Northwest
Micro Mineral
Study Group

MICRO PROBE

SPRING, 2024 **VOLUME XIII, Number 9**

SPRING MEETING

May 11, 2024 9 AM to 4 PM

Sons of Norway Columbia Lodge

2400 Grant St,, Vancouver, WA 98660

President's Message

It is almost that wonderful time of the year again. No, not Christmas. Time for our meeting, May 11. I am so looking forward to seeing all of you again and, of course, all that will be spread out on the free tables. I will be bringing a new tool that I have found very useful to me in my work with my micros. See inside this issue for a write-up on it.

But that is not the biggest new thing in my recent weeks. A while ago Jon Gladwell gave me some rock from the Big Cliff area of the Clackamas River drainage and said that it looked like thomsonite inhabited some of the vugs. Thomsonite is not listed for Big Cliff on Mindat. A new find??? Well, it looks like it. See the article in this issue. And many thanks to my collaborators on this project.

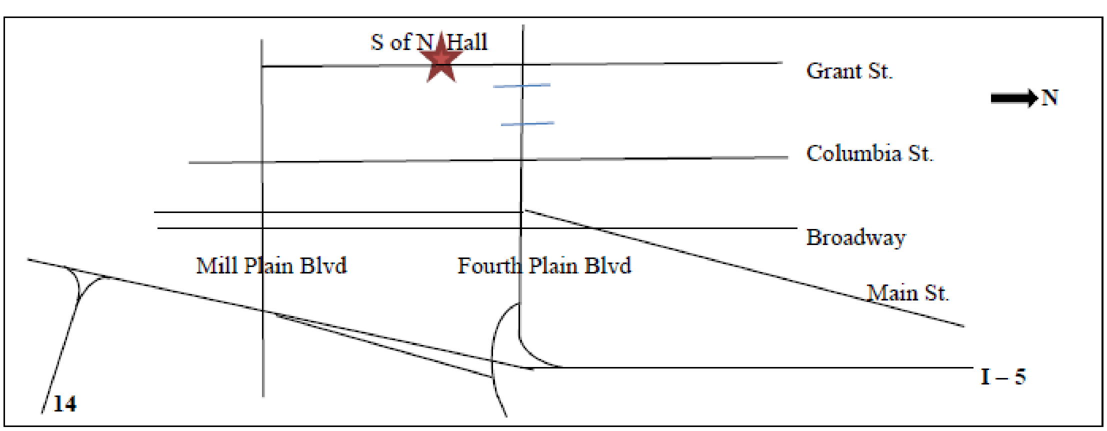
I forgot to do something last time at the meeting. Nominations and voting on new officers is supposed to happen at the November meeting. We did try to get a replacement for Kelly Starns but were unsuccessful. My position as President is also up for grabs. If you are interested in serving, please let me know.

Remember to bring your lunch salads and desserts. The club will provide sandwich fixings and drinks as usual. See you soon.

Directions:

FROM WASH. HWY 14: Continue west to Interstate 5, keep right and take I-5 North. Then keep right and continue to Exit #1D -Fourth Plain Blvd

FROM INTERSTATE 5: In Vancouver, take Exit #1D to Fourth Plain Blvd. Head west on Fourth Plain Blvd. to Grant St. and turn left. Go two blocks to 24th St.



A New Tool For the Micro Mineral Collector

TomLov DM9 Pro

By Beth Heesacker

As some of you know I have been having trouble with my hands shaking since I fell a few years ago. I fell twice, once onto my right shoulder and once on my left. The doctor said I dislodged a nerve in each of my shoulders. It is not supposed to be Parkinsons, thank God.

It does mean that I cannot hold specimens still enough to look at them with a jeweler's loop without having to brace my hands and sometimes that is not sufficient,

I had a Dino-lite but had sold it since I had my new camera setup. Dino-lites are also very expensive and I was hoping to find something less expensive.

I came across this digital microscope while searching for a solution. The best price was at Amazon. TomLov has a number of versions so I had to do a bit of detective work to decide on a model that would do what I wanted to do and that I could afford.

My criteria included

- great magnification (1,000 or so)
- to view well even on the integrated screen (7")
- sufficient adjustable lighting (lights on the microscope like a ring light plus 2 ikea like gooseneck lights - I have only used the "ring light" since it supplies more than enough light)
- to plug in a monitor for even a larger screen (21" but could go larger - no degradation of image seen))
- battery powered for in-the-field work (I have it hooked up to a battery bank at home and can take the battery bank with me where ever I go)
- ability to take pics and save to a computer in some fashion (not really important but could be useful)
- ability to take pics if I wanted to without touching the microscope (remote control so I do not shake the microscope when tripping the "shutter")
- ability to move the microscope far enough from the base that even larger specimens could fit under it ((tall stand that the microscope is mounted on)
- Cost under $100

I found all of these criteria fulfilled in the TomLov DM9 Pro (price varies depending on the day and whether you have Prime). I use it as I would a jeweler's loop to identify an area I may want to photograph. I have had it for a few weeks now and love it. I do find that I look at even smaller vugs than usual. Something about having a few cm field of view spread across a 21" screen that calls for closer investigation.

I have not tried the photography abilities yet since I do not really need them. The only drawback is the card for saving pics is a micro SD and my computers are old enough that I will have to purchase an adapter. I highly recommend the purchase of a battery bank and I leave my TomLov plugged into it all the time unless I am charging the bank.

I plan on bringing mine to our next meeting. See you soon.

Thomsonite at Big Cliff,

Clackamas County, Oregon?

By Beth Heesacker and Julian Gray

The Big Cliff Question:

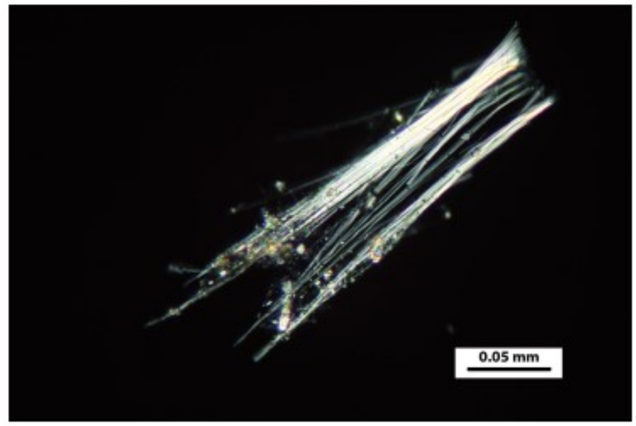
Recently Jon Gladwell brought me a couple of boxes of rock from Big Cliff, Clackamas County, Oregon that he had collected in May of 2023. He had a note in the boxes cluing me in to look for thomsonite. Previously, even after going through many buckets and boxes of Big Cliff material I had not found any thomsonite from this area. I also checked MinDat and thomsonite was not reported from there in the past.

The area called Big Cliff is up to 3 miles long and Jon does not remember exactly where along this Big Cliff stretch of Highway 224 he found this material. This makes it more difficult to pinpoint the exact location and go back to find more without careful searching. It is definitely Big Cliff material due to the amount of siderite in the vugs. Other areas in the Clackamas River drainage have siderite but not to the extent that Big Cliff does.

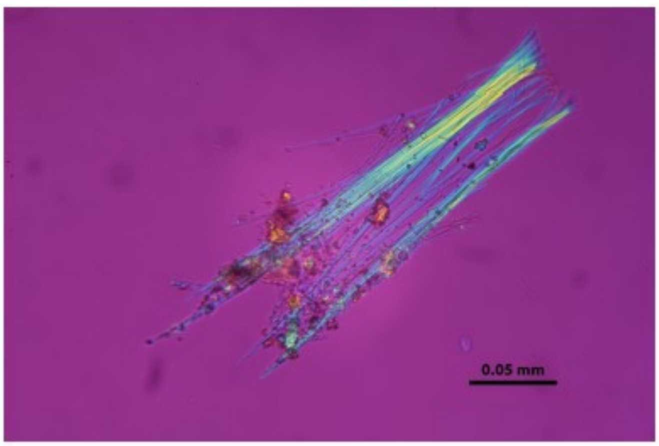
Taking the material to my microscope and with a bit of breaking with my Zuber, I unearthed what looked like thomsonite, a few different forms in fact. After taking a few stacked pictures I sent them to Jon Gladwell and to Don Howard who tentatively confirmed the thomsonite by sight identification. I also sent the pictures to Julian Gray who asked to see the specimens. He took them home and after his testing he reported back in an email:

> "The tiny white fuzzy balls are consistent with the optical properties of thomsonite. Based on the logical assumption that we are dealing with a zeolite and probably one from the natrolite group, I am confident in calling them thomsonite.
>
> Properties:
>
> - Radiating clusters of straight or curly white fibers
> - Colorless in transmitted light
> - Parallel extinction
> - Low birefringence
> - Positive sign of elongation
> - Refractive index around 1.528 (approximated using the central focal masking technique of Wilcox (1983)).
>
> I only used a refractive index liquid of 1.528, but I chose that one because it would be close to the average RI of thomsonite and different from other members of the natrolite group (natrolite and scolecite). The two refractive indices (one parallel to the crystal length and one perpendicular) bracket the RI of the liquid, that is one is higher than and the other lower than the liquid.
>
> Ref:
>
> Wilcox, Ray. "Refractive Index Determination Using Central Focal Masking Technique with Dispersion Colors." American Mineralogist 68 (1983): 1226–36."

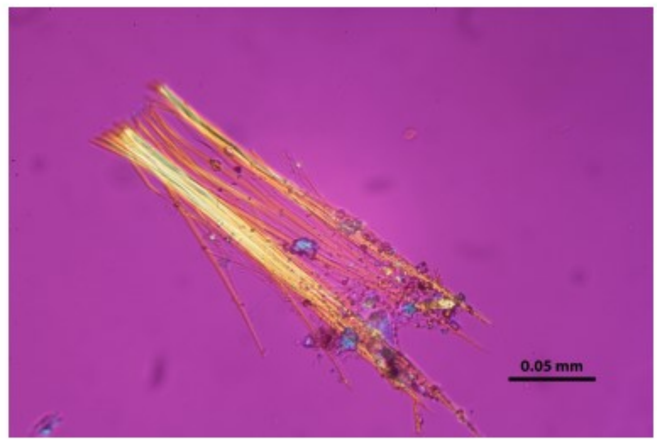
Thomsonite fibers in plane polarized light. Mounting medium is n_D = 1.528. 250X. Photo by Julian Gray.



Thomsonite fibers viewed in cross polarized light. These fibers exhibited parallel extinction and low birefringence. 250X. Photo by Julian Gray.



Thomsonite fibers placed in the 45 degree position and viewed in cross polarized light plus a 550 nm compensator plate. Addition of retardation of interference colors indicates a positive sign of elongation, that is the high refractive index is parallel to the long axis of the fibers. 250X. Photo by Julian Gray.



Thomsonite fibers 90 degrees to the 45 degree position and viewed in cross polarized light with a 550 nm compensator plate. This test provided further verification the positive sign of elongation. 250X. Photo by Julian Gray.

So, now that we have some very good evidence of thomsonite, lets look at the area and make sure the geological evidence agrees.

Minerals from the Big Cliff Locality:

Minerals previously recognized at Big Cliff (according to MinDat):

Gypsum and var. Selenite - $CaSO_4 \cdot 2H_2O$

Pyrite - FeS_2

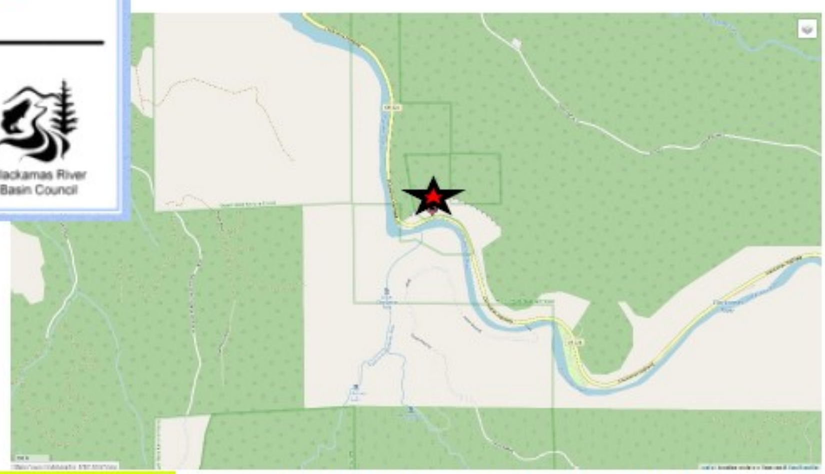
Siderite and var. Spharosiderite - $FeCO_3$

But no thomsonite. Can siderite and thomsonite co-exist? MinDat does not show an association of siderite with thomsonite (in the list of associated minerals on the siderite page). A search in MinDat for photos of siderite associated with thomsonite shows they are found together in New Zealand and France. One picture under MinDat's Clackamas River localities page does show siderite with thomsonite but closer identification of the exact locality is not mentioned. This at least shows that the two minerals have been found to exist together.

The Location - Big Cliff, Clackamas River drainage, Clackamas County, Oregon:

Oregon and the Clackamette River Drainage. The star marks the location of Big Cliff.

Used with permission of the Clackamas River Basin Council.



Big Cliff site. Google Map from MinDat

MinDat Google map with Macrostrat Geology opacity added to show fault at Big Cliff.

Photo 1 - Big Cliff 1929.

From sciencebase.gov/

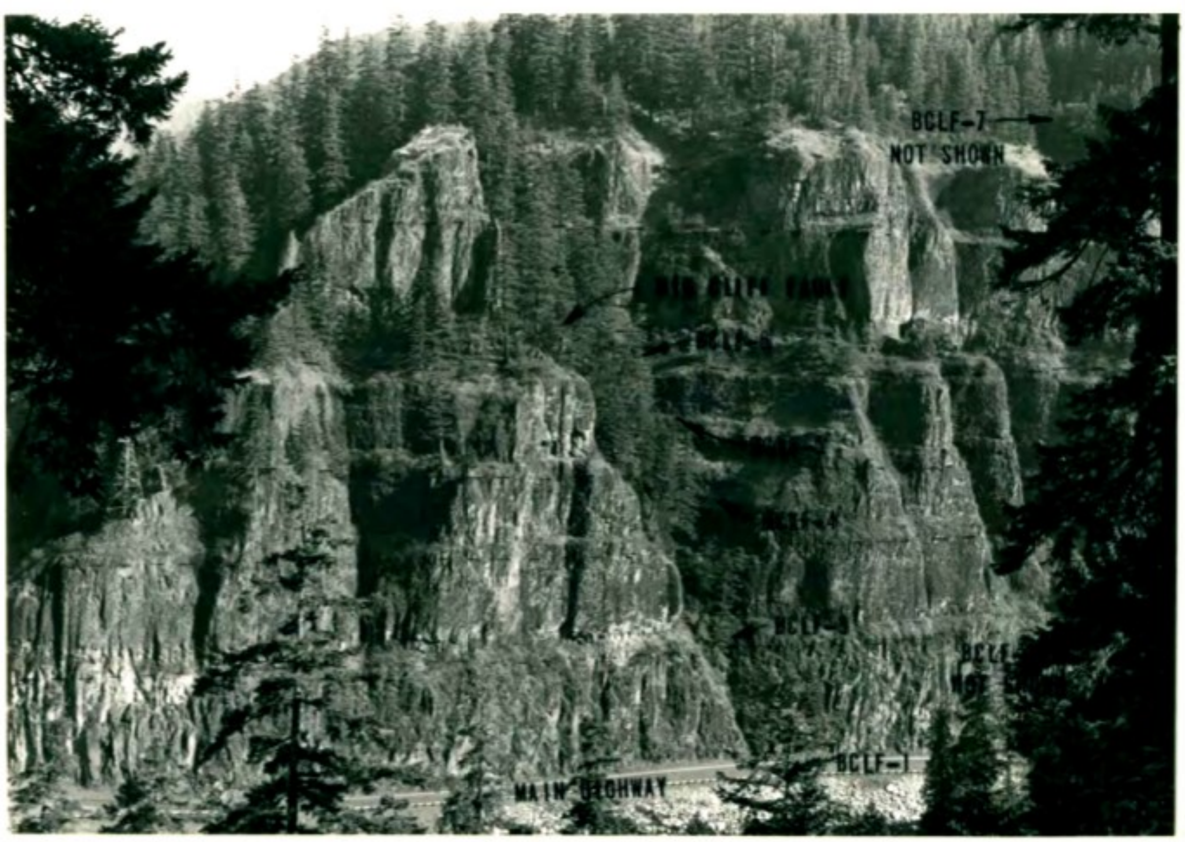


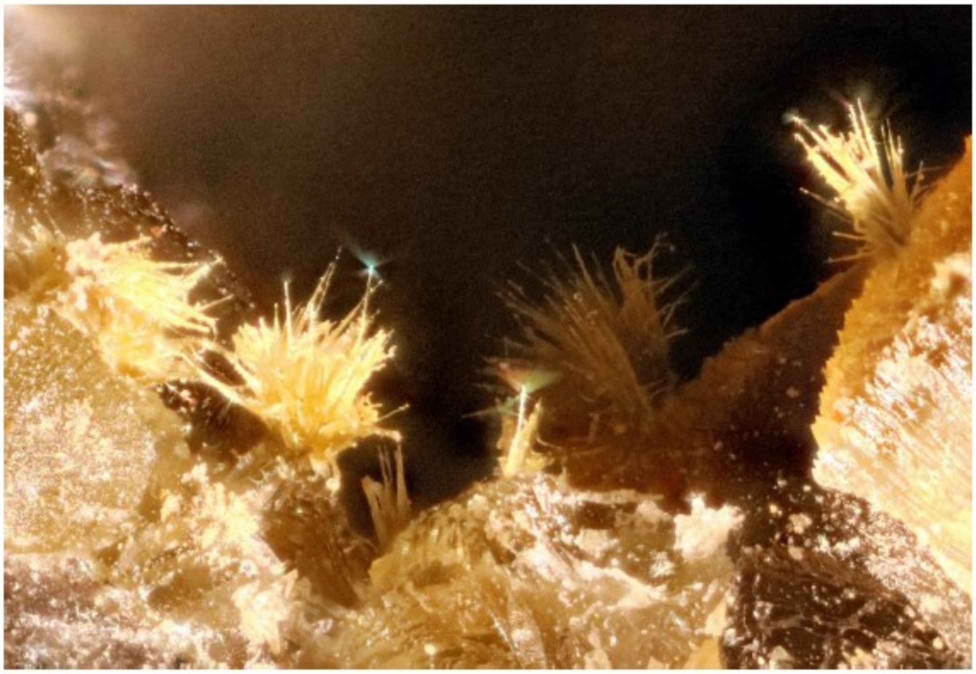
Photo 2 - Big Cliff, around 1978. From Anderson

Photo 3 - Big Cliff, May 2023. Note the fault just right of center

Photo by Jon Gladwell.

Pictures of the Possible New Mineral for This Locality (photos by Beth Heesacker):

Thomsonite - $NaCa_2[Al_5Si_5O_{20}] \cdot 6H_2O$



Thomsonite, Big Cliff, Clackamas County, Oregon. Fov 2.5 mm. Copyright by Beth Heesacker.

Thomsonite, Big Cliff, Clackamas County, Oregon. Fov 2.5 mm. Copyright by Beth Heesacker.

Thomsonite, Big Cliff, Clackamas County, Oregon. Fov 2.5 mm. Copyright by Beth Heesacker.

Thomsonite, Big Cliff, Clackamas County, Oregon. Fov 3 mm. Copyright by Beth Heesacker.

Thomsonite, Big Cliff, Clackamas County, Oregon. Fov 2.5 mm. Copyright by Beth Heesacker.

Big Cliff Geology and Thomsonite:

Zeolites are hydrated aluminosilicates (contain alumina and silicon) that form in vesicles/vugs in volcanic or sedimentary rocks. They are deposited at low temperature («200°C) in those vugs by hydrothermal deposition or by rain water seeping through rock fractures and dissolving and redepositing the minerals. The Big Cliff strike-slip fault, which could provide a pathway for this, cuts through the area as shown in the map on page 2 of this article.

The rock at Big Cliff is composed of flows of the Columbia River Basalt Group (CRBG) varying in age from 16.5 to 6.M years old. My research tracing the names of the flows from the 1970's to the present was like trying to hit a moving target. Many different papers have been written and naming, and grouping, has changed over time.

I finally came to the conclusion that the major Grande Ronde Basalt (GRB) flows (member flows of the CRBG) at Big Cliff are the Sentinel Bluffs and Winter Water members (16.0 to 15.6 Ma) which overtop the earlier Prineville flow (recognized in 1974). My conclusion is supported by the MinDat record of the Forest Service 33 quarry which is very close to Big Cliff. Both of the GRB flows and the Prineville flow contain the alumina which is needed for the thomsonite ($NaCa_2[Al_5Si_5O_{20}] \cdot 6H_2O$). All the other elements are commonly found just about anywhere.

Since the Big Cliff area has been a major collecting site for many years but without finding thomsonite, we must wonder why. Searching the NW Micro Mineral Study Group newsletter, the Micro Probe, I did not find any references to thomsonite at the Big Cliff area.

So, how did it get there and why are we just now finding it?

A) Is this the recent dissolution of one mineral and formation of another?

B) Is this a point where a new hydrothermal solution has flowed into a specific area precipitating a new mineral deposit?

C) Is this a new melt from recent volcanic activity?

D) Is there a recent metamorphic situation (temperature/pressure) causing a mineral species change?

E) Has weathering/erosion worked its way back into a new area of mineralization?

Due to the chemical composition of thomsonite versus the chemical composition of the other minerals known to be found at Big Cliff, I think this probably rules out "A".

There are no known hot springs in the area. There are hot springs in the Clackamas River drainage but not close by the Big Cliff area. Although there is a fault at Big Cliff (see map on page 2) that could allow migration of new solutions to bring new mineralization to the area. This is not the same fault as the one at Lake Harriet near the Aimes-Bancroft (or Ames-Bancroft) mine site where thomsonite is found in the Clackamette River drainage. I think this rules out "B".

Since this area has been quiet volcanically and metamorphically for about 6MA then that seems to rule out "C", and "D".

That just leaves "E" as the most probable cause of the new find. I did notice on Google maps that the area closest to the cliff top was burnt in the Lionshead fire in 2020. The heat from the fire expands and cracks the rock, and the moss and other vegetation that helps hold the rock has been burnt away. This may have contributed to accelerated erosion opening up a new area on the cliff. If you take a close look at the pictures of the site on pages 3 and 4 of the article, you can get an idea of how erosion has changed the area over the years.

Characteristics of GRB and Prineville flows:

I would like to see if we can pinpoint the flow that the thomsonite has formed in which required taking a closer look at the flows present in the Big Cliff area.

The GRB flows consist of a fine grained groundmass with no large crystals. There were magnetic reversals (R_1, N_1, R_2, and N_2) during the GRB flows but the specimens are not in situ so their polarity cannot be known.

The Prineville flows, below the GRB, have a groundmass that is also composed of fine microscopic crystals and by an absence of any large crystals. Small clumps of augite are between interlocking long, thin crystals of labradorite. Olivine, opaque oxides, and apatite needles are found with the augite, and up to 50% dark-brown basaltic glass.

I will need to carefully look at the matrix of the specimens to see if I can figure this out.

It would also be very good to know the actual location in the GRB or Prineville flow the thomsonite came from. To check this out would require a closer look at the cliff face and top. The cliff itself is probably unsafe to climb but there is a road (NF 4610) on the cliff top that is 1400-1500 feet from the cliff edge. Probably not a safe access to the cliff face but it could be interesting nonetheless to take a look.

Conclusions and continued work to be done:

Is it Thomsonite? Yes.

Is it from somewhere in the Big Cliff area? Yes, because of the quantity of siderite found in the same specimens. Some siderite is found throughout the Clackamas River drainage area but is more abundant in the Big Cliff site. Also work by Baker, et.al. shows that the chemistry of a flow is quite consistent through out and minerals found in basalt are not very mobile. They did not just "wash in" from somewhere else. There is an alteration area at Big Clifff but since it is unknown exactly where the specimens came from, it is hard to tell if this is an alteration situation.

Has it been found at Big Cliff before? Probably not, since it is absent from the Big Cliff list of minerals at the location found in the MinDat listing and the absence of articles about it in the Micro Probe.

To be more exact in our conclusions, and to erase at least some of the "ifs", we need to do some more work.

1) Go on a field trip to the area. Check out the talus, the different flows and the strike/slip fault.

2) It would be nice to do some X-ray spectrometry and mass spectrometry work on the samples.

3) We could hire a rock climber to collect samples from the cliff face, both from top to bottom and along the whole extent of the Big Cliff area. Maybe the exact location of the thomsonite could be found or at least identify the exact flow by comparison of the matrix. Volunteers???

3) Report our findings to Mindat and see if they will update their list for Big Cliff.

Acknowledgements:

I want to thank Jon Gladwell for finding this anomaly during his collecting in the Big Cliff area and calling it to my attention. Also thanks to Don Howard for his initial identification of the thomsonite and review of the article. Many thanks to Julian Gray for his work in identifying the thomsonite. While he was testing for thomsonite he also found moganite and we await further news on any other new minerals for the Big Cliff area.

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THE MICROPROBE

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