

Northwest
Micro Mineral
Study Group



MICRO PROBE

Spring, 2018

VOLUME XII, Number 7

SPRING MEETINGCAMAS, WASHINGTON

May 19, 2018

9:30 am to 4:30 pm

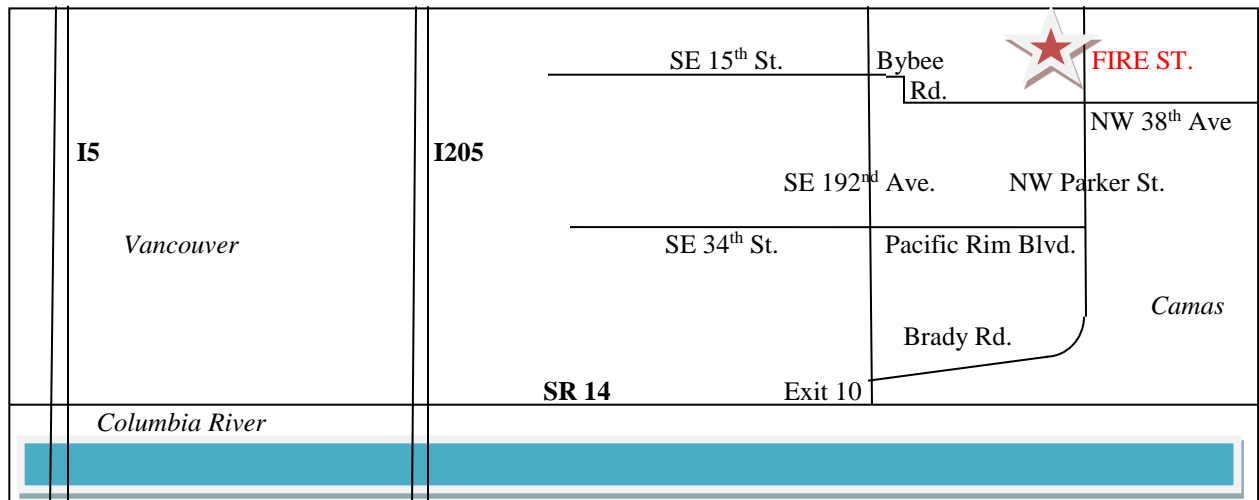
Camas-Washougal Fire Station #42
4321 NW Parker Street
Camas, Washington

We have a later-than-usual meeting date due to scheduling conflict with the fire station in Camas, but will be gathering there again to fellowship, swap stories, and look at minerals. We hope to see you all there.

To get there, from north or south, take I205 and come off onto SR14 just north of the Columbia River headed for Camas. From the east, you are already on SR14. Take exit 10 onto SE192nd Ave. An immediate right turn will put you on Brady Rd., which will soon swing around to become Parker St. There are name changes on streets between Vancouver and Camas, but don't let that throw you!

Bring microscopes and things for the give-away tables as usual. We will have the Club provide sandwich makings (bread, meat, lettuce, cheese, dressings, and coffee, tea, cocoa) for our lunch potluck: Please bring salads, chips, pop, nuts, chili, cookies, pie, or cake to add to the lunch.

After lunch, we will again try to have a picture-sharing time. Do bring the pictures you have to add to the presentation. We would love to see them. We will have the computer-projector set up.



IN MEMORY OF RUDY TSCHERNICH

It was with great sadness and a sense of profound loss that I learned of the passing of Rudy Tschernich on the day after Christmas, 2017. Rudy was a prime mover in the establishment of our Study Group, and one of the last of the founding members. He served for a number of years as our President, but more than that, he was our motivator and encourager, and was always a positive influence to get us to move forward in studying and documenting our collecting locations.

Rudy was born and raised in Snohomish, Washington, and he returned there after schooling to work for the U. S. Postal Service during the week and to visit as many collecting sites as he could on week ends and holidays. His interest started out with the quartz crystals of Denny Mountain, but soon switched to the zeolite minerals that were coming out of places like Skookumchuck Reservoir, Kosmos, and Mount Solo.

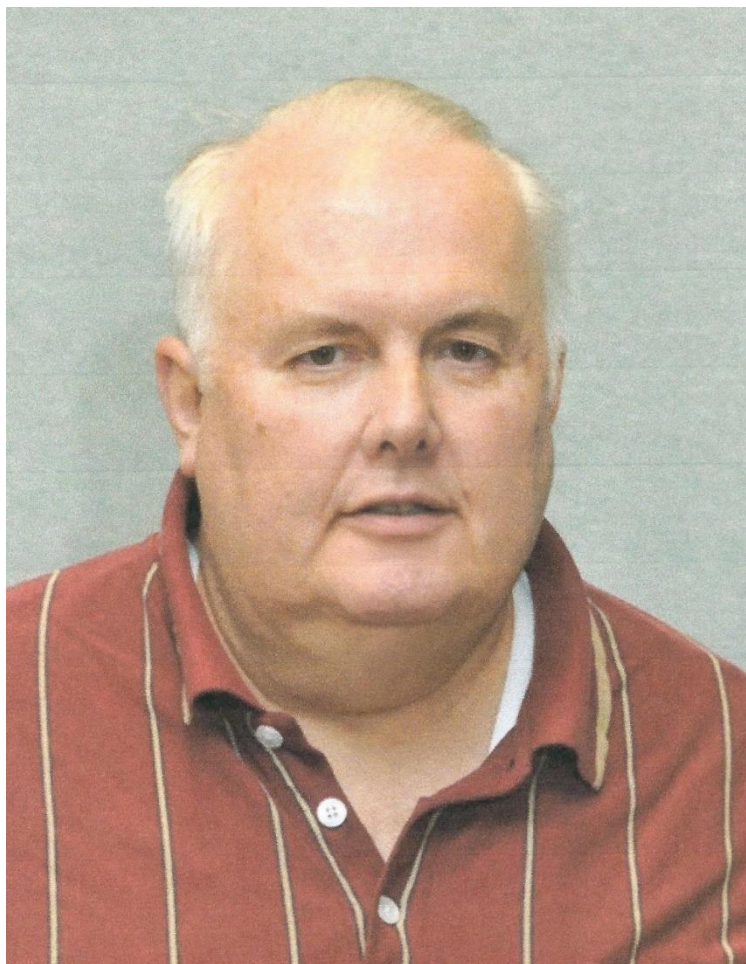
And, due to the efforts of the newly formed Study Group, coming out of Goble. He took an interest in doing the work necessary to get the newly found vanadium mineral published. The intent was to name it after John Cowles, who had found it. But midway through the process, they became aware that similar material had been found at Owyhee Reservoir. A compromise was reached, and the mineral was named cavansite with both places given as co-type localities.

Collecting went on at Goble. He found some nice little tetragonal pyramids that were entered into his collection labelled apophyllite. He also began to realize that not all of the fuzzy linings of cavities were thomsonite, so together with Bill Wise, he was again involved in naming a new mineral, and this one did become cowlesite. It has proved to be a wide-spread zeolite mineral that had simply been overlooked and misidentified.

Years later, with much more experience in identifying minerals under his belt, he took another look at those bipyramids and realized that the angles were wrong for apophyllite. An X-ray by Russ Boggs soon proved that the material was a new mineral, and the group went back to work at Goble to uncover where it had come from. The basalt there was hard, and many a bent chisel came out of the effort. Bob Boggs spent a whole week prospecting, and came up with the right spot, and enough material was obtained to complete the work in characterizing the new mineral as tschernichite. In the process, a second new mineral was uncovered, ironically also first ascribed as thomsonite, and that one became boggsite. Rudy put considerable effort into obtaining enough material to complete the characterization.

One of Rudy's main themes was to scout out and document as many of the zeolite collecting sites as possible. He visited as many as he could and located numerous new ones in the process. He kept contacts that alerted him when activity was happening at various quarries and passed that information along to the Group so that we could take advantage of fresh material. This included collecting at the Mill Creek Quarry, along Big Tree Creek in Yacolt, at Wolf Point and various other sites around Mt. St. Helens, and at various sites in the Capitol Forest. He recognized that the usual mineralogical literature was not open to publishing reports on sites that did not represent new minerals, so he encouraged us to use our Microprobe to do that documentation, and he contributed articles regularly to that end. That grew into a desire to collect the information into a book that would preserve it for later generations to use.

The gathering of information leading to the publication of *Zeolites of the World* spanned several years and involved traveling all over the world visiting sites, museums, universities, and people. His scope expanded far beyond just the localities of the Northwest. It was a huge effort to gather information, pictures, diagrams – the sorts of practical data that would be of use to collectors and research scholars alike. That the project got completed in such a magnificent way is a tribute to his resolve and tenacity. A preview, the text of the section on Cowlesite, appeared in the *Microprobe*, Vol. VI, #2 in the Fall of 1986 in an issue commemorating the life of John Cowles. The completed book was published by Geoscience Press in 1992.



Upon his retirement from the U. S. Postal Service in 2003, Rudy moved from Snohomish, Washington to Hillsboro, Oregon and joined the Rice Museum as its Curator, bringing his extensive collection of zeolites with him. There he served until 2011, supervising the establishment of a wing of Northwest Minerals and generally promoting learning experiences for the young people of the area.

Upon leaving the Museum, he moved to the Yakima area where he lived out the rest of his days. He was still interested in zeolites, setting up a system and photographing many of the specimens from his collection at the Museum as well as upgrading references on the Mindat.org website. He was in active contact with other collectors around the world that had located new places where Tschernichite had been discovered.

He also developed an interest in the minerals of the Golden Horn Batholith at Washington Pass, and helped organize an illustrated list of unknown minerals from that site in an effort to get more of them identified.

Rudy was active in photographing and promoting minerals to his very last days. He has made a tremendous impact on mineral collecting throughout the Northwest and his wisdom and guidance will truly be missed. He has been an inspiration to many of us that we will hold dear.

Donald Howard

Zeolites of the World Update

Don Howard

Rudy's monumental book on zeolites is a living tribute to him. Published in 1992, it unfortunately needs updating from time to time as new members are added to the zeolite group of minerals.

Zeolite minerals were originally understood to be those that had aluminum silicate frameworks with loosely held water molecules and easily replaced monovalent or divalent cations. That definition was expanded by IMA in 1998 to include minerals with related structures, including beryllium phosphates and some anhydrous minerals. Rudy reported on the new definitions in the *Microprobe*, Vol. VIII, #2, pages 2-6 (1998). At that time, the number of minerals considered separate zeolite species was greatly increased. These additions and changes were obviously not a part of *Zeolites of the World*.

In order to complete the data for zeolites, an update to Rudy's book was required. We undertook that task beginning in 2005. We chose to keep the same general format used in the book and prepare data sheets for each mineral. The results appeared in successive issues of the *Microprobe*, Vol. X beginning in #2 and continuing through #7. Since that time (2008), several more minerals have been added to the zeolite group. It therefore seemed appropriate, as a tribute to Rudy, to include a further update as part of this issue.

There appear to be six more minerals included in the zeolite group. Two of these, *Direnzoite* and *Florkeite*, are hydrated aluminum silicates that would have been included under the old definition. Two others, *Alflarsenite* and *Ferrochiavennite*, are hydrated beryllium silicates. The latter is a variant of the previously approved mineral chiavennite in which iron replaces the manganese. It is not clear whether this site is one that is easily exchanged. The fifth mineral, *Kirchhoffite*, is an anhydrous boron silicate. The final one, *Wenkite*, is interesting in that it is a hydrated aluminum silicate but contains a sulfate radical as well. The previous rules allowed for the presence of hydroxyl and fluoride sites but not for other acid radicals. Detailed sheets for these six minerals are given on the following pages.

In addition, several new members of the zeolite subgroups have been recognized:

CHABAZITE

Chabazite-Mg

Type locality: Karikas Hill Quarry, Bazsi, Veszprem Co., Hungary

Other localities:

Island Magee, Co. Antrim, Northern Ireland

DACHIARDITE

Dachiardite-K

Type locality: Momchilgrad Obshtira, Kardzhdi, Bulgaria

MAZZITE

Mazzite-Mg

Type locality: Mont Semiol, Chatelneuf, Loire, France

Other localities:

Michelnau Basalt Works, Nidda, Vogelsberg, Hesse, Germany

(This was originally credited as mazzite-K, which is no longer listed.)

PAULINGITE

Paulingite-Na

Type locality: Port Ganny, Giant's Causeway, Co. Antrim, Northern Ireland

Alflarsenite



Named for Alf Olaf Larsen for his extensive contributions to the mineralogy of the syenite pegmatites of the Larvik plutonic complex, Norway.

Type locality: Tufton quarry, Tvedalen, Larvik, Vestfold, Norway.

Structure

Crystal System: Monoclinic, Sphenoidal (2)

Space Group: $P2_1$

Crystal axes: $a=7.123 \text{ \AA}$
 $b=19.856 \text{ \AA}$
 $c=9.800 \text{ \AA}$
 $\beta=111.03^\circ$

Type of Structure:

Physical Properties

Color: colorless

Streak: white

Luster: vitreous

Hardness: 4

Density: 2.605 g/cm^3

Fracture: irregular/uneven

Cleavage: none observed

Twinning: occurs on $\{001\}$

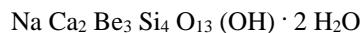
Fluorescence:

Morphology

Bladed, flattened on (010) and elongated on [100].

Forms: $\{010\}$, $\{001\}$, $\{201\}$

Chemical Composition



Occurrence

Bladed crystals in a syenitic pegmatite.

Norway

In Tuften 1 and Tuften 2 Quarries, Tvedalen, Larvik, Vestfold, Norway.

References:

1. Raade, G. Grive, J.D. & Cooper, M.A. *Alflarsenite, a new beryllium-silicate zeolite from a syenite pegmatite in the Larvik plutonic complex, Oslo Region, Norway*, **European Journal of Mineralogy**, **21**, 893-900, (2009).
2. Grive, J.D. Raade, G. & Cooper, M.A. *Alflarsenite: Structure and relationship to other Be-Si and zeolite framework structures*, **Can. Min.** **48**, 255-266, (2010).

Optical Properties

Refractive Index:

$$n_\alpha = 1.578$$

$$n_\beta = 1.580$$

$$n_\gamma = 1.583$$

biaxial positive

$$2V = 76^\circ \text{ to } 82^\circ$$

Direnzoite

$\text{Na K}_6 \text{Mg Ca}_2 (\text{Al}_{13} \text{S}_{47} \text{O}_{120}) \cdot 36 \text{H}_2\text{O}$.

Named for Francesco Di Renzo, zeolite expert at the Ecole Nationale Supérieure de Chimie de Montpellier, France.

Type locality: Mt. Peylenc, Haute-Loire, France.

Structure

Crystal System: Orthorhombic class: dipyramidal (2/m 2/m 2/m)

Space Group: Pmmn

Crystal axes: a=7.5792 Å

 b=18.201 Å

 c=26.154 Å

Type of Structure:

Physical Properties

Color: colorless

Streak: white

Luster: vitreous, silky

Hardness: ~4.5

Density: 2.12 g/cm³

Fracture: splintery

Cleavage: distinct/good along the [010]

Twinning: none

Optical Properties

Refractive Index:

$\alpha =$

$\beta =$

$\gamma =$

2V =

Morphology

Spherical aggregates of fibrous microcrystals found in cavities in a xenolithic rock.

Forms:

Chemical Composition

$\text{Na K}_6 \text{Mg Ca}_2 (\text{Al}_{13} \text{Si}_{47} \text{O}_{120}) \cdot 36 \text{H}_2\text{O}$.

Occurrence

France

Mt. Peylenc, Saint Pierre Eynac, Haute-Loire

References:

1. Galli, E., Gaultieri, A.F., *Direnzoite, a new zeolite from the Massif Central (France): Description and crystal structure*. Am. Min. **93**, 95-102 (2008).

Ferrochiavennite

$\text{Ca}_{1-2} \text{Fe} (\text{Si}, \text{Al}, \text{Be})_5 \text{Be}_2 \text{O}_{13} (\text{OH})_2 \cdot 2 \text{H}_2\text{O}$, $Z = 4$

The iron-dominant analogue of chiavennite.

Type locality: Blafjell, Langangen, Telemark and Tuften Quarries, Tvedalen, Larvik, Vestfold, Norway.

Structure

Crystal System: Monoclinic prismatic (2/m)

Space Group: $P2_1/b$

Crystal axes: $a=8.759 \text{ \AA}$
 $b=4.864 \text{ \AA}$
 $c=31.258 \text{ \AA}$
 $\beta = 90.31^\circ$

Type of Structure: Interrupted framework zeolite.

Physical Properties

Color: beige, pale-yellow, pale green

Streak: white

Luster: vitreous

Hardness: 3

Density: 2.67 g/cm^3

Fracture: irregular/uneven

Cleavage: none observed

Twinning: common on $\{100\}$

Fluorescence: none observed

Optical Properties

Refractive Index:

$\alpha = 1.583$

$\beta = 1.589$

$\gamma = 1.602$

biaxial positive

$2V = 62^\circ$

Morphology

In syenite pegmatite as beige to pale yellow spherules about 2mm in diameter (Blafjell). Very pale green spherules up to 1mm across, often only in the rim with tvedalite in the core (A/S Granit Quarry).

Chemical Composition

$\text{Ca}_{1-2} \text{Fe} (\text{Si}, \text{Al}, \text{Be})_5 \text{Be}_2 \text{O}_{13} (\text{OH})_2 \cdot 2 \text{H}_2\text{O}$

Occurrence

Norway

Found in two places: the E18 roadcuts at Blafjell, Kokkersvold, Langangen, Porsgrunn, Telemark, and in the A/S Granit Quarry, Tusten, Tvedalen, Larvik, Vestfold.

References:

1. Grice, J.D., Kristiansen, R., Friis, H., Rowe, R., Poirier, G.G., Selbekk, R.S., Cooper, M.A., & Larsen, A.O., *Ferrochiavennite, a new beryllium silicate zeolite from syenite pegmatites in the Larvik Plutonic Complex, Oslo region, Southern Norway*, **Can. Min.** **51**, pg 285-296, (2013).

Florkeite



Named in honor of German mineralogist and crystallographer Otto Wilhelm Florke.

Type locality: Caspar Quarry, Bellerberg volcano, Ettringen, Eifel, Germany

Structure

Crystal System: Triclinic class: pinacoidal -1

Space Group: P-1

Crystal axes: a=19.965 Å
b=14.271 Å
c=8.704 Å
 $\alpha=88.37^\circ$
 $\beta=125.08^\circ$
 $\gamma=89.57^\circ$

Type of Structure: a triclinic zeolite closely related to monoclinic phillipsite, with the triclinic distortion related to Al-Si ordering.

Physical Properties

Color: colorless

Streak: white

Luster: vitreous

Hardness: ?

Density: 2.270g/cm³

Fracture: irregular, uneven

Cleavage: poor/indistinct on {001 }

Optical Properties

Refractive Index:

$$\alpha = 1.506$$

$$\beta = 1.514$$

$$\gamma = 1.518$$

biaxial negative

$$2V = 71^\circ$$

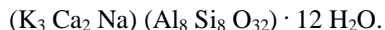
non-pleochroic

Morphology

Subparallel, short prismatic, pseudomonoclinic crystals

Forms:

Chemical Composition



Occurrence

Germany

Occurs with wollastonite and tobermorite in a pyrometamorphically modified Ca-rich xenolith enclosed in leucite-tephritic lava at Caspar Quarry on the Bellerberg volcano at Ettringen, Eifel, Germany. Associated zeolites include willhendersonite, gismondine-(Ca), and thomsonite. Also found in the same general area at Feuerberg, Lohley, Rother Kopf, and Graulei.

References:

1. Blass, G, Graf, H. W, Kolitsch, J, & Sebold, D, *The new finds from the volcanic Eifel (II)* **Mineralien-Welt** **20** (2) 38-49. (2009).
2. Lengauer, C.L, Kolitsch, U, Tillmanns, E, *Florkeite, K₃Ca₂Na[Al₈Si₈O₃₂]·12H₂O, a new phillipsite-type zeolite from the Bellerberg, East Eifel volcanic area, Germany*, **Eur. J. Mineral.** **21**, 901-913. (2009).
3. Ternes, B, *Florkeite – ein neuer Zeolith und seine Begleiter am Bellerberg-Vulkan*, **Lapis**, **35** (10), 28-29. (2010).

Kirchhoffite

$\text{Cs B Si}_2 \text{O}_6$, $Z = 16$

Named in 2010 for Gustav Kirchhoff (1824-1887) who was co-discoverer of cesium, developer of chemical spectroscopy, electrical circuitry, and black body radiation theory.

Type locality: Dara-i-Pioz Glacier, Tien Shen Mountain, Tajikistan.

Boron analogue of tetragonal pollucite.

Structure

Crystal System: Tetragonal (pseudocubic) ditetragonal dipyramidal (4/mmm)

Space Group: $I4_1/a$

Crystal axes: $a=13.019 \text{ \AA}$

$c=12.900 \text{ \AA}$

Type of Structure: Similar to pollucite and high-temperature leucite. There are two tetrahedrally coordinated sites, the larger occupied by Si and the smaller occupied by B. The 12-coordinated Cs occupy channels along [111] formed by six-membered rings of tetrahedra.

Physical Properties

Color: colorless

Streak: white

Luster: vitreous to sub-vitreous

Hardness: 6-6.5

Density: 3.622 g/cm^3

Fracture: conchoidal

Cleavage: none observed

Twinning:

Optical Properties

Refractive Index:

$n_o = 1.592$

$n_e = 1.600$

uniaxial positive

2V

Morphology

Colorless, equant grains 10 to 80 μm in diameter

Chemical Composition

$\text{Cs B Si}_2 \text{O}_6$

Occurrence

In pegmatitic veins.

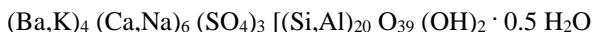
Tajikistan

Dara-i-Pioz Glacier, Tien Shen Mountain, Region of Republican Subordination.

References:

1. Agakhanov, A.A., Pautov, L.A., Karpenko, Y.V., Sokolova, E. & Hawthorne, F.C., *Kirchhoffite IMA 2009-094*, CNMNC Newsletter, *Mineralogical Magazine* **74**, 375-377 (2010).

Wenkite



Named in honor of Eduard Jean Louis Wenk (1907-2001), geologist and professor at the University of Basel, Switzerland.

Type locality: Candoglia Marble Quarries, Ossala Valley, Verbano-Cusio-Ossala Province, Italy.

Structure

Crystal System: Hexagonal

Zeolite group, Gmelinite-Offretite subgroup

Space Group:

Crystal axes: $a=13.51 \text{ \AA}$

$c=7.46 \text{ \AA}$

Type of Structure:

Physical Properties

Color: light grey

Streak: white

Luster: vitreous, pearly

Hardness: 6

Density: 3.19-3.24 g/cm³

Fracture:

Cleavage: poor/indistinct

Twinning:

Optical Properties

Refractive Index:

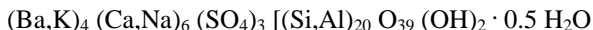
$N_O = 1.596$

$N_E = 1.589$

uniaxial negative

Morphology

Chemical Composition



Occurrence

Italy

Candoglia Marble Quarries, Ossala Valley, Verbano-Cusio-Ossala Province.

Sweden

Garpenberg Norra Mine (north), Hedemora, Dalarna.

Jakobsberg Mine, Nordmark district, Filipstad, Dalarna.

References:

1. Papageorgakis, J., *Wenkit, ein neues Mineral von Candoglia, Schweizerische, Mineralogische und Petrographische* **42**, 29-274 (1962).
2. Fleischer, M., *New mineral names*, **Am. Min.** **48**, 209-217 (1963).
3. Wenk, H.-R., *New -ray data for wenkite*, **Schweizerische Mineralogische und Petrographische Mitteilungen** **46**, 85-88 (1966).
4. International Mineralogical Association, *Commission on new minerals and mineral names*. **Min. Mag.** **36**, 131-136 (1967).
5. Yanulova, M.K., Baigulov, E.M., & Zaitseva, R.P., *Wenkitr in ores from the Karagaila deposit*, **Zapiski Vsesoyuznogo Mineralogicheskogo Obshchestva** **100**, 492-498 (1971) (in Russian).
6. Wenk, H.-R., *The structure of Wenkite*, **Zeitschrift für Kristallografie** **137**, 113-126 (1973).
7. Merlino, S., *The crystal structure of wenkite*, **Acta Cryst.** **B30** 1262-1266 (1974).
8. Lee, F., *The submicroscopic structure of wenkite*, **Am. Min.** **59(9/10)** 1135-1136 (1974).

My Long Journey into Micro Mineral Photography

By Beth Heesacker

It all started with a presentation by Don Howard and Gerry Petitmermet at the Clackamette Mineral and Gem Club a number of years ago. That brought me to the Micro Mineral Study Group. It was not long before I was hooked by the beauty of those very tiny mineral crystals. I knew I needed a microscope if I was going to get a good look at these minute beauties. I figured that I might as well be able to see them on my computer, so the only choice was a trinocular microscope. So, I acquired an AmScope. That lasted for a while, but I found out that the pictures were not the quality that I was looking for due to the focal length problem and found out about stacking.

All the stacking setups that I had seen seem very complicated and very expensive. So, my next purchase was a Dino-Lite with stacking built into it. Expensive but a lot less than the thousands of dollars it would take to purchase or build my own stacking camera setup. And I got some beautiful pictures, so was on my way.

But then I suggested that the Micro Mineral Study Group to sponsor a micro mineral room at the 2017 Pacific North West Friends of Mineralogy Symposium and Doug Merson and Bruce Kelley brought their complete photography setups to demo for visitors. Ok, I fell in love.

I began my research and kept notes in a Word file, copying interesting pictures and paragraphs from websites into the file.

First, I wanted to find out what cameras were usually used in micro/macro photography. I found some articles on the internet about micro mineral photography on Mindat and other websites. I also found many more websites focused on the macro photography of insects. My first confusion was the use of the two words “micro” and “macro”. “Micro” is appropriate term to use for the very small minerals. “Macro” is used for photography of flowers, bugs, etc. close-up.

There seemed to be many approaches to the building of the right photography setup: camera plus various macro lenses, camera plus microscope objectives, camera and extension tubes, telephoto lenses or any combination of pieces. The camera seemed to be the logical place to start. After visiting websites of people who had won awards for their photography there seemed to be a pattern in camera choice, Canon or Nikon. I wanted something that would do the best for as long as I would need it for a reasonable price. I check websites and local camera stores and found a used Canon Rebel T6i, which was one step back from the latest and greatest, at a local store for a very good price. It came with the regular lens which was ok since if this did not work out I could still use the camera and lens for my regular photography.

Now I must admit I do not know anything about settings on a camera. I need something I can set and forget. This also helped make my decision. This camera was easy to use which was what I needed.

Now for the lens. Here there were even more decisions. Macro, macro zoom, extension tubes, telephoto, microscope objectives or some combination. In my research I came upon a Canon macro zoom MPE-65mm 1x-5x but from what I read it was hard to use. Now, remember I was reading mostly insect photography websites and could see where using a zoom lens while trying to photograph a “zooming” insect could be a problem. I figured that having the camera fixed (other than the movement of the stacking rail) might make this lens easy to use and the zoom capability would give me more magnification. Again, set and forget. I found one on Ebay for a decent price so that was my second purchase.

I tried it out on the camera taking pics of small print and other small objects and was very satisfied but then I had to make an even bigger decision. During all this time I was in email discussions

with Doug Merson and Bruce Kelley asking for and receiving advice. I am very indebted to them for their help. I was advised to get Mitutoyo microscope objectives if I wanted to go to the next level.

They are expensive. This took a while longer as I lurked around Ebay checking on availability and price. I finally found what I was looking for from separate sellers, a Mitutoyo M Plan Apo 5 objective and a Mitutoyo M Plan Apo 10 objective. Can't have too much magnification, can we? Mating the objectives to the lens was interesting but I found the right pieces on Ebay again to mate the 26 mm objective to the 58 mm lens.



I had all the camera portion of the setup. Now to how to mount. In the past when I had thought about this whole operation I came across a very heavy moveable stand from a store near me called Surplus Gizmos which sell surplus bits and pieces of all kinds: mechanical, electrical, etc. I had also purchased various small stages including x, y, z, rotational and tilt ones adjustable with micrometers from Surplus Gizmos. I will attach this column of stages together with carpet tape so they do not move.

I had originally wanted to mount everything horizontally but after some discussion with Doug and Kelley I chose vertically. Let

gravity help hold it all still during the taking of the pictures. No need to prop up the heavy lenses, etc.



Lighting was the easiest part: four \$10 Ikea led lamps with a diffuser (vellum project book cover from Office Depot copy department).

I had originally planned on manually moving either the stages or the camera but decide that after spending this much I might as well get stacking rails and the software to computerize the whole process. I settled on the Cognisys StackShot rails since they were headquartered in the USA and I would not have to pay customs and Zerene Stacker software due to their helpfulness in multiple emails and a special they ran on Black Friday.



My husband helped me mount the Zerene Stacker on the stand and then mounting the camera on the stacking rails was easy. I also hooked up the shutter cable and set the whole up on a heavy piece of granite on my very heavy table.

Now to be up-front. I have taken a couple of pictures (before I attached the microscope objectives) and have not touched it since then. I have been very busy for the last few months and need a few days to devote to relearning the process for the stacker and quit being intimidated by process. I am hoping that in writing this article I will back myself into a corner and will need to get busy and produce something after all this work and money spent. There might even be some tweaks needed to the setup before it is "perfect".

Ok, you have it in print. I will take some pictures. I will take some pictures. I will take some pictures. And send them to Don Howard for the Micro Probe.

Many thanks to Doug Merson and Bruce Kelly for all their input and support during this journey.

Collection Evolution

Don Howard

In recent issues, we have talked about going back over our collections to find things we had previously missed. Recently, I discovered some ‘new minerals’ by looking back over some of the data sheets in Mindat.org. It started out when I was looking for something else on the sheets from the Silver Coin Mine in Nevada. I noticed that heyite was no longer in the mineral list. I remembered that I had a specimen from Silver Coin that had been debated and put down as heyite as the best match available.

Heyite is a vanadate of lead and iron. The type locality is a mine near Ely, Nevada, so it was a strong possibility to occur elsewhere in Nevada. As I recall, it was not a particularly good match, but the best we had at the time.

Subsequent analysis showed the presence of phosphate as well as vanadate. That can be easy to miss in an XRF spectrum on an SEM, since phosphorus does not produce a very strong peak at best.

In the meantime, another mineral, bushmakinite, had been found and identified from a gold deposit in the Urals of Russia. It had the combination of phosphate and vanadate but contained lead and aluminum. This material was clearly similar, but with ferric iron in place of the aluminum. So a new mineral had been described, ferribushmakinite, and the type locality is the Silver Coin Mine.

It was a pleasure to change my labels.

| | |
|-------------------|---|
| Heyite | $\text{Pb}_5 \text{Fe}_2 (\text{VO}_4)_2 \text{O}_4$ |
| Ferribushmakinite | $\text{Pb}_2 \text{Fe} (\text{PO}_4) (\text{VO}_4) (\text{OH})$ |
| Bushmakinite | $\text{Pb}_2 \text{Al} (\text{PO}_4) (\text{VO}_4) (\text{OH})$ |

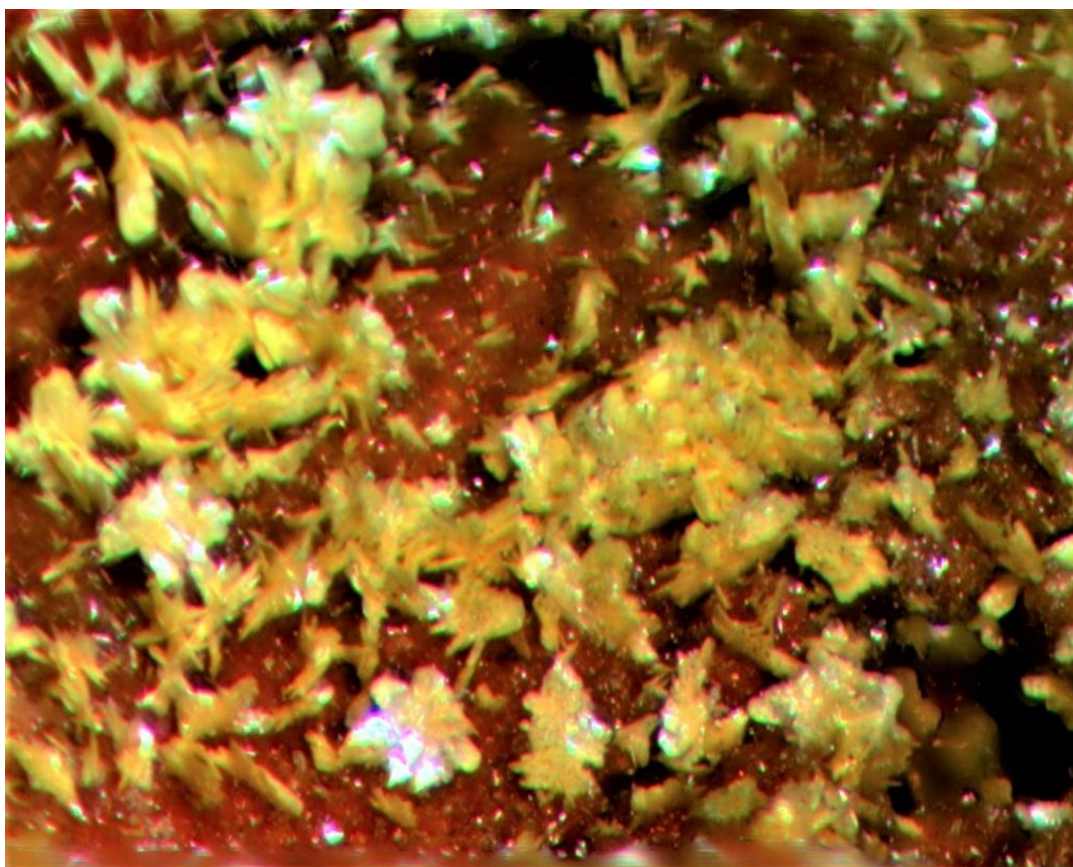


Fig. 1. Ferribushmakinite on Jarosite
Silver Coin Mine, Humboldt Co., Nevada

FOV is 4mm

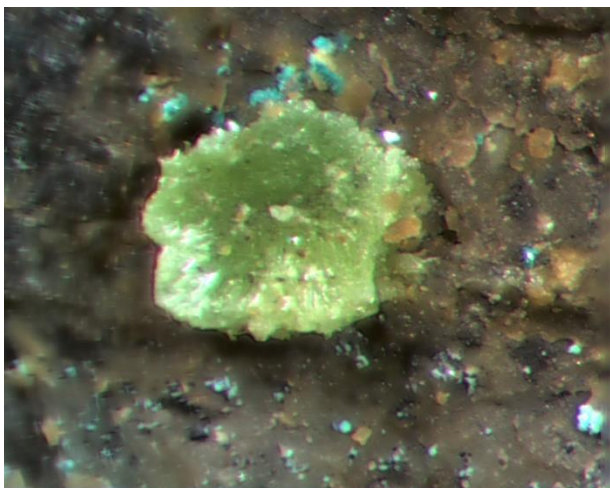


Fig. 2. Pseudojohannite FOV is 2 mm
Widowmaker Mine, San Juan Co., Utah

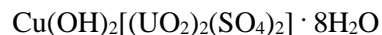


Fig. 3. Johannite FOV is 2 mm
Widowmaker Mine, San Juan Co., Utah

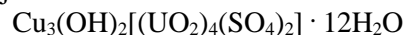
A similar thing happened shortly thereafter. This time I was looking at the information for the Widowmaker Mine in Utah and noticed that Johannite was no longer a listed mineral. Reanalysis had determined a different ratio of copper to uranyl and the mineral was now classified as pseudojohannite. The type locality for each of these minerals is in the Czech Republic, so this only corresponded to a name change.

New analyses can happen at most any time. A case in point is fluorwavellite, reported recently as a new mineral (Microprobe, Vol. XII, #3, pg6 (2016)). The mineral wavellite, $\text{Al}_3(\text{PO}_4)_2(\text{OH},\text{F})_3 \cdot 5\text{H}_2\text{O}$, commonly has fluorine replacing part of the hydroxyl ions. If this replacement is random, the mineral is wavellite. If the fluorine amounts to one third of the total and is concentrated in one of the two sites present in the structure, then the mineral is fluorwavellite. The appearance of the two minerals is identical, so there is no way short of very sophisticated structural testing to tell the two apart. In actual fact, it probably only matters to scientists. Such issues only become a factor if you are entering a display to be judged, in which case you are expected to have the correct label.

Johannite



Pseudojohannite



THE MICROPROBE

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Finally, we have two pictures taken by members that resulted from breaking down material collected many years ago. We like to feature the photographs that members are taking. We look forward to seeing contributions from Beth and her new setup. If you have special pictures, please consider sharing them.

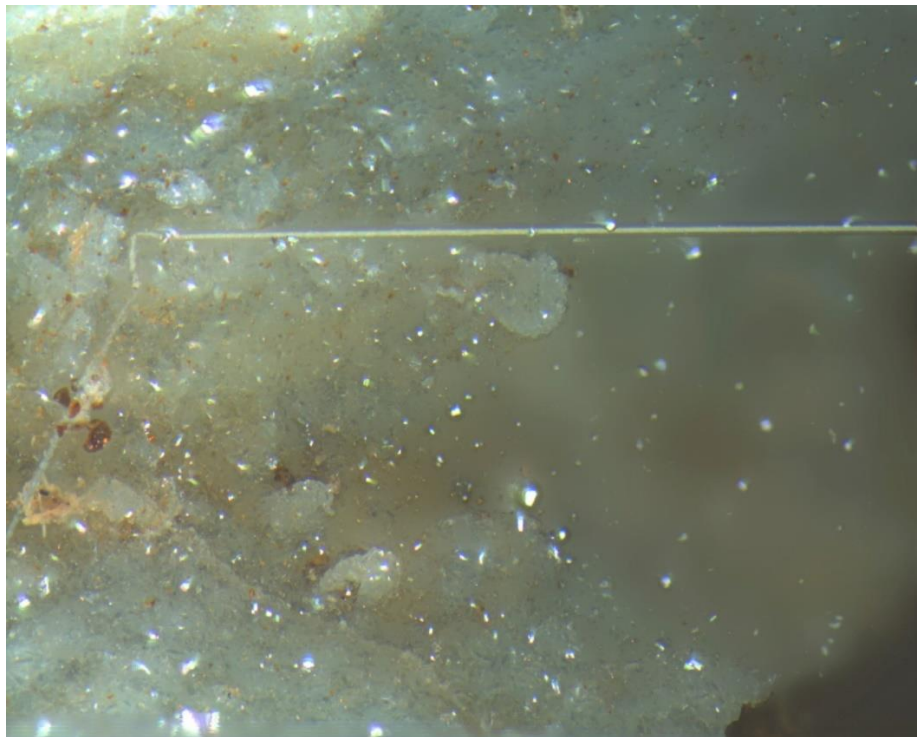


Chalcopyrite on Smectite

Beaver Valley Quarry, Shine, Jefferson Co., Washington.

FOV is 1.4mm

Doug Merson

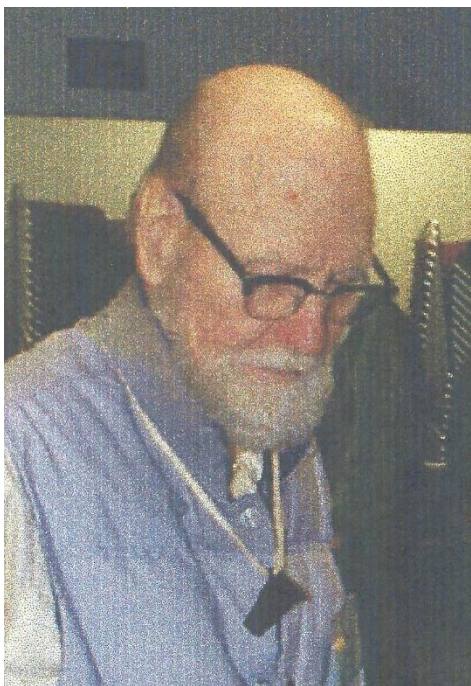


Coated Filiform Pyrite with Right Angle Bends

Starvation Creek, Hood River Co., Oregon

FOV is 8 mm

Don Howard



BOB

On January 12, Bob Boggs passed the century mark! Wow! Good going, Bob! We congratulate you on so many years of prowling around rock piles and breaking boulders.

We have had fabulous times collecting with you. We remember roaming over Gold Hill, Utah, and waiting with you at Majuba Hill, Nevada as Tim Rose came up past the Green Monster to join us. And especially, we appreciate the day we followed you up the trail into the tallus slope at the base of Liberty Bell. You were such a good guide at Washington Pass, telling us which boulders were the ones that had produced the interesting minerals. You were always generous that way. I remember chasing kangaroo rats out of the old green camper in the parking lot below Cutthroat Lake.

We especially appreciate all the hard work you put in turning over surface rock along Neer Road to find the hard stuff that held the Tschernichite, and ultimately the Boggsite. Those were happy days. Enjoy every one of the memories.



You were one of our charter members, as well as a member of the Northern California Mineralogical Association. We appreciate all the great meetings we have shared with you. We understand that getting around is harder now, and the eyes can't really handle the microscope the way they did for so many years.

But we know that you still love the minerals and all the good experiences we shared. You have been a great influence and inspiration. When we grow up, we want to be just like you.

Don Howard