



# PNWFM NEWSLETTER

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**We have our own  
logo !!!**

Design by Erin Delventhal





## President's Message

### Jessica Robertson

Hello all! It's nearly summer and PNWFM activities are back along with the warm weather. Just a few weeks ago we had a presence at Seattle Mineral Market (SMM), which was a great time. We held a successful curated auction on Saturday plus silent auctions both days, thanks to auctioneers extraordinaire Sal Noelder and Karen and Gary Hinderman.

We provided educational displays on introductory mineral identification and posters on regional mineralogy that had a consistent flow of folks stopping to admire and take pictures. Our snack booth was bustling and a welcome addition to the event. Most importantly, we spread awareness of the chapter and advanced our organizational mission of spreading education regarding the science and collecting of minerals. See page 3 for photos.

Thank you to everyone who pitched in for donations, planning, logistics, time in the booth, and moral support. Our effort went well enough that we are tentatively planning on a SMM presence again next year, with a better idea of what is needed by PNWFM and how we might partner both with SMM and other local rock and gem clubs to make the event even more exciting and educational.

Coming up this summer we have plans in the works for a return to Washington Pass in August—please watch your email and our website and social media for details to come. Planning for October's symposium is also well underway on the topic of Rare Earth Element Minerals. Some speakers are already confirmed, including Markus Raschke. Registration will open this summer.

In the meantime, have a great summer and get out there and get digging! -Jessica

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## PNWFM at the Seattle Mineral Mart



Pictures by Karen Hinderman and  
Jessica Robertson







## RIP Al Liebetrau

**Our condolences to  
Sue Liebetrau**

Editor's note: Al's obituary will be in the next issue.

Rock  
Chippings

### Nowt so queer as Malachite

The strange forms that malachite can exhibit has been a theme of several recent contributions to the BMS Newsletter. Jeremy Poole has been working with David Green on malachite and cerussite from the Murton Mine, Cumbria. Jeremy's SEM images of malachite raise more questions. Why should the crystals be made up of fibrous sub-crystals in this way?

*Contributor – David Green*

*Via BMS 118, Feb 2023*



## PNWFM Logo



Full Color



Limited Color

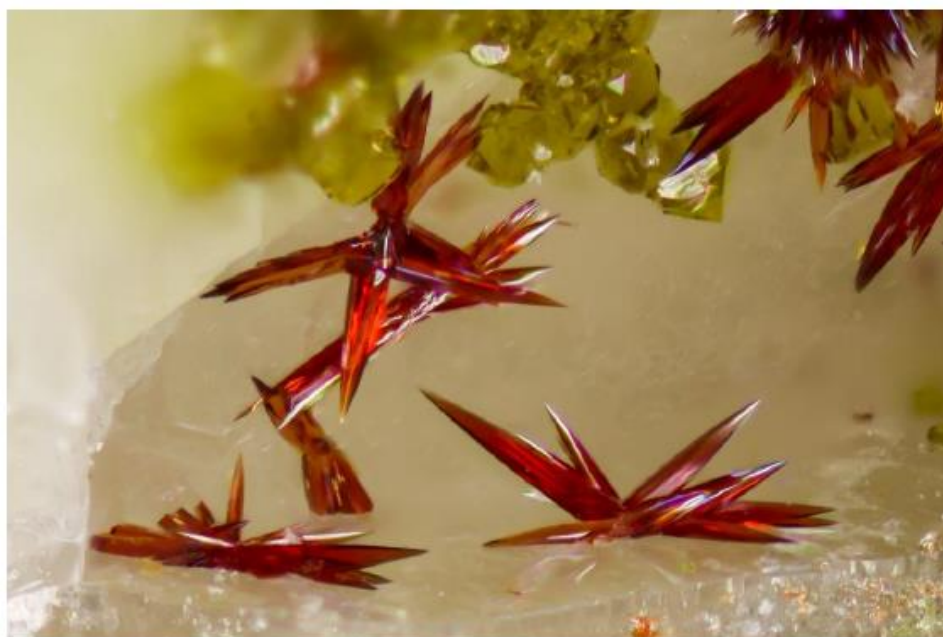


Black and White

After several years of discussion, PNWFM is pleased to unveil our brand-new club logo! Designed by graphic designer and friend-of-PNWFM Erin Delventhal in conversation with the board, our logo is intended to modernize our “look” alongside other new FM chapter logos introduced in recent years, and to feature an eye-catching and idealized “Northwest Classic” mineral combination that appeals to many collectors: pyrite and quartz clusters from King County, Washington.

The quartz points of our idealized specimen are slightly sceptered, and in the full-color version tinted to the amethyst side. Erin also provided simpler versions of the logo, in limited color and in black and white, to be used in applications where lower resolution or smaller formats are desired. If you were lucky enough to attend Seattle Mineral Market, you may have already snagged a canvas tote bag or vinyl sticker featuring the new logo. These merch items will be available for sale at future PNWFM events, and we are working out the details to offer them by mail as well. Drop us a line if you’re interested.

~~~~~



Carminite

Clara Mine

Photo Henk Smeets



## PNWFM Membership Meeting Minutes May 3, 2023

President, Jessica Robertson, opened the zoom meeting with 12 members in attendance. Bruce Kelley gave a treasurer report. He will order a square for our club to use at Seattle Mineral Market and Symposiums.

Secretary, Karen Hinderman, updated members on our plans for Seattle Mineral Market. Our club will have 2 educational display cases. We will have a silent and live auction. We will run the concessions; and, we will have a kid's activity center. Our goal is educational outreach, gain new members, advertise our annual symposium, enjoy mingling with the public, and hopefully make a little money. Jessica will put together a FAQ's sheet to help volunteers answer questions.

Our new club logo was revealed. Erin Delventhal created the new design. We will have bags and stickers with the new logo available at the Seattle Mineral Market and our Symposium.

Markus Raschke has volunteered to be the leader on the annual WA Pass Clean Up and Field Trip. He will be contacting previous organizers for assistance.

Our 49<sup>th</sup> Symposium will be held at the Red Lion in Kelso, WA, on the weekend of October 20 – 22, 2023. Most speakers are confirmed. The symposium committee meets once a month via zoom. If you want to be involved, let one of your board members know and we will sent you the meeting link.

Our 50<sup>th</sup> Symposium is just over a year and a half away. Our theme will be Golden Memories.

Good of the Order: Our sincere condolences to Sue Liebetrau. We have lost a longtime member and friend. Al, may your heavenly collecting days be fruitful.

Many thanks to Don Newsome for a generous donation of Mineral Records and Rocks and Mineral magazines. These will be sold through our auctions at the Seattle Mineral Market and our Symposium.

REMINDER: Beth Heesacker needs articles, reviews, field trip reports, and pictures for the newsletter.



### PACIFIC NORTHWEST FRIENDS OF MINERALOGY 2023 SYMPOSIUM RARE EARTH ELEMENT MINERALS OCTOBER 20-22, 2023 KELSO, WASHINGTON

- *Live in Kelso and Online*
- *Saturday Program of Presentations by National Experts in Rare Earth Element Minerals*
- *Saturday Evening Banquet*
- *Floor and Room Dealers*
- *World Class Mineral Displays*
- *Auctions and Camaraderie*

*Event registration coming soon*



Monazite

**Join PNWFM Today!**  
**PNWFM.ORG**



## **RIP Michael Kokinos**

Nov. 27, 1927 – April 26, 2023

Memorial by Al Wilkins, NCMA President

Sadly, we have learned that long time NCMA member Mike Kokinos passed away last week. He was 95. Mike was a regular attendee at NCMA conferences until fairly recently. Mike was a Life member of NCMA and a past president, treasurer, federation chair, and board member.



Mike was also a past president of the California Federation of Mineralogical Societies and acted as tax advisor to the federation for many years.

Mike had a long history with micromounting, attending the early meetings of the pre-Southern California Micro Mineral Society (SCMM) in 1962 and when the first formal meeting of SCMM was held in 1966, Mike was one of the founding members. In the 1970s, Mike belonged to the informal micromounting group in northern California that later became NCMA in 1982. Along the way, Mike developed an interest in mineral identification techniques including the use of the petrographic microscope in determining the optical properties of minerals. In about 1978 as part of the pre-NCMA activities, Mike initiated Study Group meetings to demonstrate the concepts of mineral identification through optical mineralogy. Over more than 30 years, Mike taught/tutored many collectors in the use of these techniques including many past and present NMCA members.

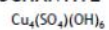
Mike was inducted into the Micromounters Hall of Fame in 2010 and the mineral Kokinosite was named after Mike in 2014.

Mike was a stalwart of NCMA and a longtime friend to many of us and he will be sorely missed.

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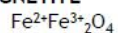
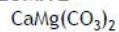
## EYE CANDY

**BROCHANTITE**

Montevecchio Mine, South  
Sardinia Province,  
Sardinia, Italy



IT JX 30 fov 2.25 mm

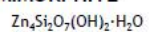
**MAGNETITE****DOLOMITE**

Montevecchio Mine,  
South Sardinia Province,  
Sardinia, Italy



IT JA 28a fov 4.5 mm

Collection of Beth  
Heesacker. Photo-  
graphs and copyright by  
Beth Heesacker.

**HEMIMORPHITE**

Silius Mine?, Iglesias,  
South Sardinia Province,  
Sardinia, Italy



IT JA 26 fov 4.5mm



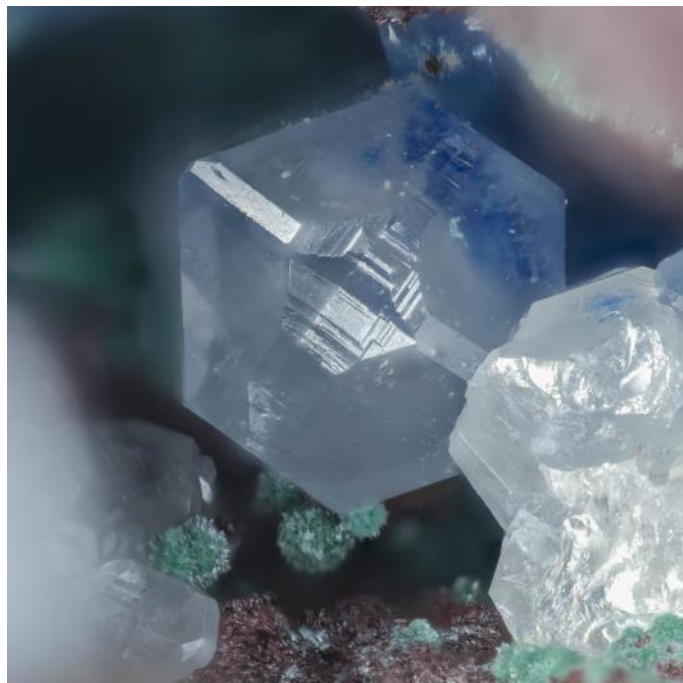


Genthelvite from MP 165, Washington Pass,  
Okanogan Co., WA

FOV: 1.5 mm Collected by Randy Becker,  
Collection and Photo by Bruce Kelley

Linarite in twinned Cerussite and Malachite from  
Grand Reef Mine, Aravaipa Dist, Graham Co., AZ

FOV: 3.7 mm Collected by Ray Lasmanis, Col-  
lection and Photo by Bruce Kelley



Calciohilairite from Liberty Bell talus, Washington Pass,  
Okanogan Co., WA

FOV: 1.6 mm Collected by Randy Becker,  
Collection and Photo by Bruce Kelley



## The Rock Box Mountain

Colleen Thomson

I came to the alarming conclusion yesterday, that one's ability to fill a house with rocks does not lessen as one gets older. The living space, on the other hand, does lessen as a direct inverse proportion to the volume of rocks.

The further conclusion was that if one were to spread the boxes of rocks around the house, that the property would sink evenly. My partner however would disagree (and has done LOUDLY on several occasions) citing the likelihood of being killed by a rockfall in our dining room as reasonable grounds for divorce.... I think that's a little extreme and a bit alarmist. We are not even married. Yet.

But I digress. I was beginning to wonder if I had strayed from collector to hoarder, like a misguided or lost tourist wandering down unknown back alleys and had found myself in a less salubrious and uncharted quarter of my hobby. It was an uncomfortable feeling and not at all what I had in mind when I started out collecting fossils and minerals as a child.

*Tension rises as the tiered rock boxes threaten to avalanche and engulf the innocent homeowners below in mineral bounties from across the world.*

To reassure myself I hadn't yet qualified for hoarder status, I first looked up the definition of a collector. There seems to be a fair amount of research gone into the subject and friendly Wikipedia says: "*The psychology of collecting also offers insight into variance between similar behaviour that can be recognised on a continuum between being beneficial as a hobby and also capable of being a mental disorder*". So that was helpful then.

More helpful was the knowledge that collecting, in all its forms is beneficial for your wellbeing and mental health. People who collect stuff are generally happier, more productive, healthier, have higher energy levels and feel good about themselves and their achievements, according to researchers at Harvard University. Fabulous. Now back to the boxes of rocks taking over the house.

I asked other mineral friends if they too had a similar problem. They ALL laughed. It seems I am not alone and that my rock box mountain is a common theme experienced by the majority of mineral collecting households. I am so relieved by that realisation and that it seems relatively 'normal' in our community.

The rock box mountain for all its towering enormity, is in a constant state of flux. It seems I am regularly 'sorting' minerals. Once again, this seems to be a known thing, that we collectors do. Taking the lid off of a box, or flat of minerals and gazing at the rows of coloured shiny treasures inside is still joyous and magical. The 'sorting' of the minerals may involve moving items between boxes into some sort of order and redoing labels, cataloguing, noting which need photographing, which ones you can live without and need to be rehomed or just marvelling at their beauty.

Whilst 'sorting' I often come across specimens that I had forgotten I had. I'm pretty sure this happens to us all. It's always lovely to take a few minutes to handle them and



get reacquainted with these lovely treasures that captured our interest enough to put away safely in their boxes. Whether the specimen is purchased, traded/swapped or you have collected it yourself. Each has its own story to tell. I think they should be called 'The Rock Box Mountain Stories'. But that's for another time.....

Meanwhile, I've got a load of boxes of rocks to move off the dining room table before the house implodes. Good luck with your own rock box mountains. You are NOT alone.

More information on the psychology of collecting  
[https://en.wikipedia.org/wiki/Psychology\\_of\\_collecting](https://en.wikipedia.org/wiki/Psychology_of_collecting)



*Boxes of rocks on the dining room table.*

*Photo Colleen Thomson*

*Via BMS 118, Feb 2023*



## Recent finds at Graulai Quarry

Henk Smeets

When you live in the very south of the Netherlands, as I do, and are part of a very active group of local micromounters, then the Volcanic Eifel in Germany is our backyard so to speak. The quarries are no more than 150 kilometres away, so just an hour and a half drive to get there. One can easily visit several in a day.

The area is dominated by volcanism which occurred in two time periods. The first period was in the Tertiary, between approximately 46 and 16 million years ago, while the second started in the Quaternary, about 1 million years ago. In the eastern part of the Eifel alone, in the area around the Laacher See (Lake Laach), the locations of some 80 eruptions are known.

The volcanism ended around 10,000 to 11,000 years ago, but there is still detectable volcanic activity in the region. In the lake you can still see emerging gas bubbles, and recent research (Kreemer, Blewitt and Davis, 2020) revealed that ground movements are still detectable, which indicates the presence of a rising mantle plume. The movements are the strongest in the vicinity of Nürburg but can even be measured where I live. Luckily of course there is no threat of an imminent eruption, but nevertheless, an eye is kept on the area.

*Henk made the most of a gap in 2020 lockdown to crack a few basalt boulders and was treated to a feast of micros.*

The *Minerale der Vulkaneifel (Minerals of the Volcanic Eifel, G. Bläß, F.J. Emmerich, 2018)* is available on a DVD and describes forty-nine collecting sites, mainly quarries that deliver basalt and lava for industrial purposes. The DVD states that ninety-nine different minerals are found – or have previously been found - although Mindat only lists 76 species.

Some of the quarries are no longer active, others are no longer accessible for mineral collectors because permission to collect is no longer granted, due to safety and liability issues - brought about to some extent by irresponsible and even destructive behavior of collectors in the past. Luckily the Graulai Quarry in the western part of the Eifel near Hillesheim is a positive exception. Together with five other quarries in the vicinity, the Graulai Quarry is exploited by a company, that until now always grants friendly permission to collect minerals on Saturday afternoons and Sundays. An e-mail to the management, stating the desired date and the number of persons usually suffices to receive a quick response.

The Graulai is like everywhere in the Eifel region in that almost all the minerals found will be micros. You definitely need a good loupe to see what is worth picking up. The collecting sites in the Eifel are a Nirvana for micromounters - but if you prefer larger pieces with crystals of naked eye proportions, you will be quickly disappointed. They just aren't there... In the past slightly larger crystals have been found a few times, but that hasn't been reported for many years. In 2014 I found a cavity of some 4 cm in a



basalt rock piece, which contained 7 mm long natrolite crystals, but that was a one time find, and a huge exception.

Additionally, you need to be lucky enough to be in the right spot at the right time: some parts of the Graulai contain many microcrystals, in other parts there is just nothing interesting. And because of the continuous quarry working, fresh material is never long at hand, as it will be quickly transported to shredding machines for further processing. In the course of the last 30 years my collecting friends and I have been there lots of times, and more than once we found nothing or only cavities with heavily weathered crystals. Other times we were luckier and found one good piece after another.



*Graulai Quarry in June 2020*

*Photo Jacques Feijen*

In 2020, in short periods between Covid-19 lock downs, we were very lucky. Because of the restrictions our first visit was in June, but we managed to go there three times in that summer. As always the good stuff was concentrated in a small part of the quarry, in an area of no more than 10 x 10 m, but that small area turned out to be very rich in cavities in the basalt. They contained a great number of different and freshly crystallized minerals. All the minerals described were found in 2020. Of course, complete certainty about the identity of the minerals can only be obtained by full analysis of the specimens, but all the very experienced collectors in our local group, as well as some other experts, agree on the visual identification of all the specimens. All photos are made by me and can be seen on my website [www.tomeikminerals.com](http://www.tomeikminerals.com).





*Åkermanite, FOV 2 mm*

**Åkermanite** belongs to the melilite group, together with gehlenite, and is therefore a calcium silicate. The tetragonal crystal shape is clearly visible in the photo and the colour is characteristic. Åkermanite is the most common melilite group mineral in the quarry and gehlenite hasn't been found yet. The specimen on the photo has been fully analysed.

**Alumohydrocalcite** is relatively abundant in the Graulai, but it is often weathered. Mostly they are seen as spherical aggregates, sometimes they are arrays of well separated crystals, of a creamy white to faint yellow colour.



*Alumohydrocalcite on nepheline, FOV 1 mm*



*Aragonite on nepheline, FOV 1 mm*

**Aragonite** is very abundant, nearly always completely transparent, pointy and sprayed.



**Calcite** is not as common as one might expect. So far I have only found calcite in scalenohedric habit ("dog tooth") as in the picture.



*Calcite, FOV 5 mm*



*Flörkeite, FOV 2 mm*

**Flörkeite** is thought to be rare, but maybe that's not altogether true. The problem is distinguishing it from the more abundant ball shaped phillipsite, to which flörkeite is chemically closely related. The visual difference is that the end faces of monoclinic phillipsite look like a saddleback roof, while the end faces of triclinic flörkeite are like a flat roof.

**Fluorapatite** is everywhere, as colourless needle like crystals, in this case partly covered by probably phillipsite.

The challenge is to find remarkable and peculiar ones.



*Fluorapatite with (probably) phillipsite, FOV 0.5 mm*





*Gonnardite, FOV 2 mm*

**Gonnardite:** white, ball shaped, woolly appearance - characteristics of the species. Gonnardite is a zeolite, and member of the natrolite subgroup.



*Götzenite with perovskite and nepheline, FOV 2 mm*

**Götzenite:** unless this is an amorphous substance, then götzenite (a "sorosilicate" of titanium with the formula  $\text{NaCa}_6\text{Ti}(\text{Si}_2\text{O}_7)_2\text{OF}_3$ ) is the only candidate for these creamy white, lathlike crystals.



*Magnetite with some fluorapatite needles, FOV 1 mm*

**Magnetite** is mostly small and often dull, but sometimes the tiny crystals are shiny on a nice contrasting background.



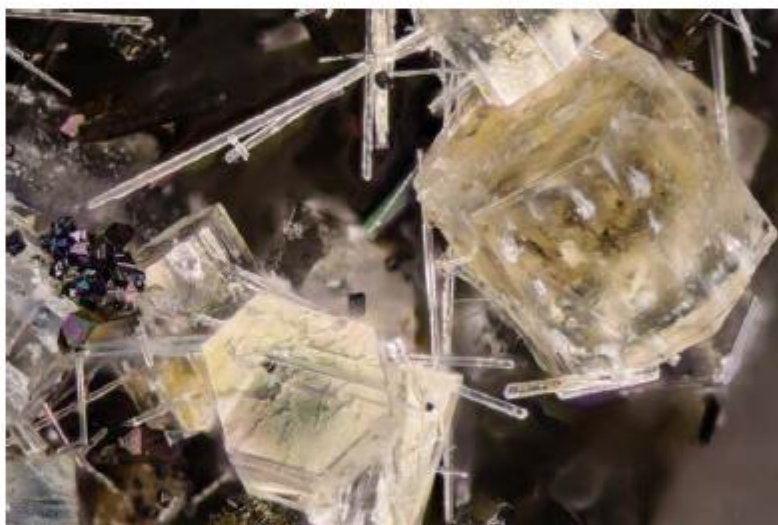


*Natrolite on clinopyroxene, FOV 1 mm*

**Natrolite** forms elongated crystals that can be recognized by their orthorhombic shape with slightly pyramidal end faces. When these are visible, natrolite is fairly easy to distinguish from other similar minerals.

**Nepheline** is even more abundant than fluorapatite.

The hexagonal crystals are unmistakable, and they are almost always transparent – although finding crystals that are unweathered is often a problem.



*Nepheline with fluorapatite and magnetite, FOV 4 mm*



*Perovskite, dendritic aggregate, FOV 3 mm*

**Perovskite** is without any doubt the most wanted mineral in the Graulai. It is found as single or piled blocky crystals, as well as dendritic treelike aggregates. When you see perovskite with its characteristic colour, you can't confuse it with anything else – but finding it in the jumble of many other and larger crystals is another matter.





*Smectite-group on nepheline, with magnetite, FOV 1 mm*

**Smectite** is the group name for a few different clay minerals such as montmorillonite, nontronite and saponite. The orange colour and the caviarlike appearance are conspicuous and that helps the determination – but without full analysis this example can only be named as one of the smectite group.

**Thaumasite** could be confused with other hairy white crystals, like aragonite or ettringite, but the woolly, cottonlike appearance makes thaumasite the most likely identification, – or perhaps this is a member of the ettringite-thaumasite series.



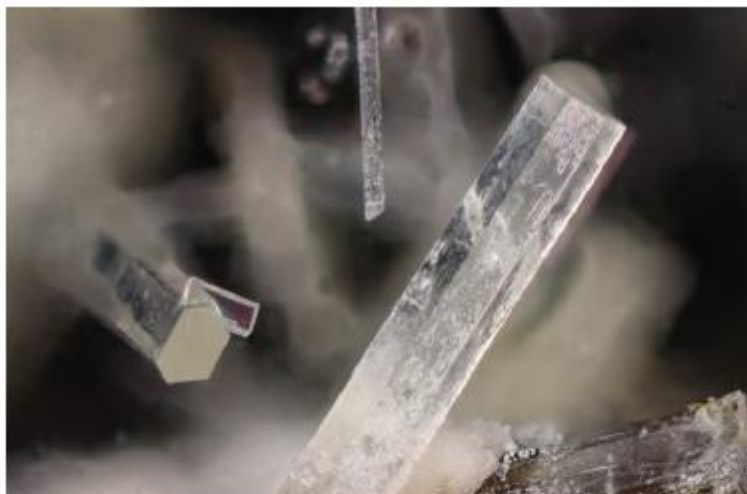
*Thaumasite, or ettringite-thaumasite series, FOV 2 mm*



*Thomsonite on nepheline, FOV 0.5 mm*

**Thomsonite**, or to be precise, thomsonite-(Ca), is relatively abundant in the Graulai, mainly as transparent, smooth ball shaped structures, often coated with other minerals. This peculiar specimen is unmistakably thomsonite, as can be inferred from the flat orthorhombic end faces of the individual crystals which have formed a smooth ball - typical of thomsonite.





*Single willhendersonite-crystal on nepheline, FOV 1 mm*

**Willhendersonite** can only be observed under large magnification. The crystals are tiny, but under the microscope single crystals are recognisable (if you know where to look!). They are so small that they can easily be missed. The triclinic crystals are often almost rectangular, platy and with some thickness.

### Sources

Blaß G. & Emmerich F.J. (2018) Minerale der Vulkaneifel, DVD, Personal edition, F.J. Emmerich, Keulen.

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Schüller W. (2011), Neufunde aus der Eifel (5), 2008-2011: “König der Gipse” in der Graulai. *Lapis*, Jg. 36 (5), p.p. 38-45, Christian Weise Verlag, Munich.

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### Websites

Geopark Vulkaneifel in Daun, [www.geopark-vulkaneifel.de](http://www.geopark-vulkaneifel.de)

Mineralienatlas, [www.mineralienatlas.de](http://www.mineralienatlas.de)

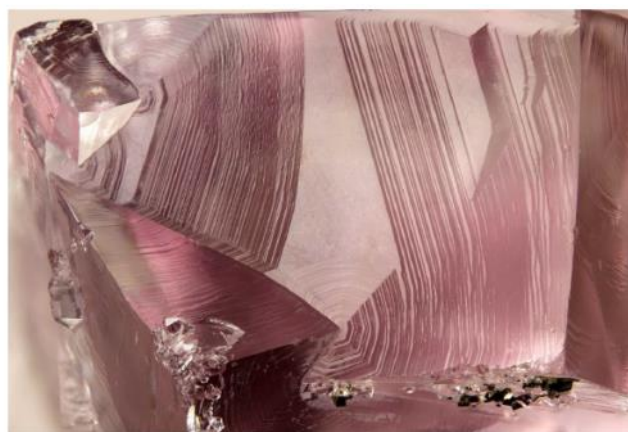
Mineralogy Database, [www.mindat.org](http://www.mindat.org)

Smorf Crystal Models, [www.smorf.nl](http://www.smorf.nl)

Tomeik Minerals, [www.tomeikminerals.com](http://www.tomeikminerals.com)

*Via BMS 118, Feb 2023*

*Via BMS 117, Nov 2022*



*Purple fluorspar from Frazer's Hush Photo John Chapman*



## News from the Rice Museum



**SATURDAY, JULY 1ST**  
**MEMBERS ONLY HOUR FROM 10AM-11AM**  
**GENERAL ENTRY FROM 11AM-5PM**

Great deals on **rocks, minerals, jewelry, and more!** If you are a lapidary artist, or are interested in rough material from the PNW and other localities, this is the time and place to stock up. We will also be cracking **geodes** AND cutting **thunder eggs**.

**Bubbles & Treats PNW** - a mobile soda shop specializing in handcrafted sodas, floats, and lemonades - will be selling refreshments. Enjoy their delicious drinks while exploring all we have to offer. Check out their [menu!](#)

**FREE** entry for **members**. **General admission** for **non-members**. Garage sale items, geodes, and thunder eggs priced individually.

## More Upcoming Events at the Rice Museum

**Saturday, July 15th** - The Gold Rush (a day all about gold)

**Saturday, July 29th** - Gem Carving Workshop with Naomi Sarna

**Saturday, August 26th** - Gem Carving Workshop with Naomi Sarna

The Rice Northwest Rock and Mineral Museum is located 25 minutes from downtown Portland, Oregon, on Highway 26 West at the Helvetia Rd./Brookwood Exit 61B.

26385 NW Groveland Drive,  
Hillsboro, OR 97124



*Via BMS 117, Nov 2022*



*Azurite and gibbsite*

*Hilarion Mine*

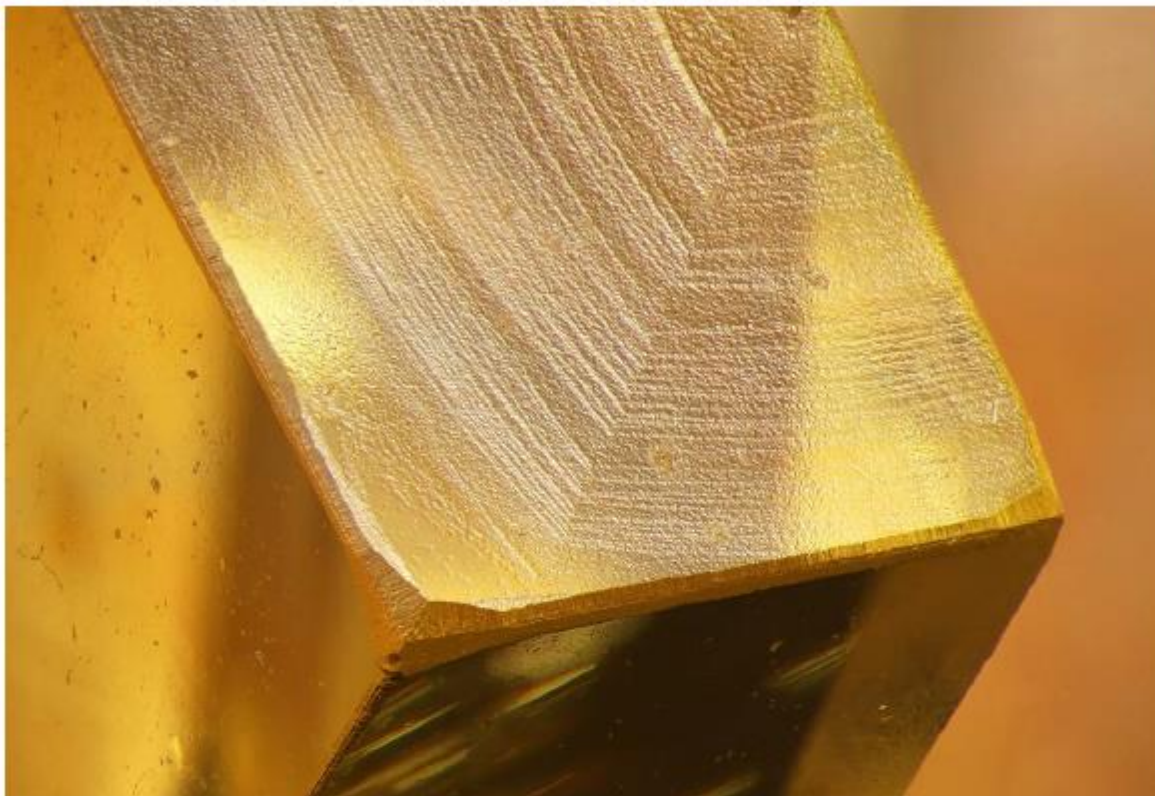
*Photo Henk Smeets*



Enjoy the summer warmth captured in the image by John Chapman of an amber coloured Hilton Mine fluorite on a bed of clear fluorite. This specimen was originally found underground by the Jean Spence and is a lovely example of an interpenetration twin. John has also managed to capture the subtle beauty of the characteristic surface features – look carefully at not only the crystal faces but also the edges and corners of the crystals. John used a Canon EOS 5D Mk II camera with a Luminar 63 mm objective lens and in order to get the depth of field on this specimen (the field of view is 34 mm) John took 126 images at 150 micrometre spacing. The subtle interplay of light and shadow on the crystal faces gives the specimen in this image an almost transcendent quality.

*Continued on next page*





Fluorite

Hilton Mine

FOV 6.6 mm

Photo John Chapman

**John says:** this image of an interpenetration twin crystal of pale amber fluorite shows some fascinating surface features of spiral dislocation. Note also, how the flattened cubic crystal is modified by thin tetrahedral chamfers, with small hexoctahedra at the corners.

The specimen was collected underground by Rick Roberts from Hilton Mine, Scordale, near Appleby, Cumbria. It was in the collection of the late Jean Spence and is now in the David Green collection.

The first image was taken using a Canon EOS 5D MkII camera on a Carl Zeiss (West Germany) Stereomicroscope SV8 with a  $f = 125$  objective lens, x4 zoom, with Schott fibre optic lighting. The close was taken using a Luminar 40.



Close up of the crystal corner FOV 3 mm Photo John Chapman





Wulfenite

Plaka No. 2 Mine Greece

FOV 3 mm

Photo Steve Rust

*Via BMS 116, Jun 2022*

## Nickel and its minerals: Part 2

John Haupt

Following-on from my article on the nickel sulphides/sulphosalts in the last issue, I now look at some of the secondary nickel minerals. After the rather drab grey-black minerals in the last issue, we now have a range of attractive yellow, green and blue minerals. Many are carbonates and/or sulphates with subtle differences in chemistry and are difficult to identify visually. The accompanying images are of micro sized specimens and their identification has not been confirmed by tests.

*Out with the grey and in with the green!*

*John takes us through the gamut of colourful secondary nickel minerals*

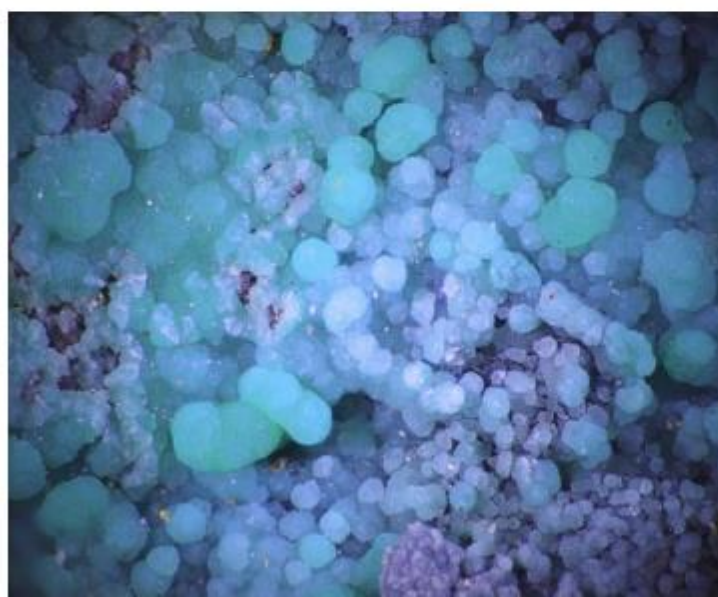


**Annabergite**  $\text{Ni}_3(\text{AsO}_4) \cdot 8\text{H}_2\text{O}$ . The most common nickel species in the arsenate - phosphate group, being recorded from more than three hundred localities world-wide. It commonly forms as attractive green bladed monoclinic crystals. The best specimens have come from the KM3 Mines, Lavrion, Greece (Currier *et al.*, 2010). It was named in 1852 after specimens identified from Annaberg, Saxony, Germany.



Annabergite Lavrion Greece FOV 10mm Photo John Haupt

**Carrboydite**  $(\text{Ni}_{1-x}\text{Al}_x)(\text{SO}_4)_{x/2}(\text{OH})_2 \cdot n\text{H}_2\text{O}$  is a yellowish green to blue-green mineral, occurring as small hemispherical 'balls' and amorphous coatings that have precipitated from groundwaters from oxidised nickel sulphides. First described from the Carr Boyd



Carrboydite 132 North Mine FOV 4 mm  
Specimen Jo Price Photo John Haupt

Rocks Nickel Mine, Western Australia, it has also been found at the 132 North Mine, Widgiemooltha, Western Australia. It was named after the mine (which in turn, had been named after a geological feature - the Carr-Boyd Rocks). They were named by William Carr-Boyd (1852-1925), a prospector who explored the area north of Kalgoorlie in mid 1894, during the early days of the Western Australian gold rushes. Interestingly the only interest at the time was for gold. It was not until 1969 that there was a nickel rush to the same area!

**Gillardite**  $\text{Cu}_3\text{Ni}(\text{OH})_6\text{Cl}_2$  and Paratacamite-(Ni)  $\text{Cu}_4(\text{Ni,Cu})(\text{OH})_4\text{Cl}_2$  A short description of these two halide minerals was given in my article on the atacamite group in newsletters BMS NL 113 & 114.





*Gaspéite rhomb clusters*  
FOV 3 mm

*132 North Mine*  
Photo John Haupt

**Gaspéite**  $\text{NiCO}_3$  forms a series with Magnesite ( $\text{MgCO}_3$ ). Probably the most common secondary nickel mineral, it occurs as aggregates of rhombic crystals, to 0.6 mm, but more commonly in veins and nodular concretions. It is relatively common in the Kambalda nickel mines in Western Australia, with larger masses/seams being used as a lapidary material for cabochons & carvings. It was first described in 1966 in specimens from a nickel prospect on the Gaspé Peninsula, Ontario, Canada.

**Glaukosphaerite**  $(\text{Cu,Ni})_2(\text{CO}_3)(\text{OH})_2$  usually occurs as apple-green to malachite-green spherules consisting of radiating fibres, with a sub-vitreous silky lustre. It is likely that a solid solution exists between glaukosphaerite & nullaginite (see below) (Nickel *et al.* 1994) and it is virtually impossible to identify them visually. It was first described from Kambalda Nickel Mines, Kambalda and has also been found at the 132 North Mine, Widgiemooltha and the Lord Brassey Mine, Heazlewood, Tasmania.

**Hellyerite**  $\text{NiCO}_3 \cdot 5.5\text{H}_2\text{O}$  was first identified from the Lord Brassey Mine, Heazlewood, Tasmania, where it forms as small, attractive pale blue monoclinic crystals.



*Hellyerite Lord Brassey Mine FOV 1 mm Photo John Haupt*

It is unstable and if not kept in an air-tight environment the crystals decompose to an X-ray amorphous, zaraitite-like green phase. (Andersen *et al.*, 2002). It is named in honour of Henry Hellyer (1791-1832), the first Surveyor-General of the Van Diemen's Land Company (an English company that was granted extensive land concessions in the north-west corner of Tasmania in 1825). Hellyer was the first European to explore the rugged inland of north-western Tasmania.

**Hydrohonessite**  $(\text{Ni}_{1-x}\text{Fe}_{3+x})(\text{OH})_2(\text{SO}_4)_{x/2} \cdot n\text{H}_2\text{O}$  Occurs as a bright yellow coating in cavities and on fracture surfaces. It was first identified from the Otter Shoot Nickel Mine, Kambalda and was later found at the 132 North Mine, Widgiemooltha.



**Kambaldaite**  $\text{NaNi}_4(\text{CO}_3)_3(\text{OH})_3 \cdot 3\text{H}_2\text{O}$  forms as small bright green hexagonal crystals and radiating spherical nodules. First described from the Otter Shoot Nickel Mine, Kambalda, it was later found at the I32 North Mine, Widgiemooltha. It is named after the mine locality.

**Nullaginite**  $\text{Ni}_2(\text{CO}_3)(\text{OH})_2$  Occurs as bright green spherules to 1mm diameter, composed of radiating fibrous crystals. First identified from the Otway Nickel Mine, it also occurs at the I32 North Mine, Widgiemooltha and the Lord Brassey Mine, Tasmania. It is also reported to occur at the Ropes Gold Mine, Michigan, USA. It was first described from the Otway Ni Deposit, Nullagine, Western Australia.



*Nullaginite I32 North Mine FOV 1 mm Specimen Jo Price Photo John Haupt*

**Otwayite**  $\text{Ni}_2(\text{CO}_3)(\text{OH})_2 \cdot \text{H}_2\text{O}$  and **Paraotwayite**  $\text{Ni}(\text{OH})_{2-x}(\text{SO}_4, \text{CO}_3)_{0.5x}$   
Otwayite forms as bright green to pale green rosette-like aggregates with a fibrous habit with a silky to waxy lustre and also as spherules, claylike coatings and veinlets in serpentinite. Found at the Otway Nickel Deposit, Nullagine, Western Australia (type locality); the I32 North Mine, Widgiemooltha and at the Lord Brassey Mine, Heazlewood, Tasmania. It was named after Charles Otway, a prospector and owner of the Otway Nickel Mine. Paraotwayite, difficult to distinguish from otwayite, also occurs at the Otway Nickel Deposit, Nullagine. Named from the Greek 'para' for near, and otwayite, for the close compositional and physical similarity to that mineral.



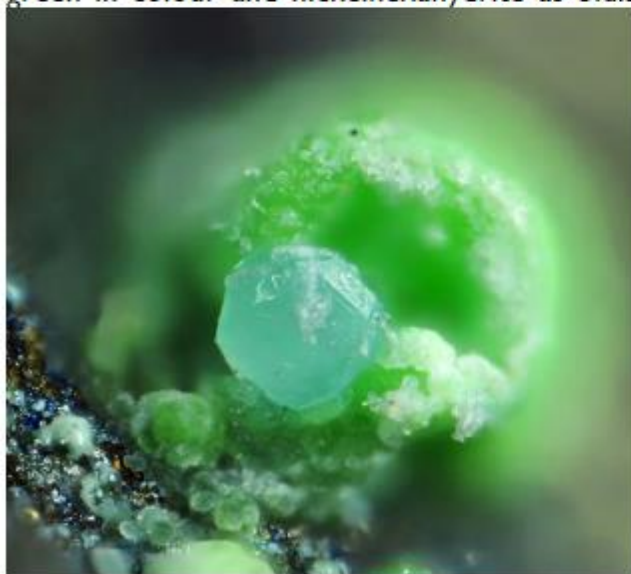
**Reevesite**

$\text{Ni}_6\text{Fe}^{3+}_2(\text{OH})_{16}(\text{CO}_3) \cdot 4\text{H}_2\text{O}$  occurs as bright yellow tiny hexagonal platelets. Specimen localities include the Otway Nickel Deposit, Nullagine, Western Australia & the Cerro Minado Mines, Andalusia, Spain. Named in 1967 in honour of Dr Frank Reeves, a US exploration geologist who found the Wolf Creek meteorite crater (from where it was first identified).



Reevesite Lord Brassey Mine FOV 2 mm Photo John Haupt

**Retgersite-Nickelhexahydrite**  $\text{NiSO}_4 \cdot \text{H}_2\text{O}$ . Retgersite is described as emerald green in colour and nickelhexahydrite as bluish green, both having a vitreous lustre.



Retgersite Lord Brassey Mine  
FOV 0.5 mm Photo John Haupt

Photographed specimens are mostly a pale blue colour. Both species are reported as occurring at the 132 North Mine and retgersite from the Lord Brassey Mine. It was named in honour of Jan Willem Retgers, a Dutch crystallographer.

**Takovite**  $\text{Ni}_6\text{Al}_2(\text{OH})_{16}[\text{CO}_3] \cdot 4\text{H}_2\text{O}$ . Takovite was first described from Takovo, Serbia, as a clay mineral composed of extremely small crystals (about one micron in size), found at the contact zone between limestone and serpentinite. It was later found as a secondary nickel mineral forming as small blue tabular hexagonal crystals at several other localities, e.g. the

Clara Mine and Gottesehre Mine in Germany; Bou Azzer district, Morocco and several nickel localities in the Kambalda Nickel District, Australia. (Pelckmans, 2021).



**Widgiemoolthalite**  $\text{Ni}_5(\text{CO}_3)_4(\text{OH})_2 \cdot 5\text{H}_2\text{O}$  occurs as spheroids to 2 mm diameter, consisting of small blue-green silky crystals at the I32 North Mine, Widgiemooltha. It is virtually identical in appearance to glaukosphaerite and nullaginite.



*Widgiemoolthalite on Gaspéite I32 North Mine FOV 1 mm Photo John Haupt*

**Zaratite**  $\text{Ni}_3(\text{CO}_3)(\text{OH})_4 \cdot 4\text{H}_2\text{O}$ . An emerald-green amorphous mineral, forming as botryoidal coatings similar to 'hyalite' (opal-AN). It is relatively common at the Lord Brassey Mine, Tasmania, where it forms from the decomposition of heazlewoodite. It commonly shows shrinkage cracking from dehydration.

#### Acknowledgements:

Thank you to Jo Price and Steve Sorrell for the photographs/specimens. I also recognise the significant work of Dr Ernie Nickel (1925-2009) of the CSIRO and IMA for his research on the nickel deposits and their mineralogy in Western Australia (see Birch, 2009).

#### References:

The references include information on the two main localities referred to in this article - The I32 North Mine and the Lord Brassey Mine.

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Currier R., Rantos, L, Möller, S., Neutkens, H., Haas, P. (2010) Annabergite. revision 1.0. Mindat Best Minerals Project, article "mesg-66-138387".

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# CRYSTAL RESEARCH

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## MINERAL COLLECTION FOR SALE

Crystal Research, in Olympia, Washington, is closing its laboratory and selling its mineral collection, consisting of

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- The locality sets include a few large showy specimens such as fluorite crystals from Roseclaire and a 6" x 7" x 13" water-clear halite cleavage from Carlsbad.

Visits to our laboratory can be arranged, beginning in July. We will conduct an email version of a silent auction during the rest of the year. Preference will be given to bids for the whole collection. We will next consider the best bids for a whole sub-collection, such as the Dana collection. We do not plan to sell individual specimens or specimens from a single locality.

For further information, or to arrange a visit, contact Paul Shlichta, Crystal Research, 9112 Tucker Road SE, Olympia, WA 98513 at [query@crystal-research.com](mailto:query@crystal-research.com) or call (360) 459-2455.

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Highway 14 near  
Cook, WA.

Collected by Jon  
Gladwell

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**CACOXENITE**  
 $\text{Fe}^{3+}_2\text{AlO}_6(\text{PO}_4)_{17}(\text{OH})_{12} \cdot 75\text{H}_2\text{O}$

Capoterra, Cagliari  
 Province,  
 Sardinia, Italy

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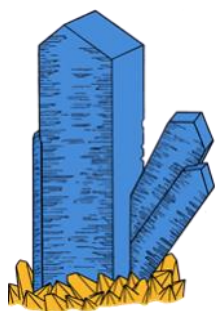


IT JA 51a fov 4.5 mm



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### **2023:**

**NW Micro Mineral Study Group - November, Nov. 11**  
**Sons of Norway Columbia Lodge**  
**2400 Grant St,**  
**Vancouver, WA 98660**

**PNWFM Symposium - October 20-22**  
**Red Lion Inn**  
**510 Kelso Drive**  
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### **2024:**

**Pacific Micromineral Conference (MSSC) - TBD**  
**Fallbrook Gem & Mineral Museum**  
**123 W. Alvarado St.,**  
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**NW Micro Mineral Study Group - May 11**  
**Sons of Norway Columbia Lodge**  
**2400 Grant St,**  
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**Seattle Mineral Market - TBD**  
**SATURDAY 10:00AM-6:00PM**  
**SUNDAY 11:00AM-5:00PM**  
**The Hangar 30 building at Magnuson Park**  
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**NCMA - May 24-26**  
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