Northwest
Micro Mineral
Study Group

MICRO PROBE

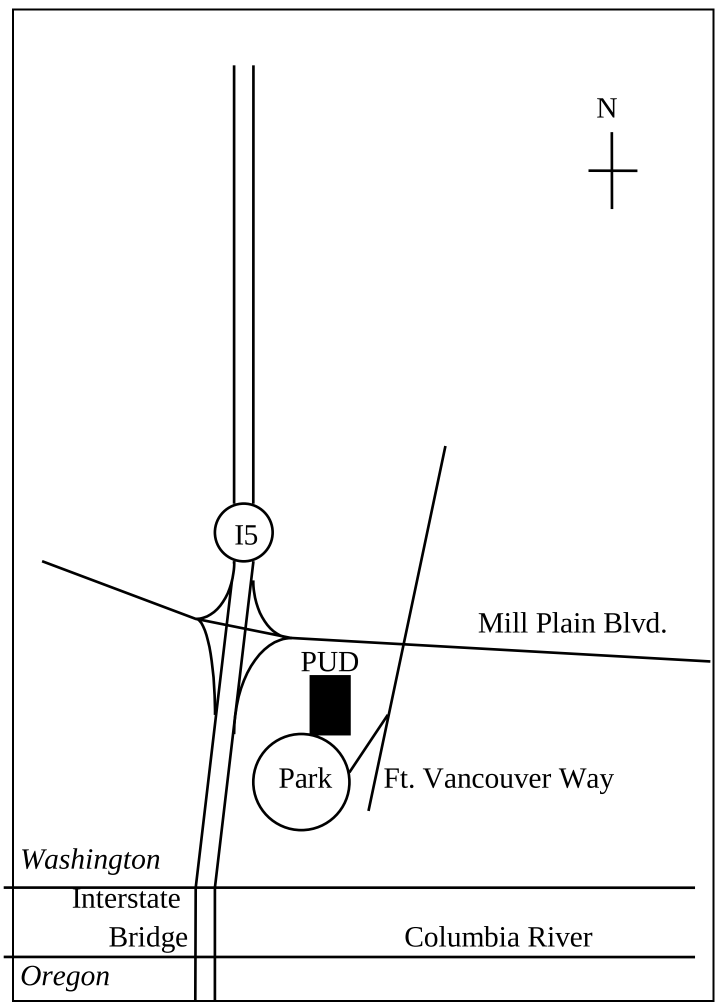
SPRING, 2010 **VOLUME XI, Number 1**

SPRING MEETING . . . . VANCOUVER, WASHINGTON

May 1, 2010 9:00 am to 5:00 pm

Clark County P. U. D. Building
1200 Fort Vancouver Way
Vancouver, Washington

Come celebrate spring talking about your favorite minerals. Bring your microscopes and something for the free table to share with others. There should be plenty of time for sharing and swapping. We will have our usual brief business meeting in the morning, to be followed by our update session to find out what localities are actively producing material and are good bets for collecting trips.



In the afternoon, **Rudy Tschernich** will be talking about the "*Minerals in jasper/chert from the Biggs Area, Oregon"* and Don Howard will be showing pictures of "*What's Old in Minerals"* from things he found at last summer's NCMA meeting at El Dorado, California. Others' pictures are always welcome.

The kitchen area is again available and we will plan on sharing lunch together. As always, the club will provide the basics for sandwiches, so bring goodies to make lunch special.

In the evening, many of us plan to go to a local buffet restaurant, so please join us if you can.

IN MEMORY OF STAN JOHNSON

We were saddened to learn in a Christmas card from Marg that her husband Stan had passed away on September 24, 2009, shortly before their 58th wedding anniversary. Stan and Marg had attended meetings regularly for many years, but had had to stop in recent years because the drive down from Salmon Arm, British Columbia had become just too difficult. We have missed their cheery faces and encouraging words. Stan and Marg were always ready to pitch in and help with whatever needed to be done.

Stan and Marg usually spent several days down in the States, visiting, especially with Jerry Wood. They loved to go on the field trips to various places around the Portland-Vancouver area.

Living in Salmon Arm for many years, Stan was in the middle of some great zeolite collecting areas. He was eager to explore around his area, and often brought his finds down for identification and discussion. He was also able to keep us abreast of the status of collecting areas in the upper Okanogan Valley and south-central British Columbia. We were sad to not see them regularly any more, and even sadder to learn of the loss of another of our Northwest collectors.

Marg is still living in Salmon Arm, where she is supported by family and granddaughters. We send her our condolences in this season of loss.

Don Howard

THE MICROPROBE

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History of the Northwest Micro Mineral Study Group (NWMMSG)

by George Williams

At the request of our President, Rudy Tschernich, I have been asked to write an early history of our Micro-mineral study group. It is true that I have been a member of the group from its inception, but it is also true that memory of activities done over 40 years ago have definite limitations.

In my experience, at least, activities building up to the formation of the group focused around activities related to Goble. Rudy wrote a very good article for the “Micro Probe”, Vol. 1, No. 2, relating the history of Goble, and I will borrow from it often concerning the early history of our group.

Prior to the organization of our local micro-mineral group, there were individuals interested in collecting micro-crystals. My wife and I started micro-mounting when several members of our newly organized junior group requested instruction in micromounting. A Portland club member, John Mihelcic, was writing a column in the “Mineralogist” published by Dr. Dake. Milton Speckles was also writing a column in the Gems and Minerals magazine. Both had developed an interest in the local zeolites, and local availability made this a good project for our young members and others.

Perhaps the most personally influential individual was John Cowles. I think of him as the troll that lived under the Longview Bridge, hence, very close to the collecting area. He was a bachelor and, with his brother, raised mint along the Columbia River. John was the self-appointed guardian of Goble, and welcomed collectors to the area but was insistent that they follow good collecting procedures. At the same time, he personally developed new collecting methods and procedures which he shared with others. John was a micromount collector, but he developed beyond that to being a micromineral collector, utilizing the Perky boxes as well as the 1 x 1 traditional box. He taught us to use a diamond bladed rock saw with flowing water, to cut out the pockets of zeolites without injuring the crystals. Pursuing his collecting he naturally, as do we all, collected more than he could hold in his personal collection while searching for the perfect specimen. But he could not indiscriminately dispose of the extras, so he also mounted these in Perky boxes and offered them to others at a reasonable price at periodic sales. This practice brought together interested individuals. The first sale was at Rainier in 1964, and in my mind was the first step toward individuals of like interest joining together and the logical step toward formation of a study group. As ardent a collector of minerals as John Cowles was, he lacked a knowledge of basic mineralogy and was very aware of this. He also realized that forming study groups was a way of correcting this lack.

Three rather distinct groups developed. From the local area were John Cowles, Harold Dunn, Gordon and Minnie Gilbertson, Bill and Sharleen Harvey, Al and Ruth Keen, Russ Kenaga, Don and Lee Kendall, Claire and Mary Kennedy, Bill and Esther Kennedy, Caroline McGanty and son Ken, Richard and Helen Rice, Channing and Virginia Smith, George and LaVerne Williams, Walter and Alice Wilson and Helen Yeager.

From the Seattle area were Robert and son, Russell Boggs, Russ and Alice Haggard, Bob and Marie Hagglund, Stan and Edith Heilman, John Hubbard, Norm Steele, and Rudy Tschernich.

Francis and Isabelle Mattison headed up a group from the east side including Chuck and Dorothy Roadruck, Ford and Alice Wilson.

It was a natural transition as we met together at crystal sales, field collecting, related club gatherings, that it be suggested to develop a group interested in collecting and studying micro-crystals. On November 8, 1970, such a group met at Pacific University, in Forest Grove, Oregon. It was at the suggestion of Gordon Gilbertson, a Portland collector, that we informally organize under the name of "Northwest Micro-Mineral Study Group". Officers were to be selected to "do the chores and work for the organization so the rest can all be study groups". It was felt that we had no need for by-laws and, since most members were already members of the Federation through their local clubs, there was no need for the Micro-mineral group to take membership in the Federation.

These suggestions received a unanimous ovation and were so ordered by Bob Hagglund, the provisional chairman of the meeting. Officers selected were Bob Hagglund, president; Lee Kendall, secretary-treasurer-editor. Rudy Tschernich was appointed as Field Trip Chairman. Initially we visualized two meetings a year, Spring and Fall.

The Spring meeting was arranged by Isabelle Mattison for April 24 & 25, 1971, at Richland, Washington. The newsletter was listing many hints for trimming specimens, mounting tips and box preparation.

Our first club sponsored field trip was arranged by Rudy for Memorial Day weekend, May 29, 30, 1971. On the 29th Ritter road was the collecting area with camping at the hot springs that evening. Those present were successful in finding the usual zeolites as well as some nice gyrolite. On Monday the group collected at Beech Creek and Monument and camped north of Spray that evening. Some exceptional levyne with chabazite was found as well as a boulder full of native copper.

A second field trip was planned by field trip chairman, Rudy, for July 24, 25, 1971. This was a west side trip to Cape Lookout, Tillamook, and Altoona, Washington areas. Ferrierite was the prime targeted mineral at Altoona where three different habits had been identified.

1971 was the year that the N.W. Federation hosted the National Show. The N.W. Federation Show date was traditionally always held on Labor Day weekend. At the organizational meeting the group had decided that they should plan for a demonstration booth or display of some sort and a meeting room for speakers or programs. Norm Steel was made responsible for arrangements. A demonstration booth was the final decision. It was agreed that scopes should be used only under close supervision, and the micromounts would be set up on the stage for the observer. The booth turned out to be very popular but needed more scopes.

New members added in 1971 were Quincy and Tej Howell of Boise, Idaho, Dean Hubbard of Snohomish, WA, Paul Lawson of Vancouver, WA, and Gordon Leroux of Everett. WA.

The Fall meeting was again set for Pacific University at Forest Grove, Oct. 23 – 24, 1971, with the usual work sessions, plus a Banquet Saturday evening served by the college. George Williams showed slides of micro-minerals. Sunday, Ford Wilson, a member who had more previous experience in micromounting, shared some helpful tips on collecting and mounting micro crystals. Rudy devoted time to the study and identification of zeolites. True to our intended purpose as a study group, Rudy made a detailed presentation of the zeolite family with handouts for everyone.

The Veterans Day field trip, Oct. 25th, was to the Clackamas River for siderite, filiform pyrite, etc. An alternate trip was planned to Mt . Solo, Longview, WA.

Our Spring meeting, April 1972, started with several changes in our format. George Williams took over his duties as the president, newly elected at the October '71 meeting. Lee Kendall continued as our secretary/treasurer/editor, and of course Rudy continued to be our highly qualified field trip chairman. More dramatic was our new meeting location. Stan and Edith Heilman offered their home site at Raymond, Washington. It was the former location of the Bales Army Post with a number of the barrack type buildings still available, one of which would be devoted to our meetings and workshop area. The grounds provided for ample camping.

Emphasis was being placed on study techniques. Some agenda suggestions were (1) each member to bring a suite of 3 – 5 mounts in a box to be passed around with emphasis on an educational point; (2) Ford Wilson had previously suggested members develop a collection of micro specimens from each of the 32 crystal classes; (3) bring trading materials; (4) Rudy would show slides from collecting areas; (5) A club produced slide program on zeolites with member contributions; (6) group business meeting to decide on, Incorporation, club booth for the Seattle show, field trips and plan a summer swap session.

Rudy presented three possible field trips for the year including: Rock Island Dam, Summit Rock, and McKenzie Pass area (Osumilite +). Dates to be decided.

New members welcomed were Hugh Aughey, Auburn, Wa; Barney Brawn, Sacramento CA; Hank and Marte Heikkola, Portland, OR; Les Holbrook, Snohomish WA; and George Shokal, San Carlos, CA.

A swap session planned for July 15, 16, at the Heilman's turned out to include a salmon bake and potluck. New members were Larry & Naomi Cox, Winnie Isptalier, Al & Adeline Dearle, Nelles and Delena Fairley, and Randy Rude. As of June 15, 1972, the membership role listed 61 people.

Meeting on Nov. 4, 1972, at Pacific University, the Articles of Incorporation and By-Laws were approved. These were duly filed and with several long waits and corrections and further red tape they were finally accepted. Dues were set at $2.00 per family.

The Certificate of Incorporation as a nonprofit organization in the state of Oregon is dated the 8th January. We organized for the purpose: "to bring together individuals in the Pacific Northwest who share the common interest of collecting, studying and gathering information of Micro-minerals. The emphasis of the group shall be directed toward educational purposes".

Registered agent was George C. Williams at 2320 Pacific Ave., Forest Grove, Ore. 97116. Three directors serving until the next annual business meeting were: Claire Kennedy, Portland; Lee Kendall, Glenwood, Ore.; and Rudy Tschernich, Snohomish, Washington. Incorporators signing were Lee Kendall, George Williams, and LaVerne Williams.

Communications were: 1) An article by Ford Wilson which had been received by members reporting on a trip to Diamond Lake and Summit Rock. 2) A warning from the sitting secretary/treasurer, via Bob Hagglund, that due to the "energy crisis" plastic boxes would become scarce and we should stock up on them while still available;'

Spring field trip scheduled was for Kamloops Lake, British Columbia for Ferrierite. It is necessary to use a boat to reach the location and Norm Steele would provide passage, six passengers at a time until all were moved, 20 minutes one way per trip. Collecting would be done on Saturday and Sunday, May 26-27, 1972.

1973 was guided under the leadership of Claire Kennedy as our President. We again met for the Spring session at Washburn Hall, Pacific University, Forest Grove. The first mailing of our official newsletter, the "Micro Probe" went into the mails either late 1973 or early 1974, with Bob Hagglund, our Secretary/Treasurer and Editor. Volume 1, No. 1 carried a " *Compilation of Zeolites: Sources of Names, with Brief Quotes from some of their Earliest References"* , by Ford Wilson. Also a six page paper by Rudy Tschernich, "*Zeolite Collecting at Goble, Oregon, History and Minerals"* . This was followed by his planned field trip to Kosmos, Washington for Epistilbite. The educational purpose for the club was being well cared for.

Norm Steele, Seattle, took over the leadership of our group in 1974. The July, 1974 meeting at the Heilman's Raymond, Washington home was opened by President, Norm Steele, member of the Boeing Employees Club, and Seattle resident. The agenda included plans for a booth at the next Federation Show to be at Forest Grove. It was planned for individual scopes and automatic slide projectors with 100 selected slides. Rudy firmed up a Sunday field trip to Stevenson, WA., followed by a discussion of collecting localities, the group adjourned for club furnished ham dinner.

We were saddened to hear the news that Isabelle Mattison had lost a prolonged battle with her health. Isabelle was one of our founding members and huge supporter of the hobby from Richland Washington.

The Fall, 1974 meeting met at Forest Grove. A valuable summary of Northwest zeolite localities was included by our field trip chairman, Rudy. The 1974 issue of the Micro Probe was the last sent from editor, Bob Hagglund.

The Spring 1975, under leadership of Russ Kenaga, returned to the Heilman grounds at Raymond, Washington. Russ stressed the proper mounting and record keeping of specimens. He was energetically working toward a "Dana Collection" of micro-minerals and included an article he had written about "Minerals in People" in the Micro-probe. Bob Smith included an article on Black Hill pegmatites.

Our Fall meeting was still held in Forest Grove, but the site moved from Pacific University to the Light & Power Auditorium, thanks to the work of Don Kendall.

Gordon Gilbertson, Portland, became our president in 1976 and a return to Raymond, Washington for the Spring meeting and Forest Grove for the Fall meeting. The "Micro Probe" introduced pictures to its pages. Sharleen Harvey, was elected as Secretary- Treasurer. Rudy Tschernich remained the field trip chairman.

Photomicrographs were introduced to this issue with scanning electron microscope (SEM) from William Wise. Membership list showed 57 people.

The Spring, 1977 meeting was again held at the Heilman camp at Raymond, Washington. A special meeting was held on July 16 -17 at the Snohomish home of Rudy Tschernich. Rudy returned from a trip to N. Ireland and Scotland mid July, one week before this meeting and told of his trip, and we had a chance to enjoy his displays. A potluck dinner was planned.

Our meetings fell into a routine with Spring meetings being held at the Heilman's place in Raymond Washington and our Fall meetings at the Forest Grove Power and Light auditorium. Even though Stan Heilman passed away on April 26, 1987, Edith Heilman expressed a desire for us to continue coming to their place for the Spring meetings. This we did with the final meeting there in the Spring of 1989. With the arrangement of parking space for camping and the nice grounds for picnics as well as a secure building for our equipment, it became an ideal and comfortable choice.

Bob Hagglund, one of the founders and long time editor of the Micro Probe died in 1978.

Russ Kenaga returned as president in 78, and Harold Dunn took a turn in 1981. Norm Steele was filling in from the vacancy left by Bob Hagglund as Micro Probe Editor. There is a period of time between 1978 and 1985 where we have no records. Meeting notices were reduced to post cards along with a packet of black and white photos of cabinet-sized minerals taken by Norm Steele. With thanks to Don Howard who joined during that period, the Micro Probe was picked up by him and revived with renewed energy. Photographs were a constant addition, and major research and reports became a regular part of our publication. Don also served many terms as our president.

In the Fall of 1989, we made our move to the Clark County P.U.D. Building in Vancouver, Washington. It provides a good central location and is also well suited to our needs.

The July, 1989 membership list showed 78 paid members. Oregon, and Washington, provided the majority but many from Canada, and California and others from New York, Florida, Nevada, and Colorado. Also welcomed as our first overseas member was Jocelyn Thornton, writer of the "Field Guide to New Zealand Geology".

It is at this point that we can recognize a healthy and growing organization that I will end my look to the past and note that the group is growing, well cared for, and foresees a healthy future.

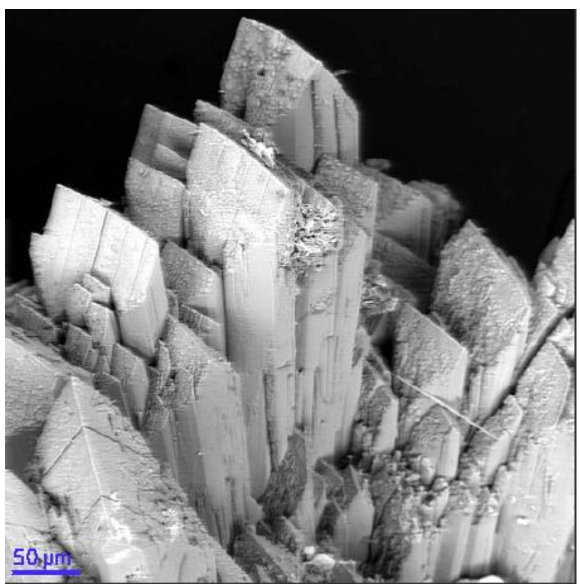
Plumbophyllite,
a new species from the Blue Bell claims near Baker, San Bernardino County, California

by Anthony R. Kampf, George R. Rossman, & Robert M. Housley

Reprinted from the Bulletin of the Mineralogical Society of Southern California

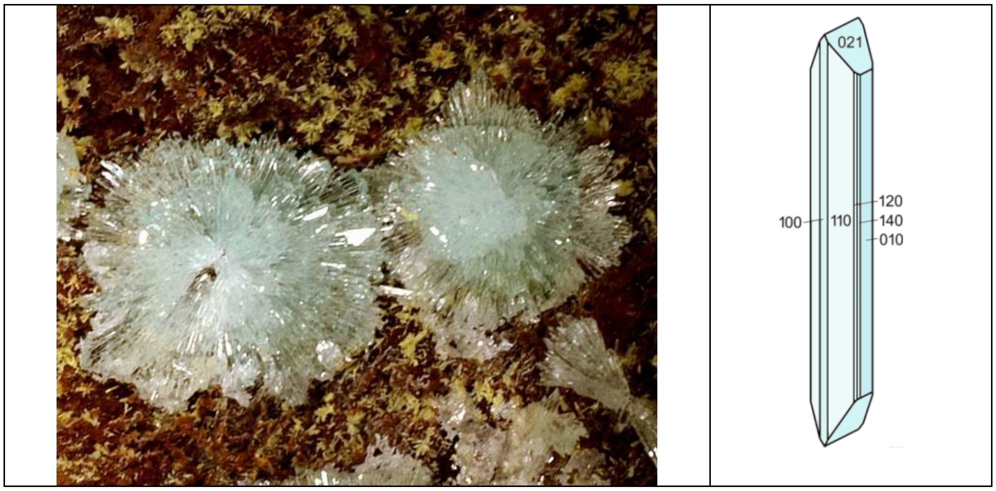
The new mineral has been named plumbophyllite, in recognition of both its chemistry (a lead mineral), $Pb_2Si_4O_{10}\cdot H_2O$, and its structure (a layer silicate). The orthorhombic mineral occurs as colorless to pale blue prismatic crystals to 3 mm with wedge-shaped terminations at the Blue Bell claims, about 11 km west of Baker, San Bernardino County, California.

It is found in narrow veins in a highly siliceous hornfels in association with cerussite, chrysocolla, fluorite, goethite, gypsum, mimetite, opal, plumbotsumite, quartz, sepiolite and wulfenite. The mineral has a white streak and vitreous luster. The Mohs hardness is about 5 and there is one perfect cleavage on {100}. The measured density is 3.96 g/cm^3 which compares favorably the density calculated from the chemical formula and unit cell parameters (3.94 g/cm^3).



SEM image of a cluster of plumbophyllite crystals

The chemical composition was determined by electron microprobe analysis that showed that the species contained PbO 60.25, CuO 0.23, SiO_2 36.22 wt.% and by C-H-N analysis that provided H_2O 3.29 wt.% for an excellent total of 99.99 wt.%. Powder IR spectroscopy confirmed the presence of molecules of water. Raman spectra were also obtained which allow future identifications on grains as small as 1 or 2 micrometers in width.



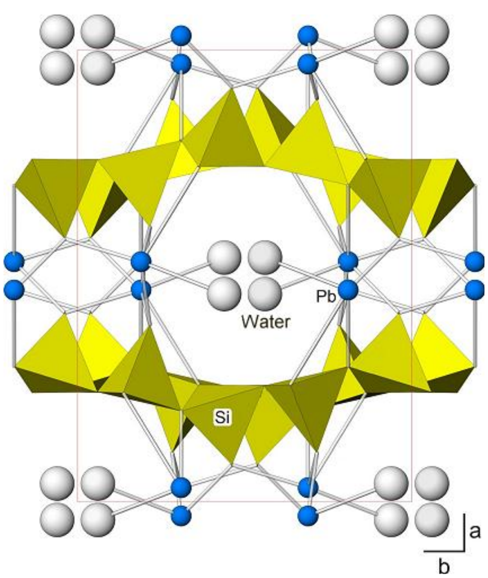
Sprays of pale-colored plumbophyllite crystals and a diagram of the crystal morphology
Some crystals of plumbophyllite are blue because of the copper substitution.

The optical properties were measured using yellow (589 nm) light. It is biaxial (+) with refractive indices α = 1.674, β = 1.684, and γ = 1.708. 2V is 66˚ and there is strong red > violet dispersion.

The strongest powder X-ray diffraction lines are [*d*]: 7.88, 6.63, 4.90, 3.623, 3.166, 2.938, 2.555, and 2.243. The full X-ray data showed that the mineral has space group *Pbcn* and that the unit-cell parameters are *a* = 13.208, *b* = 9.783, *c* = 8.654 Å. The relationship between the unit cell axes and the optical orientation is X = *b*, Y = *c*, Z = *a*.

The atomic structure was also determined. It consists of undulating sheets of silicate tetrahedra between which are located Pb atoms and channels containing H_2O (and lone-pairs of electrons from the Pb^{2+}). The silicate sheets can be described as consisting of zigzag pyroxene-like $(SiO_3)_n$ chains joined laterally into sheets with the unshared tetrahedral apices in successive chains pointed alternately up and down, a configuration also found in pentagonite.

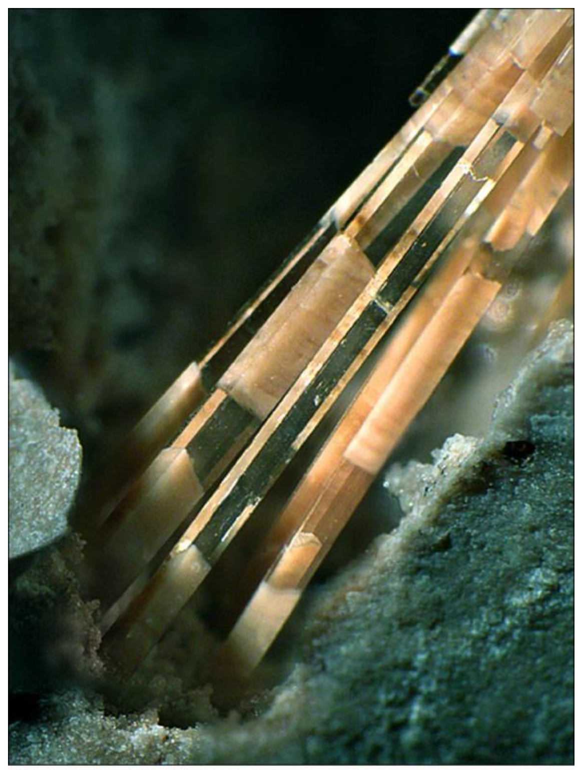
Full details of the structure and spectroscopy of plumbophyllite can be found in Kampf et al. (2009), American Mineralogist, vol. 94, pages 1198-1204.



The atomic structure of plumbophyllite looking down the c-axis. Oxygen atoms occur at each vertex of the yellow silicon tetrahedra.

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

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 5.0 mm wide



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 5.0 mm wide

Biggs Cavity Minerals

By Rudy Tschernich

Scenic chert/jasper (Fig. 1) is well known between the flows of Columbia River Basalt in the Biggs area, Sherman County, Oregon. This paper deals with the quartz, calcite, weddellite, and whewellite found in cavities in the chert/jasper.

Fig. 1 Typical scenic chert/jasper from the Biggs area

The area under study ranges roughly from Rufus in the east to the Deschutes River in the west and Wasco in the south (Fig. 2). Some chert/jasper has been found along the cliffs on the Washington side of the river, although no cavities have been reported.

The basalt flows in this study belong to the lower units of the Frenchman Springs Basalt member of the Wanapum Basalt Group, which is a subunit of the Yakima Basalt Formation, a major unit of the Columbia River Basalt Group. The exact flow under study belongs to the famous Ginkgo flow dated at 15.3 million years old and the under laying Vantage sandstones which are well studied in the Vantage, Washington area They also account for all the major petrified wood sites at Ginkgo Petrified Forest, Saddle Mountains, Yakima Ridge, Rattlesnake Hills, Horse Heaven Hills in Washington and the Deschutes River, west of Biggs and Swartz Canyon near Prineville, in Oregon. This unusual interflow period lasted about 20,000 years. The Cascade Range had not yet attained its present altitude, and the prevailing winds were southwesterly and westerly and were very moisture-laden. This created a much more humid climate than the semi-arid area seen today. During periods of volcanic activity, these winds also distributed vast amounts of volcanic ash over the surface of the plateau, similar to the thick beds of ash that formed the John Day and Clarno

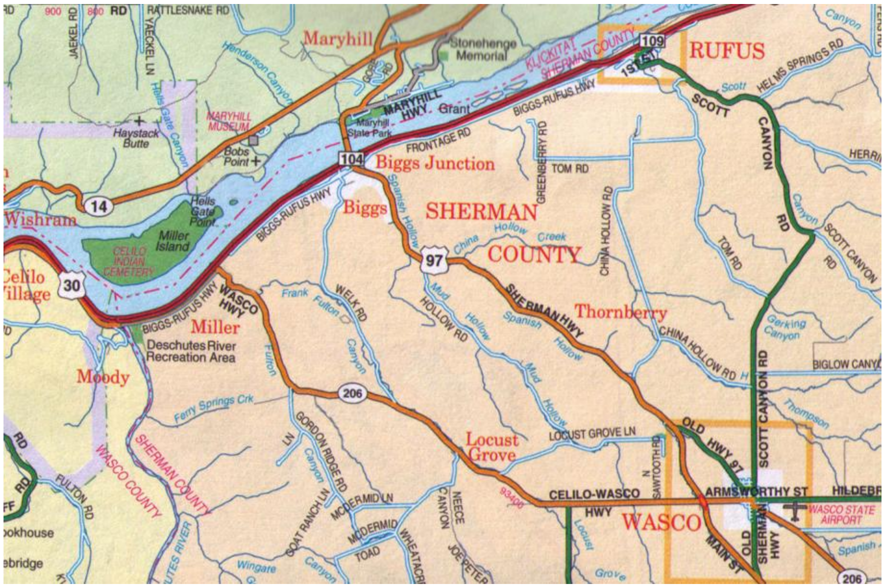


Fig. 2 Map of the general area under study in this paper.

Formation earlier. Due to the extensive nature of the Columbia River basalt flows, the drainage of the plateau was quite inefficient, resulting in innumerable lakes, some extensive and some shallow. During periods of volcanic activity, volcanic ash distributed on the plateau would be concentrated in these shallow lakes by surface runoff by rainwater or wind blown ash clouds. Eventually the lake would be overwhelmed by new basalt flows and the process repeated many times. If the lake retained its water at the time it was invaded by a lava flow, the bottom sediments being saturated would not have competency to resist deformation. If, however, the lake was dry, the sediments would have compacted and attained a competency to support the invading lava with minimal deformation. The latter condition is the most prevalent in the area under study and the bottom sediment lie sandwiched between lava flows in an undisturbed condition. Due to the presence of large quantities of andesite ash, the lake water became high in silica content.

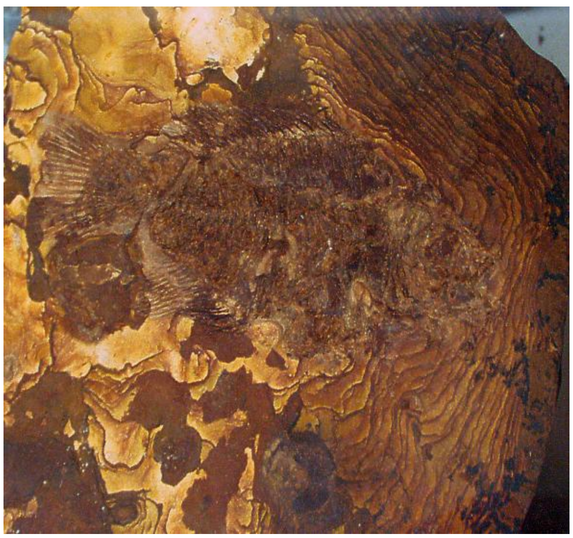


Fig. 4 Leaves enclosed in the jasper/chert near Rufus.

Fig. 3 Fish fossil in the jasper/chert near Rufus.

The presence of shallow lakes lined or filled with vegetation containing fish (Fig. 3) and leaves (Fig. 4) were found in the chert/jasper near Rufus. Volcanic ash was either light colored rhyolite or gray andesite. The very fine (gray) and coarser light colored sand-sized ash formed many thin layers (locally called Wascoite) and killed the vegetation at the bottom of the lake. Decomposition of the organic material produced either methane or carbon dioxide, which in turn formed cavities in the ash-like mud. Decomposition of the organic material also produced tiny calcite crystals on the walls of the cavities, followed by silica derived from the ash-rich water that crystallized on the calcite and welded the ash-like mud into a hard mass.

The Fulton Canyon quarry is now the best exposure of one of these jasperized lakebeds. Today the jasper/chert beds in the quarry are covered with basalt that fell from the quarry. According to Nobel Witt, who observed this quarry face when it was still exposed (Fig.5), the right side of the quarry displays the leading edge of a basalt flow, composed of pillow lava, that uprooted the paleo-lake sediments and jasper formations, indicating a subaqueous invasion of the lake. The left side of the quarry shows sediments that are covered conformably with a basalt flow, which also overwhelmed the pillow basalt of the previous flow. This indicates a dry condition during the time of deposition.

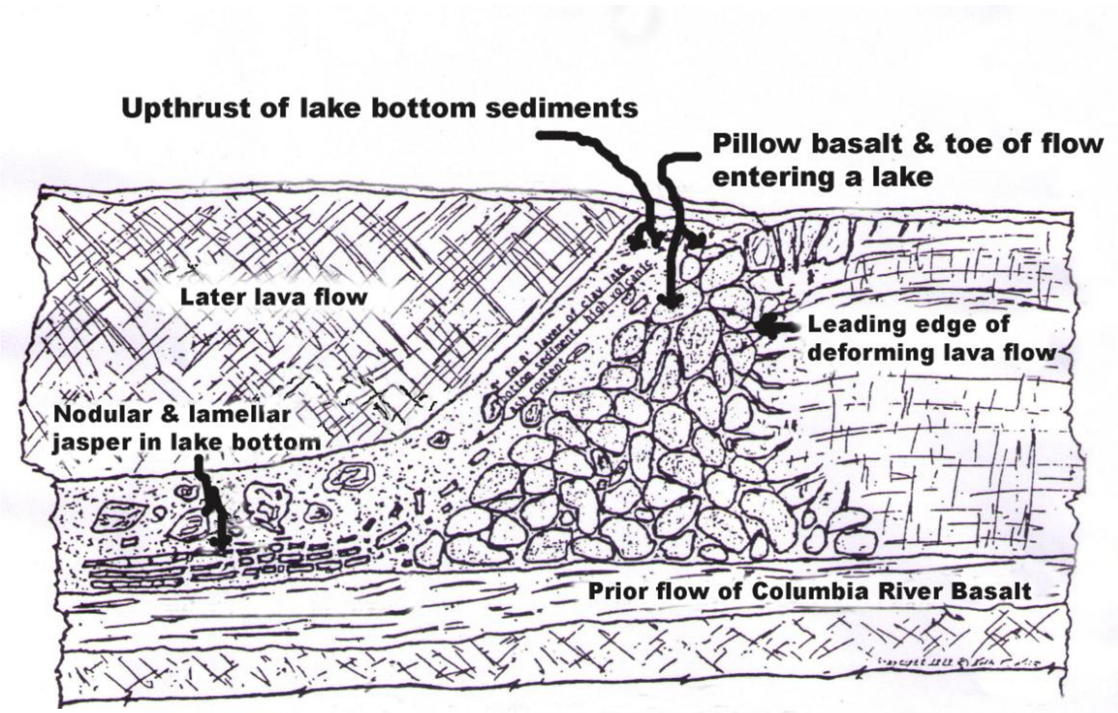


Fig. 5 **Verticle Section of the Fulton Canyon Quarry**

Fig. 6 Numerous cavities in chert/jasper.

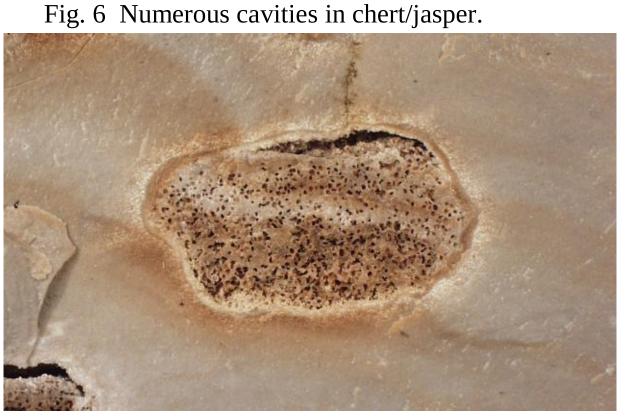
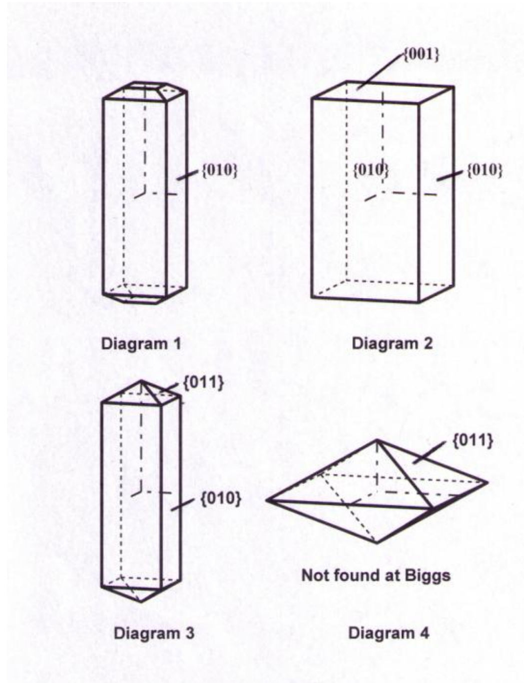


Fig. 7 Spongy quartz with dark angular cavities

Vesicles from decomposition of organic matter are very common in this quarry. Cavities in the chert/jasper occur either rounded or irregular (Fig. 6). The base of some of the cavities display a layering of spongy-looking quartz full of tiny hollow rectangular to diamond-shaped cavities, 1 to 0.4 mm in diameter, lined with brown residue that once contained calcite (Fig.7). Dissolution of the calcite by oxalic acid, derived from decomposition of the organic material, produced the very rare weddellite. Out of thousands of cavities only a very few contain weddellite. Nobel Witt found individual weddellite crystals, up to 6 x 6 x 25 mm long, and bundles of parallel crystals, up to 8 x 8 x 40 mm, in size. Weddellite also replaced scattered fish scales and bone in the chert/jasper.

The largest known weddellite crystals in the world occur in the Fulton Canyon quarry near Biggs, Oregon (Mandarino and Witt, 1983). Weddellite at this site forms euhedral, dull to vitreous, translucent to transparent, golden-yellow-brown to opaque, cream-colored crystals that fluoresces yellow under LW ultraviolet light. Weddellite commonly has a dark brown, resinous core that contains an unidentified organic material. Some crystals are coated with an overgrowth of white, fibrous, silky weddellite. Color zoning from transparent to opaque cream-color can be repeated several times along the length of a crystal, which can also show phantom crystals with terminations (Fig. 10).

Weddellite is structurally tetragonal, although crystals from Biggs appear orthorhombic (Figs. 8-10). It forms simple rectangular needles or blades composed of prism faces {010} terminated a pyramid {011} or a basal pinacoid {001} (Mandarino and Witt, 1983) (Diagrams 1-3). It has good {010} cleavage, breaking into fibers parallel to the c-axis (Mandarino and Witt, 1983). Weddellite crystals from other localities are generally under 0.5 mm and display a simple tetragonal bipyramid {011} (Diagram 4). Synthetic weddellite has many more crystal forms.



X-ray patterns of some of the Biggs crystals indicate whewellite ($CaC_2O_4 \cdot H_2O$) has replaced some of the weddellite ($CaC_2O_4 \cdot 2H_2O$ (Mandarino and Witt, 1983). Some tiny crystals may represent primary whewellite (Mandarino and Witt, 1983).

Calcium oxalate minerals should be expected wherever vegetable matter is decomposing in natural sediments (Manning, 2000). Marlowe (1970) showed that pH conditions govern the form of the calcium oxalate crystals (CaC_2O_4), better known as oxalic acid. His study found that at a pH of 4.0 crystals were monoclinic, whereas at pH conditions near 7.0 the crystals were tetragonal. Oxalic acid crystals are soluble in water and react with calcite ($CaCO_3$) to form weddellite ($CaC_2O_4 \cdot 2H_2O$), which is insoluble in water. Dehydration of the weddellite produces whewellite ($CaC_2O_4 \cdot H_2O$), which is also insoluble in water.

Weddellite is common in human kidney stones, organic-rich soils, and peat. The solubility of weddellite is very low, therefore, precipitation readily occurs when oxalic acid, produced from fungal processes in sediments and soils, reacts with calcite. Griffin, G.M. and others (1984) found that tetragonal weddellite was found in soils that contained a pH of 7.0. They also found that a depletion of oxygen in the water was ideal for the formation and preservation of the weddellite. Weddellite is a hydrated calcium oxalate with two molecules of water. In time, weddellite exposed to the air loses one of its water molecules to become whewellite. This sequence not only produces the minerals found at Biggs but also explains the precipitation of a yellow insoluble material that results from cleaning iron oxide coatings off quartz crystals with an oxalic acid solution in specimens that also contains calcite. The resulting yellow precipitate (weddellite) penetrates the rock, coats the crystals, and is very difficult to remove.

The Fulton Canyon Quarry, as well as all the chert/jasper sites in the Biggs area, are posted “No Trespassing”. It is NOT advised to try to collect there.

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Siderite and Associated Minerals Along the Clackamas River, Clackamas County, Oregon, USA

By Bill Tompkins

There are many sites along the Clackamas River where siderite occurs. The bulk of these localities are found along Highway 224 between mileposts 33 and 41. This report will concentrate on two of the sites closest to Estacada. Known as Big Cliff and Memaloose Roadcut, they were chosen because of the range in color and crystal forms in which the siderite has formed, ease of collecting, and because of the associated minerals.

Siderite, $FeCO_3$, trigonal, with a hardness of 3.5 to 4.5, is a common secondary mineral in Northwest basalts. Usually found as a brown, rusty appearing crust in pockets up to several inches across along the Clackamas River, in some sites it can be larger, more colorful, and found in different forms. Siderite here can also be found associated with calcite, pyrite, heulandite, opal, and selenite.

BIG CLIFF

At Big Cliff, Highway 224 milepost 33.1, the pockets can be much larger than at other sites. I have collected pockets over 4 inches across commonly and 6 inches across occasionally. I have seen pieces in other collector's cabinets with pockets larger than 6 inches across. Ray Schneider had a piece that he showed me years ago that stood over 18 inches tall and was cut with a rock saw into the shape of a 4-sided steep pyramid. On each of the sides was a pocket lined with beautiful purple siderite. The piece was stunning. Ray told me that he collected it many years ago when the highway was being built. That comment about the way collecting used to be, when the highway was under construction, is a common thread with other collectors. I have seen quantities of pieces with filiform pyrite, and pieces with selenite, that were collected from this area way back then.

Collecting at Big Cliff is still possible but is sometimes a problem. I have collected there many times and once there was a small problem. The Mt. Hood National Forest Ranger that stopped and talked to me was concerned that I might leave rocks on the pavement, and a promise not to brought permission to collect. It seems that small rockfalls happen here regularly, because every time I stop and look there are fresh samples to choose from, lying in the ditch right beside the highway, so that enough samples can be collected in just minutes. Another nice part about collecting in the talus slope here is that sometimes the rock comes from much farther up the cliff, making for a variety of sources.

The siderite at Big Cliff is usually the only mineral found in the cavity. The color is why I still stop; the siderite in some of the pockets has an iridescent sheen that resembles an oil slick with colors ranging from purple to green with flashes caused by the siderite being actually a mass of bladed crystals that reflect the light differently as you turn the piece. Some pieces also have small hemispheres of siderite that I believe were floater crystals that later attached and were covered with a later generation. Selenite, forming rods up to an inch long, can be found with the siderite, and rarely pyrite.

MEMALOOSE ROADCUT

The Memaloose Roadcut is, found by turning at the Memaloose bridge at Highway 224 milepost 33.9 and continuing uphill on Memaloose road (also known as Forest Development Road 45) just over ½ mile. The siderite and associated minerals can be found on both sides of the road. The site is on the north side of a steep mountainside that is almost always in the shade, meaning that this site is usually covered with moss and leaves, so the collecting area is not obvious.

The siderite can be found as the common brown crust, as very colorful linings, as smooth hemispheres up to 3/8ths of an inch across, and as single crystals several millimeters across. The color of the siderite here ranges from almost white to almost black. The crystals form as individual crystals or as bladed masses.

Associated minerals here include calcite, selenite, pyrite, heulandite, and opal. The calcite forms blades that are usually yellow to white. Calcite can line the entire pocket or form on top of the siderite. When the calcite formed on top of siderite spheres, the calcite would form hemispheres up to over an inch across, making good cabinet specimens. The opal can be tiny, clear spheres on top of the siderite, or intergrown with the siderite in layers, or when it is the only mineral in a cavity it can be brown to black and up to 10mm thick. Rarely, the clear opal spheres will stack end to end and form columns up to 5mm.

Many of the minerals found here appear to have formed in several generations, making for quite a variety. Some of the hemispheres are smooth, some are coarsely bladed, some have calcite growing on the siderite blades, some are almost white, some are almost black, and most are some shade of brown. Also, some of the siderite hemispheres are damaged, revealing the different layers in their growth.

In summary, I understand that siderite is not usually an attractive addition to a collection, but these two localities can be incorporarated into a field trip further upstream at localities such as the Oak Grove Fork, Lake Harriet, and the Fish Creek Roadcut. I recommend a look sometime when you are in the area because the siderite is better than average and the associated minerals make a stop worthwhile.

I have been adding photos of both localities and their minerals to MinDat.org

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Optical Determination of Zinclipscombite

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Zinclipscombite – $Zn^{2+}Fe^{3+}_2(PO_4)_2(OH)_2$ – was described as a new mineral species from the Silver Coin Mine, Humboldt Co., Nevada by Chukanov and others in 2006. As the name suggests, it is the zinc-analog of lipscombite. Zinclipscombite occurs as dark-green to brown spherules up to 2.5 mm in size, consisting of tetragonal crystals that are elongated on the c-axis. Lipscombite – $Fe^{2+}Fe^{3+}_2(PO_4)_2(OH)_2$ – was first recognized at the Silver Coin Mine in the early 1990s, and was verified by X-ray diffraction (XRD) and electron probe micro-analysis (EMX) methods. Since lipscombite and zinclipscombite cannot be visually distinguished, we started to question whether some of the 'lipscombite' specimens in our collections might in fact be zinclipscombite.

A possible means of addressing this question would be to perform a chemical test for zinc. However, one of us (BW) suggested that we could instead use a simple optical test to check for zinclipscombite. Chukanov had noted that zinclipscombite is optically uniaxial (+), meaning that the index of refraction parallel to the c-axis ($n_{\square}$) was greater than the index of refraction perpendicular to the c-axis ($n_{\square}$). Published optical data for lipscombite are sparse, but our observations have shown that lipscombite is uniaxial (–), with $n_{\square}$ greater than $n_{\square}$. In uniaxial minerals, the optic sign (+ or –) is the same as the "sign of elongation", and since lipscombite and zinclipscombite crystals are both elongated parallel to the c-axis, it was possible to simply check the sign of elongation.

The reader should refer to an optical mineralogy text for details, but this test simply entails:

(1) orienting the elongated crystal grain properly between the crossed polarizers of a petrographic microscope,
(2) inserting an accessory plate that changes the path difference between the 'fast' and 'slow' light waves by a known amount, and
(3) checking for whether the interference colors of the crystal increase or decrease relative to the accessory plate (e.g. Phillips, 1971).

In samples that were tested by us, we found examples of both positive and negative signs of elongation, confirming that both zinclipscombite and lipscombite occur at the Silver Coin Mine. Although this optical test provides a necessary criterion for distinguishing the two minerals, it may not be sufficient for telling the two apart in every instance. Paired optical and chemical (electron probe or scanning electron microscope) measurements of individual grains are needed to determine the extent to which zinc and iron substitute for one another in these minerals, and the effect this has on the optical properties.

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