennu from orbit for most of 2 years, on Oct. 20, 2020, the TAGSAM arm collected a 121.6 g sample from the surface of Bennu; this was more than twice the 60 g objective. (The sample was so large that the container lid jammed open.) OSIRIS-REx left Bennu on April 7, 2021, and reached Earth on Sept. 24, 2023, where it ejected the sample return capsule which landed safely, parachuting into the Utah desert. Once returned, the samples were opened, processed, and stored in dry nitrogen to avoid contact with air.

Continued next page.

EXTRATRRESTRIAL continued

Fig. 5: OSIRIS-REx sample return capsule just after landing in Utah on Sept 24, 2023, with members of the recovery team. Credit: NASA/Keegan Barber via Wikipedia.

TAGSAM is 11 feet long, with a cylindrical sample container on the end. To acquire the sample, the spacecraft's orbit lowered within reach of TAGSAM, which then reaches out to touch the surface with the sample container. A blast of nitrogen gas then stirs up the regolith, some of which lands in the sample container. The spacecraft does not land on the asteroid: the entire operation is performed from orbit! The spacecraft then backs away and places the sample container in the return capsule for the return to Earth. The video of the sample acquisition is here:

https://youtube.com/watch?v=LJBv4reH9IU

(101955) Bennu was discovered on Sept. 11, 1999, by the Lincoln Near-Earth Asteroid Research (LINEAR) project. It is a member of the Apollo group of Earth-crossing asteroids, with an orbital period of 1.1955 years, a perihelion of 0.8969 AU, and aphelion of 1.3559 AU. Bennu is 565 m x 535 m x 508 m and rotates every 4.3 hours; the very weak gravity and fast rotation are believed to have caused the regolith to accumulate around the equator, producing its roughly charcoal-briquette-like shape (which seems to be rather common for small asteroids: (162173) Ryugu, which was sampled by the Japanese Hyabusa-2 in 2018, has a similar shape). It is a B-type carbonaceous asteroid (a type which includes (2) Pallas), similar to CI or CM carbonaceous chondrite meteorites.

Bennu is believed to be a second or later generation "rubble pile" formed of debris from a larger body in the inner main asteroid belt that broke up 730-1550 Myr ago.

On January 29, companion papers published simultaneously in Nature and Nature Astronomy discussed the composition of the Bennu sample in detail. Both papers were published open access, so anyone can read or download them for free at Nature's web site or through the doi links in the citations below.

1) T. J. McCoy (NMNH) et al., An evaporite sequence from ancient brine in Bennu samples:

Full citation: McCoy, T.J., Russell, S.S., Zega, T.J. et al. An evaporite sequence from ancient brine recorded in Bennu samples. Nature 637, 1072–1077 (2025). https://doi.org/10.1038/s41586-024-08495-6

Many of us know the lead author Tim McCoy of the Smithsonian National Museum of Natural History, who is a good friend of the local mineral clubs.

In this paper, Tim's team found abundant mineralization that formed in aqueous solutions, including sulfides (mainly pyrrhotite), magnetite, salts (halite, sylvite), carbonates (calcite, dolomite, magnesite), sodium-rich phosphates, sulfates, chlorides, and fluorides. These species would have formed during the evaporation of brines in Bennu's parent body, and could form an environment that could catalyze prebiotic organic compounds. Similar brines are thought to also occur beneath the surfaces of the dwarf planet Ceres and Saturn's moon Enceladus.

The authors found cases where salt grains completely disappeared over 5-8 months while being stored in dry air, and places where salt particles formed under the same conditions. Direct sampling and careful curation (in dry nitrogen) to avoid contact with air were crucial to the discovery of the many salts found.

2) Daniel Glavin (NASA GSFC) et al., Abundant ammonia and nitrogen-rich soluble organic matter in samples from asteroid (101955) Bennu:

Continued next page.

EXTRATRRESTRIAL continued

Full citation: Glavin, D.P., Dworkin, J.P., Alexander, C.M.O. et al. Abundant ammonia and nitrogen-rich soluble organic matter in samples from asteroid (101955) Bennu. Nat Astron 9, 199–210 (2025). https://doi.org/10.1038/s41550-024-02472-9

(Please note that I am not a chemist! What follows is my rather poor understanding gained mostly from reading the paper.)

In this paper, Glavin's team found that Bennu is relatively rich in volatiles such as carbon and nitrogen compounds and ammonia, more so than Ryugu or most meteorites. The abundance of Nitrogen-15 implies that the ammonia formed in a cold molecular cloud or in the outer proto-planetary disk. 33 amino acids were found including 14 of the 20 that occur in terrestrial biology, and all 5 of the biological nucleobases (adenine, guanine, cytosine, thymine, and uracil) that occur in DNA and RNA. Many other organic compounds were identified, including formaldehyde, carboxylic acids, polycyclic aromatic hydrocarbons (PAHs), and amines. About 10000 nitrogen-bearing species were found. The abundances of amino acids, ammonia, and other soluble organics imply low temperature formation and alteration in the outer solar system.

Many organic compounds, such as amino acids, are chiral: they occur in mirror-image forms; in terrestrial biology, amino acids are overwhelmingly left-handed (L-). The amino acids in Bennu, however, were found to be racemic, that is they occur in roughly equal proportions of left- and right- (D-) handed forms. Amino acids found in carbonaceous meteorites (such as Murchison) also tend to be mostly racemic, although this varies. This argues against the hypothesis that the left-chirality of terrestrial biology resulted from organic molecules deposited by meteorite impacts.

Following the safe return of its Bennu samples, OSIRIS-REx was renamed OSIRIS-APEX, for APophis EXplorer, and redirected to the near-Earth asteroid (99942) Apophis. Apophis will make a close approach to Earth on April 13, 2029, and OSIRIS-APEX will rendezvous on April 21. It will conduct orbital studies similar to those it made at Bennu.

Sources:

https://en.wikipedia.org/wiki/OSIRIS-REx

https://en.wikipedia.org/wiki/TAGSAM

https://en.wikipedia.org/wiki/101955_Bennu

The papers by McCoy et al and Glavin et al cited above:

https://doi.org/10.1038/s41586-024-08495-6
https://doi.org/10.1038/s41550-024-02472-9

https://youtube.com/watch?v=LJBv4reH9IU

Biographical Sketch – Jeff Guerber

Kathy asked me to include a short biographical sketch to go along with my March "Extraterrestrial Update" presentation, in particular about my career at NASA:

I've been fascinated by astronomy almost as long as I've been picking up rocks. (Almost, but not quite!). I majored in Astronomy (which included nearly as much physics as the Physics majors had!) at Case Western Reserve University in Cleveland, with the intention of becoming a professional research astronomer. Well, that never quite worked out, but after graduating I found a job as a Programmer/Analyst with a contractor at the NASA Goddard Space Flight Center in Greenbelt, writing science analysis programs for the Voyager infrared spectrometer team. I would go on to spend nearly all of my career at Goddard, mainly developing software to analyze data received from a variety of spacecraft in planetary science, high-energy astrophysics, and Earth science.

Voyagers 1 and 2 were launched in 1977, encountered Jupiter in 1979, and Saturn in 1980 (V-1) and 1981 (V-2). I was with the project during Voyager-2's encounters with Uranus in 1986 and Neptune in 1989. Our instrument was the InfraRed Interferometer Spectrometer, or IRIS, a Michelson interferometer configured as a spectrometer for the thermal infrared. If you've seen pictures of Voyager or visited the engineering model in the Air and Space Museum, IRIS is the big round instrument on the scan platform with the gold-coated mirror. Continued next page.

Biography Jeff continued

My role with the IRIS team mainly involved programming and operating the temperature inversion program, which took the infrared spectra and developed temperature profiles into the planet's atmosphere. To this day, Voyager-2 remains the only spacecraft to have visited either Uranus or Neptune. The two Voyagers are still operating and returning data, although to save power they are down to only operating three instruments each. Voyager-1 exited the heliosphere into interstellar space in August 2012, Voyager-2 did so in November 2018.

Following Neptune, I had expected to move on to the Planetary Atmospheres group's next project, Mars Observer's Thermal Emission Spectrograph. Unfortunately, we lost that spacecraft during Mars orbit insertion, and although it was rebuilt and later flown very successfully as Mars Global Surveyor, there wasn't funding to support programmers for a while. I wound up in high-energy astrophysics, which involves observing X-rays, gamma rays, and the like. Because these are blocked by Earth's atmosphere, they can only be observed from space. I mostly wrote software to use the data returned by the Advanced Satellite for Cosmology and Astrophysics (ASCA), a Japanese X-ray astronomy observatory that had major NASA participation. I also spent a period archiving ASCA data in Goddard's National Space Science Data Center.

From high-energy astrophysics I found myself back down to Earth, developing the data-visualization package for ICESat, the Ice, Cloud, and land Elevation Satellite, an Earth-orbiting laser altimeter mission. The main driver for the ICESat mission was the state of the icecaps on Greenland and Antarctica, which is the primary control of sea level. By that time, it was absolutely clear that the climate was warming, but because this would evaporate more water from the oceans, and thus cause more precipitation, it was not clear going in whether the icecaps would shrink or grow. (We would eventually discover that, although they are getting a little thicker in the middle, they have been losing far more ice off the edges.) Besides the icecaps, ICESat also provided global topography coverage to 5 cm vertical accuracy over the land and ocean surfaces.

After ICESat ended, I developed a tool to allow scientists to submit their ice sheet elevation models and have them automatically compared against both lidar and radar altimetry data. I then found myself back in high-energy astrophysics, running the data center for NASA's Swift gamma-ray burst observatory. From there, it was back again to Earth lidar altimetry, working on the hydrology part of the data-processing pipeline for ICESat-2, the follow-on to the original ICESat. A few years ago, my ICESat-2 job got cut, but right around that time Mom and Dad were getting older and began needing more help, so it made sense for me to stay home. The first year I did a little independent consulting work for some of my old colleagues, then at the University of Maryland, involving altimetry data for certain rivers in Alaska, but with my parent's situation I didn't pursue further work after that.

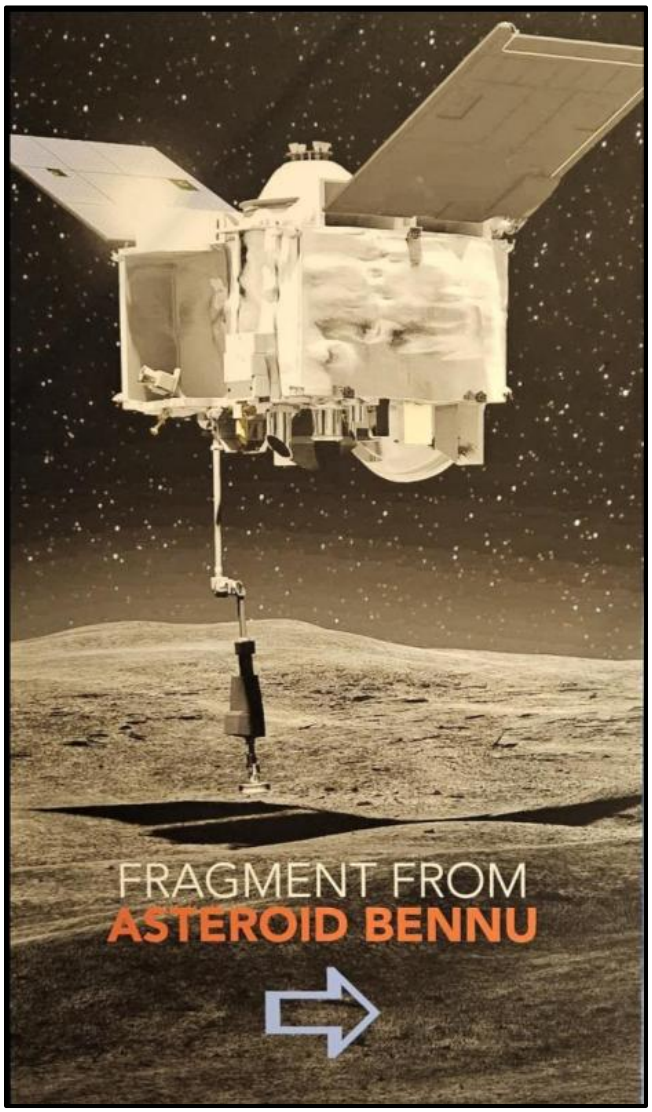
So that's a summary of my career at NASA. In all, I spent just under 33 years working on a series of fascinating missions with a lot of the brightest people around. The time has come that I'm looking for the next stage; whether that will be back at NASA, or elsewhere I don't yet know. Time will tell; it always does.

L-R Vice President Jeff Guerber, George Loud, President David Fryauff, Craig Moore, Robert Clemenzi viewing Jeff's MNCA program on March

Smithsonian's Asteroid Bennu Sample

By Kathy Hrechka, editor - Reprinted Dec 2023 MM

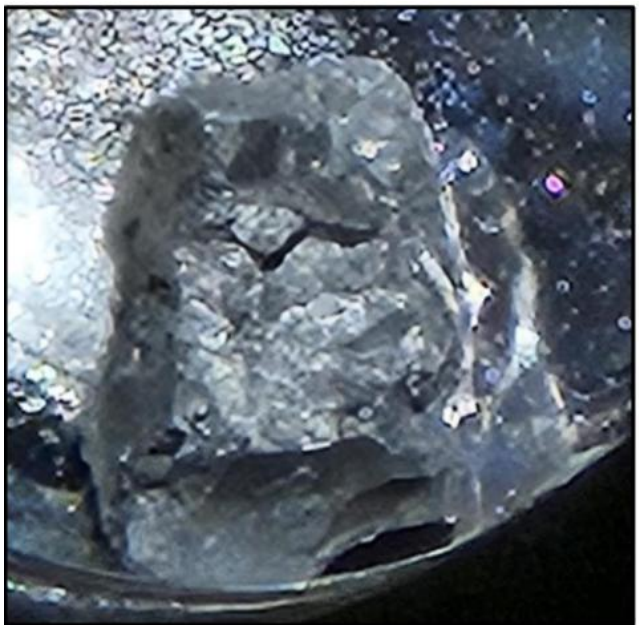
Bennu was unveiled at Smithsonian's National Museum of Natural History on November 3, 2023, by Sant Director, Dr. Kirk Johnson. I had the opportunity to study the exhibit while volunteering in the Geology, Gems, and Mineral gallery. What an honor to witness and view such a historical piece of a carbon-rich asteroid dating 4.5 billion years. The capsule was collected from the asteroid by NASA's OSIRIS-REx mission in 2020, before returning to earth on September 24, 2023, landing in the Utah desert.



Entrance of exhibit in the NMNH Meteorite gallery of Geology, Gems, and Minerals.

"A VIEW OF THE BEGINNING: Discovered in 1999, the asteroid Bennu formed soon after the birth of the Solar System 4.6 billion years ago. It orbits the Sun at about the same distance as Earth does. With these new samples, scientists can now study the water-rich minerals and carbon-rich molecules formed before life contained within to better understand the origins of the Solar System, Earth's oceans, and life itself NASA's OSIRIS-REx mission launched in 2016 and reached Bennu in 2018 to collect samples in 2020 from the asteroid's surface with its extendable arm. These samples returned to Earth in September 2023. Illustration provided by NASA. Model of Atlas V 411 Rocket – Cutaway view with OSIRIS-Rex in the payload fairing. 1/84 scale. On loan courtesy of United Launce Alliance (ULA.) Model of OSIRIS-Rex Spacecraft 1/24 scale- Loaned by Lockhead Martin" Museum Exhibit. Continued next page.

"Sample of asteroid Bennu. The container protects the sample from our atmosphere. Loaned by NASA"



Enlarged view of Bennu. Photo credits, Kathy Hrechka

"The mission is led by the University of Arizona with an international team of scientists, including at the Smithsonian, and managed by NASA's Goddard Space Flight Center. The spacecraft, built by Lockheed Martin Space, was launched on a United Launch Alliance Atlas V rocket. Samples are curated by NASA's Johnson Space Center". Museum exhibit: The spacecraft is projected to enter orbit around the asteroid Apophis in 2029, as its next mission.

Smithsonian's 2010 Lorton, Virginia

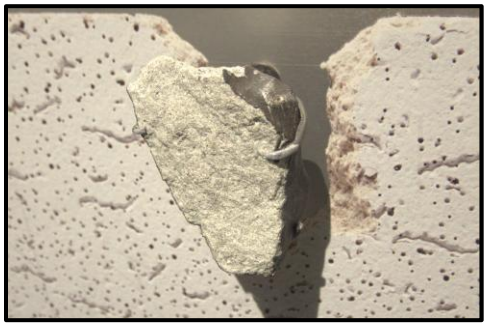
By Kathy Hrechka, editor

Many geology club members remember the event of a meteorite landing in Lorton, Virginia on January 18, 2010. The meteorite landed in a doctor's office. I recall that an employee's husband was a geologist, who eventually reached out to the Smithsonian for authentication. Today that meteorite is on display in the meteorite hall, as the museum purchased it from the doctor who became its rightful owner.

"Lorton – Stone chrondrite (ordinary, L16) Fell 2010 Fairfax County, Virginia" Museum exhibit. Photo by Kathy Hrechka, volunteer in the Geology, Gems, and Mineral gallery at the Natural History Museum.

"2010: Lorton, Virginia

Around dusk on January 18, 2010, people in the DC region observed a greenish fireball streaking through the sky. Doctors at the Williamsburg Square Family Practice – about 18 miles from the Museum – heard a crash, and discovered a 0.728 lb (330 g) meteorite had punched through their roof and landed in the exam room." Museum exhibit.



Closeup view of meteorite. Photo by Kathy Hrechka

Copper Uranyl Selenites: Derriksite, Demesmaekerite, Marthozite

By Michael Pabst PhD, Treasurer

In the last article, we described the copper selenite Chalcomenite. One of the featured Chalcomenite specimens was from the Musonoi Mine in DR Congo, which is famous for radioactive minerals. The specimen contained several copper uranyl selenites, which we will look at more closely in this article.

Derriksite
$Cu_4(UO_2)(SeO_3)_2(OH)_6$
Orthorhombic *mm*2 – pyramidal

Demesmaekerite
$Pb_2Cu_5(UO_2)_2(SeO_3)_6(OH)_6 \cdot 2H_2O$
Triclinic $\bar{1}$ – pinacoidal

Marthozite
$Cu(UO_2)_3(SeO_3)_2O_2 \cdot 8H_2O$
Orthorhombic *mm*2 – pyramidal

Guilleminite
$Ba(UO_2)_3(SeO_3)_2O_2 \cdot 3H_2O$
Orthorhombic *mm*2 – pyramidal

The type locality for all these uranyl selenites listed in the table is the Musonoi Mine, although they have subsequently been found in other localities. (Guilleminite is not a copper mineral, but it is associated with copper selenites at Musonoi Mine, so we will consider it here.)

Derriksite. Derriksite is a copper uranyl selenite $Cu_4(UO_2)(SeO_3)_2(OH)_6$, first described in 1971. Derriksite exhibits a range of colors including green, bottle green, dark green, and brown-green. It is orthorhombic *mm*2 – pyramidal, meaning that the top of the crystal can be different from the bottom. Derriksite was named after Jean-Marie François Derriks (1912 -1992), a geologist and administrator of the Union Minière du Haut Katanga, which operated the Musonoi Mine. Derriksite was found in the oxidation zone of the Cu and Co deposit at the Musonoi Mine, in association with the other minerals in the table above. Derriksite has also been found in the Zálesí uranium deposit in Czech Republic.

Below is a photo of Derriksite from my Chalcomenite specimen:

***Derriksite** (dark green) and **Chalcomenite** (blue). Musonoi, DR Congo. FOV 2 mm. Specimen and photo by Michael Pabst, using stereomicroscope, stacking 11 images.*

Crystals of Derriksite are tiny and rare, so good photos are scarce. Here is my favorite photo of Derriksite, taken by Christophe Boutry: https://www.mindat.org/photo-1259987.html.

Demesmaekerite. Demesmaekerite is a **lead** and copper uranyl selenite $Pb_2Cu_5(UO_2)_2(SeO_3)_6(OH)_6 \cdot 2H_2O$. Demesmaekerite is triclinic $\bar{1}$- pinacoidal. The color is bottle-green when fresh, turning somewhat brownish and opaque on dehydration. Hardness is 3-4 on Mohs scale. Demesmaekerite was named for Gaston Demesmaeker (1911-1997), a Belgian geologist and a director of the Union Minière du Haut Katanga.

Continued next page.

Copper continued

Demesmaekerite is also found at the Zálesí uranium deposit in Czech Republic and at the Eureka Mine in Spain. Here is a view of an area of Demesmaekerite on my Chalcomenite specimen:

Demesmaekerite *(greenish yellow). Musonoi, DR Congo. FOV 1.5 mm. Specimen and photo by Michael Pabst, using WeMacro rail with Mitutoyu lens, stacking 25 images.*

Stephan Wolfsried has an admirable photo of Demesmaekerite:
https://www.mindat.org/photo-605012.html.

Marthozite. There is another copper uranyl selenite found at Musonoi called Marthozite.
Marthozite is copper uranyl selenite **oxide** $Cu^{2+}(UO_2)_3(SeO_3)_2O_2{\cdot}8H_2O$, so it is more oxidized than Derriksite, for example. Marthozite is orthorhombic *mm*2 – pyramidal, like Derriksite. Named after Aimé Marthoz (1894-1962), former director-general of the Union Minière du Haut Katanga, when the D.R. Congo was a Belgian colony.

I have a nice specimen that shows the characteristic crystals of Marthozite nestled in Malachite:

Marthozite *(yellow) and* ***Malachite*** *(green). Musonoi Mine, DR Congo. FOV 8 mm. Specimen and photo by Michael Pabst, using stereomicroscope, stacking 4 images.*

Here is a good photo of Marthozite by Paul De Bondt:
https://www.mindat.org/photo-405996.html.

Guilleminite. Guilleminite $Ba(UO_2)_3(SeO_3)_2O_2{\cdot}3H_2O$ is the barium analog of Marthozite. It is also orthorhombic *mm*2 – pyramidal. It does not contain copper, and so it tends to have a brighter (less greenish) yellow color. Named for Jean Claude Guillemin (1923-1994), professor and curator at the Ecole des Mines in Paris, director of the Union Minière du Haut Katanga, and co-founder of the International Mineralogical Association (IMA). Crystals of Guilleminite are rare and tiny. Usually, Guilleminite forms crusts or blobs. I have a specimen with tiny Guilleminite crystals perched on blades of dark green Vandenbrandeite $Cu(UO_2)(OH)_4$.

Continued next page.

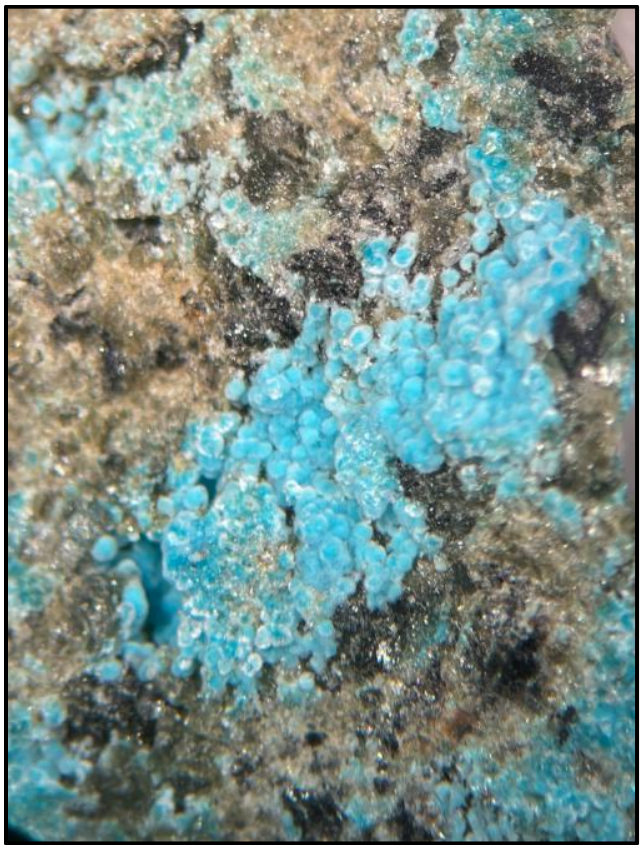
Copper continued

Guilleminite *(yellow) on* ***Vandenbrandeite*** *(green) from Musonoi, DR Congo. FOV 8 mm. Specimen and photo by Michael Pabst.*

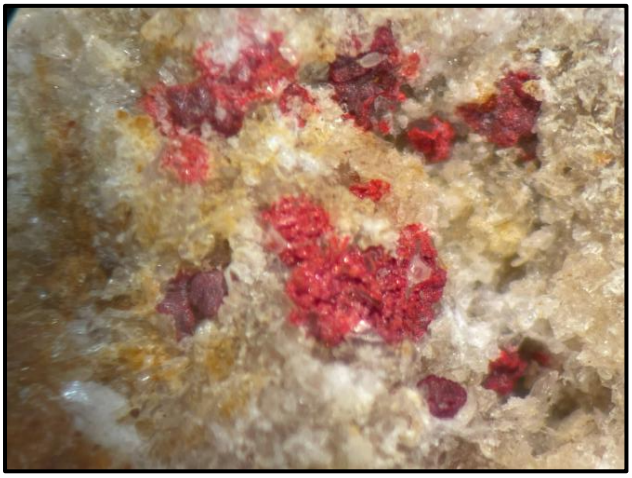
Stephen Wolfsried has a nice photo of well-formed Guilleminite crystals on Vandenbrandeite: https://www.mindat.org/photo-83844.html. Uwe Haubenreisser has an esthetic photo of Guilleminite blades on Malachite: https://www.mindat.org/photo-1274556.html.

Next article will return to more common copper sulfates, specifically copper **aluminum** sulfates.

Newly Acquired Micros - David Fryauff



Mcguinnessite *FOV 6.0 mm -- Hunting Hill Quarry, Rockville, MD. Gift from George Loud*



Cinnabar *FOV = 3.0 mm -- Kiggins Mine, Clackamas Co., OR.2025 Leidy Symposium giveaway table*

Leidy Symposium

By Steve Stuart, Editor CMMA

The 49th Annual Leidy Microscopical Society Micro mount Symposium was held on Friday, March 7th through Saturday, March 8th at the Advent Lutheran Church in Richboro, Pennsylvania. The Leidy Microscopical Society celebrates its 100th Anniversary this year, although precursor organizations stretch back to 1858 when a group of medical doctors, including Dr. Joseph Leidy, formed a Biological Study Group associated with the Philadelphia Academy of Natural Sciences. The association faded away by 1924, and in 1925 several former members reestablished a private, non-profit society and named it the Leidy Microscopical Society. The silent auction table was set up on Friday for the Saturday auction which ended about 1:30 pm.

John Ferrante brought a selection of micromounts from the Carl Rilling collection for viewing by attendees. Dr. Carl A. Rilling, MD was inducted into the Micromounters Hall of Fame in 2014. He passed away in 1970. His collection resides with John Ferrante. Here is a selection of photos provided by Don McAlarnen.

John Ferrante also brought some antique microscopes to allow attendees to view diatoms slides. One was a Joseph Zentmayer "American Centennial Stand" fabricated in 1876. The other was a R and J Beck microscope of similar vintage, crafted in England.

Left: Zentmayer microscope. Right: Diatoms through the 150-year-old optics. Such clarity!! Steve Stuart photos.

Left: Beck microscope. Right: Diatoms though the Beck microscope. Not quite as clear as the Zentmayer 'scope. Steve Stuart photos.

A table was allocated to view stereophotographs taken by Dr. Carl Rilling of the Frank Keeley micromount collection. Two viewers owned by Dr. Rilling were provided for attendees to peruse the slide decks. There was also a modern microscope provided by John Ferrante to view diatom slides and other biologicals. Frank Keeley was inducted into the Micromounters Hall of Fame in 1986. He passed in 1949.

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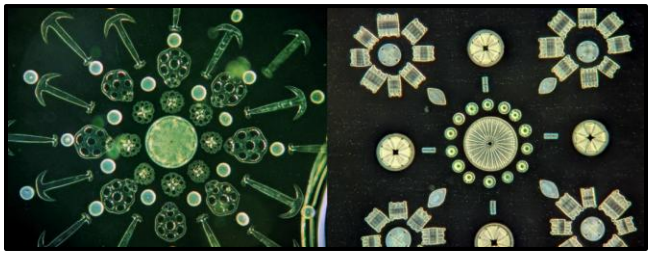
Leidy continued

The viewing table with stereophotograph viewers and a microscope.

Here are some photos of diatoms through the microscope taken with a smartphone camera.



Diatoms photos by Steve Stuart. The anchors on the left are actually sponge spicules.

The Saturday session ran from 9 am to about 6 pm. There were two speakers. The first presentation before the lunch break was by Chris Duerr, a member of the Pennsylvania Mineralogical Society. It was entitled "Diving into Olivine". It was a highly technical talk with phase diagrams and discussion about the temperatures and pressures within the earth that favors the formation of olivine in volcanic basalts. Chris contributed a display case to accompany his presentation.

The olivine gemstone is called peridot or chrysolite. It was mined by Greeks, Romans and Middle East kigdoms on Zabargad Island in the Red Sea. There are also green sand beaches in Hawaii and other places with olivine grains. The display also included a brass microscope owned by Samuel G. Gordon, a Pennsylvania mineralogist.

Chris Duerr discussing olivine. Steve Stuart photo

Olivine display case. Don McAlarnen photo.

The Saturday afternoon presentation was by Bill Dailey, a collector of high-quality samples of diatomite, a.k.a. diatomaceous earth, and freshly collected diatom samples from all over the world. He has been doing this for 25 years. His talk was entitled "The Fascinating World of Diatoms". His freshly collected diatoms come from local streams in Maryland. He discussed the preparation process for harvesting the algae from rocks and pond scum, washing with hydrogen peroxide and sodium metaphosphate, and preparing slides for microscopic examination. Diatomites are fossilized diatoms from deposits around the world. His talk focused on Eocene-era diatoms from Oamaru, New Zealand, and on Cretaceous-era diatoms from Dosado Canyon, California.

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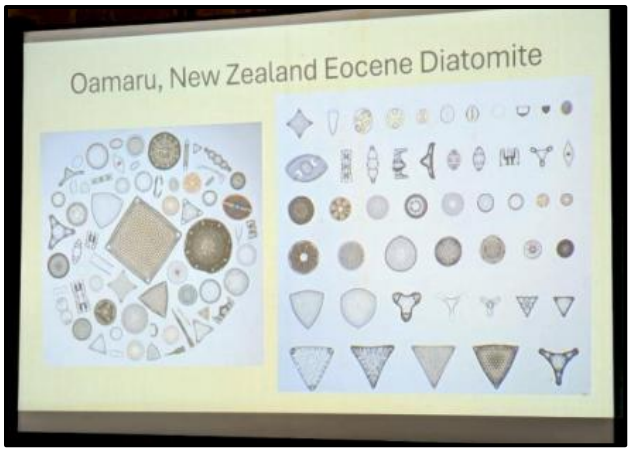
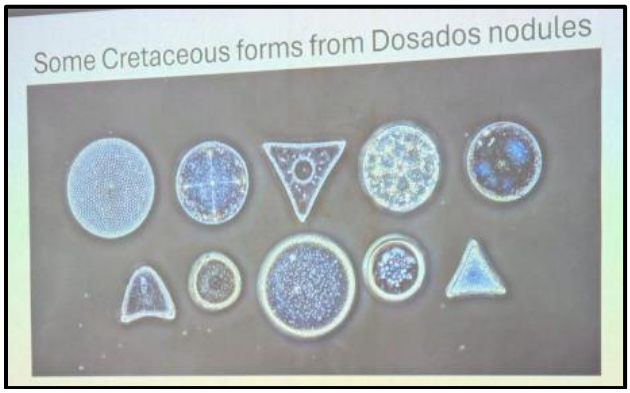
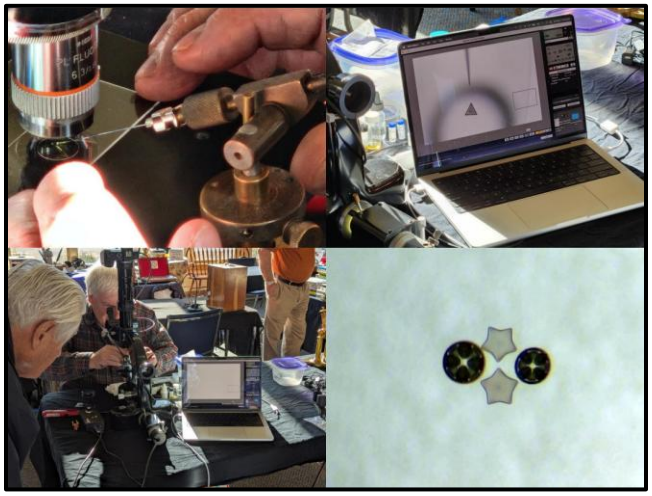


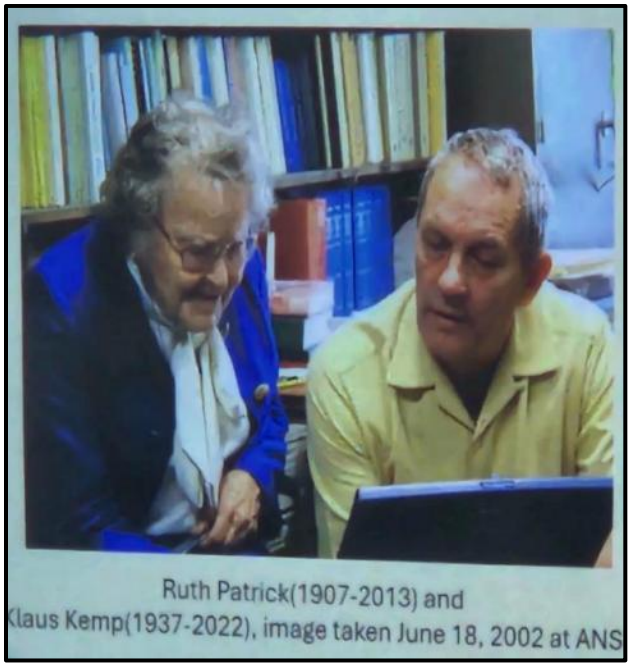


Bill also keeps alive the Victorian art of creating arranged diatoms slides. He brought a microscope, a fine tungsten needle for manipulating individual diatoms, and a laptop computer for viewers to see the process. Fascinating!



Top row: Don McAlarnen photos. Bottom row: Steve Stuart photos.

Bill was mentored for many years by Klaus Kemp in England. Klaus passed away in 2022 and was the premier modern day diatom arranger.



A slide from Bill Dailey's presentation. Captured by Don McAlarnen.

The Symposium hosted eighteen attendees on Friday, fourteen members and four guests. On Saturday, there were fourteen members and six guests for a slight increase to twenty.

Opening remarks on Saturday by Eric Brosius. John Ferrante is seated. Steve Stuart photo.

Continued next page.

Eric Brosius and Dave Fryauff. Steve Stuart photo.

Don McAlarnen (standing) and Al Pribula (sitting). Steve Stuart photo.

Proof that your author was actually there! Steve is the editor of MicroNews CANADIAN MICRO MINERAL ASSOCIATION INC. Article reprinted with permission Vol. 59, No. 3, March 2025. Don McAlarnen photo.

Australian Micromount Club on Zoom

Micromount Club Zoom Host: Steve Sorrell resides in Melbourne, Australia and hosts various geology persons of interest at his micromount meeting each month on Zoom. You can sign up for Steve's programs, while enjoying friendly faces within our geology community around the globe.

https://crocoite.com/index.php/2023/07/the-micromount-club-zoom-sessions/

All sessions are held on the third Wednesday of the month (unless noted otherwise) **6am Australian time**. Steve has set up a recurring Zoom meeting, which means you only need to register once, and join as many sessions as you like.

2025 Micromount Club Zoom Meetings: 3pm ET

(Please verify your local time zone once signed up).

April 16: "Minerals of Japan" presented by Steve Sorrell.

May 21: "Crystal shapes: spheres, cubes, fibers and more" presented by Frank Loman.

June 18: "Minerals on Stamps" presented by Steve Sorrell.

July 16: Topic & Speaker TBD.

MNCA Editor's note: thanks to Steve Sorrell from Melbourne, Australia, we have been connecting with new mineral friends around the world for the past three years. I have learned that he is a master photomicrographer, as well as an author of mineral books and a talented mineral artist.

American Federation of Mineralogical Societies

(AFMS)
www.amfed.org

Please read the AFMS bulletin attached in original monthly email to MNCA members.

2025 Purpose of the AFMS: To promote popular interest and education in the various Earth Sciences, and in particular the subjects of Geology, Mineralogy, Paleontology, Lapidary, and related subjects, and to sponsor and provide ways to coordinate the work and efforts of all interested persons and groups; to sponsor and encourage the formation and international development of Societies and Regional Federations and thereby to strive toward greater international good will and fellowship.

Celebrating over 50 years!
The Rock & Gem magazine is recognized as the official magazine of the AFMS.
Free archived downloads

Rock & Gem Magazine Archive : Free Download, Borrow, and Streaming : Internet Archive

Eastern Federation of Mineralogical and Lapidary Societies

(EFMLS)
https://efmls.org

Communication and Involvement
Are the Keys to Our Success!

Please read the EFMLS bulletin attached in original monthly email to MNCA members.

April 2025 Local Geology Club Meetings

2: Mineralogical Society of the District of Columbia MSDC Meeting 7:30pm on Zoom www.mineralogicalsocietyofdc.org

7: Northern Virginia Mineral Club NVMC
www.novamineralclub.org

14: The Gem, Lapidary and Mineral Society of Montgomery County, Maryland – GLMSMC
Meeting 7:30 pm www.glmsmc.com

?: The Gem, Lapidary and Mineral Society of Washington, DC – GLMS-DC meeting 7 p.m.
Chevy Chase Community Center, 5601 Connecticut Ave; Washington, DC. www.glmsdc.org

16: Baltimore Mineral Society BMS meeting
www.baltimoremineralsociety.org

28: Micromineralogists of the National Capital Area, Inc. MNCA Meting 3pm Kings Park Library
www.dcmicrominerals.org

MNCA Dues are Due 2025

Note: MNCA members, remember to pay your dues for 2025. Details are found on page 13.
Michael Pabst, Treasurer

Geo Word of the Day and its definition

furutobeite (fu-ru-to'-be-ite) A metallic gray monoclinic mineral: $(Cu,Ag)_6PbS_4$

könlite (kön'-lite) A brown to yellow hydrocarbon found in brown coal and having an approximate composition of 91.75% carbon, 7.50% hydrogen, and 0.75% oxygen. Syn: könleinite; koenlinite.

lisitsynite A vitreous colorless orthorhombic mineral: $KBSi_2O_6$.

All terms and definitions come from the Glossary of Geology, 5th Edition Revised.
GeoWord of the Day is brought to you by: EnviroTech! envirotechonline.com.

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2025 Central US Micro-Mineral Symposium (CUSMS) to be held in Little Rock, AR. As I write this, planning for this year's symposium is in the early stages of development. As such, we have suggested two dates at the end of September; Wednesday, September 17th through Saturday, September 20th - OR - Wednesday, Sept 24th through Saturday, September 27th of 2025. If you are interested in attending, please block this time frame and respond with your preferred dates. - Given that in the meantime we are still considered to be democracy, the majority will rule. Should either date be ok with you, please indicate this in your response. We will notify all the responders with the chosen dates as early as possible so everyone can begin the planning process.

Space is limited and registrations will be made on a first come first served basis. Like our previous events, we have tried to avoid a registration fee to attend, although you will still be responsible for your meals and lodging throughout the event. Hope to hear from every soon. Ed O'Dell edodell@twc.com

Micromineralogists of the National Capital Area
www.dcmicrominerals.org

We are meeting at Kings Park Library in Burke, VA 3-5:30pm (forth Monday to Wednesday)

MNCA Purpose: To promote, educate and encourage interest in geology, mineralogy, and related sciences.

President: David Fryauff
Vice President: Jeff Guerber
Secretary: John Sanborn
Treasurer: Michael Pabst
Editor/Historian: Kathy Hrechka
Website: Kathy Hrechka
AMC Conference: open

The society is a member of:
* Eastern Federation of Mineralogical and Lapidary Societies (EFMLS) www.efmls.org
*American Federation of Mineralogical Societies (AFMS) www.amfed.org affiliation

Dues: MNCA Membership **Dues 2025**
$15 (single) or $20 (family) donations
MNCA - Michael Pabst, Treasurer
270 Rachel Drive
Penn Laird, VA 22846

Editor's Note: By Kathy Hrechka
Send your articles and photos to your editor.
Club Article Deadline is the 1st of each month.
***The Mineral Mite* will be emailed by the 5th.**
No newsletter July/August

Inducted into Editor's Hall of Fame – 2018
EFMLS Trophy 2021 Small bulletins

Newsletter inputs:
* David Fryauff
* Jeff Guerber
* Michael Pabst
* Peter Chin
* John Sanborn
* Steve Stuart