Northwest Micro Mineral Study Group



**MICRO PROBE** 

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## SPRING MEETING ......CAMAS, WASHINGTON

May 6, 2017

9:30 am to 4:30 pm

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

We have become quite comfortable at the fire station in Camas, and 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 Doug Merson share his illustrations of **The Minerals of Mont Sainte Hilaire.** Do bring the pictures you have to share with the group. We would love to see them. A computer and projector will be available.

			SE 15 <sup>th</sup> St.	Bybee Rd.	FIRE ST.
15	1205				NW 38 <sup>th</sup> Ave
			SE 192 <sup>n</sup>	<sup>a</sup> Ave. NW Pa	rker St.
Vancouver			SE 34 <sup>th</sup> St.	Pacific Rim Blvd.	
				Brady Rd.	Camas
		SR 14	Exit 10		
Columbia River					

### Hungarian Occurrence of Tschernichite

Gabor Koller and Dávid Szabó

Hungary's tschernichite occurence is located in the Mátra Mountains, between Mraznica-tető (701 m) and Sas-kő (898 m), 4,5 km N from Markaz. The current surface of the Mátra Mountains is built up from volcanic rocks (mostly andesites). The volcanic activities formed the northern edge of the mountains in the Oligocene, but the main mass of the mountain range was formed during the Miocene. As a result of post-volcanic activities, several epithermal polymetallic ore deposits (Recsk, Gyöngyösoroszi, Parádsasvár) formed along with extensive rock alterations, e.g. silicification (mostly with geyseric activity), clay mineralization, carbonatization, zeolitization.

The zeolite occurrence near Mraznica-tető, above the village of Markaz, has been known for a long time, but for years stellerite was the only known zeolite mineral. The host rock is very tough, brownish-grey pyroxene andesite with porhyritic texture. Quartz, biotite, and tridymite usually occur in its cavities; zeolites are quite rare compared to them. Pyritization often occurs; ferric oxides and gypsum can usually be detected in the marginal zones.



Map of the region of Hungary north of Markaz, showing the collecting site

The andesite excavated by the road cut is strongly eroded. Small veins are noticeable in it. These veins are filled with zeolites, but only with small chabazite-Ca crystals up to 2 mm (often var. phacolite) and with stellerites of about the same size. Any other zeolite minerals have not yet been noticed.

The tschernichite occured in a slightly different zone, in a much harder, unweathered andesite. Only 5-6 boulders (about a size of a human head) that contained tschernichite have been found, and these were in the roadbed of the forest road. Since their first discovery, their origin



The road cut at the site between Mraznica-tető and Sas-kő



Tschernichite in a small cavity in andesite

has been a mystery. They probably came from a zone which is now covered with the road.

The hard, brighter andesite often has both large and small cavities, ranging from 0,5 cm up to 10 cm. Cavities larger than 0,5 cm are deformed and flattened. In these 5-6 boulders, the most common mineral is the tschernichite. Cavities larger than 2 cm do not contain this species, but instead are covered with small tabular crystals of stellerite, while the cavities under 2 cm almost exclusively contain tschernichites.

The tschernichite is without doubt the most rare species at the locality. At its discovery in 2002, there were not a lot other localities in the world. Unfortunately, the examination took a long time, and the species was not confirmed from the locality until 2010.

The most common habit for tschernichite crystals from Mraznica-tető is a combination of tetragonal bipyramid and basal plane. The crystals are stubby rather than steep, so they appear quite different than the common tschernichites from other localities, especially from the ones from Neer Road. Steep tetragonal bipyramids are quite rare at this locality. There are three distinct types of tschernichite bearing cavities. These are in order of occurrence:

- 1. Cavities filled with colorless, stubby tschernichite crystals up to 2 mm. The crystals often have stepped basal planes. These are the largest and most aesthetic looking cavities, making the occurrence unique.
- 2. Cavities with a tridymite and quartz coating with some (usually 1-3) white, translucent, stubby single crystal (first generation). Often covered with clay minerals (second generation).
- 3. Small cavities filled with colorless or white steep bipyramids. These crystals rarely reach the common size of 1-2 mm.

The most common zeolite minerals in the cavities are tschernichite and stellerite. They can be found in 90% of the cavities. The remaining minerals in order of frequency are:

**chabazite-Ca**: pseudorhombohedral crystals up to 2 mm, twins, often variety phacolite.

**heulandite-Ca**: colorless tabular crystals up to 2 mm, often making aggregates.

**lévyne-Ca**: only a few have been found, pseudohexagonal tabular crystals with round edges up to 3 mm.

The locality was the first tschernichite occurrence in Europe. The tschernichites from Mraznica-tető aren't as big and aesthetic like the ones from the type locality, but they are well formed and unique, soon making them a favorite of mineral collectors. The tschernichites have been analyzed with XRD by Sándor Szakáll (University of Miskcolc) and Béla Fehér (Herman Ottó Museum, Miskolc) and with WDS by Simona Bigi (University of Modena, Italy).



Tschernichite, type 3 Photo by László Tóth



Tschernichite, type 1



Tschernichite, type 2

#### **Organic Minerals**

Don Howard

When I think of minerals, I usually envision inorganic minerals, that is, crystals composed of salts of the normal acid radicals, like sulfates and arsenates and silicates. That includes a wide range of possibilities. However, there are a number of minerals that contain the element carbon. And carbon compounds are associated with organic processes.

The most common minerals containing carbon are the carbonates. These are salts of carbonic acid,  $H_2 CO_3$ , which is formed when  $CO_2$  dissolves in water. Calcite, dolomite, and magnesite are among the common carbonates, and they fix a great percentage of our world's carbon atoms into solid rock away from the atmosphere, where  $CO_2$  causes problems by trapping heat. For the purposes of this article, I am going to lump carbonates in with the salts mentioned in the above paragraph.

A second group of minerals are the inorganic salts of organic acids. One of the more common such acids is oxalic acid, HOOCCOOH. It is formed in many plants, such as spinach and the members of the oxalis family (sourgrass). Oxalic acid is released when the vegetation decays, such as in lake sediments. The very insoluble compound calcium oxalate then may form when the acid reacts with calcite. Minerals such as weddellite,  $Ca(C_2O_4) \cdot 2H_2O$ , and whewellite,  $Ca(C_2O_4) \cdot H_2O$ , are thus formed. Rudy Tschernich has written up a detailed report of the occurrence of these minerals at the Fulton Canyon Quarry (*Biggs Cavity Minerals*, Microprobe, Vol. XI, #1, p10-15, 2010). Oxalates with other cations occur rarely at various places around the world.



Weddellite, Fulton Canyon Quarry, Biggs, Sherman Co., Oregon Rice Northwest Museum of Rocks and Minerals (RM#6755) Photomicrograph by Saul Krotki 2009, field of view 15.0 mm wide

There are also some peculiar minerals that are mostly inorganic, but their crystal form requires the influence of some organic substances. The most obvious one of these is melanophlogite., one of the silica clathrates,  $Si_{46}O_{92} \cdot X$ , where X is an organic molecule. The organic molecule stabilizes the tetragonal structure for the silica. Different references cite different molecules for the organic.

Melanophlogite is known from numerous places around the world. In the western United States, there are several known localities in California, especially in Los Angeles County. The material probably is formed when the solutions carrying the silica also contain traces of organic compounds. It is not clear if the structure requires a specific organic compound, or whether a variety of such compounds will suffice. The crystal shapes are usually simple cubes, such as those shown in the picture at right.

There are also a variety of minerals that are completely organic. That is, they are composed primarily of carbon and hydrogen. Organic chemicals are generally divided into two groups: the aliphatic and the aromatic.



Melanophlogite Agoura Hills, Los Angeles Co., California

Aliphatic compounds are basically derived from methane, CH<sub>4</sub>, a molecule composed of four hydrogen atoms arranged tetrahedrally around a carbon atom. By removing one hydrogen atom, we create a methyl radical. We can then take a methane molecule and replace one of the four hydrogens with the methyl group, forming ethane, CH<sub>3</sub>-CH<sub>3</sub>, or C<sub>2</sub>H<sub>6</sub>. If we remove a hydrogen from ethane and replace it with a methyl group, we get propane: CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>3</sub> or C<sub>3</sub>H<sub>8</sub>. Methane, ethane, and propane are gases at ordinary temperature and pressure. We can continue replacing hydrogen atoms with methyl groups to form longer and longer chain molecules of the form  $C_nH_{2n+2}$ . These linear chain molecules comprise the aliphatic compounds.

One of the more widely known such molecules is octane, C<sub>8</sub>H<sub>18</sub>. As the chains get longer, the boiling point rises, so octane is a volatile liquid. Chains of about this length are ideal for automobile fuel. Longer chains are less volatile, and by the time they reach values above n=16, they are actually waxy solids. These long chains make up paraffin, and are used to make candles among other things. Crude oil, pumped from the ground, has a wide array of different lengths of chain molecules. The ones around n=8 are distilled out for fuel, A process called "cracking" involves taking the longer chains, vaporizing them at elevated temperature, and passing them over a catalyst composed of finely divided platinum dispersed on a porous support. The catalyst promotes breaking the long chains into smaller pieces that will be useful for fuel.



Evenkite on Quartz Fulemule Valley, Paradfurdo, Hungary

There is at least one mineral that is composed of longer chain molecules: evenkite, C<sub>24</sub>H<sub>50</sub>. The

specimen that I have is a colorless, waxy material on a bed of drusy quartz crystals. There is no contrast and it is almost impossible to show photographically. There is a difference in texture, but the camera has trouble depicting that. Fortunately, evenkite is weakly fluorescent green when excited by the 405nm laser light. I include it here, together with my best attempt at a picture, for completeness sake.

The other major category of organic compounds is the aromatics. Instead of a long chain, these compounds incorporate a ring structure of six carbon atoms. The simplest member of this family is the compound benzene,  $C_6H_6$ . As shown at right, each carbon atom is bonded to two other carbon atoms and one hydrogen atom. Hydrogen atoms can be removed and replaced by other groups, such as a methyl radical, or even a piece of molecular chain, as well as groups containing oxygen or nitrogen atoms. Many such molecules have been identified.

An interesting set of molecules involve several rings connected together by sharing a common edge. Two such molecules incorporating three rings, anthracene and phenanthrene, are also shown in the diagrams at right. Here, the orange hexagon represents the ring of six carbon atoms. Carbon atoms that are joined only to two other carbon atoms are understood to also have a hydrogen atom

attached. Thus, both compounds would be represented by the formula  $C_{14}H_{10}$ . Both anthracene and phenanthrene are constituents of coal tar. In pure form, they are colorless

waxy solids. Phenanthrene occurs naturally as the mineral Ravatite, originally discovered at a site in Tajikistan, and since found at a couple of mines in Germany. The mineral is produced where mines or dumps are on fire.

There are a couple of California deposits that have produced aromatic organic minerals with even more complicated molecular structures. One is idrialite,  $C_{22}H_{14}$ , dimethylbenzphenanthrene, where another benzene ring has been added to the phenanthrene molecule, and two hydrogens have been replaced by methyl radicals. This occurs at several old mercury mines in the Coast Range, including Skaggs Springs, Sonoma Co. and New Idria, San Benito Co. The specimen that I have is a set of amber-colored blades, shown below. It is fluorescent a vivid yellow-green when illuminated by the 405nm laser.









Carpathite and Cinnabar in Quartz Picacho Mine, San Benito Co., California Two views, ordinary light at left, 405nm laser light at right.

The other mineral is carpathite, from the New Idria area of San Benito Co. This is actually the mineral that piqued my interest in the first place. There were a number of excellent pieces available on the free table at the NCMA meeting last Spring. The Pichaco Mine features the world's best specimens.

Mindat mentioned that the material is known chemically as coronene,  $C_{24}H_{12}$ . Coronene is, to me, one of the most unusual of compounds. As shown in the diagram at right, it is a ring of six benzene rings sharing edges. Each of the outermost carbon atoms are bonded to two other carbon atoms and to a hydrogen atom. All the other carbon atoms have three neighbors to which they are bonded.



Carpathite is a transparent yellow color, and like idrialite fluoresces a bright green. It is soft and waxy, and is somewhat flexible. Normally, the monoclinic crystals are embedded in the quartz matrix, but very rarely a cavity with free crystals has been found.

One wonders how such a complicated mineral has been formed. As mentioned above, coronene is a constituent of oil and tar deposit along with many other complicated molecules. One hint comes from the cinnabar present: we are dealing with a deposit that has its origins in hot spring activity. There are also known oil reserves present in the area: Coalinga and Bakersfield. Specific organic compounds have probably been concentrated according to temperature through natural steam distillation.

Curious mineral compounds! The more I look into them, the more questions I have and the more I want to find out.

Carpathite on Quartz Picacho Mine, San Benito Co., California

> Specimen: Ted Hadley Photograph: Doug Merson



# A Couple of Interesting Finds (Or How to Recuperate from Shoulder Surgery)

### **Doug Merson**

As most of you may know, I had a fall skiing on March  $9^{th}$  last year. This kept from the last two meetings. I had hoped to get through this years' ski season with cortisone shots. It was obvious after the first shot that would not work. On October  $27^{th}$  I had surgery to repair a badly torn rotator cuff.

Knowing that I would have almost a year with severe restrictions on what I could do, I decided to convert my photo setup to vertical and make it operable with just my right hand. I also obtained a couple of Mitutoyo M plan apo objectives. 5X and 10X. I use a Canon 55 - 250mm zoom lens as a tube lens. After getting this all set prior to the surgery, I was ready to photograph as many of my micro minerals as I could.

The photos were done in no particular order. As I worked my way through the flats, I came across an interesting piece from Jaquish Road that I collected on a group field trip there after a meeting in the 90's. This is the first view of the piece. The metallic blue resembles chalcocite and is with thomsonite and chabazite. The second photo is a crop of the first photo.



Fig. 1 Chalcocite? FOV = 1.5mm Jaquish Road, Goble, Columbia Co., Oregon



Fig 2 Chalcocite? FOV = 0.8mm



Fig. 3 Chalcocite crystal from KrystalShaper drawn by Dave Barthelmy

Chalcocite crystallizes in the monoclinic system and may appears as pseudo hexagonal crystals as shown in Figure 3. Covellite is another copper sulfide that can have a blueish color. It crystallizes in the hexagonal system as shown in figure 4.



Fig 4 Covellite crystal from KrystalShaper drawn by Dave Barthelmy

So far this is the only one of these that I have run across. If anyone who has collected there finds multiple piece that look like this, it would be appreciated if they could provide one for analysis.

Another interesting piece I found came from the spillway at Lemolo Lake, Klamath County, Oregon. I had seen this piece a number of years ago but had not photographed it. Under the microscope lighting this appeared as black spikes. It occurs in the narrow zone between the red oxidized surface and the interior that is nearly devoid of cavities. Pseudobrookite, tridymite, and aegirine are found in nearby cavities. My thoughts are that this is goethite after aegirine. Some of the enstatite here does alter to aegirine. This is another one that if we find a spare piece needs to be analyzed.



Fig. 5 Goethite? FOV = 1.9mm

### **Editor's Note**

Identifying the presence of chalcocite (or possibly covellite) from the Goble area may help to answer for me the origin of those little blue clusters of blades that were on many of the heulanditethomsonite specimens found at Jaquish Road and along Neer Road, that can easily be mistaken for cavansite. Analyses in the past have always yielded an identification of chrysocolla. Silica containing solutions could easily alter the chalcocite to chrysocolla. The bladed nature of the chalcocite would explain the shapes of the clusters.

Similar clusters, observed in the cavities at Summit Rock, could well have been originally chalcocite that has been altered to chrysocolla. I have on occasion observed blackish material in with the blue bladed. D. Howard



Chrysocolla with Thomsonite Jaquish Road, Goble, Columbia Co., Oregon

Chrysocolla on tridymite Summit Rock, Klamath Co., Oregon

### **THE MICROPROBE**

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