Northwest Micro - Mineral Study Group

The Micro Probe

Volume II, No 1 Spring 1975

MEETING DATE: May 10th and 11th, come anytime you can make it.

MEETING PLACE: Home of Stan and Edith Heilman at Raymond, Wn. Instructions on how to get there will be given below.

Camping space available at Heilman's. Come on Friday if that is more convenient.

Motel accomodations should be made at Mountcastle Motel at Raymond, Washington (phone 942-2488) the rates are moderate and it is only a couple miles from Heilman's.

Bring your own lunch for Saturday noon. Saturday evening meal will be pot-luck. The club will provide the meat. Left overs should make up Sunday lunch. Will those whose last name begins with A through H bring salads (or the makings). Those whose last name begins with the letter I through Z bring desserts.

Because it will be necessary to know how many to prepare for (so as to have enough meat etc.) please let Caroline McGanty, Route 2, Box 95, Yamhill, Or. 97148 know if you will be coming. Tell her how many there will be in your party, if you will be bringing a salad or a dessert and if you plan to camp at Heilman's. If you can't let her know till the last minute, her phone number is 662-3334.

To get to Heilman's: On highway US 101 at the north end of the bridge at Raymond, Washington turn west toward Tokeland and Westport. Follow this road about 2 or 2½ miles, you will come to a road angling off to the right, follow this road for a short way, past a couple cross roads to a group of barn red buildings on your right. You've reached your destination. Heilman's place is the former Bales Army post and the buildings are long army barracks type buildings. If you should get lost, Heilman's phone number is 942-5231.

If it has been rainy weather, we suggest you have Stan advise you on a camping spot as some areas are lower ground than others and we wouldn't want anyone to get stuck.

Russ Kenaga Writes: Russ Kenaga, Jr. President

I am looking at the words printed by Bob Hagglund in the last issue of the "MICRO-PROBE", in which he stated it was not well-timed and the membership was not well "sold" on the idea. I felt, without talking to him, that there was probably more than one reason, but perhaps one of the foremost was the difficulty in just plain doing everything - getting material and all the work involved in getting the "Micro-Probe" out to the membership. I also felt that in terms of reader interest it was considerably more successful than he imagined. Upon being voted President (and I was there, too), I felt it wise to give people an opportunity to be a contributor, so made assignments - but to the date of this letter (Feb. 1975) one only made a contribution. I certainly hope every member gives this matter some thought and sends in material they believe would be of interest to the rest of us. AND, many votes of sincere thanks go to Bob & Marie Hagglund and Don & Lee Kendall - as well as to our Secretary, Caroline McGanty - for their good work!

In any avocation there are all degrees of interest, and certainly in one as all-compassing as mineralogy and crystallography it is so. I believe the degree of interest is directly reflected in the time one spends but even more specifically, in the amount of knowledge obtained, together with the expertise shown in both mounting and the "bookwork" - that is, the labelingand the storage and retrieval of information. Who likes a sloppily mounted specimen? One that is off-center, shows excessive glue and may be damaged? Or the label is partly illegable or is either mis-labeled as to the species or the location? And then, of course, without a good retrieval system, when the collection gets even of moderate size a specific specimen becomes very difficult to find. All of the foregoing notwithstanding, if the hobbyist does not seek to bring his sometimes poor, initial material selections to a high degree of quality value, then I believe his efforts will be of little value to him or to anyone else. A lot of the challenge to me has been and is in providing correspondents with quality material they do not have; in return for which, hopefully, they will do likewise for me.

The foregoing in not meant to be anything but a desire to instill in each micromounter a desire to become more knowledgable and to up-grade one's collection. I well remember the intense satisfaction I received when I first started viewing specimens which I am sure have, by now, been replaced with better ones. As Neal Yedlin puts it, "buy and use a good mineral book!"

A couple of other thoughts come to mind. Any who have buddingtonite from me, please change the label to BARITE - tested by Dr. Richard Erd of the U.S. Geological Survey, who did the original work on the Clear Lake, Calif. mercury deposit. A prime example of jumping to conclusions. Buddingtonite from there is a very tiny Xl. which would be completely missed by the untutored. Also, various habits may be assumed by the same mineral, often in the same specimen. Dr. Paul Moore, U. of Chicago, recently tested phosphates in the Mullica Hill, N.J. belemites; beraunite in 4 habits and colors !

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MINERALS IN PEOPLE by Russ Kenaga, Jr.

Since everything, whether organic or inorganic, is mineral, it follows that humans are also mineral and further, occur under certain conditions as crystals. The following article refers to a number of minerals forming human pathological concretionscalled calculi and altho some mineralogists would not consider these materials as minerals in the strictest sense, most are identical with minerals in composition and structure and are therefore referred by their mineral names, leaving their status unanswered.

Source of the material is from an article by Richard I. Gibson, of Davis, Calif., published in "The American Mineralogist", Vol. 59, 1177 - 1182, 1974. 15,000 human mineral deposits were studied, most samples coming from the Midwest, of which over 14,500 samples were derived from the urinary system of kidneys, ureters, bladder and urethra.

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MINERALS IN PEOPLE - - by Russ Kenaga. (continued)

Calcium oxalates are whewellite and weddellite, both very uncommon in the mineral world but both occuring abundantly in calculi and ofter in the same calculus; apatite, brushite, monetite and whitlockite.

WHEWELLITE $CaC_2O_4 \cdot H_2O$

The predominant habit consists of smooth to botryoidal or globular radiating crystalline aggregates. Discrete crystals rarely present but a monoclinic cleavage is observable. Common colors are brown to olive-green but shades from black to yellow exist - due to included organic material. Whewellite calculi are often deposited upon renal papillae, small protrusions within the kidney; the calculus almost invariably has a small nucleus usually composed of apatite, brushite or whitlockite. Stones are concentrically laminated and radial about the center, clearly indicating deposition therein. A special kind of whewellite stone is referred to by urologists as the jackstone, with symmetrical, elongate, branching protrusions, and centers of branches often show nuclei of carbonaceous organic matter.

WEDDELLITE $CaC_2O_4 \cdot 2H_2O$

Occurs almost always as well-formed tetragonal dipyramidal crystals and aggregates of single crystals, intergrown. Colors are commonly yellow to white or colorless, reflecting differences of included organic material. Secondary and tertiary crops of smaller, differently-colored crystals may be deposited upon faces of early-formed crystals up to 5mm on an edge. Occasional super-deposition of whewellite spherules takes place on the apices of weddellite crystals in the tetragonal prism position. The tetragonal dipyramid containing weddellite display tetragonal prisms a(010), always on yellow crystals and up to 2mm across. Pseudomorphism occurs, from the partial dehydration of weddellite to whewellite, resulting in strikingly perfect pseudomorphs. The Whewellite occurs as finely granular to course, equant prisms, in colorless, yellow, green and brown varieties sometimes within the same specimen. The replacement begins at the center and works outward, becoming increasingly fine-grained, but surfaces are rarely replaced, probably because of the acqueous environment of the urinary system maintaining the stability of the weddellite.

APATITE (hydroxyl-apatite) $Ca_{10}(PO_4)_6(OH)_2$

The most important mineral in the human body is apatite, the principal constituent of bones and teeth. Both hydroxyl-apatite and carbonate-apatite occur in the urinary calculi, with the latter forming more abundantly, but the habits are the same and often serve as a center for deposition of subsequent compounds. The first habit is soft, crumbly, fine-grained, white, yellow or light brown powder. The second habit is massive, glassy, yellow, brown or black material. It is usually thinly laminated, both in pure apatite calculi and as small patches within other mineral frameworks, as in interstices of intergrown weddellite crystals. Glassy apatite sometimes occurs as concentric laminations 2 - 4 microns thick, especially in the rare variety of calculi referred by urologists as "milk of calcium", an unconsolidated mass of spherical stones, each less than 1mm in diameter.

BRUSHITE $CaHPO_4$

Occurs as a response to acidic conditions, is isostructural with gypsum. $CaHPO_4$ is much less common than apatite but occurs regularly. Flat, bladed, colorless-to-yellow monoclinic crystals occur in calculi as radiating aggregates; individual crystals as tabular on (010) with (001) and (100) also present. Small, second order prisms have been noted and internally, silky fibers display pearly luster on the perfect (010) cleavage.

MONETITE

This triclinic, anhydrous analog of brushite was identified only three times in this group, as laminated, gray-to-brown, finely granular material associated with oxalates and apatite. Beck, Mulvaney and Rhamey (1974) studied the first reported human occurances, and Beck's monetite calculi displayed lathlike triclinic crystals, an additional associate was brushite.

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Minerals in People, continued.

Prien and Frondel (1947) reported it in urinary sediments of carnivorous animals.

WHITLOCKITE $Ca_8Mg(PO_4)_6$

$Ca_3(PO_4)6$ has long been termed whitlockite but with recent redefination its formula is now given as $Ca_8Mg(PO_4)_6$. The X-ray pattern of this urinary compound matches that of whitlockite, but adequate chemical ananyses are lacking to confirm the presence of Mg in the urinary material. It is unstable in the urinary system and apatite should precipitate; but whitlockite is stabilized in nature by small amounts of Mg and Zn - and this certainly happens in the human body as well. Pure whitlockite is almost the only constituent of prostatic calculi and prostatic fluid has the highest concentration of sinc in the human body. Urinary and prostatic whitlockite has a distinctly resinous luster and a textbook-type hacky fracture. Translucent brown, amber and yellow laminae are very convolute in section, clearly illustrating a tendency for small stones to fuse into larger ones. It is the only mineral discussed here which regularly shows such fusion.

Magnesium phosphates are important indicators of infections in the urinary system. In many cases the precipitation of the minerals themselves may be enhanced or catalyzed by the presence of the infective organisms. The three urinary magnesium phosphates described here are struvite, newberyite and hannayite.

STRUVITE $MgNH_4(PO_4).6H_2O$

Struvite is orthorhombic-pyramidal in crystals. This hemimorphic symmetry is best shown by well-formed, colorless crystals larger than 1mm across, displaying a wide variety of forms. Such crystals line cavities, cracks and pore spaces in laminated stones composed of powdery apatite co-precipitated with small, white, rounded to blocky struvite crystals. These calculioften develop irregular branches which reach into crevices within the kidney; they are called "staghorns" by urologists and almost always are associated with urea-splitting infections caused by several strains of bacteria. With increasing struvite content, stones become more porous and aggregates of struvite crystals assume a columnar, slightly radial arrangement. It is the alkaline end-member.

NEWBERYITE $(MgH(PO_4).3H_2O$

A mineralogical enigma is presented by newberyite, an acid phosphate which is nonetheless associated with struvite and with infections of proteus mirabilis, bacteria known to liberate NH_3 and thus increase pH by their activity in the urinary system. The most common occurance of newberyite is aspale-green-to-white textured spherules scattered on the surfaces and in spore spaces of apatite-struvite stones. Many calculi containing this type of newberyite are crumbly and fragmented, with spherules occuring on broken inner surfaces as well as exterior portions. The spherules, up to 2½mm in diameter, are dense intergrowths of radiating newberyite crystals and, when malformed, display rosettes and other splayed forms. Well-formed, vitreous, green, platy, diamond-shaped orthorhombic crystals constitute the second habit of newberyite; such crystals are smaller than 0.5mm in length and are found on the surfaces of apatite-struvite stones.

HANNAYITE $Mg_3(NH_4)_2H_4(PO_4)_4.8H_2O$

Noted five times in this series of calculi, hannayite is a triclinic mineral occuring as soft, white, sheaf-like laths and radial sprays. Associated minerals are apatite and struvite (3 cases), apatite, struvite and newberyite (1 case), and apatite, whewellite and weddellite (1 case). The formula and association of hannayite suggest it represents a response to near-neutral conditions in the urinary system. Its rarity is probably caused by the difficulty of mairtaining a delicate pH balance in the human body over signifcant periods of time.

MISCELLANEOUS URINARY MINERALS

Calcite was found four times, always as yellow to brown, granular, poorly consolidated material not associated with other minerals. Two calculi composed of weddellite crystals deposited on globular whewellite contained as a last deposit collorless cubic crystals of

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. . . halite. Gypsum occured three times as fragile, colorless monoclinic crystals about 0.3mm long on surfaces of calcium oxalate stones.

NON-URINARY PATHOLOGICAL MINERALS

Gall stones usually consist of organic compounds, but stones entirely or in part of three calcium carbonate polymorphs, calcite, aragonite and vaterite, have been observed. About 50 salivary gland stones analyzed in this study were all pure, dense, porcelaneous white-to-yellow apatite; a single tonsil stone was powdery white apatite, and a single pancreas calculus was calcite. The few calculi observed from the liver and from joint deposits were all organic compounds.

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FIELD TRIP NEWS - - - - - - YELLOW LAKE, B.C. * * * * * * * * * MAY 24 - 25 - 26, 1975

The main field trip of the year will be to the Yellow Lake, B.C. zeolite area over the Memorial Day weekend. Members participating are asked to collect at Yellow Lake ONLY on May 25. This is so that everyone will have time to travel to the area and that everyone can benefit from the knowledge and excitement of the group.

The collecting area is in road cuts of hiway 3 on the north side of Yellow Lake near Ollala, B.C. - between Princeton and Penticton . The country is very beautiful and a picnic area is present at the west end of the lake - no camping. We will meet along the road at the collecting area; best collecting is at the east end of the area (nearest Penticton. There are motels in Penticton and plenty of camping areas are available.

The rock is hard and in the walls of the road cuts. A few boulders are present. We collect near the road so watch out for cars; we do not want anyone run over or rolling rocks on the road.

MINERALS PRESENT AT YELLOW LAKE: Material very good but not abundant.

BREWSTERITE, A RARE ZEOLITE, RICH IN STRONTIUM.
THOMSONITE, with very unusual and new crystal faces; well-formed with unusually high Sr content.
HEULANDITE, good crystals with highest known Sr. content.
MESOLITE & SCOLECITE, Uncommon at this locality.
ANALCIME, Small micro crystals.
CALCITE, a variety of crystal forms.
FLUORITE, micro octahedrons on brewsterite and heulandite.
LAUMONTITE, good small crystals.
GOETHITE, fine blades and radiating groups on brewsterite.
PYRITE, STILBITE, CHABAZITE, present but scarce.

If you get to the Yellow Lake area early or want to continue collecting after the field trip, there are several good areas nearby. At Penticton there are very largefeldspar crystals - up to 2 to 4 inches. New localities for ferrierite at Pinaus Lake and Monte Lake, northwest of Vernon. More information at the meeting at Raymond, WA. HOPE TO SEE YOU ON THE TRIP.

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CLACKAMAS, OREGON, FIELD TRIP PLANNED FOR THIS SUMMER:

Up the Clackamas River, out of Estacada, Oregon, is found a number of very fine micro minerals and a few cabinet specimens. Micro-minerals are:

Phillipsite; filiform pyrite; pyrite; levyne; offretite; brewsterite(?); mesolite(?); siderite; selenite; heulandite, and others.

Cabinet specimens: Siderite, var. spherosiderite, very anundant; Aragonite needles.

ZEOLITES OF INDIA

by Rudy Tschernich

On January 11 my father and I left on the trip to western India in search for the fine zeolites that made India famous. On the way we made stops in New York, London, Frankfurt, Rome Beirut and Delhi. There is 13½ hours difference between our time and that at Bombay, so when it was 10 at night in Washington, we were enjoying warm weather and daylight the next day in Bombay.

Living conditions are horrible. About 90% of the people live in slums that are beyond description. Their "houses" are a pile of cardboard, sheet metal and gunnysacks held together with manure. Everything is dirty and the odor is something else! The only way to survive in that country is to isolate yourself from the rest of India. We stayed at the best hotel in India, the Taj Intercontinental; there the water and ice could be used and the food is excellent.

We visited some of the quarries in the Bombay area. Those quarries right in town were hard to "take"; slums were built rightin the quarries and human manure all over the ground. Little was found in these quarries - all the work is done by hand - drilling is by ramming a crowbar into a hole and with luck a worker might make two holes in a day. The rock is broken with hammers and hand-loaded into trucks. Pockets are cleaned out as soon as something is found for the workers know that they can sell the crystals to people coming to the quarry or to dealers who have contracted their material. Normally nothing can be collected by visitors; and they would feel that you were stealing their material is a good pocket was exposed and you collected in it.

The quarries just out of Bombay are much better; not as dirty and material is much more abundant. At one quarry over 100 large pockets were exposed when we visited. The rock is pillow basalt with openings between the pillows containing abundant prehnite, apophyllite and quartz, while pockets within the pillows contain fantastic balls of okenite and gyrolite along with laumontite, calcite, apophyllite and quartz. We were able to collect in some of these pockets for there were many present but still the best material is from the workers.

Because of the expense of hotel accomodations, high prices for rental cars and the lack of collecting in the quarries, we decided to cut our trip short and make only the essential areas and do more purchasing. We took a train to Poona, a distance of 125 miles. The countryside looked a great deal like the Spray/Beech Creek areas of eastern Oregon and was very nice to see. Poona is now renemed PUNE, the pre-British name for the town but I imagine the collectors will still call it by the well-accepted name, "POONA". The famous quarries in Poona are located just outside the town and consist of about 8 small quarries , of which only three were in operation; if you can call 3 or 4 people very slowly working an "operating" quarry! A few pockets with stilbite and heulandite were in the walls but nothing worth collecting. We purchased a few green apophyllites from the workers and then went with one of the workers to a nearby village for more material. When we were seen by the villagers they all came out with crystals in their hands. Here I was, in the middle of about 50 prople, all trying to sell what they had. The quality was fair, the price O.K. but no real buys; the villagers know a sucker when they see one!

While in Poona we visited the three important dealers of zeolites. Two of them were fantastically high; their price to me was at least 4 times what I could sell the material for in the States. They wanted $10 for a poor, 2" stilbite and $75 for an average mesolite that would compare to a $25 specimen from Skookumchuck Dam. These people are American Missionaries and sell a lot to European buyers who pay far more than we do in the U.S. The third dealer is an Indian who had fine material at prices that could at least be considered realistic. He had very fine, deep-green apophyllite and I was able to get several of the finest I have ever seen; both cabinet specimens and a large quantity of fine thumbnails.

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When I returned to Bombay I looked up the three important dealers in that area. Again, two of the dealers prices were very high and they were only interested in selling in lots of 25 crates. The only specimens I was interested in getting were the ones they claimed were part of their "collections" - - that is, after I had picked them out.

Fortunately the third dealer was excellent; his prices were very good and the quality very high. I spent most of my money at his place and hand-picked over a ton of super fine zeolites and associated minerals. I have shipped this material by boat, all hand-wrapped and in wooden crates to assure safe arrival. They had a carpenter come in and make special boxes for the large specimens and a rock mason to do the trimming of the specimens. The shipment should arrive in Seattle around April 1 - - I hope! THE SHIPMENT CONTAINS THE FOLLOWING:

Gyrolite, balls in many colors, white, green (light and dark), cream and some brown. Thousands of TN's, hundreds of 2 x 2 and cabinet sizes.

Okenite, Balls of fine, undamaged fur. I packed these myself. Thousands of TN's and 2 x 2, many cabinet and about 6 specimens 12 x 14 with fantastic, undamaged balls individually scattered on a light green rock.

Apophyllite, hundreds of green TN's, some 2 x 2 and a few larger. Thousands of colorless apophyllite with large crystals, interesting crystal forms and fine associations. All sizes from TN's to 12 x 14 inch.

Prehnite, many colors and types, including very interesting prehnite casts after laumontite associated with okenite, gyrolite and apophyllite.

Stilbite, some very fine groups of all sizes. Stilbite in good crystal form was not abundant when I was in India. I got no "bow-ties" and not as many specimens as I would have liked.

Mesolite, about 20 nice specimens with thick needles, very similar to those found at Skookumchuck Dam.

Scolecite, very few 2 to 3 inch crystals. This mineral was very scarce at all the dealers at this time; the main quarries which produce the scolecite are now closed.

Laumontite, very fine singles up to 3 inches long and some fine groups.

Mineral-wise, we were very successful but I would not recommend this trip for others; it is very difficult to get used to India. Total cost for the trip ran over $6,000 and that is a lot of crystals to sell or trade!

The minerals and slides of the trip should be ready (available) at the Raymond meeting. Anyone interested in this material is welcome to stop at my place anytime after the shipment arrives.

Looking over some of the micro quartz found with the zeolites in the Bombay quarries, I find some of the quartz is covered with very fine extra faces, including very small "c" faces.

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ERROR - - ERROR CAPE LOCKOUT "NATROLITE" IS OFFRETITE ERROR - - ERROR

While testing many of the firrous zeolites for identification as to natrolite - mesolite-scolecite or mordenite, the very common white hair from Cape Lookout was identified as natrolite; the optics indicate this to be true IF OTHER SPECIES ARE NOT CONSIDERED. Dr. Wise has x-rayed this material and found it to be offretite (offretite and natrolite have almost identical optics). This work was done because of a complete chemical composition study being made on all the species present at Cape Lookout for a paper on the rare zeolite dachardite which is found at that locality. CHANGE YOUR LABELS AND TELL OTHERS TO DO SO. All of the long, thin hair is offretite; little white "cotton" balls on the hair IS mordenite. Cape Lookout is very unusual because of the form of offretite there and the extreme abundance. Offretite forms hexagonal prisms with "c" face at most localities. Very high power is required to see the hexagonal cross-section on Cape Lookout material. Offretite forms overgrowths on levyne and makes the "hubs" on Milwaukie material. MORE INFORMATION AT THE MICRO MEETING AT RAYMOND, 2nd WEEKEND IN MAY, 1975 - - HOPE YOU CAN MAKE IT ! Rudy T.

[illegible] IN THE BLACK HILLS PEGMATITES by Robert J. Smith

The Black Hills, located in the southwest corner of South Dakota, are a mineral collectors paradise. Ever since gold was discovered in 1847 the Hills have been a focal point of the mineral industry. The Black Hills are a range of mountains carved from a dome-shaped uplift about sixty miles wide and one hundred thirty miles long. the way they seem to rise suddenly out of the much lower prairie is almost mysterious. The Indian tribes in the area considered the Black Hills sacred. Today the Hills are one of the nation's most popular vacation spots and, as we all know, a mecca for the mineral collector.

Spread throughout the area are numerous mines and prospects, ranging from the giant Homestake Gold Mine down to small one-man operations. Of major interest to mineral collectors in the Hills is the wide range of mineral environments found there. These run from the placer streams and mother lodes to great limestone blocks containing beautiful and extensive caverns.

The Black Hills are justly famous for yet another type of deposit, however. These are the numerous pegmatites clustered in the south-central area of the Hills. Many of these pegmatites are highly mineralized and offer a wide range of micro-minerals as well as cabinet specimens.

Pegmatites are usually coarse-grained igneous metamorphic rock bodies. They are formed from the residual volatile rock fraction of magmas. They tend to intrude into the country rock and solidify late in the igneous history of the area. In the Black Hills most of the pegmatites have intruded into highly folded and faulted schists, gneisses and, sometimes, granites. The range in sizes of Black Hills pegmatites is from a few inches to over a mile in length. The pegmatites form over a wide range of temperatures. Thus the paragenetic sequences of each deposit shows a good deal of individuality. This individuality is based on the conditions of formation and on the natures of the magmatic fluid and country rock. Thus each pegmatite has a facinating story all its own. In this paper I would like to discuss a few of the more famous collecting sites, with an emphasis on some new species of interest to micro-mineral study.

Most of the interesting pegmatites of the Black Hills are grouped in the Keystone and the Custer areas in the south central part of the Hills. Perhaps the most famous pegmatite in the Hills is the Etta Mine a few miles from Keystone. This is the deposit that produced huge spodumene crystals (up to 40 feet long) as well as large beryl and columbite/tantalite crystals. These are not exactly micro material but some fine micro-mounts have been produced from the Etta Mine dumps. This pegmatite is a steeply plunging, pipe-like body that originally formed a small hill-like knob. Mining activity has reduced the know to a deep pit. Some interesting phosphate minerals have been found at this locality but are rare.

However within walking distance from the Etta pegmatite is another deposit that has produced a number of fine phosphate specimens. This is the White Cap (or King Mica) mine. The author has collected some fine lazulite specimens as well as other specimens at this mine.

Some distance from these two pegmatites, but still in the Keystone area, is the Dan Patch mine. This is an oval shaped, pipe-like body plunging to the south. This pegmatite is a good locality for triphlite - lithiophilite and the alteration minerals of these phosphates. Also fine specimens of uraninite and its alteration products.

Other interesting mines in this area are the Hugo pegmatite, the Peerless Mine, and the several Bob Ingersol Mines. These and others in the Keystone area have produced many fine micro-minerals.

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The area around the town of Custer in Custer County has many pegmatites of mineralogical interest. Several of these pegmatites have produced excellent specimens of the rarer phosphate minerals as well as some species new to the mineral world.

The Tin Mountain mine is located about six miles southwest of Custer. It is one of the older pegmatite mines in the Black Hills, having been discovered before 1890. The pegmatite occurs in a ridge of quartz, mica schist country rock. It has an "L" shape with one arm about one hundred ninety feet long and the other arm about two hundred eighty feet long. There are quite extensive underground workings at the mine and a good deal of mining activity has taken place over the years. A wide variety of rare radioactive minerals have been found there, including autunite, kasolite, montebrassite, uranophane, fourmarierite and vandendreisscheite. Amblygonite, rarely found in fine crystals, are found in this pegmatite. Some of the phosphate minerals are found here also but they are rarer in this pegmatite than in some of the others in the area. Some fine examples of the apatite family have been collected in the Tin Mountain Mine dumps.

The Victory pegmatite is located about two miles northeast of Custer. This pegmatite is composed of two interconnected lenses. This mine has produced a good deal of high quality mica, found mostly in the outer of the two zones of the mine. A facinating array of accessory minerals have been observed in the contact between the zones. Tourmaline crystals as well as a number of phosphate minerals are found in this zone. A new species was described from this pegmatite. This mineral is Wyllieite, $Na_2Al(PO_4)_3$, and it seems to have been quite common at this mine. It has been collected for years but was mislabeled as triphylite. Sadly, many of the phosphates collected for years from the pegmatites of the Black Hills have been misidentified and therefore mislabeled. This is partly due to a lack of care in collecting and partly to the subtle differences between some of the species.

The High Climb pegmatite is about seven miles north of Custer. It is at an altitude of between 5,500 to 6,000 feet and is in very rugged terrain. It is a highly zoned pegmatite that has produced some fine beryl, columbite, tourmaline, apatite, and loellingite. Not too much work has been done on the phosphate mineralogy of this pegmatite, perhaps due to the inaccessibility of the mine. Some good opportunity for collecting should be found there.

The Bull Moose Mine is perhaps the classic phosphate pegmatite in the Black Hills. It is about three miles southeast of Custer. Most of the rarer Black Hills phosphate minerals have been collected at this mine. These include large masses of graftonite and many alteration products of the primary phosphates. Other specimens collected at this locality include sarcopside, triphylite, wolfeite, heterosite, purpurite, barbosalite, strengite, leucophosphite, bermanite, tavorite, hureaulite and many others.

The Tip Top pegmatite is about five miles southwest of Custer. It is a large lenticular body intruded into schist. This prospect contains large amounts of triphylite-lithiophilite series minerals. Triphylite is the primary phosphate component of a number of pegmatites in the area. Alteration of the core of triphylite produces a number of secondary forms, including members of the rockbridgeite - sicklerite series, the heterosite - purpurite series and the ferrisicklerite - sicklerite series.

In small vugs in the alteration rim of this system are some beautiful micro crystals of many species, including leucophosphite, hureaulite, collingsite, bermanite, laueite, mitradatite and others. Most of the secondary phosphates in the paragenetic sequence of the Tip Top Mine are products of the oxidation of the triphylite - lithiophilite series or involve addition of divalent calcium ion or magnesium ion.

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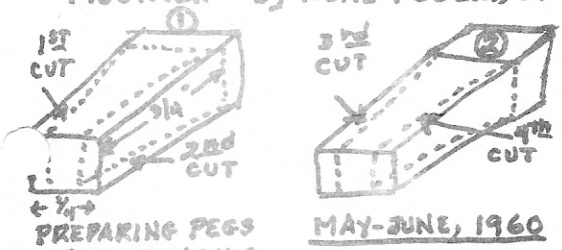
SKETCHES TAKEN FROM ROCKS & MINERALS MAGAZINE (by date), FROM "THE MICRO-MOUNTER" by NEAL YEDLIN, OF NEW HAVEN, CONN.

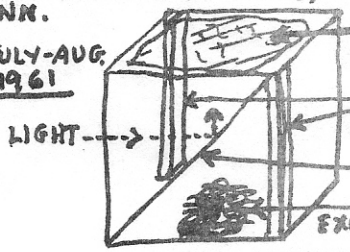


PREPARING PEGS FOR MOUNTING XLS.

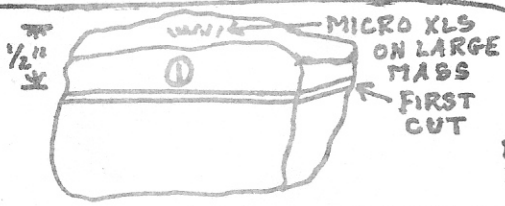
MAY-JUNE, 1960

FINISHED PEDASTAL CUT TO ANY LENGTH.

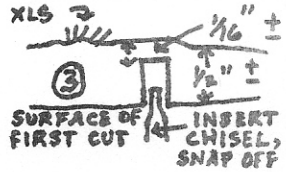
JULY-AUG. 1961



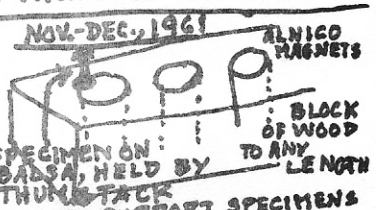
DEVICE FOR MOUNTING MICA WITH INCLUSIONS.



REPEAT AT RIGHT ANGLES IF NECESSARY



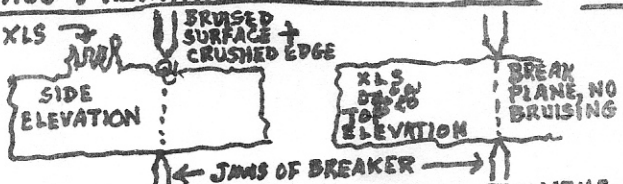
NOV.-DEC., 1961



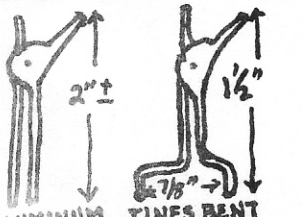
RIG TO SUPPORT SPECIMENS WHILE DRYING.

A METHOD OF SAWING XLS OUT OF MASS & RETAINING NATURAL APPEARANCE.

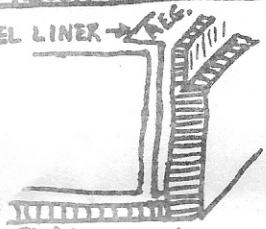
NARROW GLUED BASES LOOSEN UNDER SHOCK. PROPER MOUNTING TECHNIQUE, THE MINERALOGICAL RECORD, VOL. 4, #5

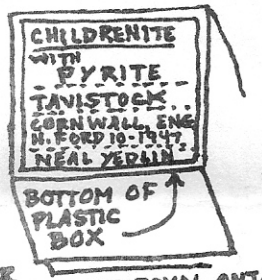


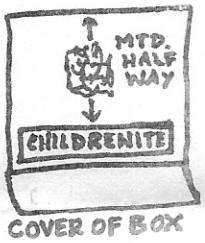
SUGGESTED METHOD OF TRIMMING SPECIMENS. MIN. RECORD, VOL. 5, NO. 2.



MICROMOUNT GRIPPER
MIN. RECORD, VOL. 3, NO. 2.







CLEAR BOXES WITH WHITE OR BLACK PAPER LINING, USED BY THE ROYAL ONTARIO MUSEUM. MIN. RECORD, VOL. 3, NO. 3.

TO CLEAN COPPER - APPLY REVERE WARE INSTANT COPPER CLEANER, IMMEDIATELY RINSE IN SUDSY WATER, DRY. USE SMALL ARTIST'S BRUSH.

BOOK: CLEANING AND PRESERVING MINERALS, by RICHARD M. PEARL, MAXWELL PUBLISHING CO., BOX 1315, COLORADO SPRINGS, COLO., 1971, 80 PPS., $2.75.

CROSS-INDEXING SYSTEM USED BY:

RUSSELL F. KENAGA, JR.
10777 S.E. Ridgeway Dr.
Portland, Oregon 97266

1. 3 STORAGE AREAS.
2. LOOSE-LEAF NOTEBOOK.
3. ALPHABETICAL CARD FILE.

1. ALL 1X1" BOXES, NUMERICALLY NUMBERED. LABELS ON BOTTOMS ALSO, IF SPECIMEN IS MOUNTED IN LID, & IF SO, IS INDICATED BY A RED ✓ MARK. IF NOT MOUNTED (70% ARE NOT), THEN THE WORD LOOSE IN RED, APPEARS ON THE LABEL.

2nd STORAGE AREA: SF (STUDY FILE) SECTION, SUITES FROM A LOCALITY, NUMBERED THUSLY:

SF-H-15X
TRIPLE KING PYRITE
BALLSGARH, KY.

H = LOCALITY, 15X THE SPECIMEN NO. & BOX SIZE. 1" - NO LETTER AFTER THE NUMBER. X = 1 1/4" BOX, & Y, 2X2, etc. EACH LOCATION COLOR CODED WITH COLOR DOTS OR 1/2 DOTS, PLACED L, CENTER, OR R, BOTTOM.

3rd STORAGE SECTION: ALL 1 1/4" & LARGER, NUMERICAL, FOLLOWED BY LETTER DENOTING BOX SIZE: 652 Y VANADINITE, MORROCCO. NOT MOUNTED, BUT NO ON BOTTOM OF SPECIMEN.

2. NOTEBOOK. PAGES NUMBERED FOR EACH OF THE 3 SECTIONS. EACH LINE HAS 5 ITEMS:
904. TUNGSTENITE. XLS RARE. ERBERTO TEALDI 1-3-75 6.00 (RETAIL VALUE)

3. ALPHABETICAL FILE - 3X5 CARDS; SECTIONS: EGG CARTON, NUMBERED LOCATIONS (WHICH NOS. ARE USED ON LOWER L. ON CARTON, STACKED SEQUENTIALLY.) SF LOCATIONS: SHOWS COUNTY, NUMBER & PAGE NO. IN NOTEBOOK. SPECIES SECTION, ALSO VARIETY SECTION. DATA AT TOP INCLUDES NAME, FORMULA, XL SYSTEM, HABITS, & OTHER DATA. ON LEFT, APPEAR THE BOX OR SPECIMEN NUMBERS FROM ALL 3 STORAGE AREAS, FOLLOWED BY LOCATION & BRIEF DESCRIPTION ON ALL MINERALS OF NOTE, IN THE SPECIMEN, REPEATED AS DESIRED ON EACH CARD. ABBREVIATIONS INCLUDE: XL = CRYSTAL. PSEUDO = PSEUDMORPH. YEL = YELLOW. GR = GREEN. BR = BROWN, etc. TRP = TRANSPARENT. TRL = TRANSLUCENT. CLVG = CLEAVAGE. TBLR = TABULAR.

AN INDEX PAGE IS USED TO BEGIN THE SF (SUITES) NOTEBOOK SECTION, LISTING COLOR CODE & POSITION OF COLOR DOTS, & PAGE NO. OF EACH LOCATION. THE FOREGOING IS A LOT OF WORK - BUT FAST RETRIEVAL & CROSS INDEXING ENHANCE THE VALUE OF THE COLLECTION.

In the phosphate system of this mine three new species have been identified and described. They are Jahnsite, Segelerite and Robertsite; published by Moore, (Am.Min. V 59, # 1, 2.

Jahnite ($CaMnMg_2(H_2O)_8Fe_2(OH)_2(PO_4)_4$) is a fairly common mineral in the low temperature phase of the pegmatite. It occurs as short, tabular to long, prismatic crystals of a brownish purple to a yellow or yellow-green color. The specific gravity is about 2.706, the hardness is 4, cleavage good (001). Jahnite also has been uncovered at the famous Palermo Mine in New Hampshire and in other pegmatites in the Black Hills. It will undoubtly be found as a consistuent of many phosphate pegmatites around the world.

Slegelerite ($CaMg(H_2O)_4Fe(OH)(PO_4)_2$) is a rarer mineral than jahnsite but it is chemically similar. It is found as long prismatic crystals of a pale green color. Sp.gr. about 2.67, hardness 4, perfect cleavage (010) So far Segelerite has been found only at the Tip Top Mine.

Robertsite ($Ca_3Mn_4(OH)_6H_2O)_3(PO_4)_4$ is a moderately abundant mineral in this locale. Robertsite occurs as aggregates of deep red to bronze plates, botryoidal groups of black fibers and plates and as wedge-shaped crystals. Sp.gr. is 3.17, hardness 3.5, streak brown, good cleavage (100). Robertsite has also been found at several other pegmatites in the Black Hills.

In this short paper we have looked at only a few of the many different pegmatites of the Black Hills of South Dakota. And at that we could only cover them sketchilly. But we hope that this does give a feeling for the facinating possibilities that the pegmatites hold for micro-mineralogy. Perhaps in future articles we could cover individual pegmatites in more depth. If you would like to do some more reading in phosphate mineralogy and pegmatites there is a fine article by Paul Moore in the Mineralogical Record, Vol. 4, #3, Page 103. Also the fine book by Willard Roberts and George Rapp, "The Mineralogy of the Black Hills", published by the South Dakota School of Mines, Rapid City, So. Dak., will be of great value. Some fine photos of micro-minerals can be found in Roberts, Rapps and Webers "Encyclopedia of Minerals" published by Van Nostrand Reinhold.

The MICRO-PROBE
Northwest Micro-Mineral Study Group.
2412 Chestnut Street,
Everett, WA 98201

XXX

THIRD CLASS MAIL