FRIENDS OF MINERALOGY
Pennsylvania Chapter
NEWSLETTER

VOL. 48 NO. 3 FALL 2020

JOIN US FOR THIS VIRTUAL LIVE EVENT!

Pennsylvania Chapter Plans November 7 Virtual Symposium and November 8 Field Trip

Friends of Mineralogy-Pennsylvania Chapter will hold its annual symposium for mineral collectors on Saturday, November 7, 2020, as a live virtual event from 9:00 a.m. to 2:30 p.m., subject to change. An in-person field collecting trip is planned for Sunday, November 8. The online symposium will include several virtual live presentations of interest to Pennsylvania mineral collectors, with audience questions and answers.

The Symposium will be available to FM-PA Chapter 2020 members who **register in advance**. Non-members may pay for 2021 membership by October 26 and receive membership for the remainder of 2020, including the Symposium and Field Trip, as a bonus. See <http://www.rasloto.com/FM/> for membership application, symposium details, and registration form as they become available.

Call for Symposium Presentations

Friends of Mineralogy - Pennsylvania Chapter invites submission of abstracts for virtual live presentation at our annual symposium. It will be a Zoom meeting taking place on Saturday, November 7, 2020 (and an in-person field collecting trip planned for Sunday, November 8). Presentations on Pennsylvania minerals or mineral localities, or other topics of interest to collectors, are invited. We provide an honorarium of $100 for each 40 minute presentation.

Short abstracts may be submitted to Chapter President Joseph Marchesani <jmarch06@comcast.net> by October 12 to be considered for acceptance as Symposium presentations. Upon acceptance, final abstracts for inclusion in the Symposium Program are required by October 26. These may be up to two pages and may include illustrations of sufficient resolution to look good in print; a biographical sketch and photograph of the author are also welcome.

Accepted speakers should be prepared to make their virtual live presentations and answer audience questions via Zoom in a scheduled time slot on November 7. It is expected that most of these will be PowerPoint presentations with live narration via Zoom shared screen. FM-PA plans to have preparatory "dry run" test session(s) in advance. FM-PA may make the presentations available for a limited time following the symposium.

Short Mineral Collecting Videos Requested

Short (5-10 minute) videos of mineral collecting sites and/or recent collecting activities and resulting specimens may be submitted by October 26 for possible inclusion in the Symposium. Contact Bill Stephens <bstephens@stephensenv.com> for instructions on submission.

2020 Memberships Extended through 2021

Because the pandemic has prevented us from presenting many activities, the Board of Directors has decided that FM-PA memberships which have been paid for 2020 will be extended through 2021 at no charge.

National Bulletin of FM

The June issue of the Bulletin of FM is available on their web site, <www.friendsofmineralogy.org>. In keeping with the 50th anniversary of FM, Peter Modreski shares his recollections of the early years in an article on pages 3-4. He says, in part: "FM Region 3 (Pennsylvania) held mineral symposia in 1973 and 1974, which were designated as the First and Second Annual FM-Region 3 Mineral Symposia. In 1973 was the Pennsylvania Mineral Collecting Symposium, Nov 2-3, and in 1974 the theme was Minerals and Ores in Igneous rocks in Pennsylvania, November 1-3 (see https://www.friendsofmineralogy.org/symposia/past-symposia/). Both were held at held at Lafayette College, Easton, PA."

Editor's Note

We thank all of the members who responded to the survey in the last issue. The general state of the pandemic, and Pennsylvania regulations limiting indoor gatherings, prevent us from having an in-person Symposium.

Minerals of the Penn/MD Materials Quarry, Fulton Township, Lancaster County, Pennsylvania, Part 4, Carbonate Minerals

Ronald A. Sloto, P.G.
West Chester University

Introduction

The Penn/MD Materials quarry, owned and operated by the H&K Group, produces aggregate from ultramafic rocks of the Baltimore Mafic Complex, known locally as the State Line Serpentinite District. This complex of ultramafic and associated gabbroic rocks is believed to be a remnant from the roots of an island arc complex formed about 490 to 510 million years ago (Smith and Barnes, 1998; Smith and Barnes, 2008).

All analyses were performed at the West Chester University Center for Microanalysis and Imaging, Research and Training (CMIRT). Imaging and chemical analyses were done using an FEI Quanta 400 environmental scanning electron microscope integrated with an Oxford AZtec X-ray energy dispersive spectrometer (SEM-EDS). Samples were unpolished and uncoated.

The author thanks Jay Lang and the H&K Group for access to the quarry, Dennis Buffenmeyer and Tom Pankratz for providing specimens for analysis, and Robert C. Smith, II, for helpful comments on this manuscript.

Carbonate minerals observed at the Penn/MD Materials quarry include aragonite, calcite, dolomite, hydromagnesite, magnesite, and nakauriite, which are discussed here. Carbonate minerals observed also include desautelsite and pyroaurite, which were described in part 1 of this series (Sloto, 2019).

The copper magnesium carbonate mineral mcguinnessite occurs in the adjacent Cedar Hill quarry, but it has not yet been verified from the Penn/MD Materials quarry. I have tested over a dozen suspected mcguinnessite specimens from the Penn/MD Materials quarry (mostly provided by other collectors); however, none of them contained copper and, therefore, were not mcguinnessite. In all cases, they were a green to blue green amorphous-appearing serpentine mineral.

Aragonite $CaCO_3$

Aragonite is the second most common polymorph of natural calcium carbonate. Two specimens of clear, elongated crystals (figs. 1 and 2) were provided for analysis by Dennis Buffenmeyer. Analysis by SEM-EDS showed both to be calcium carbonate. They are assumed to be aragonite on the basis of crystal form. Aragonite is known from other serpentine localities, such as the nearby Wood mine (Geyer and others, 1976; Wilson, 2011). Aragonite crystals from the Penn/MD Materials quarry appear identical to those from the Wood mine pictured in Wilson (2011, p. 316).

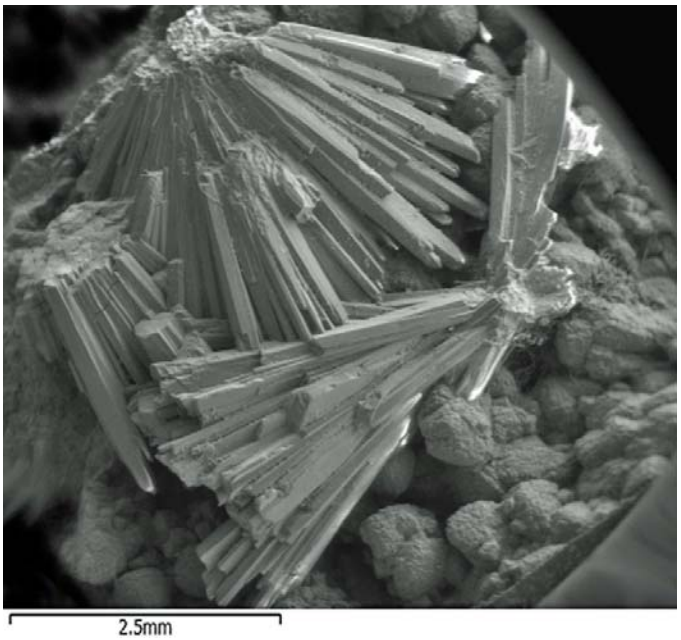

Figure 1. Scanning electron microscope image of aragonite crystals from the Penn/MD Materials quarry. Magnification is approximately 40 X.

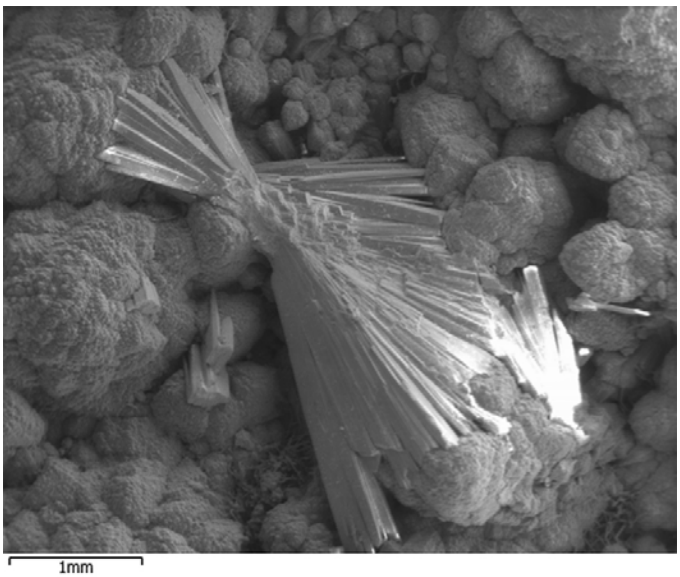

Figure 2. Scanning electron microscope image of aragonite crystals from the Penn/MD Materials quarry. Magnification is approximately 75 X.

Calcite $CaCO_3$

Calcite is a rare mineral at the Penn/MD Materials quarry. Only one specimen (RS-4112-B) was analyzed that could be considered calcite. The chemical composition was $(Ca_{0.88}Mg_{0.22})CO_3$.

Dolomite $CaMg(CO_3)_2$

Dolomite is a rhombohedral carbonate mineral with the ideal formula $CaMg(CO_3)_2$ in which calcium and magnesium occupy preferred sites. Dolomite is a common mineral at the Penn/MD Materials quarry. It occurs as crystals (figs 3 and 4), cleavages (figure 5), and as massive dolomite (fig. 6). It can be brown, orange, white, or clear. Cleavages of white dolomite resemble calcite (fig. 7). The Mg to Ca ratio of 10 dolomite samples ranged from 1:0.47 to 1:2.18 with an average Mg to Ca ratio of 1:0.97.

Figure 3. Dolomite crystals from the Penn/MD Materials quarry, magnified. Sloto collection RS-4049.

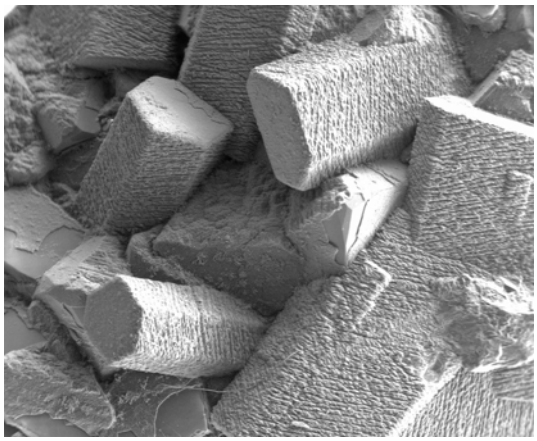

Figure 4. Scanning electron microscope image of dolomite crystals from the Penn/MD Materials quarry. Magnification is approximately 60 X. Sloto collection RS-4140.

Figure 5. Dolomite cleavages from the Penn/MD Materials quarry. Field of view is 10 cm.

Figure 6. Massive dolomite from the Penn/MD Materials quarry, 4cm. Sloto collection RS-4129. The brown mineral is dolomite.

Figure 7. Dolomite cleavage from the Penn/MD Materials quarry, 4.5 cm. Sloto collection RS-4224.

Hydromagnesite $Mg_5(CO_3)_4(OH)_2 \cdot 4H_2O$

Hydromagnesite occurs rarely at the Penn/MD Materials quarry. I found only one specimen (fig. 8) in the quarry. The hydromagnesite forms clear to white acicular crystals in divergent sprays on magnesite. Another specimen (fig. 9) was given to me many years ago by Ed Carvalho, who collected it in 1996. The identification of both was confirmed by SEM-EDS.

Figure 8. Hydromagnesite crystals from the Penn/MD Materials quarry; crystal sprays to 3 mm. Sloto collection RS-3954.

Figure 9. Hydromagnesite from the Penn/MD Materials quarry. Field of view is 3 mm. Sloto collection RS-2812. Collected by Ed Carvalho in 1996.

Magnesite $MgCO_3$

Massive magnesite is abundant at the Penn/MD Materials quarry in a variety of colors and forms. The most common color is white, but it can be brown or gray. It forms thick white veins in serpentine (fig. 10), interlayered with serpentine (fig. 11), globular (fig. 12), and botryoidal (fig.13). It is sometimes mistaken for chalcedony because of a similar appearance (fig. 12).

Figure 10. Massive magnesite from the Penn/MD Materials quarry, 8 cm. Sloto collection RS-4207. The magnesite fluoresces a weak white under shortwave ultraviolet light.

Figure 11. Magnesite interlayered with serpentine from the Penn/MD Materials quarry. Field of view is 7 cm. Sloto collection RS-3307.

Figure 12. Magnesite from the Penn/MD Materials quarry, 8.5 cm. Sloto collection RS-4272.

Figure 13. Magnesite from the Penn/MD Materials quarry. Field of view is 1 cm. Sloto collection RS-4100.

Magnesite/Quartz Mixture $MgCO_3 + SiO_2$

Several SEM-EDS analyses of a white mineral with an undulating surface (fig. 14) showed it to be a Si-C-Mg-O mineral with a composition that did not match any known mineral. Further investigation determined that the mineral was a mixture of equal parts magnesite and quartz. After examining several of these specimens, they became easy to recognize because the surface usually was cracked when viewed under magnification (fig. 15). It is possible that the SiO_2 could be opal; however, further testing would be necessary.

Figure 14. Magnesite-quartz mixture from the Penn/MD Materials quarry. Field of view is 2 cm. Sloto collection RS-3956.

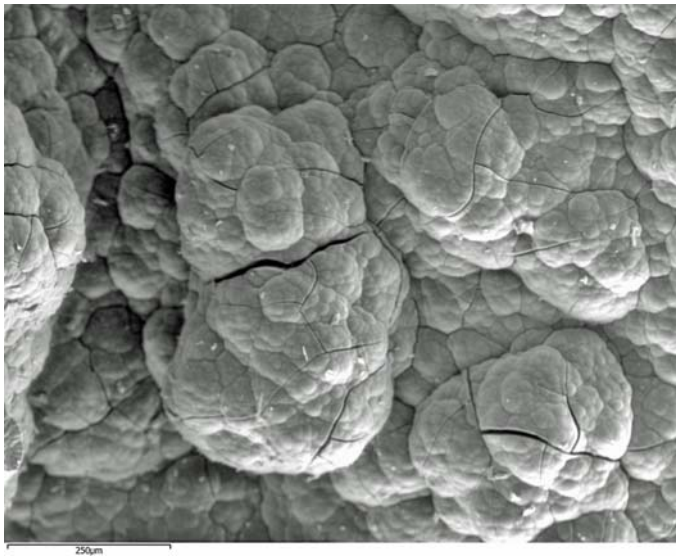

Figure 15. Scanning electron microscope image of magnesite-quartz mixture from the Penn/MD Materials quarry. Magnification is approximately 360 X. Sloto collection RS-4136.

Nakauriite

There has been much controversy surrounding the composition of nakauriite. It was originally described by Suzuki and others (1976) as a copper sulfate-carbonate hydroxide hydrate mineral from Nakauri, Japan, with the idealized chemical formula $(Mn,Ni,Cu)_8(SO_4)_4(CO_3)(OH)_6 \cdot 48H_2O$. The nakauriite from Japan occurred as clear, sky-blue bundled aggregates of very small slender to fibrous crystals less than about 0.2 mm in length and 0.006 mm in width. It occurred as fracture fillings in a brucite-bearing serpentinite and was named nakauriite for the locality.

Peacor and others (1982) determined by X-ray diffraction analysis that the cuprohydromagnesite and cuproartinite from Gabbs, Nevada, described by Oswald and Crook (1979) were actually nakauriite. The research done by Oswald and Crook was done prior to the publication of the paper by Suzuki and others (1976) describing nakauriite. Cuprohydromagnesite $(Cu,Mg)_5(CO_3)_4(OH)_2 \cdot 4H_2O$ occurred at Gabbs as translucent, blue, bladed, elongated crystals; and cuproartinite $(Cu,Mg)_2(CO_3)(OH)_2 \cdot 3H_2O$ occurred as blue acicular translucent, elongated crystals (Oswald and Crook, 1979). Note that neither contained sulphur and both contained magnesium, which differs from the material from Nakauri, Japan. According to Peacor and others (1982), electron microprobe analyses of nakauriite from both Japan and Nevada showed little or no sulphur present. Peacor and others (1982) did not present additional chemical data.

Foord and others (1985) described the occurrence of nakauriite from the adjacent Cedar Hill quarry in the Pennsylvania Chapter Friends of Mineralogy Newsletter: *"We would like to report on the occurrence and identification of a brightly colored fibrous (as seen in an SEM photograph), pale blue to medium navy blue, to platy, medium navy blue mineral which was identified by Robert C. Smith, II, in April, 1983, as nakauriite…. Microprobe analyses showed little or no sulfur to be present, and microchemical tests produced the same results… The mineral occurs as blue fibrous sprays and mats in thin coatings with antigorite, some magnesite, quartz, and talc at the Cedar Hill serpentine quarry, Fulton Township, southwestern Lancaster County."*

Samples were supplied by Thomas O'Neil to Deane K. Smith and others, who obtained X-ray diffraction data between 1972 and 1983. However, because of the limited amount of clean material free from antigorite, a good chemical analysis could not be obtained (Foord and others, 1985, p. 4).

In 1975, Robert C. Smith, II, and Robert B. Finkelman collected similar bright blue material from the Cedar Hill quarry. However, the mineral was mixed with antigorite, and, based on Smith's optical data, could not be fully identified (Smith, 1978, p. 209).

Additional material of a better quality and in larger quantities was collected from the Cedar Hill quarry by Bryon Brookmyer and Martin Anne in September 1982. Some of the material was sent to Robert Smith II, Eugene Foord, Allen Heyl, and Deane Smith. Robert Smith obtained X-ray diffraction powder patterns and matched them with nakauriite in April 1983. Similar X-ray diffraction data were obtained by Foord on light blue and medium blue varieties of nakauriite. SEM examination by Foord showed Cu, Mg, Fe, and Ni to be present. Iron was present in minor amounts, but no sulfur was detected. The ratio of Cu to Ni was estimated to be about 4:1 in the light blue material and was somewhat greater in the darker blue material. Lower amounts of Cu and Ni and greater amounts of Mg were found in the almost terminated ends of some of the light blue fibers. Mn was not detected in the Cedar Hill nakauriite. Foord and Heyl concluded that there may be three end members: Cu, Ni, and Mg, and possibly a fourth (Mn). The presence of carbonate was confirmed by infrared spectra made by Arnold H. Fainberg on material from the Cedar Hill quarry, as well as from Nakauri, Japan (Foord and others, 1985, p. 5-7).

Barnes (1986, p. 8) stated this about nakauriite from Pennsylvania: *"Additional work is needed to fully understand this mineral that has been a source of controversy and great interest to the mineralogical community. What is clear is that it is still possible to encounter very rare and attractive minerals that have not been previously known in Pennsylvania, and about which much remains to be learned."*

A sample of nakauriite (fig. 16) collected in the Penn/MD Materials quarry by Alex Kane was furnished to the author by Tom Pankratz for SEM-EDS analysis. Analysis of the sample (table 1) showed the dominant metals were, in decreasing order, magnesium, copper, and nickel. Sulphur was not detected. The manganese and iron concentrations were very low. Contamination by antigorite likely was minimal as indicated by the low value for silicon. The analysis gave the approximate chemical formula $(Mg_{5.75}Cu_{1.73}Ni_{0.68})(CO_3)_4(OH)_2 \cdot 10H_2O$.

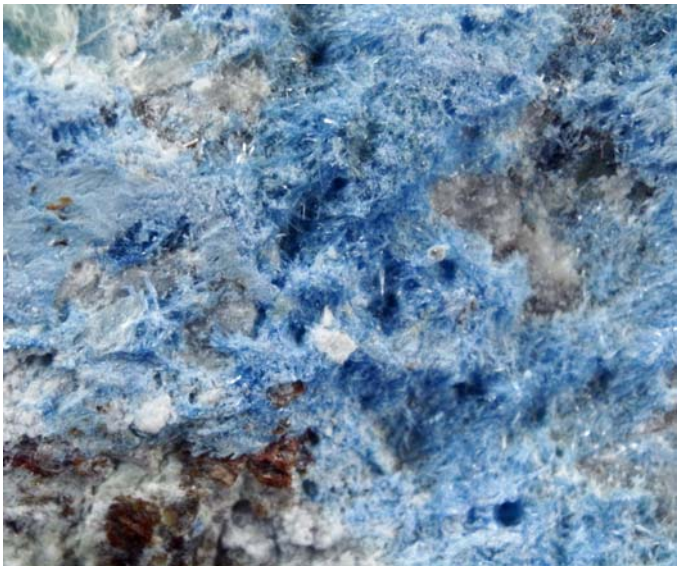

Figure 16. Nakauriite from the Penn/MD Materials quarry, magnified. Tom Pankratz specimen.

Table 1. Results of X-Ray energy dispersive spectrometer (EDS) analysis of nakauriite from the Penn/MD Materials quarry. Values are in weight percent. The median represents 37 measurements taken at 6 sites.

Element	C	O	Mg	Si	Ca	Mn	Fe	Ni	Cu
Median	6.62	52.73	19.25	0.57	0.17	0.03	0.29	5.52	15.14

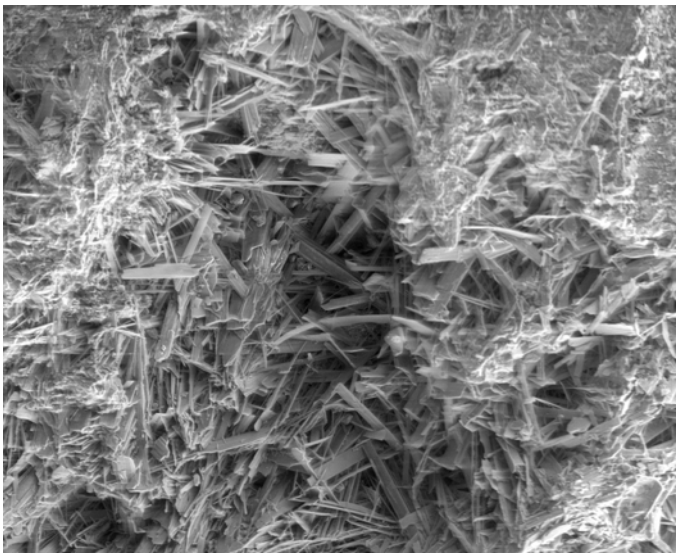

Figure 17. Scanning electron microscope image of nakauriite from the Penn/MD Materials quarry. Magnification is approximately 180 X. Tom Pankratz specimen.

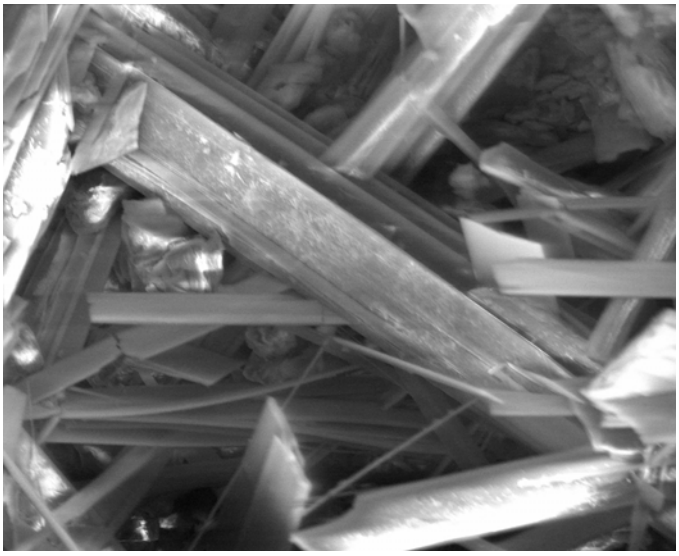

Figure 18. Scanning electron microscope image of nakauriite from the Penn/MD Materials quarry. Magnification is approximately 1275 X. Tom Pankratz specimen.

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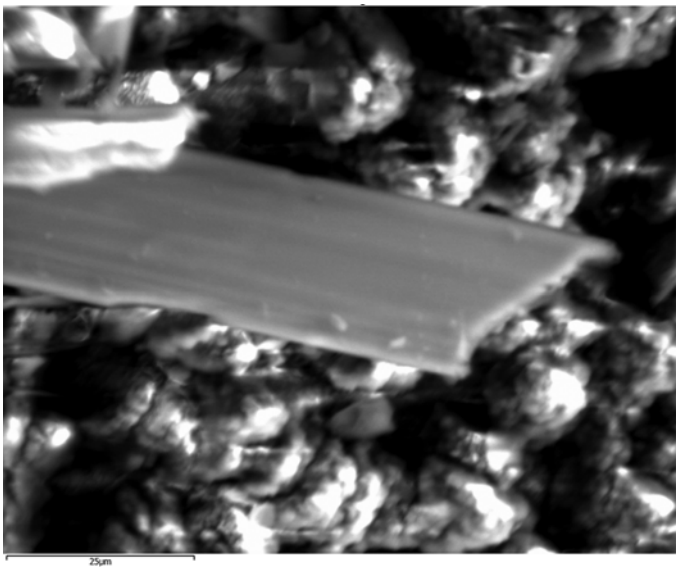

Figure 19. Scanning electron microscope image of a nakauriite crystal from the Penn/MD Materials quarry. Magnification is approximately 3000 X. Tom Pankratz specimen.

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UPCOMING EVENTS

See www.mineralevents.com for more

Many events are still being rescheduled. Confirm details of events before attending.

Sep 26-27, 2020: Franklin/Sterling Hill G&M Show. Franklin Firehouse, 137 Buckwheat Rd., Franklin NJ. Sat 9-5, Sun 10-4. Indoor & outdoor. www.facebook.com/AnnualFranklinSterlingGemMineralShow/

Oct 3, 2020: Autumn Mineralfest, by PESA. Macungie, PA. Sat. only, 8:30-3:00. http://www.mineralfest.com/

Oct 23-25, 2020: EFMLS Convention & Catawba Valley G&M Club Show, Hickory, NC https://efmls.org/annual-convention/

Oct 31, 2020: Ultraviolation fluorescent minerals show, by R&M Club of Lower Bucks County & UV Nomads of FMS. First UM Church, 840 Trenton Rd., Fairless Hills, PA 19030. Sat. only 9-4.

Oct 31, 2020: South Penn Rock & Mineral Swap & Sale, by CPRMC & Franklin County RMC. South Mountain Fairgrounds, Biglerville PA. Sat. only.

Nov. 7-8, 2020: Friends of Mineralogy - Pennsylvania Chapter Annual Symposium - Live Virtual Event - and Field Trip. https://rasloto.com/FM/

Nov. 14-15, 2020: Monongahela Rockhounds Show, rescheduled from April. West Mifflin Volunteer Fire Co., #4 Skyview Hall, 660 Noble Drive, Pittsburgh, PA 15122. (Near Century III Mall & Allegheny Co. Airport) See http://www.monongahelarockhounds.org/events.php

From the Editor

David Glick

THANK YOU to everyone who has been providing material for the Newsletter! Everyone else - join the fun! Feel free to contact me at xidg@verizon.net, or 814-237-1094 days and evenings. Mail can be sent to 209 Spring Lea Dr., State College PA 16801. Materials for the **Winter** issue should be submitted by **November 30.**

Materials related to Pennsylvania mineralogy, collecting or collectors are invited for this newsletter: articles, long or short; announcements from FM-PA committees; photographs of specimens, field localities, collections, etc.; reports on publications about PA minerals or by PA authors, or actual book reviews; or other items within the mineralogy and mineral collecting areas of interest. Photographs should be of good resolution (at least 1000 pixels across) without much JPEG compression, so that they will look good in print. Please provide captions including photographers' names.

We are producing four issues each year; your material is needed! If you know people who have interesting material, please encourage them to submit it.

DONATIONS WELCOMED

The FM-PA Chapter is a 501(c)(3) nonprofit organization; donations are gratefully accepted and should qualify for deduction from your federal income tax. Donations of any size help to offset the general operating costs of the Society, helping to keep dues low.

FM on the WWW

Please explore the FM-PA Chapter web site at www.rasloto.com/FM/ and facebook: Friends of Mineralogy Pennsylvania Chapter

National News

The Bulletin of Friends of Mineralogy, links to other chapters, and much more can be found on their web site: www.friendsofmineralogy.org

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