Northwest
Micro Mineral
Study Group

MICRO PROBE

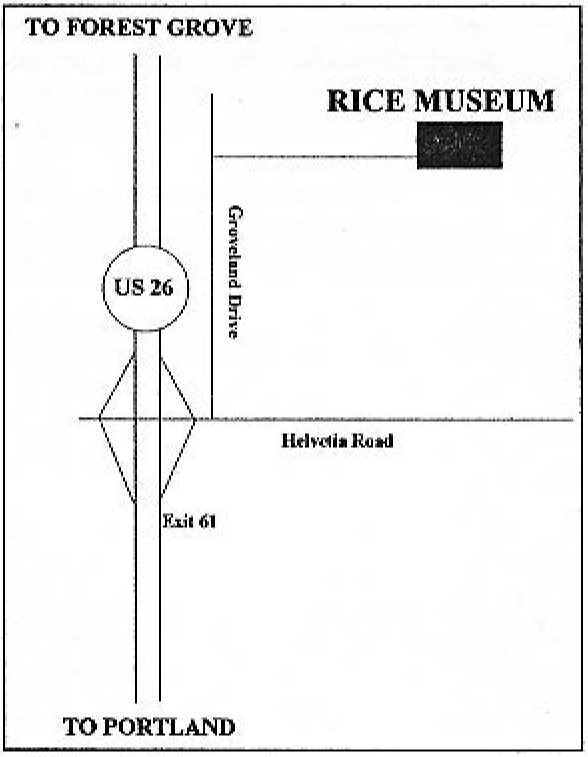
FALL, 2004 VOLUME IX, Number 10

SPRING MEETING . .. . .HILLSBORO, OREGON

Saturday, November 6, 2004 **9:30 am to 5:00 pm**

Rice NW Museum of Rocks and Minerals
26385 NW Groveland Drive
Hillsboro, Oregon

To reach the Rice Museum, take the Sunset Highway (US 26) west from Portland. Exit at Helvetia Road (exit 61). Jog right 100 feet, then left onto Groveland Drive. The museum is in the trees 1.3 miles to the west. This will be our first meeting in the new Northwest Gallery. Bring your microscope and plan to enjoy the day. And of course bring material to share with others on the free table. Material left over will go on the Museum's give-away pile. And if you have not yet had your picture taken for the new roster, Don Lown will be there to do the honors.



Morning:
11 am We are pleased to have Dr. Robert Housley with us for the day. He will be talking on "Recent Rare Mineral Finds at Southern California and Nevada Mines". Bob is an active member of the Mineralogical Society of Southern California, and does research on his minerals using SEM and x-ray equipment.

Afternoon:
2 pm Our usual short business meeting and review of the collecting status of locations in the Northwest.

The kitchen area will be available and the club will provide lemonade, coffee, hot water, and the basics for sandwiches. So bring the extras for lunch and we will plan to have a sort of "pot luck" feast at noon.

Restaurants are available in the local area. Some of us will get together to eat dinner with the speaker, so please plan to join us if at all possible.

IN MEMORY OF FRED DEVITO

1937 – 2004

The Micromounters Hall of Fame lost another valued member on March 20, 2004, with the death of Fred DeVito.

Born in Newark, New Jersey, Fred began collecting minerals in local traprock quarries in 1951. He soon widened his area of interest to many eastern localities, including Franklin, New Jersey and Nova Scotia. Although his interest in minerals was strong, he took his B.S. in biology from California State University, Long Beach. In 1968 he moved to Riverside, California and soon found the complex mineralization of the Crestmore quarries. With help from Dr. Joseph Murdock, U.C.L.A., and the geology department at U.C. Riverside, Fred identified many species, co-authoring *Contact Metamorphic Minerals – Crestmore* (March, 1977). At Long Beach State University, he authored *The Occurrence of 17 Minerals Found at Crestmore 1965 to 1970* (May, 1971). With the help of Dr. Bill Wise and his laboratory at U.C. Santa Barbara, Fred co-authored *The Jensen Quarry*, published in the "Mineralogical Record" (Sept/Oct. 1984).

In time, Fred and his wife, Joyce, purchased the micromount business of Wayne and Dona Leicht and established their own dealership, Microworld (1976-1985). They also purchased several other micromount collections, including those of Earl Morehead, Russ MacFall, Dave Jamriska, and Alice Kraissl.

Moving his collecting activities to the Santa Monica Mountains, Fred found many unreported microminerals, some within the city of Los Angeles. He authored the "Microscoop" column for the Mineralogical Society of Southern California (MSSC) Bulletin (1978), was MSSC president (1987-1988), and president of Friends of Mineralogy (FM) Southern California (1989).

Fred later moved to central California, to a beautiful locality in Oakhurst, close to the southern tip of Yosemite National Park, on the western slopes of the Sierra Nevada range. Here, on a forty-acre property complete with its own lake, he began working on microminerals of the Sierra Nevada foothills. His basic micromount collection was largely self-collected, but recent acquisitions through purchase had brought it close to the 30,000 specimen mark. It was housed in a series of fine cabinets, carefully arranged and catalogued, together with a selection of recent and antique microscopes.

Fred earned his living as a wholesale distributor of pectin products, but his drive in mineralogy and his willingness to help and cooperate with others earned him membership in the Micromounters Hall of Fame in 1995. He leaves an example well worth emulating.

Quintin Wight

IN MEMORY OF MILTON SPECKELS

1911 – 2004

In another crushing blow to the micromount community, Milton Louis Speckels, author of the little pink book we all know so well, died of a massive heart attack on Saturday, May 15, 2004.

Milton, better known as "Speck" by his friends, was born on May 13, 1911, in Coupland, Texas, and died just two days after his 93rd birthday. Holding a Bachelor of Science Degree in engineering administration from Texas A & M, Milton worked for the U.S. Bureau of Reclamation as a materials engineer on major dam sites in Texas and Arizona. Called up under an R.O.T.C. commission in 1942, he attained the rank of Major with the U.S. Army before his discharge in 1946. In 1954, he took up an engineering position at the Naval Weapons Center at China Lake, California, and retired there in 1975.

Mineralogy became Milton's hobby while he worked at the Davis Dam on the Colorado River in Arizona. There, he met mineral dealer Guy Hazen, who accompanied him to local mines and worked with him on a nearby quartz crystal locality. In 1956, in Fresno, California, he met micromounter William C. Oke (himself inducted to the Micromounters Hall of Fame in 1989), and began concentrating on micromounting.

Milton attended the very first Baltimore Micromount Symposium. He was the first Micromount Chairman (1960-63) for the California Federation of Mineralogical Societies. At that time he reinstated the micromounters' trading list and started writing the column "Micro News" in *Gems and Minerals* magazine. This column became the basic source of information for his book, *The Complete Guide to Micromounts* (1965), that quickly became a standard for the hobby. Because his publisher limited him to 100 pages, including the covers, Milton was forced to condense his writing. In doing so, he squeezed an enormous amount of information into one small volume. He had it reprinted in 1993, enjoying a similar success at that time.

In 1966, he received the American Federation of Mineralogical Societies' National Trophy for micromounts. Milton was a charter member of the Southern California Micromineralogists, and was Program Chairman for their first three Annual Conferences. He was also a member of the Northern California Mineralogical Association and the Northwest Micro Mineral Study Group, and was a Life Member of the Mineralogical Society of America.

Once his interest in mineralogy began, Milton took more courses in mineralogy and crystallography, and turned to the Scanning Electron Microscopy (SEM), discovering new crystallographic data. He had a wide interest in minerals, but specialized in the zeolites, publishing many locality discoveries. One of his last articles was "Microminerals at Rock Island Dam, Douglas County, Washington" in the May/June 1991 issue of *Rocks and Minerals*. He supplied many of the SEM illustrations for Rudy Tschernich's book, *Zeolites of the World.*

Most of his large micromount collection (5,200 catalogued specimens) originated in the western states. The collection was put up for sale after his wife, Betty, died, when he moved to a retirement residence. Sales at Tucson and other shows have since spread them across large parts of the world.

An accomplished 33-mm photographer, he presented slide shows of his minerals at club meetings, museums, mineralogical shows, and symposia. His book, his columns, and a large volume of correspondence brought him recognition throughout the world as a master micromounter. For his efforts, he was inducted to the Micromounters Hall of Fame in 1991.

Above all, Milton was a friendly man. While on a visit to the Naval Weapons Center in 1974, My wife and I dropped by his home in Ridgecrest, California. We were complete strangers to him at that time, but he invited us in for tea, showed us slides and micromounts, and showered us with specimens to take home. His book is a standard, and so was he. He will be missed.

Quintin Wight

Filiform Ilmenite

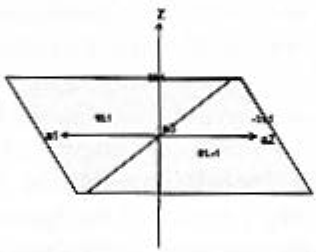
Donald G. Howard

When you examine complex material very closely, a few oddities arise. In going over the bottom crust material from the spillway at Lemolo Lake, Chuck Sweany and I each came up with a few slender black needles that were different from the other minerals we had encountered. Like all of the Lemolo Lake material, they are not very large and they do not necessarily lie in good positions to study, but I did finally get one piece small enough to fit in the SEM. To my surprise, the needle showed in XRF to be iron titanium oxide in the same proportions as the ilmenite crystals scattered throughout the cavities.

But wait a minute. The crystal appears to have a diamond-shaped cross-section. And ilmenite is rhombohedral, usually in very thin, roughly hexagonal platelets in these cavities. Very near the interface with the lower flow, the ilmenites sometimes show some thickening, but they still are clearly rhombohedral, roughly hexagonal with alternately sloping faces. What crystal form is this? How can a rhombohedral mineral form acicular crystals?

Well, I finally got the piece mounted in the SEM in such a way that I could twist it around to look directly down the long axis of the needle, and the termination was surely strange. It had two sloping faces that were twisted with respect to the diamond-shaped cross-section. In fact, it looked just like a normal rhombohedral ilmenite when I could not see how long it was.

Figure 1.
Filiform Ilmenite viewed end on down the a3 axis.



Here is what seems to be happening. Unlike most hexagonal minerals that are elongated along the c-axis, this crystal seems to be elongated along one of the three a-axes. Therefore, the four sides of the needle are composed of two (00.1) faces and two (-11.1) faces. The upper "termination" is then composed of the other two faces crystallographically equivalent to (-11.1): (01.-1) and (1-1.1). It has the same faces as the rhombohedral platelets, but it has been stretched enormously along that one a-axis.

That is why I am calling it "filiform". In the case of filiform pyrite, the growth is exaggerated along one of the three crystallographically equivalent cubic axes. In this case, the growth is exaggerated along one of the three crystallographically equivalent a-axes. How do I think that happens? I believe that it is a case of catalyzed growth (See *On Filiforms, Nanowires and Whiskers* **Microprobe**, Vol. IX, #5, page 10.). Something, probably a tiny crystallite, serves to concentrate material and facilitate growth at the interface, getting lifted in the process so the enhanced growth can continue. In the case of the filiform pyrite, the growth is occurring in hydrated phase, and the crystallite may very well be a tiny bit of zeolite, perhaps heulandite. In this present case, the minerals are all high temperature, so we are looking at vapor phase deposition. I do not have even a clue as to what the catalyzing material might be. The Lemolo Lake andesite is pretty simple in bulk, with few minerals present, but we are again talking about that rind within a centimeter or two of the interface with the lower flow, where infused chemicals have produced a much larger variety of minerals.

One thing is certain: the filiform crystals are quite rare. Only a few cavities have been discovered, compared to many cavities with "normal" ilmenite crystals. Micrograph #004 shows both a filiform and a fairly thick rhombohedral crystal growing side by side.

So keep looking. Who knows what other strange stuff will turn up.

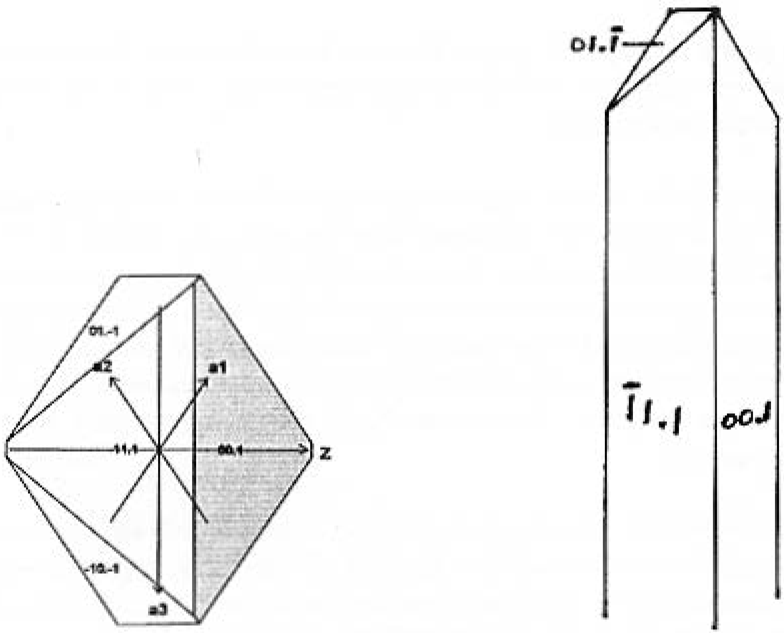


Figure 2. A "normal" rhombohedral crystal and one of the filiform ilmenites shown in the same relative orientation. Here the elongation is assumed to be along the a3 axis.

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Nice datolite and natrolite found in the Saddleback Basalt at Boron

Robert Housley

During our recent MSSC field trip to Boron a few of us were fortunate to be able to collect some very nice datolite and natrolite specimens. Before describing them let me start with a little background.

The approximately 19 million year old Saddleback basalt lies stratigraphically immediately below the extensive borate deposits at Boron (Siefke, 1991). The upper portion of this basalt is vesicular. Since the deposit now dips significantly toward the east it has proven necessary to remove some of this basalt in developing the current open pit. Naturally the first part to be removed came from the vesicular upper part. For some period of time in the past, collectors had periodic opportunities to collect from these vesicular basalt waste piles. Unfortunately for me the opportunity ended before I had taken advantage of it.

As could be anticipated from the juxtaposition of borate rich lake waters with basalts known to be good hosts for zeolites a number of interesting minerals were found in the vesicles. Those known up until that time were described in a talk and a 4 page handout twenty years ago by Wally Kleck and William Wise at the Pacific Micromount Conference in 1984. Described vesicle minerals included **mazzite**, analcime, heulandite, chabazite, gmelinite, phillipsite, stilbite, greigite, pyrrhotite, ferroan saponite, and rarely searlsite, ulexite, borax, rhodochrocite, and calcite. This was the second known world occurrence of the very rare zeolite mazzite, and still is the second confirmed occurrence. The type locality is in France. Since the vesicles tended to be small these were mostly micro minerals. At that time I had not yet developed much interest in micro minerals.

With this background I was anticipating the opportunity to look at some of the basalt piles afforded by our recent MSSC field trip with even more excitement than I had experienced earlier in seeing the actual mining operation and collecting kernite and probertite first hand. After we stopped in the basalt area my first reaction was surprise and a little disappointment in noticing that none of the nearby basalt seemed to be vesicular and that the main mineralization in it seemed to be in narrow calcite veins.

The disappointment was short lived however. Right next to the van I spotted a larger segment of a calcite vein with some crystal pockets and began to work. After filling a small box with samples there I started looking at further basalt piles and on one found a ten inch ball of calcite with multiple crystal chambers imbedded in clay and added that to my haul. About then Herman Ruvalcaba came back to the van with what had to be the find of the day. As I recall it was a plate with several large sharp, clear, calcite crystals on a base of natrolite and, at the time, unidentified druzy balls.

Generously Herman offered to take those of us who were nearby and interested over to where he had found this treasure, and several of us followed off after him. On the rock piles close to his find I spotted a number of smaller veins containing natrolite and the unknown balls and I was able to sample 3 or 4 of them before we were called to leave. The others who came along also found some of this interesting material.

After getting home I could hardly wait to look at the balls in the SEM.

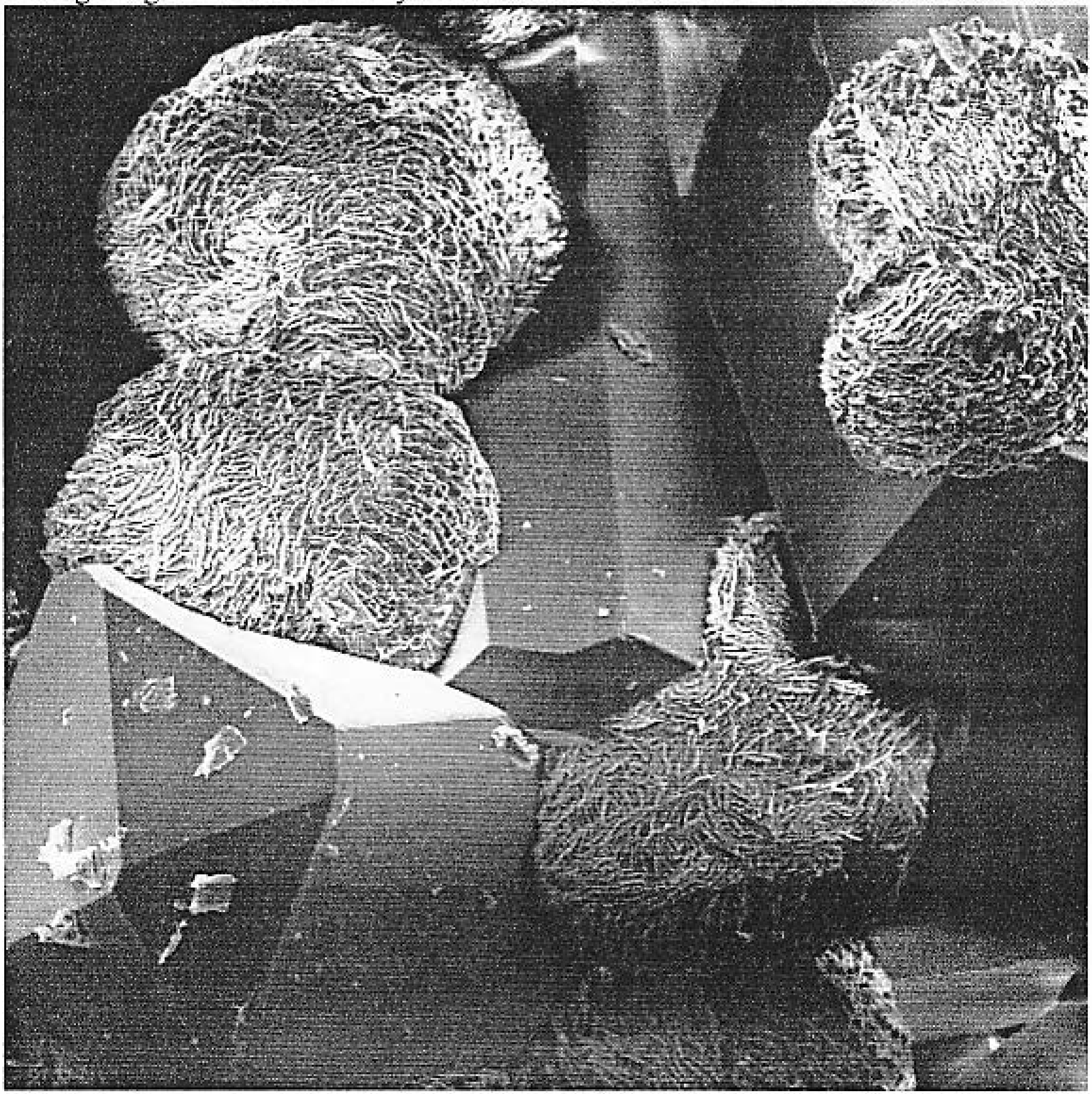
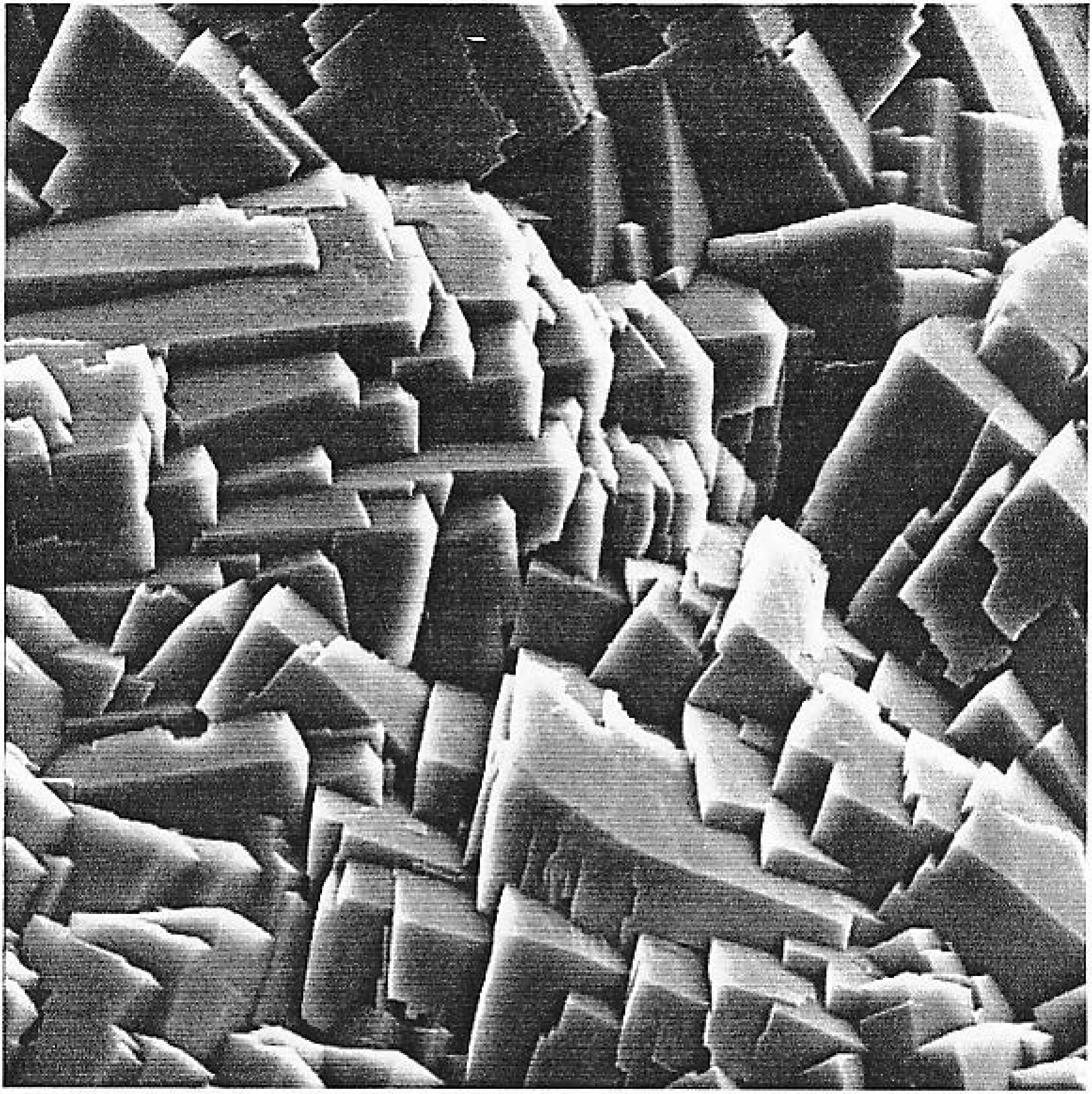


Figure 1 shows several of the balls in a cluster of nice clear, sharp natrolite crystals. The field of view is 0.6 millimeters. The surface of one of the balls is shown at higher magnification in Figure 2, with a field of view of 70 micrometers. The EDX spectra of these crystals show only lines for Ca, Si, and O meaning that the balls are either a Ca silicate or Ca borosilicate.



That composition information still leaves a lot of possibilities and since for some I did not recognize the crystal habit I was temporarily stumped. In hindsight I now recall that I had seen similar material from Tick Canyon.

In any case I recently was able to obtain a large enough clean sample of ball material to obtain an x-ray powder diffraction pattern with the equipment that I have available. The pattern shows a good match with either bakerite or datolite whose x-ray powder diffraction patterns are very similar. Based on what appeared to be a slightly better match to the bakerite pattern and a similarity in appearance with material at Tick Canyon which has been known as bakerite I initially felt sure that the balls were clearly identified as bakerite. Now based on recently published work on the Tick Canyon material I believe they are datolite. (See note added in proof). Although the mineralogy of Boron has been extensively studied (Morgan and Erd, 1969) datolite has never been reported from there before, and only one very poor piece of natrolite had been found there before.

Thus although I did not find any mazzite as hoped our MSSC trip did produce new information about the mineralogy of Boron. This information also suggests that boron mineralization extends through a network of cracks deeper into the underlying Saddleback basalt than previously realized.

For the record I list below datolite associations I have seen in the different Boron samples.

Sample1. This sample consists largely of gray to clear large partially corroded crystals of colemanite embedded in platy pseudo hexagonal calcite. The cavities also contain sugary clinoptilolite-Na and very small amounts of brownish datolite. The clinoptilolite is sometimes enclosed in parts of the calcite blades giving them a cloudy appearance.

Sample 2. This sample consists largely of stout, clear natrolite needles with well developed faces coated with brownish datolite balls. The SEM pictures are from this sample, which is probably my best.

Sample 3. This sample has small analcime crystals with a little natrolite coated with small datolite balls.

Sample 4. This sample has brown datolite balls to 2 millimeters completely imbedded in clear calcite. Also imbedded in the calcite are a few larger blebs of ulexite.

Thus altogether datolite at Boron at least occurs with natrolite, analcime, clinoptilolite-Na, colemanite, ulexite, and calcite. Probably if we had had a little longer we would have found more associates.

For the record the large calcite chunk I mentioned earlier yielded about a flat of decent specimens of pseudo octahedral calcite, but had no associated minerals.

Note added in proof In a review of the first draft of this report Tony Kampf called my attention to the paper below by Perchiazzi et al (2004) showing that what has been known as crystalline bakerite from Tick Canyon is actually datolite. I now feel that it is most likely that this material is also datolite.

References

Siefke J. W. (1991) The Boron Open Pit Mine at the Kramer Borate Deposit. In "The Diversity of Mineral and Energy Resources of Southern California" Society of Economic Geologists guidebook series vol. 12, pp. 4-15.

Morgan V. and Erd R. C. (1969) Minerals of the Kramer Borate District, California. CDMG Mineral Information Service, vol. 22, pp. 142-153 and 165-172.

Perchiazzi N.,Gualtieri A. F., Merlino S., and Kampf A. R. (2004) The atomic structure of bakerite and its relationship to datolite. American Mineralogist, vol. 89, pp. 767-776.

Minerals of the New Era Mine, Wolf Creek Mining District, Lewis and Clark County, Montana

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Miles City, MT 59391

The Wolf Creek Mining District is located approximately 80 kilometers (50 miles) north of Helena and is one of the many small districts in Lewis and Clark County. Less than a dozen mines are scattered in the hills surrounding Wolf Creek. Access into the area is provided by the Little Wolf Creek Road, a good gravel road, which branches from the Montana Route 434 about 8 kilometers (5 miles) north of the town of Wolf Creek. The district was discovered in the late 1800s and was a small producer of copper and silver through the 1920s (Pardee & Schrader, 1933).

The geology of the area consists of Precambrian Belt Supergroup and Middle Cambrian sedimentary rocks that have been thrust over volcanic units of the Cretaceous Two Medicine Formation (McClernan, 1983). The ore deposits are small and appear to be localized along small faults associated with the major thrust faults.

The New Era mine (also know as the Rosetta or Rosenfield) is on the south side of Wolf Creek in sec. 30, T. 15 N., R. 4 W. The mine has two adits, one at the level of the creek and the other about 23 meters (75 feet) above in the forest. Both adits are caved and the lower one was cut by road construction. The dump from the lower adit has been flattened making a wide pull-off/parking space along the creek. The upper adit has a small dump with a small pile of "ore" which is heavily iron stained. Collecting can be done at either dump, but in the experience of the author, the "ore" from the upper adit produces nicer specimens. All minerals recovered from this location were micro-sized. Although the list of minerals is not great from this mine, some of the specimens are quite nice.

Ankerite is present as tan rhombohedral crystals up to 2 mm long. In some specimens the crystals have curved surfaces and occasionally stack into "rose-like" structures. Ankerite crystals always occur in cavities associated with barite.

Azurite is relatively common from the "ore pile" at the upper adit and sparse at the lower adit. Small dark blue, spherical masses 0.2 mm across are the most common form, but tiny (less than 0.1 mm long) bladed crystals are also present. Azurite is often associated with malachite or massive quartz.

Barite forms colorless tabular crystals up to a few millimeters long. Larger specimens occasionally show the development of chisel-shaped crystals. Small cavities completely lined with microcrystals are commonly encountered, especially from the dump of the upper adit. Walsh (1986) reported "...large nodules found in the stream and found crystals to over an inch in cavities on the inside." Barite is found in cavities associated with ankerite and in different cavities with malachite.

Calcite is present as uncommon colorless "dog tooth" crystals up to 1 millimeter. Cavities containing calcite contained no other minerals.

Chalcopyrite was the major copper bearing ore mineral from this mine. Small blebs and masses of chalcopyrite are commonly found on the dozed parking area near the stream. No crystals of this mineral were recovered. Walsh (1986) reported finding nodules of crystals in Wolf Creek.

Gypsum was recovered in a single specimen. The simple crystal is about 0.5 mm long and was not associated with any other minerals.

Iron oxide minerals are common throughout both dumps. No attempt was made to determine which particular iron mineral is present.

Malachite is found commonly as bright to dull medium green masses. Most of the malachite forms crusts and masses coating other mineral, especially barite. Occasionally small (less than 0.5 mm) spherical masses of radiating needle-like crystals are found. Malachite is associated with barite and azurite.

Mn-oxide minerals are present on fracture planes where they form dark brown to black dendritic masses.

Quartz is present as colorless to gray masses, but crystals were not found.

Scorodite is an unusual mineral from this mine. Small (up to 0.5 mm) lustrous hemispheres range in color from nearly white to pale green to light olive green. Broken spheres show a radial structure. Scorodite was identified by Excalibur Mineral Company using Energy Dispersive Spectroscopy and SEM imaging. Results of analysis are: FeO = 33.8 Wt %, CuO = 7.17 Wt%, As2O5 = 59.04 Wt%.

References:

McClernan, H. G., 1983, Metallic mineral deposits of Lewis and Clark County, Montana: Montana Bureau of Mines and Geology Memoir 52, 72 p.

Pardee, J. T., and Schrader, F. C., 1933, Metalliferous deposits of the greater Helena mining region, Montana: U. S. Geological Survey Bulletin 842, 309 p.

Walsh, P., 1986, Rockin' around Montana: A guide to gem and mineral collecting sites in the Treasure State: Manx Publishing Company, Helena, Montana, 96 p.

Jewels from Washington Pass

Photomicrographs by Saul Krotki

At Washington Pass, I fill a bucket of promising granite in a few hours. I am too exited to know what minute crystals I have gathered. At home, after many patient hours at the microscope, the rewards are revealed. Here are a few surprises from this year's exploration.

Fig.1: A sharp Allanite-(Ce) supported by strands of fibrous riebeckite.

Field of view 1.2 mm.

From the Liberty Bell collecting area.

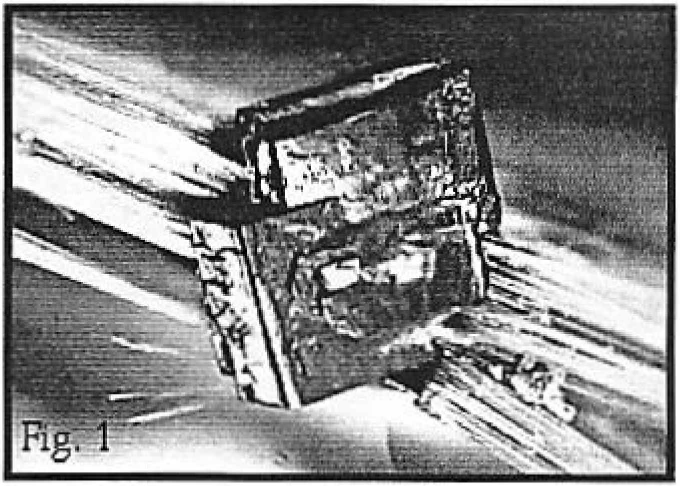


Fig. 1

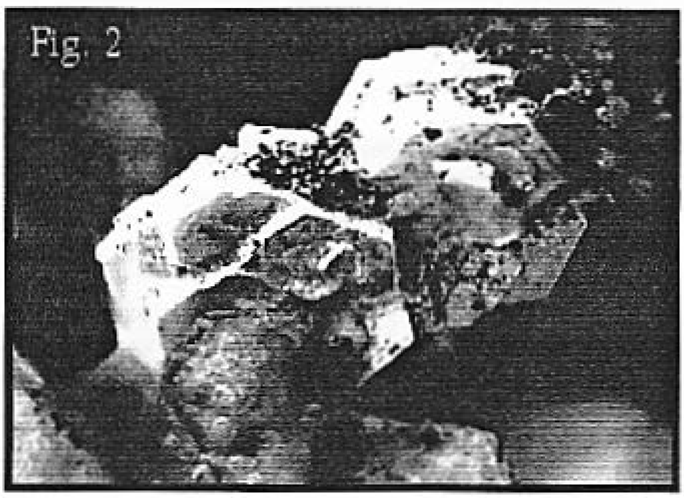


Fig. 2

Fig.2: A cluster of salmon colored Bastnäsite-(Ce)/ Synchysite-(Ce) crystals

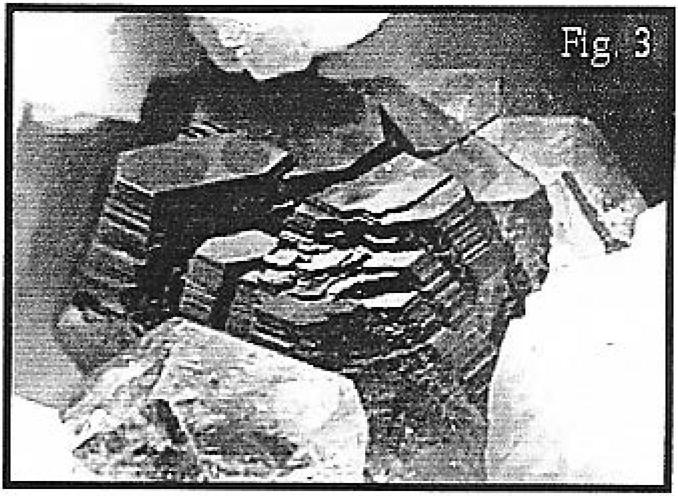
Field of view 1.5 mm.

From the milepost 164 collecting area.

Fig.3: An unaltered honey-yellow siderite crystal exhibiting marvelous growth hillocks.

The crystal measures 3.0 mm across.

From the milepost 164 collecting area.



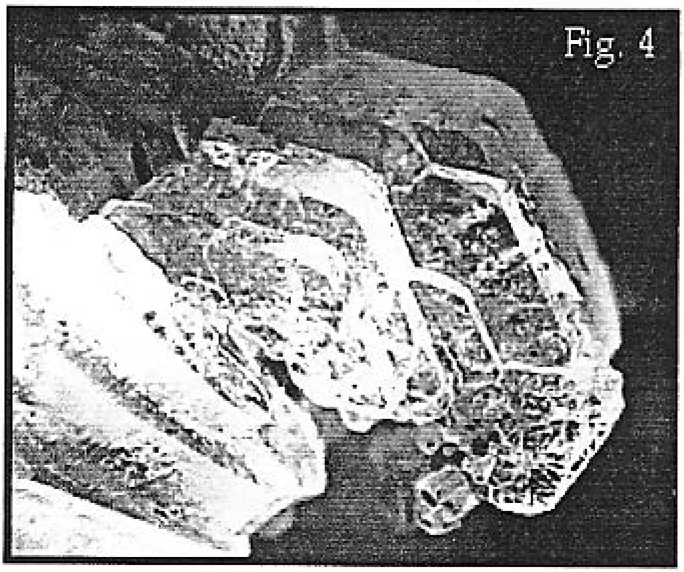


Fig.4: A cluster of stacked plates of transparent zektzerite crystals.

The highly fluorescent cluster measures 3.0 mm x 4.0 mm.

From the milepost 166 collecting area.

SPIÇIES LIST — Silver coin Mine, Iron Point District, Edna Mountains,

SPECIES (Variety)	COLOR (Fluorescence)	HABIT
Adamite, cuprian	lime green	blocky to prismatic crystals
Alunite	pale yellow	hexagonal plates
Anglesite	colorless	platy to equant
Ankerite	tan	
Aragonite	colorless	radial prismatic
Atacamite	green	prismatic
Aurichalcite	light blue	radial, lath-like
Austenite, cuprian	green	balls of tiny crystals
Barite	colorless	blocky
Bayldonite	yellow-green	fine blocky
Beraunite	dark green	platy, radial lath-like
Brochantite	green	prismatic
Caledonite	blue	prismatic
Calderonite	orange-brown	platy
Carbonate-fluorapatite	colorless (FL green)	short prismatic
Carbonate-hydroxyapatite	colorless (FL green)	short prismatic
Cerussite	colorless	platy, smears
Chlorargyrite, bromian	gray-green, brownish	distorted octahedral crystals
Chrysocolla	light blue-green	amorphous coating
Cinnabar	red	granular, microcrystalline
Conichalcite	yellow-green	balls of tiny crystals
Corkite	brown	equant crystals
Covellite	metallic purple	secondary near chalcopyrite
Creedite (Unk. #3)	colorless	radial spherules of prismatic crystals
Cyanotrichite	blue	fine fibers
Cyrilovite	yellow	radiating clumps of grains
Descloizite	dark brown	clusters of plates
Duftite	yellow-green	sprays of prismatic crystals
Fluorite	colorless	cubes
Goethite	brown	earthy masses & pseudomorphs
Gypsum	colorless	prismatic crystals
Hemimorphite	colorless	prismatic crystals
Hentschellite	dark green	radial clusters of prismatic crystals
Heyite	yellow/orange	small twinned flakes
Hinsdalite	yellow-green	rhomb-shaped crystals
Jarosite	yellow-brown	hexagonal plates
Kaolinite	white	earthy masses, coatings
Kidwellite	light to dark green	radiating fibrous coatings
Leucophosphite	cream to tan	platy to sheaves, spheres
Linarite	deep blue	bladed

ASSOCIATED MINERALS	ID AND TYPE OF DATA	CERTAINTY OF ID
bayldonite, molybdofornacite	MJ-SEM/EDS, WW-optics	A
plumbojarosite, jarosite	PHH-SEM/EDS, BSE	A
	NCMA-optics	A
	RWT-habit, luster, optics	A
calcite	RWT-chem, morphology	A
hemimorphite	NCMA-optics	A
malachite	RWT-habit, color	A
	WW-xrd	A
early pyrite, carbonates	WW-optics, luster	A
malachite, molybdofornacite	WW-xrd	A
kidwellite, jarosite	NCMA-optics	B
malachite, mixite	WW-chem, optics	A
linarite	RWT-morphology, color	A
hinsdalite, stolzite, alunite	PH-SEM/EDS, PA-xrd	A
	WW-optics	A
	HB-EMX	A
wulfenite, molybdofornacite	WW-habit, luster	A
most other minerals	EEF-EDS, habit, luster	A
	NCMA-appearance	A
	MJ-SEM/EDS	A
mimetite	RWT-habit, color	B
stolzite, pyromorphite, calderonite	WW-xrd, MJ-SEM/EDS	A
	NCMA-apearance	A
brochantite	WW-xrd	A
malachite	appearance	A
kidwellite	WW-xrd, SEM/EDS	A
heyite	DH-SEM/EDS	A
mimetite	WW-xrd	A
most Al-phosphates, broch., hemim.	appearance	A
most other minerals	appearance	A
	WW-xrd, MJ-SEM/EDS	A
malachite, calcite	appearance, WW-xrd	A
jarosite, kidwellite	EEF-xrd	A
stolzite, hinsdalite	AR-xrd, MJ-SEM/EDS	A?
pyromorphite, stolzite, chlorargyrite	PH, MJ-SEM/EDS	A
precedes phosphate minerals	luster, habit	A
	DH-SEM/EDS, xrd?	A
jarosite, other phosphate minerals	SAW-optics, WW-xrd (several samples)	A
lipscombite, kidwellite	NCMA-optics, MJ-SEM/EDS, WW-xrd	A
brochantite, caledonite	color, luster, habit	A

SPECIES (Variety)	COLOR (Fluorescence)	HABIT
Lipscombite	v. dark green to brown	coatings/balls of fine crystals
Malachite	green	balls/clusters of fibers
Meurigite (=Na-meurigite?)	colorless to cream	sprays of fibers
Mimetite	colorless to yellow	prismatic
Mixite	green	sprays of fine fibers
Molybdofornacite (Unk. #4)	yellow-green	square plates in clusters
Morinite (Unk. #2)	light blue	botryoidal
Mottramite	brown-black	fine clusters of plates
Perhamite (Unk. #1)	colorless	hexagonal plates in clusters
Pharmacosiderite	pale yellow-green	cubes
Plumbojarosite	yellow-brown	hexagonal plates
Plumbogummite (Unk. #5)	olive-green	sheaves & crusts, rhombic crystals
Pyrite	brassy metallic	blocky crystals
Pyromorphite	colorless	prismatic
Quartz	colorless	prismatic
Rosasite	blue	botryoidal
Smithsonite	colorless	rhombohedra
Spangolite	blue-green	platy to equant
Stolzite	pale yellow (FL blue)	square plates
Strengite	red, pink to colorless	balls of tiny prisms, crystals
Turquoise	pale blue	balls/clusters of pointed plates
Variscite	colorless tp pale green	octahedral crystals
Wardite	colorless	crusts of equant crystals
Wavellite	colorless	radiating striated blades
Wulfenite	yellow to pale yellow	square plates

SPECIES REPORTED BUT NOT YET CONFIRMED:

Arsenopyrite		
Beudantite		
Bindheimite		
Fluellite		
Fornacite		
Heterogenite		
Lepidocrocite		
Libethenite	green	prismatic
Neotocite		
Olivenite	olive green	balls
Owyheeite	black	
Parnauite	green	clusters of blades
Vaquelinite		

ASSOCIATED MINERALS	ID AND TYPE OF DATA	CERTAINTY OF ID
perhamite, turquoise, wavellite	WW-xrd, EMX	A
hemimorphite, brochantite	microchem	A
kidwellite, Leucophosphite	WW, PA-xrd/SEM/EDS	A
wulfenite	WH-microchem	A
malachite, brochantite	habit, MJ-SEM/EDS	A
hemimorphite, duftite, malachite	AR-xrd, PA-SEB/EDS	A
perhamite, turquoise	AR-xrd, WW-xrd, EMX	A
	WW-xrd, MJ-SEM/EDS	A
morinite, lipscombite, turquoise	EEF-xrd, WW-xrd, EMX	A
jarosite	habit, appearance	B
zoned with alunite	PH-SEM/EDS, BSE	A
duftite	WW-xrd, SEM/EDS	A
quartz vein mineral	color, habit	A
hinsdalite	MJ-SEM/EDS	A
goethite, hematite	habit	A
hemimorphite, duftite, chlorargyrite	appearance	A
hemimorphite, malachite	appearance, WW-optics	B
brochantite	NCMA-optics	A
pyromorphite, hinsdalite	PH, MJ-SEM/EDS, habit	A
variscite, wavellite, turquoise	NCMA-optics, MJ-SEM/EDS	A
wavellite, variscite, lipscombite, +	DH,EEF,HB-SEM/EDS, WW-xrd	A
wavellite, turquoise	habit, NCMA-optics, MJ-SEM/EDS	A
perhamite, chlorargyrite	NCMA-optics	B
turquoise	habit, NCMA-optics,WW-xrd	A
mimetite, cerussite	NCMA, non-fluorescence	A
	SAW data? Report to RWT, Needs confirmation	
	Reported to RWT	
	MJ-SEM/EDS. Needs xrd	
	Listed in Handbook of Mineralogy, vol. 4	
	MJ-SEM/EDS. Needs confirmation	
	MJ-SEM/EDS. Needs confirmation	
	?? Needs confirmation	
	?? Needs confirmation	
	MJ-SEM/EDS. Needs confirmation	
	MJ-SEM/EDS. Needs confirmation	
	BC-EMX needs xrd confirmation	
	habit	
	MJ. Needs confirmation	

IDENTIFICATIONS BY:

PA	Paul Adams	WH	William Hunt
HB	Henry Barwood	MJ	Matrin Jensen
BC	Bart Cannon	AR	Andy Roberts
EEF	Gene Foord	RWT	Richard Thomssen
DH	Don Howard	SAW	Sid Williams
PH	Paul Hlava	WW	William Wise

NCMA Northern California Mineralogical Association study group, Most identifications using optical and physical properties.

RESEARCH TYPE:

SEM/EDS & BSE yield qualitative analyses

EMX yield quantative chemical analyses

xrd gives structural patterns

FIGURE CAPTIONS

For electron micrographs, the number is in the lower right corner on the front.

#004 Ilmenite on Tridynite **(x140)**

Lemolo Lake, Douglas Co., Oregon

One of the filiform crystals, greatly elongated along an a-axis. The front face is the (00.1). The large angular crystal at right is an more normal equant ilmenite.

#571 Perhamite **(x250)**

Silver Coin Mine, Humboldt Co., Nevada

Very thin hexagonal platelets in small rosettes. These give specimens a pearly look.

Sheet of color prints:

Six color micrographs of minerals from the Silver Coin Mine, Humboldt Co., Nevada

Individually labeled, with scale bar to give relative size. The variscite is interesting in that all faces except the (001) are frosted. The inset at lower left shows the blue-white fluorescence of the stolzite crystals in short wave ultraviolet light, which distinguishes them from the wulfenite from this mine, which is also colorless and in thin platelets.

CREDITS:

Electron micrographs & specimens — Don Howard

Color micrographs & specimens — William Wise

(*except as noted on the left-hand margin; see code on mineral list.*)

NOTICE TO ALL MEMBERS

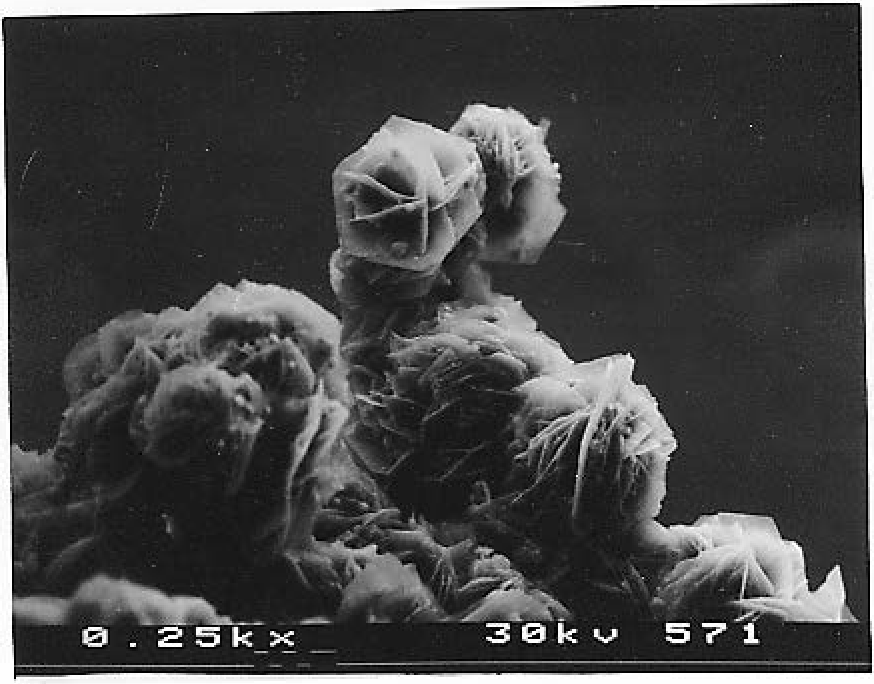
FROM Don Lown, Secretary-Treasurer

In the interest of updating and making our membership list more informative, we would like to get the e-mail address of all members who have one.

Also, we are trying to get photographs of all members that we can put onto a membership list. If you have a photo showing head/face and can e-mail it to me, please send it to **donlown@earthlink.net** If you will be at our meeting, I will have my camera available to take pictures.

Thanks,

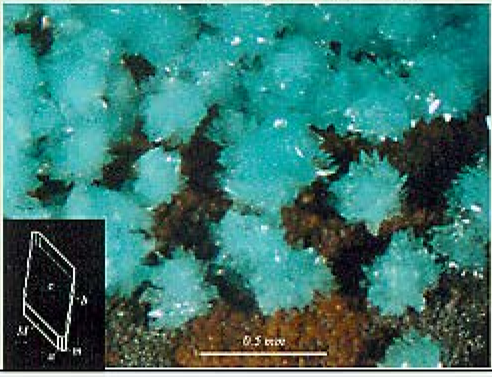
Don Lown


0.25kx 30kv 571


.140kx 30kv

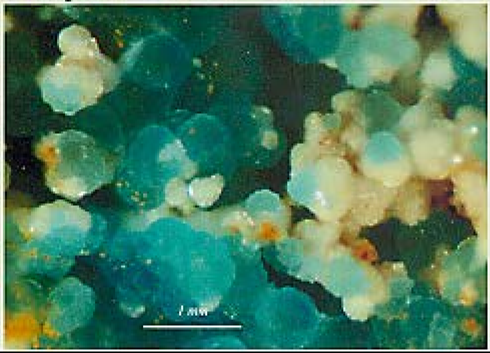
Turquoise $CuAl_6(PO_4)_4(OH)_8(H_2O)_4$

JM
WW



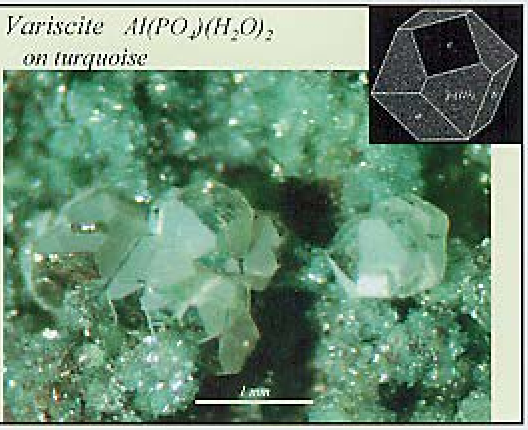
Morinite $NaCa_2Al_2(PO_4)_2(F,OH)_5(H_2O)_2$
and perhamite

WW



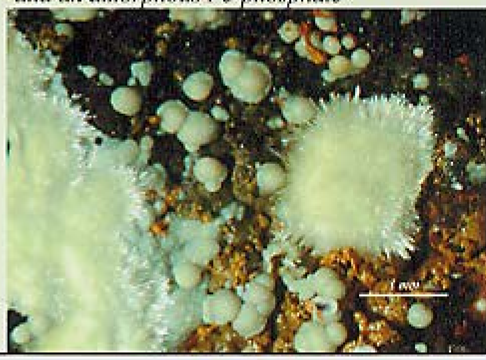
Variscite $Al(PO_4)(H_2O)_2$
on turquoise

WW



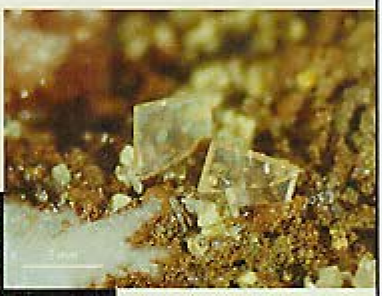
Na-Meurigite $(Na,K)Fe_7(PO_4)_5(OH)_7(H_2O)_8$
and an amorphous Fe-phosphate

WW



Stolzite $PbWO_4$

and pyromorphite pseudomorphs after beudantite



UV SW fluorescence

Heyite $Pb_5Fe^{2+}_2(VO_4)_2O_4$ *on jarosite and quartz*

RT