

THE PICKING TABLE

JOURNAL OF THE FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY

Volume 50, No. 1– Spring 2009

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Inside This Issue:

- Opal added to the Franklin-Sterling Hill species list
- Uraninite - a "First Find" from the Trotter Dump
- A useful analog to the Franklin-Sterling Hill mineral deposit
- Geology of the Hamburg Quarry
- A rare mineral discovered in the New Jersey Highlands
- How to Photoshop® edit your mineral photos



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Coming in the Fall 2009 50th anniversary issue;

Articles on geology by Richard Volkert and Fred Young, on minerals by Bill Kroth and Richard Bostwick, on history by George Elling and Bill Truran, updates on the Franklin Mineral Museum and the Sterling Hill Mining Museum plus an interview with FOMS founder Richard Hauck.

THE PICKING TABLE

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The Picking Table is the official publication of the Franklin-Ogdensburg Mineralogical Society, Inc. (FOMS), a nonprofit organization, and is sent to all members. *The Picking Table* is published twice each year and features articles of interest to the mineralogical community that pertain to the Franklin-Ogdensburg, New Jersey area.

Members are encouraged to submit articles for publication. Articles should have substance and be cohesively written and submitted as a double-spaced Microsoft Word document to thepickingtable@gmail.com.

The views and opinions expressed in *The Picking Table* do not necessarily reflect those of FOMS or the editors.

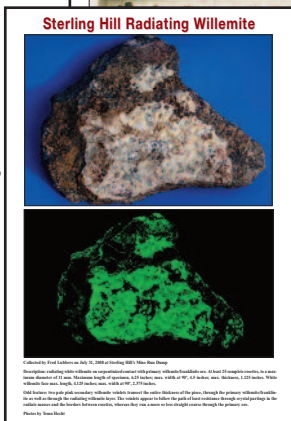
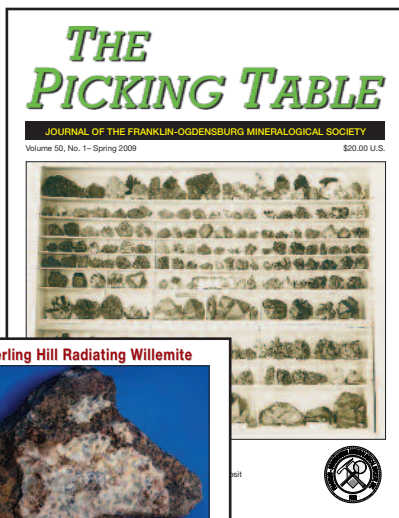
FOMS is a member of the Eastern Federation of Mineralogical and Lapidary Societies, Inc. (EFMLS).

About the front cover:

Featured on the front cover is a photograph of the Franklin collection of Frederick A. Canfield housed in its original case. This collection was studied by Charles Palache for his famous 1935 Treatise on Franklin, "U. S. Geological Survey Professional Paper 180." The complete story is on page 5 of this issue.

About the back cover:

On July 31, 2008, Fred Lubbers was digging on the Mine Run Dump at Sterling Hill when he noticed an unusually flat surface on a hundred pound boulder of weathered Sterling Hill ore. A chip from its edge showed a thin layer of crystallized Willemite in a 1/8" thick serpentine vein. Fred carefully removed that end of the boulder and took it home. Over two days, using hand made chisels, he scored the surface of the serpentine vein and meticulously chipped it away to expose the Willemite. This specimen is now in the collection of the late Joe Orosz. Radiating Willemite is rare at Sterling Hill, rare on the Mine Run Dump, and unique in a dump-collected specimen of this caliber.



From the Editor's Desk

Fred Young

234 Warbasse Junction Road
Lafayette, NJ 07848

As we sit at our computers preparing the spring 2009 *Picking Table*, which we are proud to note will be mailed throughout 6 time zones and across two oceans, we want to wish you all a happy and healthy New Year. Our New Year's resolution is to honor our commitment to deliver *The Picking Table* on time, every time, every year, spring and fall, from our computers to your mailboxes.

There have been several improvements to our publishing techniques and we are confident that these improvements will allow us to keep this resolution.

The Picking Table has gone completely digital: digital photography, digital writing, digital typesetting, digital design, and digital printing. By utilizing the latest computer software and hardware, and state-of-the-art digital presses, what used to take us months to complete now takes weeks, what used to take weeks to complete now takes days, what used to take days to complete now takes hours, and what used to take hours to complete now takes minutes.

Authors submit their papers in Microsoft Word format. These papers are put through a six stage proofing process: content suitability, technical review, layout and design, proofreading for punctuation, style and grammar, preparation of a readable pdf draft and final proofread for typos to make sure all i's are dotted and t's are crossed. A high resolution pdf file is then prepared for printing.

This all has to be performed within a budget which has been set by the FOMS board of trustees.

By utilizing a process called File Transfer Protocol we are able to send the high resolution pdf to a Kodak M 700 Nex Press and Epson large format printer. This process takes minutes.

The file is then downloaded into the printing press and a press proof is printed, folded, and stitched, and given to us for approval. This allows us to judge the quality of the mineral photos to make sure


the colors are true to the original scans or when possible, true to the actual mineral used for the photograph.

If we approve the press proof, the press run is started. If the photos need improvement they will be sent through another computer process called Photoshop® (see page 18 in this issue) and the necessary color adjustments are made, the color-corrected photo is re-inserted into the file and the press run is continued.

The last *Picking Table* you received in December, 2008 went through this process for the first time and we are happy to note that the system works.

The final high-resolution pdf prepared by the *Picking Table* designer, Debbie Young, was given final approval by the interim managing editor, Earl Verbeek at 8:30 pm on Tuesday, December 16th. It was sent immediately to the printer from our computer to his computer and at 9 am the next day we were given a printed, folded, and stitched book to read and approve. The quality was superb and we gave the approval to continue the print run. By 4 pm that day, 400 finished copies were picked up and delivered to the Sterling Hill Mining Museum where the books were inserted into envelopes and sent to the local United States Post Office to begin the slowest leg of their journey to you via SNAIL MAIL. It takes longer to go through the postal system than it takes us to do the final proof-read.

We are truly living in a global village and our computers make us all next-door neighbors.

So, thank you, neighbor, for being a loyal FOMS member. 

The Picking Table welcomes comments in letters to the editor. Please include your name, title, company address and daytime phone number. Writers should disclose any connection or relationship with the subject of their comments. We reserve the right to edit letters for length and clarity and to use them in all print and electronic editions. Prospective authors should address correspondence to:

The Picking Table
Attn. **Fred Young**
234 Warbasse Junction Road
Lafayette, NJ 07848
thepickingtable@gmail.com

Franklin-Ogdensburg Mineralogical Society, Inc. Spring and Summer 2009 Activity Schedule

Saturday, March 21, 2009

9:00 AM - Noon — F.O.M.S. Field Trip — Sterling Hill Mining Museum.
Collecting permitted on the Mine Run Dump and in the Fill quarry, Passaic pit, and “Saddle” area.
Fees for mineral collecting: \$5.00 admission plus \$1.50/lb for all material taken.
9:00 AM - Noon — F.O.M.S. Micro Group — Franklin Mineral Museum.
1:30 PM - 3:30 PM — F.O.M.S. Meeting — Franklin Mineral Museum.
Lecture: *The Five Stages of Mineral Collecting*, by Mitch Portnoy.

Saturday, April 18, 2009

9:00 AM - Noon — F.O.M.S. Field Trip — Collecting at the Taylor Road site.
Meet at the Franklin Mineral Museum. Park, and walk from there. Fee charged.
9:00 AM - Noon — F.O.M.S. Micro Group — Franklin Mineral Museum.
1:30 PM - 3:30 PM — F.O.M.S. Meeting — Franklin Mineral Museum.
Lecture: *The Mines and Minerals of Bolivia*, by Alfredo Petrov.

Saturday and Sunday, April 25 and 26, 2009

SPRING SHOW WEEKEND

37th Annual N.J.E.S.A. Gem & Mineral Show

held in conjunction with the the

14th Annual F.O.M.S. Spring Swap-and-Sell.

Sponsored by the New Jersey Earth Science Association, The Sterling Hill Mining Museum, and the Franklin-Ogdensburg Mineralogical Society, Inc. Franklin Middle School, Washington St., Franklin, NJ.

N.J.E.S.A. Show hours: Saturday, 9:00 AM to 5:30 PM; Sunday, 10 AM to 5:00 PM.

Swap-and-Sell hours: Saturday, 8:00 AM to 5:30 PM; Sunday, 9:00 AM to 5:00 PM.

Admission \$5.00 per person, children under 14 free with paying adult.

(For Swap-and-Sell information, contact Chet Lemanski after 8:00 PM at (609) 893-7366.)

**Sterling Hill Garage Sale, Christiansen Pavilion, Sterling Hill Mining Museum.

Saturday and Sunday: 10:00 AM to 3:00 PM

BANQUET AND AUCTION

Saturday evening at the GeoTech Center, Sterling Hill Mining Museum.

Admission limited to 60 people. Social hour at 5:30 to 6:30 PM, followed by an all-you-can-eat buffet from 6:30 to 7:30 PM.

Banquet Tickets are \$17.00 each and include: all food, coffee, tea, and soft drinks. **B.Y.O.B.!!**

Silent Auction from 5:30 PM to 7:30 PM. Live Auction at 7:45 PM.

Both auctions are for the benefit of all three show sponsors: N.J.E.S.A., F.O.M.S., and the Sterling Hill Mining Museum.

FIELD COLLECTING

**Sterling Hill Mining Museum. Organized by the Delaware Valley Earth Science Society (DVESS).

!!!!Schedule: **Saturday, 9:00 AM to 11:00 PM!!!!**

\$20 per person includes extended mine tour and registration. \$1.50 per pound for material collected.

Preregistration required; see www.uvworld.org for more information.

Sterling Hill Mining Museum, **Sunday only.

Collecting on the the Mine Run Dump and in the Fill quarry, Passaic pit , and “Saddle” area.

9:00 AM to 3:00 PM (**Open to the public!**)

Fees for mineral collecting: \$5.00 admission plus \$1.50/lb for all material taken.

Sunday, May 3, 2009

**Noon — Annual Volunteer Appreciation and Miners Day Tribute at the Franklin Mineral Museum, including special events and a concert by the famous Franklin Band.

Franklin-Ogdensburg Mineralogical Society, Inc. Spring and Summer 2009 Activity Schedule

Saturday, May 16, 2009

9:00 AM - Noon — F.O.M.S. Field Trip — Collecting at the Braen quarry
(a.k.a. Franklin quarry) Cork Hill Road, Franklin NJ.
If gate is open, drive through and park on the left of the gate. Please don't block the roadway.
9:00 AM - Noon — F.O.M.S. Micro Group — Franklin Mineral Museum.
1:30 PM - 3:30 PM — F.O.M.S. Meeting — Franklin Mineral Museum.
Lecture: *A Tale of Three Granites from the New Jersey Highlands* by Richard Volkert.

Saturday, June 6, 2009

**7:00 PM - 10:00 PM — Spring Night Dig and Mineral Sale at the Buckwheat Dump, Franklin.
Sponsored by the Franklin Mineral Museum. Open to the public – poundage fee charged.
Eye protection, flashlight, and UV lamp advised.
For more information contact the Franklin Mineral Museum: (973) 827-3481

Saturday, June 13, 2009

**1:00 PM – 9:30 PM — Fluorescent Mineral Society Meeting at the GeoTech Center at Sterling Hill.
1:00 PM – 5:00 PM — Meeting with presentations.
5:00 PM – 7:00 PM — Dinner: grilled hamburgers and hot dogs; salads and soft drinks included.
B.Y.O.B. if you would like something stronger during the day, or with dinner.
Dinner ticket donation: \$10.00 per person.
RESERVATIONS NECESSARY: Dick Bostwick: rbostwick@att.net, or home phone: 212-749-5817
Night collecting after dinner until 9:30 PM
Fees for mineral collecting: \$5.00 admission plus \$1.50/lb for all material taken.

Saturday, June 20, 2009

9:00 AM - Noon — F.O.M.S. Field Trip — Collecting on the Buckwheat Dump. Fee charged.
9:00 AM - Noon — F.O.M.S. Micro Group — Franklin Mineral Museum.
1:30 PM - 3:30 PM — F.O.M.S. Meeting — Franklin Mineral Museum.
Lecture: *The Mill Site Story*, by Vandall King
** 7:00 PM – 10:30 PM — Sterling Hill Mining Museum.
Night Collecting on the Mine Run Dump and in the Fill quarry, Passaic pit , and “Saddle” area.
Fees for mineral collecting: \$5.00 admission plus \$1.50/lb for all material taken.
(Open to Sterling Hill Mining Museum members only)

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Scheduled activities of the F.O.M.S. include meetings, field trips, and other events.
Regular meetings are held on the third Saturdays of March, April, May, June, September,
October, and November, and generally comprise a business session followed by a lecture.
F.O.M.S. meetings are open to the public, and are held at 1:30 PM, usually in Kraissl Hall at the Franklin Mineral Museum,
Evans St., Franklin NJ (check listings for exceptions).
Most F.O.M.S. field trips are open only to F.O.M.S. members aged 13 or older.
Proper field trip gear required: hard hat, protective eyewear, gloves, sturdy shoes.

****Activities so marked are not F.O.M.S. functions but may
be of interest to its members. Fees, and membership in
other organizations, may be required.**

**Any information in this schedule, including fees, is
subject to change without notice.**

Compiled by Tema Hecht <thecht@att.net>

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Letters from the Past

George Elling

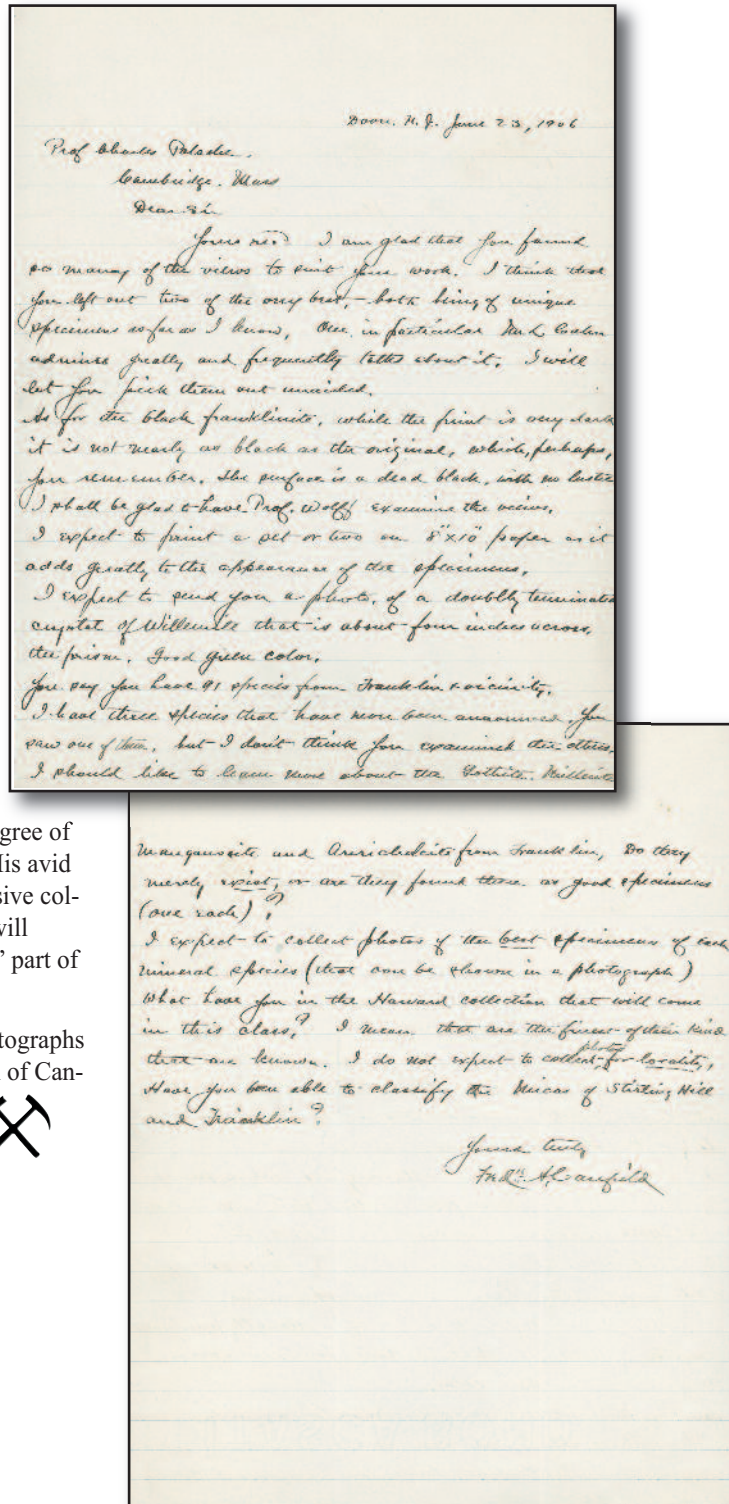
758 Charnwood Drive
Wyckoff, NJ 07481

This is the fourth installment of "Letters From the Past." We plan to publish other historic letters as a regular feature in future issues of *The Picking Table*. Part of the Franklin-Sterling Hill mystique over the years has emanated from the people associated with its mining heritage and its minerals. We hope to bring to life personalities that up until now have been relegated to footnotes or to bibliographies.

In this issue of *The Picking Table* we are featuring a letter written in 1906 to Professor Charles Palache from Frederick A. Canfield. We are also providing an interesting added feature highlighting Palache's personal recollections of Canfield. Canfield was an avid and extremely knowledgeable mineral collector. His collection was considered by Palache to be the best of all the Franklin collections that he studied for his famous 1935 treatise on Franklin, "Geological Survey Professional Paper 180."

In his introduction, Palache states, "Of the numerous collections studied, four stand out preeminently. Easily first, is the Canfield collection..." Canfield was born April 7, 1849 in the Canfield homestead at Ferromonte near Dover, NJ and died July 3, 1926. A graduate of Rutgers College in 1870, he received the degree of mining engineer from the Columbia School of Mines. His avid interest in mineralogy dominated his life, and his extensive collection was donated to the Smithsonian Institution. As will become clear, after reading the "Palache Recollections," part of the collection ended up at Harvard.

The following letter discusses, among other things, photographs of his collection. Included in this article is a photograph of Canfield's Franklin collection housed in its original case.



Mineral Collectors- F.A. Canfield.

I have written of Canfield and his collection but the memoir leaves out most of my personal recollections of this strange character. I first met him in 1886, visiting his collection with Dr. Wolff who had long known him. His collection was then divided, the newer portion in his office in Dover, N.J., the older part, his father's especially, in the family home. When I began my Franklin monograph his collection was naturally a "first" to me. It was by date 1840, united and housed in a trunk wing attached to the old mansion and built, as I seem to remember, to give it safety from fire. I was his guest for several days in July, 1886. It was a strange household. The garden surrounding this country mansion was in complete disorder, the house, except for the wing and a few bedrooms was neglected. Canfield was a bachelor and an aged housekeeper took care of him and cooked the meals. His only real interest was his mineral collection. It is true he still made occasional business trips for mine examination. And he went frequently to Franklin, Johnson, and to the New York mineral dealers for specimens. But his collection was his life.

It was almost impossible for him to let a specimen go out of his hands once he had acquired it. If he had something he wanted determined he would himself remove a sample rather than entrust the specimen to me or anyone. He made blowpipe tests and did some qualitative chemical work. His eye for crystal form was excellent and he used the microscope incessantly. His catalogue was most carefully compiled and the specimens measured. The tiny paper label pasted on each with name, locality, and date written in a minute but very distinct hand are characteristic of the place each specimen held in his heart. One outstanding feature of the Canfield collection was the case of Franklin minerals which had been brought together and arranged by his father many years before. This case, shown in the photos, had a glass cover fastened with

Canfield 2'

screws. It was not opened for my examination. The specimens from it were carefully examined by Dr. Poschag when taken to the National Museum, and were found to be synthetic. This was called for owing to the fact that many similar specimens from Stirling Mill had been found to have been repaired or manufactured in an ingenious fashion. Plaster of Paris had been applied and points consisting of small octahedrons of franklinite embedded in it. The surface, coated with graphite left dull, gave a fairly good resemblance to natural crystals and the angles were of course true. I found a dozen or so such half-way specimens on our shelves still retaining Canfield's labels and price marks ranging from five to forty dollars, the value of one of these may still be seen in the teaching collection. Canfield told me, as I seem to remember, that the big crystals in that case had been found by a Mr. Woodruff and sold to his father. As Woodruff found no more and hated to see the blank spaces on his shelves where they had been, he obtained permission to make these copies for his own use. These fell into unscrupulous hands after his death and were sold as authentic specimens.

When Canfield's estate was appraised it was found insufficient to fulfill his various money bequests. The executors therefore decided that the collection willed to the Smithsonian Institution should be regarded as consisting only of the specimens numbered and catalogued. The several thousand uncatalogued specimens were offered for sale to augment the estate. After Bureau had examined them we made a bid of \$1500, which was accepted. The packing up of the two collections and clearing out of the house revealed some strange things. The men who packed the Smithsonian part of the collection told me that while they were at work a search was going on for a grand piano, left with other things to Rutgers College. It was finally found in a corner of the living room entirely buried under unopened newspaper and magazine mail-matter which had been thrown on it and through the years had covered it from sight.

Canfield 3

Bureau packed the Harvard purchase. He found specimens from attic to cellar, most of them meticulously labelled with date of acquisition even though not entered in the catalogue. But in one upstairs room he found where Canfield had worked out and treated his specimens. The floor was a foot or more deep in chips, dust and rock fragments- nothing had ever been thrown away. Canfield died at the age of 78 from injuries received in a fall on his cellar stairs. My letter file from his estate from 1896 to 1964 but with a considerable gap from 1895 to 1900. He was constantly sending me samples or tiny fragments for identification. Once after long-continued absence I got him to visit Cambridge for a day and to see our collection and he stayed at my house. The only comment on his visit that I can remember was this. "So most remarkable thing I have seen in the city of Cambridge-a city of 100,000 people without a hotel". That was of course before the day of the Commodore and Continental.

I visited Mr Canfield at his home near Dover on Tuesday August 19th in company of Mr E. F. Holtorn. I only stayed about an hour as I was on the way to see the Loring Collection at Newton. Canfield's Franklin Minerals are superb especially his Calcites and Franklinites. His South American Minerals are excellent particularly one pyrite with light terminal flows. He told me he had some 2000 or more of the 1908 Eric Cut every week many specimens. His case goods 'less' not as remarkable as I thought they would be.



The Frederick A. Canfield Franklin Mineral Collection

Uraninite from the Trotter Dump

Fred E. Davis

57 Greenway Street
Hamden, CT 06517-1319

Introduction

The Trotter Dump Diggg on April 29, 2006, was the author's first visit to Franklin, New Jersey. Most of his prior field trips had been in the northeast U.S., primarily Connecticut and New Hampshire with occasional trips to Oxford County, Maine; Amelia County, Virginia; Mont Saint-Hilaire, Quebec, Canada; and western North Carolina (where the author grew up and learned to love mineral collecting). For a first-time visitor to Franklin, the author wasn't quite sure what to expect aside from the glowing obvious. Exploration on the Internet revealed the *astounding* number of minerals found in the area. Included on the list are several radioactive minerals, so the author also packed his scintillation detector modified with a digital signal processing (DSP) unit of his own design. As luck would have it, the author was in for a big surprise.

History

To say that uraninite (UO₂) in the Franklin/Ogdensburg area of New Jersey is rare would be an understatement. Omer S. Dean's interesting account in the 1990 *Picking Table*² illustrates this quite clearly. The first discovery was a single, 0.39 inch (1 cm) crystal of uraninite found at Sterling Hill in 1966. Immediately after the discovery, attempts to find further examples failed; there was only one crystal. This was analyzed by Dr. Clifford Frondel, reported in 1970³, and became part of the Harvard Mineralogical Museum's collection.

In 1989, uraninite was discovered at the Buckwheat Dump in Franklin. The mineral was described as metamict, with crystals measuring 0.16 to 0.30 inch across (4 to 7.5 mm). As recounted in the 1990 article, several specimens were distributed among four collections.

Pete Dunn's excellent reference⁴ discusses these two occurrences.

Messages exchanged on MinDat's Message Board indicated that further material was discovered on the Buckwheat Dump in 2005. The woman who found it apparently brought the specimen to the Franklin Mineral Museum to make them aware of the discovery, but it was otherwise not reported. While the specimen was suspected of being uraninite (and was reportedly significantly radioactive), the identification was not verified. Images posted on MinDat are interesting, but they do not provide sufficient visible characteristics to indicate uraninite.

In all of the material researched, there are *no* reported occurrences of uraninite at The Trotter Dump in its history.

Discovery

Given the author's lack of familiarity with the area, he asked a

friend very familiar with the geology for a quick overview at the Diggg. After the introduction, the author was informed that his scintillation detector wouldn't find much use there.

There were occasional "warm" spots detected by the scintillator around the dumps and quarry, but very little that yielded anything notable. So the author collected some interesting fluorescent material (not hard to do in Franklin). As he was talking to another friend while walking past the boulder field near the calcite wall, the DSP unit gave a quick chirp.

This stopped the author dead in his tracks. The scintillator was near waist-level and the audible chirp indicated a *strong* increase in gamma photons. He backed up a step or two and it chirped once again. This was *not* a random event, but very location-specific and repeatable. Placing the scintillator closer to the ground gave a stronger signal still, and zeroing in on the best signal gave an *extremely* strong signal. For a buried specimen, this had to be one *extraordinary* piece!

The author pulled out his shovel, scraped away the grass and soil from a small patch, and began exploring the hidden material under foot. This was in a location that looked as though it had not been disturbed in a *very* long time. At about three inches down (7.6 cm), the shovel struck a large stone. This obstacle, about the size of a brick, was removed and scanned with the scintillometer. This was it! The DSP was singing a happy tune.

The specimen was rinsed in the tub of water at the dump, but to little avail. The soil was sticking as if it were glued on. The mystery mineral was not yet visible, but there was no question that it was a keeper. The next day, the specimen was scrubbed several times with several different brushes, ending with a final round with an electric toothbrush in an attempt to get the stubborn bits of soil from the nooks and crannies. Finally, it began to reveal its secrets.

Description and Analysis

The specimen is somewhat wedge shaped, a little over 6 inches (15 cm) long by 2 to 2.5 inches (5 to 6.4 cm) tall, and 3 to 1.5 inches (7.6 to 3.8 cm) thick (Photo 1). It weighs about 3.16 lbs (1.43 kg). The obvious radioactive mineralization is an area embedded with black, mostly fractured, crystals of suspected uraninite up to 0.2 inches (5 mm) diameter, arranged in a swath 1.5 inches (3.8 cm) wide across the width of the specimen near the narrow end of the wedge (Photo 2). Most of the crystals are sitting in what appears to be a weathered feldspar matrix. The majority of the matrix appears to be massive garnet. There are several undamaged, octahedral points visible in the feldspar matrix, and examination with a stereoscopic microscope revealed additional black crystals embedded in the dark, brownish-red matrix.

Black, Radioactive Crystals

The author performed an X-ray powder diffraction (XRD) analysis and confirmed the identity of uraninite (Figure 1). Of the nine peaks for uraninite, these crystals show all nine with excellent alignment. The initial impression from the radiation reading was correct.

Brownish-Red Matrix

The brownish-red matrix appears to be massive garnet. There are a few garnet crystals, particularly around the weathered feldspar. Most are a deep red, but others appear to be an opaque black. One of these was removed to reveal that they are not actually opaque, but very dark orange-red to brown-red, visible only with strong illumination. Specific gravity measurements on small matrix chips ranged between 3.75 and 3.86, which suggested andradite $\text{Ca}_3\text{Fe}_2(\text{SiO}_4)_3$. X-ray examination of the chips showed dense inclusions (probably zinc or lead minerals) which explains some of the specific gravity variability. The matrix material produced an XRD pattern that was closest to, but not perfectly aligned with, grossular, $\text{Ca}_3\text{Al}_2(\text{SiO}_4)_3$. Further examination using a scanning electron microscope with Energy Dispersive Spectroscopy (Figure 3) revealed the composition to be in a solid solution of approximately 66% andradite, $\text{Ca}_3\text{Fe}_2(\text{SiO}_4)_3$ and 33% spessartine, $\text{Mn}_3\text{Al}_2(\text{SiO}_4)_3$. (These figures are only approximate, since the measurement was semi-quantitative and no calibration references were used.) The XRD peaks lie in the same proportion between the reference peaks for andradite and spessartine (Figure 2, red and green peaks, respectively). Since the majority is andradite, the XRD peaks fall closest to the andradite reference. Analysis of the matrix material with an electron microprobe also revealed the presence of sphalerite (ZnS) and lead, probably in the form of galena (PbS).

Garnets are a complex group of minerals further divided into two more groups based upon their chemistry. The two groups are pyralspite (pyrope-almandine-spessartine) and grandite (grossular-andradite). Some texts include uvarovite to form the ugrandite group. Natural garnets tend to be a solid solution mix within a group, instead of pure forms of the end-members. It is uncommon, but not impossible, to find natural garnets that are a solid solution *between* the two groups⁵. MinDat refers to a generic term called “spandite,” consisting of 50% each spessartine and andradite. The garnet analyzed here appears to be one of these uncommon mixes in a solid solution between andradite in the grandite group and spessartine in the pyralspite group.

When exposed to short wave and long wave ultraviolet light, the specimen revealed only a few, small grains of willemite, Zn_2SiO_4 , and calcite, CaCO_3 . There appears to be a thin dissemination of a uranophane-like material, primarily around the uraninite, based upon a dim, yellow-green fluorescence in short wave only.

Conclusion

The specimen recovered from the April 2006 Diggg is the first reported find of uraninite from The Trotter Dump. The matrix is composed of andradite and spessartine that form an unusual solid solution between the pyralspite-grandite garnet groups.

Acknowledgements

The author is very grateful to the kind assistance of Lee Lowell of the Franklin Mineral Museum for historical information and articles, George Muench for the EDS analysis, and Fritz Moritz for his assistance, both geological and editorial. The author is forever grateful to Eddie Luzik for his insistence that the author accompany him on the trip for fun.

Photographs



Photo 1. The specimen with scale for reference. The uraninite crystals are predominantly on the right side. Photo by Fred E. Davis.



Photo 2. Detail of the uraninite crystals. One of the octahedron tips is just below and left of center. The dark reddish-brown garnet matrix can be seen above and below the uraninite in this view. Field of view is approximately 2 inches (5.1 cm). Photo by Fred E. Davi

Figures

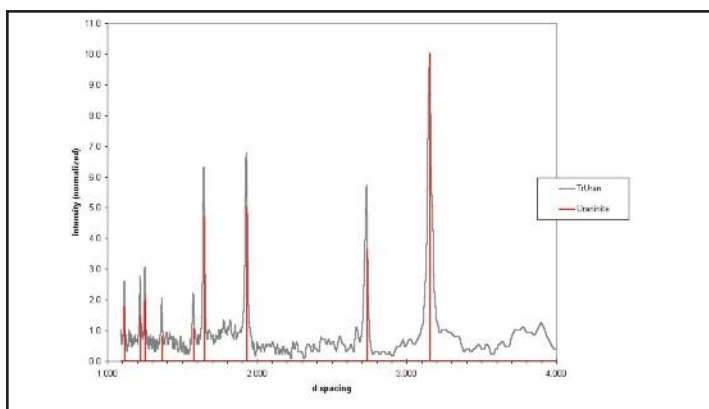


Figure 1. X-ray diffraction pattern of uraninite from the Trotter Dump (gray) compared to uraninite reference peaks (red).

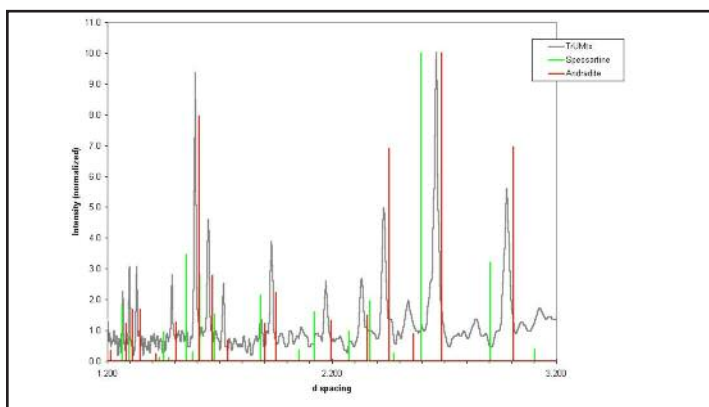


Figure 2. Matrix XRD data compared to spessartine and andradite reference peaks. Since the matrix garnet is predominantly andradite, the peaks fall closest to the andradite reference.

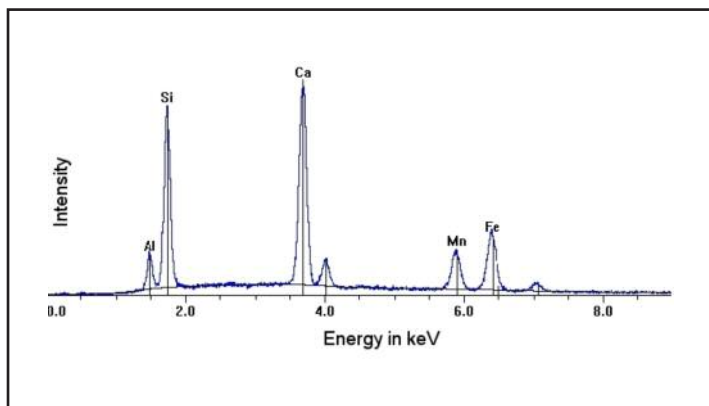


Figure 3. Energy Dispersive Spectroscopy spectrum of garnet matrix.

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² Dean, O. S., “Those Rare Uraninites from Franklin and Sterling Hill, New Jersey,” 1990, *The Picking Table*, Vol. 31 no. 2, pp. 7-11.

³ Frondel, Clifford, “Scandium content of ore and skarn minerals at Franklin, New Jersey,” *American Mineralogist*, Vol. 55, pp. 1051-1054, 1970.

⁴ Dunn, Pete J., “Franklin and Sterling Hill, New Jersey: The World’s Most Magnificent Mineral Deposits,” 1995.

⁵ pyralspite-grandite: Griffen, Hatch, Phillips, Kulaksiz, “Crystal chemistry and symmetry of a birefringent tetragonal pyralspite₇₅-grandite₂₅ garnet,” *American Mineralogist*, Vol. 77, pp. 399-406, 1992,

almandine-spessartine: Geiger, Feenstra, “Molar volumes of mixing of almandine-pyrope and almandine-spessartine garnets and the crystal chemistry and thermodynamic-mixing properties of the aluminosilicate garnets,” *American Mineralogist*, Vol. 82, pp. 571-581, 1997,

grossular-spessartine: Rodehorst, Geiger, Armbruster, “The crystal structures of grossular and spessartine between 100 and 600 K and the crystal chemistry of grossular-spessartine solid solutions,” *American Mineralogist*, Vol. 87, pp. 542-549, 2002, and:

Geiger, Armbruster, “Mn₃Al₂Si₃O₁₂ spessartine and Ca₃Al₂Si₃O₁₂ grossular garnet: Structural dynamic and thermodynamic properties,” *American Mineralogist*, Vol. 82, pp. 740-747, 1997.



The Calcite-Apatite-Pyroxene Occurrence at Hamburg Quarry

A Bancroft Terrane Style Vein-Dike?

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Introduction

In recent years members of the Franklin-Ogdensburg Mineralogical Society have had the opportunity to collect material from the calcite-apatite-pyroxene mineral assemblage at Hamburg Quarry. The author first encountered these minerals in May 1996 and discussed them in *The Picking Table* in 1998 (V. 39, #1). During that first encounter the author found striking similarities to the calcite-apatite occurrences in Ontario and Quebec, Canada. Like the Canadian examples, the calcite-apatite-pyroxene mineral assemblage at Hamburg seemed to occur as the very coarsely crystalline core of a vein-like body that merged into a banded skarn replacing the adjacent Losee gneiss. In Canada such deposits have long been recognized as a distinct class of mineral deposit first referred to as “vein-dikes” by Ellsworth (1932). The term vein-dike implies confusion concerning the origin of these deposits that persists to this day.

Geology

The Hamburg Quarry is situated at the northwestern edge of the Reading Prong in Sussex County, New Jersey. The Reading Prong is a range of highlands underlain by Mesoproterozoic metamorphic rocks that extends from western most Connecticut to near Reading, Pennsylvania. The rocks of this region have been studied for more than 150 years, some portions of them intensely. This interest was driven by the widespread occurrence of iron ore, exploited from colonial times until the 1960s, and the presence of the unique zinc deposits at Franklin and Sterling Hill.

The Reading Prong is one of several massifs of Grenville-age rocks outcropping between the sedimentary rocks of the Appalachian Basin and the Paleozoic-age metamorphic terranes of New England and the southeastern piedmont. The rocks of the Reading Prong are subdivided into two general groups: a complex of mostly sodium-rich igneous rocks and a sequence of metasediments and metavolcanics. The former, known as the Losee Metamorphic Suite, is exposed in the Hamburg Quarry. Peak metamorphism of the Reading Prong rocks occurred during the Ottawa phase of Grenville Orogeny, which by approximately 1030 Ma had begun to wane. For approximately 55 Ma following the emplacement of the post-orogenic, undeformed Mount Eve Granite, at 1020 Ma, the Reading Prong rocks were intruded by pegmatites.

The details of Reading Prong geology, more than this brief outline, are

beyond the scope of this work. There is a voluminous literature concerning this subject and the reader is referred to Volkert et al. (2005), Volkert and Drake (1999) and the references therein.

The calcite-apatite-pyroxene occurrence at Hamburg Quarry is vein-like in its architecture. It presents many features indicative of a fracture filling. The hosting structure is a narrow fracture zone, generally concordant with the foliation of the Losee gneiss country rock (Fig. 1)



Figure 1: Near surface exposure of the fracture containing the calcite-rich vein (October 1997). Scale bar = 10 feet.

although local discordancies are very common. Available observations indicate that the fracture zone is quite linear and is mineralized over a strike length of at least 2000 feet. This length is comparable to the most extensive examples in Canada. At Hamburg Quarry there is considerable irregularity in the width of the fracture zone and the distribution of the calcite-rich vein assemblage within it. This is typical of fracture filling veins. The calcite-rich assemblage ranges from small lenses, a few inches in dimension, sparsely and irregularly scattered within the fracture zone (Fig. 2), to lenses, commonly up to 1 foot wide (rarely more) and many feet in height and length. In the more extensional segments of the fracture zone, the wider calcite-rich lenses contain many irregular fragments of Losee gneiss country rock.

There are three distinct alteration patterns in and around the vein. The first pattern was clearly visible when near-surface exposures at the

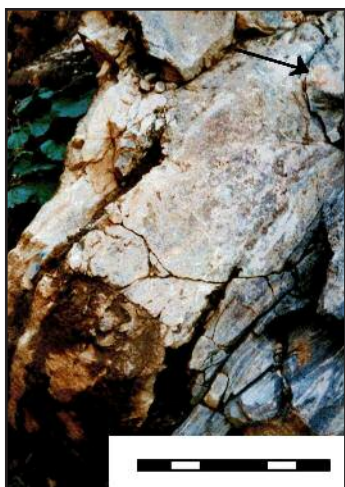


Figure 2: Vein-dike with calcite both leached and intact (arrow). Scale = 18 inches



Figure 3A: Coarsely crystalline apatite-calcite vein filling and pyroxene-scapolite skarn grading into quartz-oligoclase gneiss. Apatite crystals are approximately 2 inches long. Scale = 4 inches



Figure 3B: Pyroxene crystals, with minor apatite, projecting into the calcite-rich vein filling from the inner margin of the skarn mantling the fracture wall. The largest crystal is approximately 1.9 inches.



Figure 3C: Apatite crystals in vein calcite. The largest crystal is approximately 2.75 inches.

southwest end of the quarry, now mined away, were viewed from a distance (Fig. 1). The pattern consisted of broad bands of distinctly lighter colored rock flanking the narrow fracture zone. The color contrast was barely discernible when viewed from close proximity and did not seem to be simply due to the lightened rock being a more leucocratic phase of the Losee Metamorphic Suite than in adjacent areas. This outcrop was exposed to near surface weathering twice, in recent geologic time and in the Cambrian. The Losee gneiss within the lightened areas was not visibly decayed except in the fracture zone where pre-existing calcite had been weathered away (Fig. 2). However, no specimens were examined microscopically. The apparent bleaching of the rock is not visually discernible in fresh material. It is not known if the lighter color was due to more extensive weathering, enabled by fracture-enhanced permeability, is a subtle metasomatic feature whose visibility was enhanced by weathering or is due to some other process.

The second pattern, visible along the contact between the calcite-rich assemblage and the Losee gneiss, both in the vein wall and in breccia fragments within the fracture, is the development of a banded skarn (Fig. 3A). At some sites large, euhedral crystals, up to 2 or 3 inches, usually pyroxene and/or apatite, occur at the inner margin of the skarn (Fig. 3B) or “floating” in the calcite core of the vein (Fig. 3C). Elsewhere, the skarn is composed of much smaller, anhedral to subhedral crystals and the crystals within the calcite are correspondingly smaller (Fig. 4). The two textures can occur in quite close proximity to one another. Whether coarsely or finely crystalline, the pyroxene-rich inner band transitions into a massive outer scapolite-rich band. The scapolite band locally contains sparsely scattered crystals of sphene and traces of pyrite. It also contains small, irregular quartz-feldspar relics of the Losee gneiss. The transition from scapolite-rich skarn to unaltered Losee gneiss is abrupt but irregular, characterized by small, ragged salients and embayments.



Figure 4: Calcite-rich vein filling and fine grained pyroxene-scapolite skarn grading into quartz-oligoclase gneiss. Scale = 3 inches.

The third pattern consists of common contacts between calcite and gneiss that are sharp and exhibit no skarn development. This pattern is typical of discordant veins extending into the country rock (Fig. 5) but is also common within the principal fracture filling vein (Fig. 6).

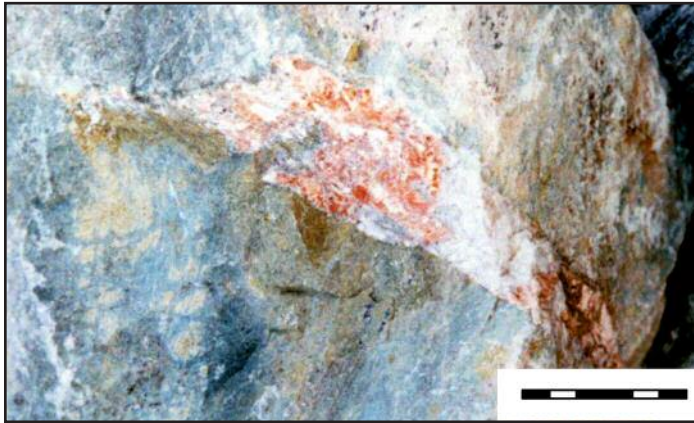


Figure 5: Discordant calcite-filled gash vein extending into the country rock. Scale = 6 inches.



Figure 6: Late generation calcite within the vein-dike. Scale = 8 inches.

The mineral assemblage within the core of the vein is generally simple. Very coarsely crystalline, salmon-colored calcite is the dominant mineral but locally its portion of the vein-filling assemblage drops below half. Apatite, although abundant locally, is not universally present. It occurs only in the calcite-rich vein core and with pyroxene at the innermost margin of the skarn. Pyroxene, both in the calcite-rich core and at the contact with the country rock, is present wherever banded reaction skarn is developed. Pyroxene ranges in color from moderate green to black, reflecting a range of composition that has yet to be studied. The green examples are probably diopside. Some of the dark, greenish-black crystals have been shown to be hedenbergite. It is likely that other compositions within the range of augite are present. In the outer part of the skarn scapolite is the dominant mineral. Although abundant, scapolite does not occur as euhedral crystals because there is always an intervening layer of pyroxene-rich material separating it from the calcite.

Other minerals that may be present are biotite and quartz plus minor epidote and pyrite/chalcopyrite. Locally the assemblage calcite-quartz-pyroxene has been seen but wollastonite has not been recognized. Sphene is uncommon. Molybdenite and zircon have been found but are very rare.

A late generation of fractures, some strikingly angular and discordant (Fig. 5), occur within and adjacent to the main fracture. The principal mineral filling the later fractures is calcite, similar in texture and color to the earlier calcite. The late calcite is nearly monomineralic in some sites, especially those extending outside the main fissure into the country rock. Elsewhere, the later calcite contains an assemblage of other minerals that seems identical to that contained in the early calcite. Although the concentration and texture of the silicate minerals tends to be lower and more fine-grained, the differences are usually subtle. The most obvious feature marking the late fractures is the lack of skarn where these veins intersect the country rock (Fig. 6).

The calcite-apatite-pyroxene occurrence at the Hamburg quarry is, thus far, unique for the Franklin-Sterling Hill region. However, mineral occurrences described from the Harriman State Park area in Orange County, NY (Gates et al, 2003), about 30 airline miles northeast of Hamburg, bear some similarities to the local example. In Orange County magnetite-rich epigenetic assemblages, locally minable, were deposited in the extensional portions of brittle fractures, up to 3.5 miles long. These fractures developed within extensive zones of mylonite produced by earlier ductile deformation. Where the wallrock contains calc-silicate gneiss and marble the epigenetic mineral assemblage is typically scapolite, pyroxene, and phlogopite followed by magnetite and calcite. In areas with more granitic country rocks the veins contain hornblende and clinopyroxene followed by magnetite and massive quartz. Immediately adjacent to the veins the wallrock is bleached.

In one of the best exposed examples, at the Hogencamp Mine in a calc-silicate dominate area, feldspar, in the wall rock, has been converted to mica, and pyroxene to amphibole. Minor amounts of scapolite, calcite and apatite also occur. The mineral assemblages within the vein are described by Gates et al. (2003) as being arranged in distinct bands. Adjacent to the wallrock the mineral assemblage is amphibole, scapolite, K-feldspar and biotite. Toward the center the mineral assemblage within successive bands becomes progressively enriched in calcic pyroxene. In the widest parts of the vein the core contains magnetite, pyroxene and calcite.

In Canada, primarily in a subdivision of the Grenville Province known as the Bancroft Terrane, bodies of rock typically dominated by calcite have been explored, mined and collected for at least a century. These occurrences are mostly small pods or lenses, a few inches to a few feet wide and a few to a few 100s of feet long. The individual vein-dike pods tend to be found in clusters. Although many are fracture fillings they tend not to be strung out in long linear trends. They occur in a variety of country rocks ranging from marble and other metasediments to nepheline syenites. Lentz (1998) has shown that many examples have a clear relationship to pegmatites and skarns.

The study of some calcite-apatite vein-dikes in Canada has shown that the mineral assemblage of the deposit is substantially related to the composition of the country rock. Although the variety of minerals that are found in the Canadian examples is quite extensive, the assemblage present in individual occurrences is much more limited, most commonly including apatite, fluorite, feldspar, pyroxene, scapolite and sphene. Molybdenite, zircon, monazite, as well as other rare earth and

uranium minerals, nepheline, and amphiboles are common to abundant locally.

Discussion

The vein deposits in the Harriman State Park area have been interpreted by Gates et al. (2003) as late Grenville features resulting from the reaction between escaping metamorphic fluids and the country rock, probably during or immediately following the transition from ductile to brittle deformation. At this period in a metamorphic cycle, temperatures, although declining, are still high, but fluid pressure is decreasing rapidly (Hanson, 1997). Hydrofracturing and thermal cracking provide a conduit for fluids still being produced at greater depths. The Hamburg Quarry vein is not localized within an earlier mylonite, as are the magnetite-pyroxene-calcite veins in the Harriman State Park. Although pegmatites are abundant at Hamburg, including some in close proximity to the vein (R. A. Volkert, personal communication, 2007), none have been observed intruding it. The alteration of the country rock flanking the vein is also quite different in both mineralogy and style.

The origin of the vein-dikes in Canada is still a subject of controversy. Although it is generally agreed that they are late Grenville features there are two basic lines of thought concerning their emplacement. One would classify them as carbonatites while another classifies them as hydrothermal. On first thought these processes seem dissimilar enough that a distinction might be easily made. However, the issue is cloudier than one might think because under high grade metamorphic or synmagmatic conditions the distinctions blur and the end products converge significantly. One intermediate theory (Lentz, 1998, 1999) is that marble was remobilized and transported by volatile-rich fluids. For the Canadian examples Lentz (1998) presents substantial evidence supporting a relationship between the vein-dike depositing fluids, pegmatite intrusion and skarn formation. In the Hamburg example no field relationships have been seen that provide solid evidence for such a relationship.

Because of its occurrence in a brittle fracture and lack of any metamorphic fabric there is little doubt that the calcite-rich vein-dike at Hamburg Quarry is a late Grenville feature. Volkert et al. (2005) discuss the intrusion of postorogenic pegmatites in the Reading Prong as well as the occurrence of non-foliated skarns in the Franklin Marble and the occurrence of post metamorphic hydrothermal veins. Post-orogenic pegmatite intrusion spanned at least 55 Ma. The youngest U – Pb zircon age from a Reading Prong pegmatite is approximately 965 Ma (Grauch and Alienikoff, 1985). Volkert et al. (2004) note that most Reading Prong pegmatites conform to the criteria given by Brisbin (1986) that indicate emplacement in brittle deformation environment. In addition, ⁴⁰Ar/³⁹Ar ages from hornblende reported by Volkert et al. (2004) and Gates et al. (2003) suggest that temperatures generally remained above 500°C at least until approximately 920 Ma.

The vein assemblages and the reaction skarns developed in and around all the mineral occurrences discussed here depended on several factors in addition to the composition of the country rocks. These include fluid chemistry, temperature, and the architecture of the vein, the physical nature of the fractured material (Caine, et al, 1996). In both the Canadian and Harriman State Park examples there is a widely recognized correlation between the composition of the country rock and the mineralogy of the vein-dike/skarn mineral assemblages (Lentz, 1998; Gates et al., 2003). At the Hamburg Quarry the Losee gneiss is largely quartz-oligoclase gneiss. Although there are significant local variations of other rock forming and accessory minerals and some small,

scattered amphibolites the general environment is very sodic. There is no discernable reflection of this in either the calcite-rich vein core or in the mantling skarn. The optical properties and the specific gravity suggest that the scapolite at the outer margin of the skarn is meionite, the calcium-rich variety.

Conclusion

The Hamburg Quarry calcite-apatite-pyroxene vein is a hydrothermal/metasomatic fracture filling. It most likely originated from metamorphic fluids escaping from depth through newly created brittle fractures and reacting with the country rock as suggested by Gates et al. (2003) for the Hogencamp ore deposit and similar mineralized veins in the Harriman State Park. The Hamburg Quarry vein is a fluid dominated mineral assemblage, i.e. the bulk of the chemical components that make up the vein-filling mineral assemblage were introduced from outside the presently exposed environment. Evidence as to whether or not it is remobilized marble, as proposed by Lentz (1998) for the Bancroft Terrane vein-dikes, has yet to be developed.

The Hamburg Quarry vein is of very late Grenville age. This is the limit of what can be said with certainty. The inability to assign a more precise date of formation derives from the lack of clear evidence of a relationship of the vein to pegmatites. Given the presence of pegmatite in the Hogencamp ore deposit and the indications that postorogenic pegmatites throughout the Reading Prong highlands were intruded in a brittle deformation environment it is likely that the Hamburg Quarry vein is roughly coeval with pegmatite intrusion. The nature of any relationship between the pegmatites and the hydrothermal veins, other than coincidental timing, remains unclear.

Is the Hamburg Quarry vein a Bancroft Terrane style vein-dike? At present the best answer is maybe.

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Minerals from Metamorphosed Manganese Deposits in Japan and Their Relationship to the Franklin-Sterling Hill Mineral Deposits

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As we all know, the ores of the Franklin district are chemically unique, although a very few other mines in the world do show some mineralogical similarities like, for example, Långban in Sweden. Much less well known in the English-speaking world is that a few partial “Franklin-type” parageneses also occur in some Japanese manganese mines, most notably the Gozaisho mine.

This type of ore deposit is known as a metamorphosed “bedded” (i.e.: originally sedimentary) manganese deposit, consisting of metamorphosed manganese-rich, iron-poor sediments, the manganese having originally been deposited on the sea-floor, perhaps analogous to the present “deep sea manganese nodules.” The orebodies are stratiform or lenticular in shape, sometimes folded, and hosted in regionally- or contact-metamorphosed sedimentary rocks, often metachert or quartzite, more rarely crystalline schists with a higher grade of metamorphism. Almost 800 such deposits are known in Japan, spread over most of the length of the country, in formations of every geologic age (but most often Paleozoic), and well over 300 were commercially worked for manganese, although some of these were only very small one-family operations. The exact number of such mines depends on how small of a hole in the ground one is willing to call a “mine.” None of these deposits is being worked as manganese ore anymore, and present commercial activity is limited to quarrying for road metal, with some very minor exploitation of the pink Mn silicates for decorative and lapidary uses.

Japanese researchers divide bedded manganese deposits into two types: 1) rhodochrosite with Mn oxides like braunite and hausmannite, and only minor silicates; 2) Mn silicates such as rhodonite, tephroite, spessartine, pyroxmangite, with lesser rhodochrosite and Mn oxides. The first type is richer, but occurred as generally smaller deposits, with individual orebodies from less than a ton to several thousand tons. These include the very fine-grained so-called “chocolate ore” (from its brown color) - most often hausmannite, but they can also be rich in jacobsonite, galaxite, manganosite, caryophyllite, etc. The largest known orebody of this type was at the Hamayokogawa mine, measuring 65x58x13 meters. This mine produced 34,000 tons of ore with 39% Mn in 1952.

The second type, silicate-rich orebodies, were of low grade but larger size. The largest is perhaps a bed at the Ananai mine which exhibited a strike 4.6 km long (almost 3 miles)! The rhodochrosite in these deposits is quite impure, with Fe, Mg and Ca substituting for Mn, and some of the so-called “rhodochrosite” is really pink kutnohorite. But though these poor ores were uneconomic to mine, collectors find them more interesting because of their large quantities of red and pink Mn silicates like rhodonite, pyroxmangite, sonolite and others, as well as their rare accessory species. (When the

author expressed an interest in the pink ores to an elderly retired miner from the Yamato mine on Amami island, he was dismissively told that the pink ores were “rubbish,” and that he ought to be much more interested in the rich “chocolate ore!”)

The customary division into silicate-rich and oxide-rich ores is an oversimplification because many mines had both types of ore present, some as silicate-rich low-grade ore surrounding pods of high-grade oxide-rich ore, some as alternating thin bands of silicate-rich and oxide-rich assemblages. Those deposits hosted in metachert often have the richest pink, lapidary grade Mn silicates, being commonly high in Mn, Mg and Si, and relatively low in Ca and Fe.

Some of these deposits have not yet been checked for specimen potential or for rare species. A few are well known among collectors for rare minerals containing vanadium, barium and strontium, some of which display a brilliant emerald-green color. These deposits include the type localities for 20 species: **haradaite**, **iwakiite**, **jimboite**, **kanoite**, **kinoshitalite**, **kozulite**, **nagashimalite**, **nambulite**, **natronambulite**, **potassicleakeite**, **protomangano-ferro-anthophyllite**, **shigaite**, **shirozulite**, **sonolite**, **suzukiite**, **tamaite**, **taneyamalite**, **tokyoite**, **watatsumiite**, and **yoshimuraite**. These ores often hold minor, totally uneconomic quantities of zinc, cobalt, nickel, arsenic, beryllium, copper, mercury, molybdenum, or tungsten, which are expressed as species like huebnerite, sphalerite, cinnabar and helvite—more familiar from completely different geological environments in other countries. Seafloor Mn nodules commonly hold minor Ni and Co, and have been considered a future resource for these metals. Nickel-cobalt species found so far in Japanese metasedimentary Mn ores are cobaltite, gersdorffite, nickeline, pentlandite, and siegenite.

Only the Gozaisho mine in Fukushima also contains significant amounts of arsenic-bearing minerals and so has more complex parageneses with some resemblance to those of Långban or Franklin, including the species **arseniopleite**, **brandtite**, **geigerite**, **långbanite**, **manganberzeliite**, **sterlinghillite**, and **wallkilldellite-Mn**. (Literature references to these Gozaisho species and their analyses are available on www.mindat.org for those with a deeper interest in the topic.) The main ore mineral at the Gozaisho mine was rhodonite, with lesser quantities of braunite and tephroite.

A total of 216 species are reported, of which 111 are also reported from Franklin, 105 not yet reported from Franklin. The relevance of this for Franklin collectors is that it is quite likely that at least a few of these species may eventually also be found in manganese-rich zones of the Franklin ores, perhaps currently misidentified as other species.

APPENDIX 1 – Names and locations of the most important Japanese metasedimentary manganese mines:

Here are examples of some of Japan's bedded manganese deposits, arranged in the fashion Japanese geographers usually do it, roughly by prefecture from northeast to southwest: **Hokkaido**: Tatehira, Yuubaridake; **Iwate**: Fujikura, Fukushi, Funakozawa, Hanawa, Hijikuzu, Himegamori, Hongou, Kanazawa, Kawai, Kohare, Kotamagawa, Mitsune, Namiita, Nodatamagawa, Otani, Tachikawa, Takamatsu, Taki, Takinosawa, Tanohata, Toyoguchi; **Fukushima**: Gozaisho, Kuratani; **Tochigi**: Dainichizawa, Higashizawa, Hikari, Hikoma, Hokkohji, Juuniyashima, Kamibishi, Kamikuga, Kanoiri, Kaso, Kiguchi, Kuranosawa, Kyuurasawa, Manako, Matsuzaka, Nemoto, Nippyo/Yokoneyama, Nomine, Ou'ashi, Ohgaki, Sasahira, Takahira, Takanosu; **Ibaragi**: Kurami, Nagasawa, Takanomine; **Gumma**: Atago, Bamba, Hagidaira, Hanawa, Kawazura/Higashiyama, Konakayama, Kurokawa, Kurosakaishi, Mogurazawa, Nakanoyama, Ritoh, Sanyoh, Shohwa, Yamabishi; **Saitama**: Agano, Hinosawa, Hirogawara, Iwaizawa, Komatsu, Ohkura, Ohmiya/Hidaka, Urayamaekokoku; **Tokyo**: Kiyokawa, Okutama, Shintani/Kamiya, Shiromaru; **Kanagawa**: Dainichi; **Nagano**: Hamayokogawa, Karakizawa, Kiyotaki, Yagizawa; **Yamanashi**: Kusama, Ochiai; **Fukui**: Fujii; **Gifu**: Ajiro, Fukutomi, Kuraki, Nagashima, Tsurumaki; **Aichi**: Danto, Ishigane, Ishizuka/Yokosuka, Taguchi; **Mie**: Kamo, Kurihara, Sanpei-Fukutoku, Yamada; **Shiga**: Beppo, Ioi, Kumanohata, Ohori, Takashima, Yaei; **Kyoto**: Ashidani, Dainimachi, Hokkejino, Kitchoh, Michi-Okutani, Mukaiyama, Ouetani, Sanpei, Shin-Otani, Sono, Takagamine, Tamagawa, Tamaiwa; **Osaka**: Hirono; **Okayama**: Ohnagusa?; **Tottori**: Mizutani, Ou'idani; **Hiroshima**: Bunkoh/Takayama, Hohkoh; **Yamaguchi**: Fukadani, Fukumaki, Furujuku, Hata, Kinkoh, Kusugi, Renge, Takamori, Tennoh, Tsutsumi, Wagi; **Tokushima**: Dosu, Hakuryu; **Kouchi**: Ananai, Kohchoh, Matsuo, Nirou, Ushioe; **Ehime**: Ashiyama, Furumiya, Ippoh, Irita, Kamisugai, Kurase, Nomura; **Fukuoka**: Gorougahata; **Saga**: Kyuuragi, Sasahara; **Kumamoto**: Ichinomata, Ikenotsura, Oritate; **Nagasaki**: Kinkai, Matsugaseko, Mie, Tone; **Ouita**: Chinu, Kuratomi, Shimoharai; **Miyazaki**: Akimoto, Iwato, Morowaku, Shimozuru; **Kagoshima**: Nishikata, Yamato; **Okinawa**: unworked chert-hosted deposits on Motobu peninsula.

APPENDIX 2 - List of mineral species reported from Japanese metasedimentary manganese mines:

+ = abundant or widely distributed in Japanese metasedimentary Mn deposits

F = species also reported from Franklin, New Jersey

SH = species also reported from Sterling Hill, New Jersey

| | |
|------|-------------------------------|
| | Abswurbachite |
| F/SH | Actinolite (Mn-bearing) |
| F | Aegirine (Mn-bearing) |
| | Akhtenskite |
| | +Alabandite |
| F/SH | Albite (sometimes Ba-bearing) |
| F | Allanite-(Ce) |
| F/SH | +Alleghanyite |
| F/SH | Almandine |
| | Andalusite |
| F/SH | Andradite |
| F | Apatite-(Caf) |



Långbanite - $(\text{Mn}^{2+}, \text{Ca}) (\text{Mn}^{3+}, \text{Fe}^{3+})_9 \text{Sb}^{5+} [\text{O}_8|\text{SiO}_4]_2$
Långbanite grain is 5mm across, in rhodonite (?) mix.
Locality - Gozaisho mine in Fukushima, Japan. Excalibur Mineral Corp. specimen. Photo by Dr. Jeff Weismann



Kanoite - $\text{Mn}^{2+} (\text{Mg}, \text{Mn}^{2+}) [\text{Si}_2\text{O}_6]_2$ 2cm orange-brown crystals/cleavages in pyroxmangite-cumingtonite matrix.
Locality - Tatehira mine Hokkaido, Japan. Alfredo Petrov specimen. Photo by Dr. Jeff Weismann



Braunitzite - $\text{Mn}^{2+}\text{Mn}^{3+}_6 [\text{O}_8|\text{SiO}_4]$ 1mm crystal.
Locality - Tone mine Nagasaki, Japan. Alfredo Petrov specimen. Photo by Dr. Jeff Weismann

| | | | | | | | |
|------|-------------------------|------|-----------------------|------|---------------------|------|---------------------|
| F/SH | Apophyllite-(KF) | SH | Goldmanite | SH | Niahite | | Sugilite |
| | Ardennite | F/SH | Graphite | F | Nickeline | SH | Sulfur |
| | Arfvedsonite | F/SH | Grossular | | Noelbensonite | | Sursassite |
| | Arseniopleite | | Grunerite | | Nsutite | F/SH | Sussexite |
| F/SH | Arsenopyrite | F/SH | Gypsum | F | Opal | | Suzukiite |
| F/SH | Augite | | Halloysite-10A and-7A | | Orientite | | Switzerite |
| | (Mn-rich "urbanite") | | Haradaite | F | Orthoclase | | Takanelite |
| F/SH | Axinite-(Mn) | | Harmotome | | (sometimes Ba-rich) | | Tamaite |
| | Banalsite | F/SH | +Hausmannite | | Orthoericssonite | | Taneyamalite |
| F | +Bannisterite | F/SH | Hedenbergite | | Parsettensite | F/SH | Tennantite |
| F/SH | Barite | | (Mn-Rich) | | Parvowinchite | F/SH | +Tephroite |
| F/SH | +Bementite | | Hejtmanite | F | Pennantite | SH | Tetrahedrite |
| SH | Birnessite | | Helvite | | Pentlandite | | Tinzenite |
| F/SH | Bornite | F/SH | +Hematite | F/SH | Phlogopite (Mn-rich | | Tiragalloite |
| SH | Brandtite | | Hollandite | | "manganophyllite"; | F/SH | Titanite |
| | +Braunite | F | Hübnerite | | Ba rich) | F/SH | Todorokite |
| F/SH | +Bustamite | | Hydrogarnet | F/SH | Piemontite | | Tokyoite |
| F/SH | +Calcite (Mn-rich | | Inesite | | Potassicleakeite | F/SH | Tremolite (Mn-rich) |
| | "manganocalcite") | | Iwakiite | F | Prehnite | | Tucekite |
| F/SH | +Caryophilite | F | +Jacobsite | | Protomangano-ferro- | | Tweddillite |
| F | Celsian | | Jimboite | | anthophyllite | F/SH | Uraninite |
| F/SH | Chalcocite | F | Johannsenite | F | Pumpellyite-(Mg) | | Vermiculite |
| F/SH | Chalcopyrite | | Joseite | | Pumpellyite-(Mn2+) | F/SH | Vesuvianite |
| F/SH | Chrysocolla | | Kanoite | F/SH | Pyrite | SH | Villyaellenite |
| | Cinnabar | | Kellyite | F/SH | +Pyrochroite | | Vivianite |
| SH | Clinzoisite | | Kinoshitalite-1M | | Pyrolusite | | Vuorelainenite |
| | Cobaltite | | Kozulite | SH | +Pyrophanite | SH | Walkkildellite-Mn |
| | Cobaltpentlandite | | Krauskopfite | F/SH | +Pyroxmangite | | Watatsumiite |
| F/SH | Copper | F/SH | +Kutnohorite | F/SH | Pyrrhotite-4M | | Welinite |
| | Cordierite | | Långbanite | F/SH | +Quartz | | Winchite |
| | Cosalite | F | Leucophoenicite? | | Rambergite | | Wiserite |
| | Crednerite | | Magnesioarfvedsonite | | Ramsdellite | | Witherite |
| SH | Cryptomelane | F/SH | Magnetite | F/SH | +Rhodochrosite | F/SH | Wollastonite |
| | Cubanite | F/SH | Malachite | F/SH | +Rhodonite | | Yarrowite |
| SH | Cumingtonite | F | Manganberzeliite | | Ribbeite | | Yoshimuraite |
| | (Mn-rich) | F | Manganhumite | F | Richterite | F/SH | Zircon |
| | Cymrite | F | Manganite | | Riebeckite | | |
| | Deweylite | F | Manganocumingtonite | | Romanechite | | |
| F/SH | Diopside | | Manganogrunerite | F | Roméite | | |
| | (Mn-rich "schefferite") | F | +Manganosite | | Roscoelite | | |
| | Donpeacorite | SH | Manganpyrosmalite | F | Safflorite | | |
| F/SH | Dravite | | Manjiroite | | Sanbornite | | |
| | Eckermannite | SH | Marcasite | | Saponite | | |
| | Edingtonite | F | Marsturite | F | Sarkinite | | |
| | Eggletonite | | Maucherite | F/SH | Schorl | | |
| F/SH | Epidote | | Mcgillite | F | Sepiolite | | |
| F/SH | Fayalite | | Metaswitzerite | | Serandite | | |
| | (Mn-rich "knebelite") | F/SH | Microcline (Ba-rich) | | Shigaite | | |
| F | +Feitknechtite | | Millerite | | Shirozulite | | |
| | Fianelite | F/SH | Molybdenite | F/SH | Siderite | | |
| F | Gageite | F | Monazite-(Ce) | | Siegenite | | |
| | +Galaxite | | Mozartite | F/SH | +Sonolite | | |
| F/SH | Galena | F/SH | Muscovite | F/SH | +Spessartine | | |
| F | +Ganophyllite | | (Mn-and/or Ba-rich) | F/SH | Sphalerite | | |
| | Geigerite | | Nagashimalite | SH | Sterlinghillite | | |
| F | Gersdorffite | | Namansilite | | Stilpnomelane | | |
| F | Glaucocroite | | Nambulite | | Strakhovite | | |
| | Godlevskite | | Natronambulite | F | Strontianite | | |
| F/SH | Goethite | F/SH | +Neotocite | | Strontiopiemontite | | |

Unnamed V-analogue of
Potassicleakeite



Editor's Note:

When this article was submitted for publication, opal had been reported from the Japanese mineral deposit but unknown from the Franklin deposit. It has now been found and collected from the Franklin deposit - see story on p17 of this issue.

Mineral # 357 Found at Franklin, NJ

Reprinted from the Mineral News Vol. 24 No. 11

Dr. Steven Kuitems, Joe Orosz and Tony Nikischer
(on behalf of) The Hudson Institute of Mineralogy

Even though mining at this venerable deposit ceased many years ago, minerals new to the deposit continue to be discovered through careful observation and applied mineralogical studies. The Franklin-Sterling deposit at one time had over 360 confirmed species identified, but recent IMA decisions to demote several species names to varietal status had reduced this number to 356. A recent study of a single specimen containing a small vein of opal found on the dumps by one of the authors (SK) has now raised the total species count to 357.

Dr. Steven Kuitems describes his find thusly: this find can be directly attributed to the habitual use of magnification to examine collecting finds. In the field, the use of a 10x hand lens (doublet or triplet) that is sufficiently rugged to carry on your person is a tremendous benefit when doing an initial examination of a specimen. At home after an initial cleaning, my specimens are routinely examined under a low powered binocular microscope. When collecting in the Franklin, N.J. area, examination under short, medium, and long wave ultraviolet light has become a regular routine as well. The benefit of a cleaned specimen and total darkness results in a much more conclusive determination of true fluorescent color responses of the specimen. It is far superior to many in-the-field methods where one's eyes do not always have the adjustment time or ambient light conditions for accurate assessment.

The specimen in question showed a typical exsolution willemite pattern crisscrossing a massive, non-fluorescing tephroite matrix, with a fainter green fluorescent response disseminated in the dark, oxide-coated side of the specimen. The actual response of a pure isolated grain of this opal has yet to be definitively examined under a microscope, but it was this faint response that drew attention initially. The entire specimen size was 8x8x4 cm and one side had a black, oxide-coated layer about 3 to 5 mm thick. The majority of the specimen consisted of dark brown, vitreous tephroite which was largely translucent, with transparent areas observed in thin section.

Initial examination in the field under 10x magnification showed that the black oxide-coated layer was not uniformly oxidized material, but rather only a thin surficial coating. Under and through this black oxide was a distinctly pink carbonate with numerous lenses of clear to predominantly milky, opaline material. When observed in sunlight, faint rainbow refraction colors were observed in some of the opaline areas. After cleaning the specimen, it was examined under a low power binocular microscope which confirmed earlier observations that the opaline areas of 1 to 3 mm were confined to the 3-5mm surface zone on one side of the specimen, definitely not encroaching into the tephroite matrix itself. This thin, vein material was similar to common milky opal from other localities, except that it was in very tiny blebs scattered beneath the oxide surface.

A portion of the specimen was studied at the Franklin Mineral

Museum by one of us (JO) to determine its optical properties. Opal has relatively unique optical properties and can be readily distinguished from quartz and its polymorphs by optical methods. It is amorphous/isotropic with a low index of refraction of 1.43 to 1.46, and it displays a conchoidal fracture. Some of the opalescent/pearly material was extracted from a fresh break and crushed for study under the polarizing light microscope. There were at least three phases present in the extracted material, with two phases making up the majority of the material. Of the two significant constituents, one was birefringent with prominent cleavage, the other, the opal-like phase, was isotropic with conchoidal fracture.

Fifteen isotropic conchoidal grains were studied in oil with an index of refraction of 1.472 using the Becke line method. All fragments showed a refractive index of less than 1.472, consistent with the suspected opal, and lower than those of quartz and its polymorphs. The specimen was then sent to the Hudson Institute of Mineralogy for additional study.

Because there was insufficient material and functioning equipment for standard powder diffraction methods at the Institute, tiny grains from the opalescent veinlet were analyzed at Excalibur Mineral Corporation (TN) to determine its chemical make-up. The work was performed on behalf of The Hudson Institute's Sid and Betty Williams Laboratory for Mineralogical Research, which is in its early stages of growth and has been enthusiastically and financially supported by the Franklin Mineral Museum, and to a lesser extent by the Franklin-Ogdensburg Mineralogical Society.

Using a Philips 525M scanning electron microscope fitted with an EDAX ultra thin window CDU LEAP detector, multiple analyses were conducted at operating conditions set at 20Kv high tension output with a 100nm spot. Only Si and O were detected. Although the detection system can readily quantify elements in the periodic table from carbon and higher, water and hydroxyl cannot be determined by this analytical technique, which cannot detect light elements such as hydrogen. Hence, observation of the optical properties was the linchpin ingredient needed to eliminate quartz and its polymorphs from consideration based on the chemical analyses.

The optical and chemical data, as well as the physical characteristics, were consistent with that of opal. Its associations (tephroite, willemite etc.) further confirmed its Franklin origins, and this common species has thus become the 357th recognized mineral on the "Franklin-Sterling List." All material for this study came from a single hand specimen, and the mineral is now represented in the Kuitems and Franklin Mineral Museum collections.



Editor's note: When this article was first published in *The Mineral News*, Vol. 24, No. 11, The Franklin-Sterling List total was thought to be 359 including opal. It has since been determined to be 357 including opal.

Using a Photo Editing Program to Improve your Rock Photos

Stuart Schneider

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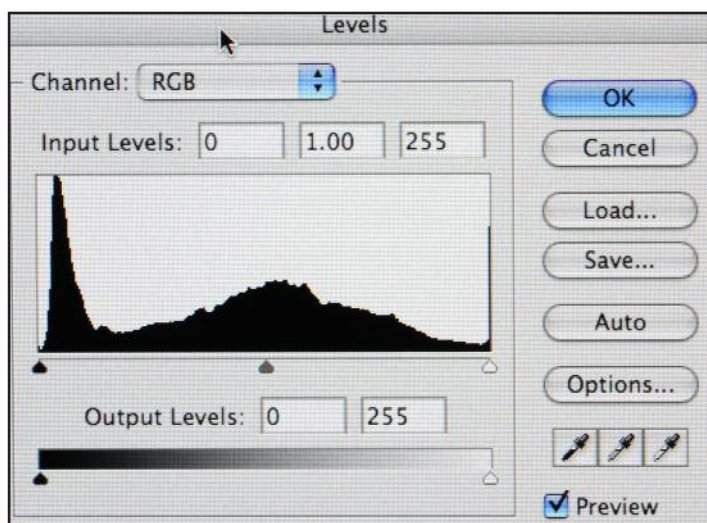
Here are some techniques that you can use to improve your photographs of minerals and fluorescent minerals. I use Adobe® Photoshop® CS2 and CS3 but you can get great results with Photoshop® Elements, a program that costs about \$70. I am assuming that you can get your photographs into your computer, either by scanning photos that you have taken with film and printed, or better still are photographs taken with a digital camera. If you are new to digital cameras, there are many on the market that will do an incredible job. Make sure that it is at least a 5 megapixel camera. Anything under 5 megs will get a photo, but it will lack good shadow detail.

When taking the photo, you should try to use two lights; one is the main light and the other is the fill light. I use daylight fluorescent light bulbs. The main light illuminates the rock and the fill light softens the shadows. The fill light is twice to three times as far away from the rock as the main light. If you don't have a pair of lights, then shoot outside on a slightly cloudy day. Bright sunlight will not give you a good photo. Use a tripod and get your camera close to the rock. You are taking a closeup photo.

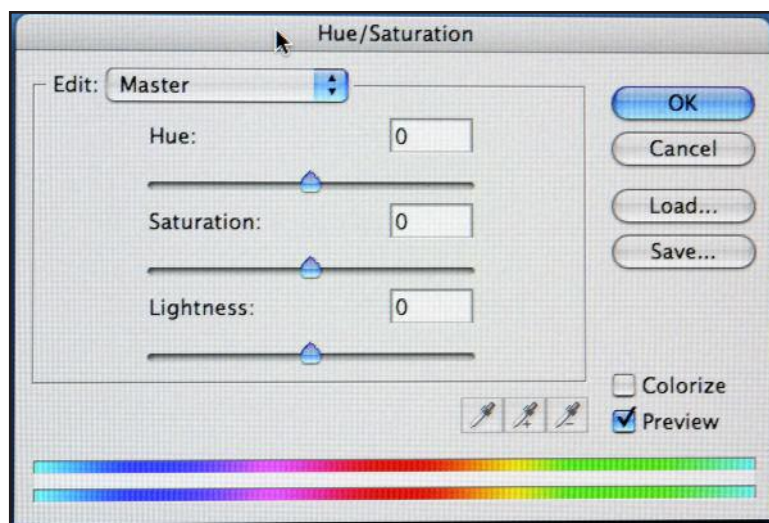
Now that you have the photo in your camera, download it into the computer. Open your photo editing program (let's call it "PEP" from now on) and look at the photo. Maybe you need to crop out some of the background. Use the crop tool. If there is a color cast you will need to correct it with the PEP. Try to have something in the photo that you know is a neutral color – black, white or grey is good. Most programs give you the ability to get rid of a color cast with a color adjustment slider or an eyedropper that you click on the neutral grey and it removes the color cast. Now you have a good daylight photo. If you are saving the photo to print to a newsletter,

magazine, etc. make the photo 5 inches wide at 300 dpi (dots per inch or ppi, pixels per inch). Some cameras give you a 72 dpi image that is 24 or more inches wide (depending on how many megapixels the camera has). The PEP should make it easy enough to adjust the size of the photo. If possible, save the photo as a TIFF, alternatively save it as a JPEG. TIFFs and JPEGs are formats for saving a photo. JPEGs compress the information (think of it as cutting down the quality and making smaller file sizes). TIFFs do not compress the information (giving you much larger file sizes). If you are putting the photos on a website, then make the photos 96 dpi and save it as a JPEG.

A good photograph will have a good range of tonal qualities. For example, a film camera creates a negative that has 256 tones – black to grey to white. A photographic print has fewer tones. We are not talking about colors, but shades of grey. A good photo has a pleasing range of tones. Try to avoid pure white (also known as a burned out area) or pure black areas (except in your UV photos). Even dark shadows have some detail in them. Try not to lose that detail. This is accomplished in the PEP by adjusting the "levels" or "shadows/highlights", or "exposure". Now, let's take a photo under Ultraviolet light. I use an Olympus 5050z camera for this since it automatically balances the SW or LW UV so that you can work with it in the PEP. The 5050z is no longer made. (You can find a used one on eBay.) UV light has a lot of blue in it. Some cameras cannot handle UV and give you a blue photo that will never show the right colors. If your camera has a "shade" setting, try setting it on that when you take a UV photo. When taking the photo, I hand hold the UV light and let the camera determine the exposure. I set



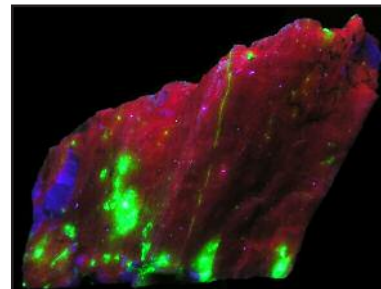
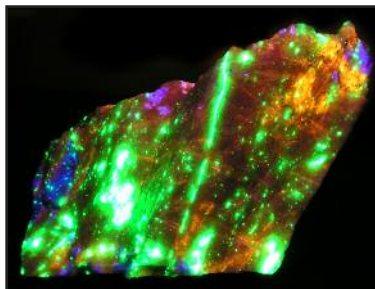
Levels image



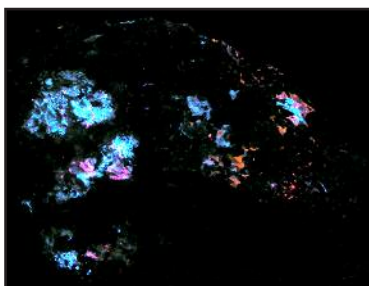
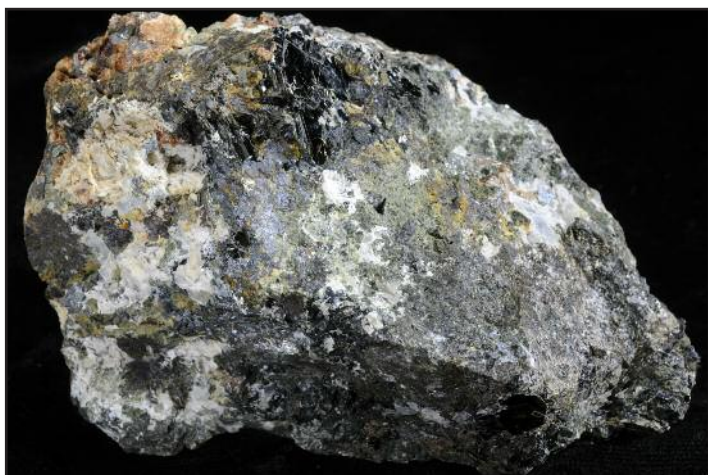
Hue/Saturation image

the camera on “Aperture priority” and stop down the lens aperture to f11 or f16 (very small opening). This gives me a good depth of field (more of the rock is in focus). Again get the photo out of the camera and into the computer. It may look too dark or if you are shooting a Franklin piece with willemite in it, it may look overly green or calcite may look overly orange-red. You will use the PEP to adjust the light. In Photoshop®, I use the levels adjustment (3 sliders) and slide the right slider to the left to brighten the photo.

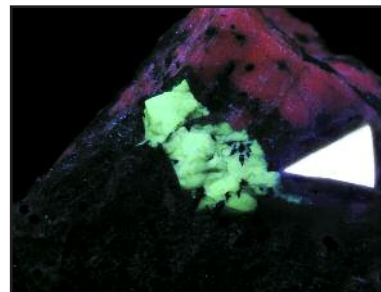
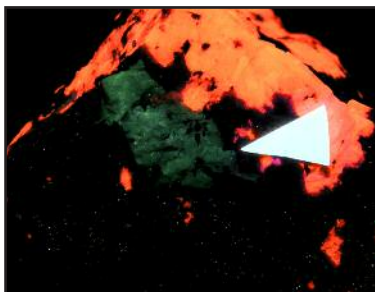
Then I slide the left slider to the right to darken the blacks. If the greens are blowing out the other colors, then I go to the Hue/Saturation adjustments and decrease the saturation of the green and perhaps darken them a bit. I may have to adjust the saturation of the other colors to make them look the way my eyes saw the rock under the SW UV lamp. Once you try this, it will become a bit easier to understand and your photos will improve dramatically.



Fluorescent bustamite with hardystonite, clinohedrite, and willemite from the Franklin mine, Franklin, Sussex County, NJ. The bustamite fluoresces red LW, the clinohedrite fluoresces orange SW, hardystonite fluoresces purple-blue SW and LW, willemite fluoresces green SW.



Biotite with hydrozincite, and sphalerite on calcite. Found in August 2008 in the Noble pit area of the Sterling Hill mine, Ogdensburg, Sussex County, NJ. The hydrozincite fluoresces bright pale blue SW and the sphalerite fluoresces orange (SW & better LW).



Rare Sterling Hill mine mineral, genthelvite, discovered in late 2002 in one area of the Passaic Pit of the Sterling Hill mine, Ogdensburg, Sussex County, NJ. Genthelvite fluoresces lime green under LW and barely fluoresces green SW. Calcite fluoresces orange-red SW.

Kornerupine: A Rare and Unusual Mineral in the New Jersey Highlands

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Sometimes it's easy to believe that nothing new or exciting awaits discovery in the New Jersey Highlands because the rocks have been the subject of geologic study for nearly 200 years. Most days spent doing field work in the Highlands end uneventfully with no experiences to elicit an eye-popping or jaw-dropping reaction. However, on those rare days when an unusual or quite extraordinary geologic feature is encountered, the realization sets in that the ancient rocks of the Highlands are giving up another of their long-held secrets.

Such was the case in January 2008 when an outcrop of gneiss in the Greenwood Lake area, like many other outcrops of gneiss in the Highlands, was about to become just another data point for the geologic map I was making. Conspicuous on the undersurface of the outcrop was a 3-inch-long group of dark greenish-gray prismatic crystals, the largest of which was nearly an inch long (Fig. 1). Closer examination of the outcrop, and of numerous surrounding outcrops, revealed no additional crystals making this find analogous to locating a "needle in a haystack." Preliminary field identification suggested the mineral might be tourmaline, but subsequent X-ray diffraction analysis by colleagues John Dooley and Larry Mueller at the New Jersey Geological Survey revealed the mineral to be kornerupine.

Kornerupine is a complex magnesium aluminum iron borosilicate that has the chemical formula $(\text{Mg}, \text{Fe}^{2+})_4 (\text{Al}, \text{Fe}^{3+})_6 (\text{Si}, \text{Al}, \text{B})_5 \text{O}_{21} (\text{OH})$. It is not a particularly common mineral and is found in about 70 locations worldwide in Australia, South Africa, Canada, Asia, Scandinavia, India, and the United States. The type locality is in southwest Greenland, at Fiskenaes, in the Nuuk area. In the U.S. it is known from localities in Utah, the Adirondack Mountains in New York, and New Jersey. The first, and until recently the only find of kornerupine in New Jersey, was in 1969 from Mase Mountain in Jefferson Township by Davis Young during field work for his dissertation. The details of this occurrence were eventually published (Young, 1995). Both of the known locations in New Jersey are in the Highlands, and because of its origin kornerupine would not be expected in rocks outside of that region. It is particularly noteworthy that kornerupine is now recognized in both the western and eastern parts of the Highlands, further confirming a common origin and metamorphic history for the entire region.

Kornerupine is used as both a specific mineral name, and as a name for a group of borosilicate minerals such as prismatic and grandidierite that have a kornerupine-like orthorhombic crystal structure. Characterization and refinement of the chemical crys-

tallography of kornerupine was accomplished through the work of Paulus Moore and colleagues (Moore and Bennett, 1968; Moore et al., 1989). The use of the name kornerupine is typically applied to minerals in this group that have a boron content of less than 0.5 atoms per formula unit. Prismatic and grandidierite both contain considerably more boron than kornerupine and so they have greater than 0.5 atoms per formula unit of boron in their crystal structure. Both kornerupine and prismatic were observed by Davis Young in the gneiss from Mase Mountain. Thus far only the former has been recognized from the Greenwood Lake locality, although work on this gneiss is in the early stages and additional detailed mineralogical analysis is planned.

The formation of kornerupine is of considerable interest to geologists because it is found only in rocks that have undergone metamorphism at high-temperature and moderate pressure. The kornerupine-bearing gneiss at both New Jersey localities was formed initially from sediments that were deposited between about 1250 and 1300 million-years-ago. Metamorphism of the sedimentary protolith of the gneiss at slightly over 1 billion years ago resulted in the conversion of the original sediments into a mineral assemblage that now includes quartz + K-feldspar + plagioclase + biotite ± garnet ± magnetite ± kornerupine. The source of the boron in the gneiss that was ultimately responsible for the formation of the kornerupine is a question that is not easily answered and it poses an interesting challenge. Once solved, however, the answer would provide another tantalizing glimpse into the environment of the Highlands at more than 1 billion years ago. But, as with most things in science, the answer to important questions is seldom straightforward. The boron in the gneiss may have originated from a source that was external to the host rock. That is, it may have been introduced into permeable sediments of the gneiss protolith via a boron-rich fluid possibly from a hydrothermal source. The presence of magnetite deposits close to the Greenwood Lake kornerupine locality provides some support for this interpretation because the ore in these deposits contains metals that suggest an origin from a hydrothermal fluid. Alternatively, the boron may have been derived from a source that was internal to the rock. Dravitic tourmaline is present in some of the gneisses in the Highlands that were formed from metamorphosed sediments. Breakdown of the tourmaline through chemical reactions may have occurred as a result of partial melting of the gneiss during metamorphism. This, in turn, would produce kornerupine as part of the new mineral assemblage. Support for this interpretation comes from the fact the kornerupine appears to be confined mainly to the coarser-grained

part of the rock (Fig. 1) that was formed through partial melting of the finer-grained host gneiss. Either of these interpretations adequately accounts for the origin of the kornerupine. Future work might involve the use of boron isotope analysis that would provide useful information on the source of the boron and permit a choice to be made from among these two interpretations. At least for now, however, the origin of the rare and unusual mineral kornerupine in the Highlands will have to remain a mystery.

Just how many additional secrets the ancient rocks of the New Jersey Highlands will continue to share is unknown. One thing for sure is that more discoveries will likely await those who have the patience and persistence to seek them out. Or, in the words of the fifth century Greek dramatist Euripides, “leave no stone unturned.”

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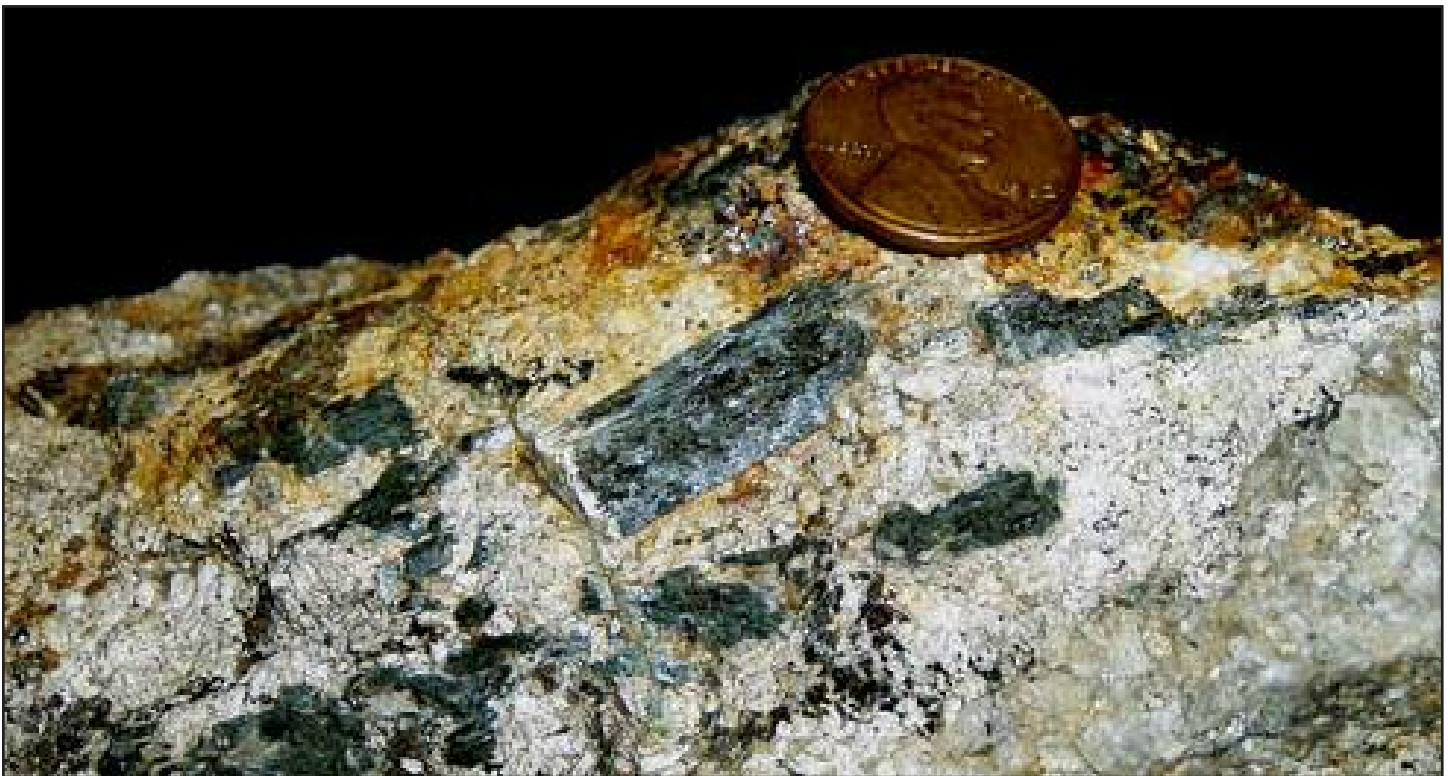


Figure 1. Hand sample of kornerupine-bearing gneiss from the Greenwood Lake area, Passaic County, New Jersey. Dark green, prismatic kornerupine crystals beneath the coin are embedded in a matrix of quartz, feldspar and biotite. Richard Volkert photo.

Sterling Hill Mining Museum News

Joe Kaiser
40 Castlewood Trail
Sparta, NJ 07871

A new and exciting program at SHMM is the Sterling Hill Astronomy Group, which is open to the public. Anyone can join for a modest annual membership fee. Club membership is \$25.00 per person and \$35.00 for a family and will provide monthly viewing as well as special-event observing. For further information, please contact Bill Kroth by e-mail at WKROTH8394@aol.com or telephone 201-933-3029 after 5:00 p.m.

Every year more than 20,000 school children come to Sterling Hill, take the tour, and participate in the highly successful Rock Discovery Center. Many teachers use the activity as a hands-on starting point to cover science, history, art, geography or economics. They learn about Edison's discovery of magnetite in Ogdensburg. He built a plant to crush the ore. The students learn to identify the problems he encountered and how they were overcome. Some of these ideas are still being used at mines today even though Edison could not totally overcome all the associated problems to make his own mine successful.

There are many educational opportunities available through the Sterling Hill Mining Museum (SHMM), and Dr. Earl Verbeek, SHMM Educational Director, can be contacted to discuss particulars at SHMM@ptd.net. Scheduled events are announced on the website (www.sterlinghill.org). The educational program embodies four major components: (1) teacher workshops at Sterling Hill, (2) classroom visits, (3) distance learning live and (4) educational materials. Some programs embody ideas and sites in the area related to but not on the museum grounds. Each of the workshops can be slanted to emphasize one or more curriculum segments. The cost of scheduled workshops can be found on the museum website.

In 2008 Bill Kroth and Gordon Powers finished one of the finest representations of the Periodic Table of the Elements on display anywhere. The display is over ten feet long and is over seven feet high. It is made of 110 cubicles each roughly six inches square. The exhibit shows examples of purified elements, ores that produced them, and some of the industrial and commercial products that contain them. There are individual lights in each of the cubicles.

Despite the difficult economy, 2008, although not as good as 2007, was still a very impressive year, and the museum remained self-

sufficient. More resources are still needed to develop important and needed projects in SHMM teaching programs, to fund the Pillar of Light, and to have long-term plans for a technology museum. For these programs to develop, the museum needs to build support from a variety of sources.

The Pillar of Light has generous and welcome support from the Ellis family, and needs to find matching funds to bring the project to success. A video conferencing education program has been set-up in the basement of the gift shop. Help is needed to support and promote the program until it becomes self-sufficient. It will get visiting scientists into the classrooms.

A little further into the future is the technology museum. The mill buildings, hoist house and shop buildings on the hill are being maintained by our museum for future use. Someday when this area can be used for its best purpose, SHMM will be ready.

Dr. Pete J. Dunn, recently retired from the Smithsonian Institution where he served for 35 years as a mineralogist, has donated his extensive collection of Franklin-Sterling Hill literature to the museum. It is housed in a locked safe and is not accessible to the public but is being kept as a master set. Duplicates will be made of Dunn papers as time allows. The ultimate goal is to have the entire Franklin-Sterling Hill literature file open to anyone who wishes to learn more about these deposits. The logistics of where the files will be stored, under what circumstances it may be accessed, and how to handle requests for copying have not yet been worked out.

John Kolic has been busy in the Passaic and Noble pit area, cleaning dirt from boulders and outcrops, and making large ones smaller. The goal is to expose some interesting geology and enable a better understanding of what occurred. The ore vein in the fill quarry has been prepared for enclosure to fully display the rich color under UV presentation. This will be our Pillar of Light display.

The Sterling Hill Garage Sale held on the weekend of the two shows has much interesting material available. In April, Foundation members will be able to collect both day and night; check the website for the exact date. The website of SHMM had a 70% overhaul last summer. A site map has been reviewed by several museum staff and the SHMM Board of Directors. Internet users can check the status of ongoing events by visiting our website, www.sterlinghill.org.



Franklin Mineral Museum News

Lee Lowell

Collections Manager, Franklin Mineral Museum
32 Evans Street, Franklin, NJ 07416

Museum Facilities and Grounds

Finally, after years of hot and humid summer days in the museum, air-conditioning was installed late this summer. I suspect the rocks were not comfortable with the warm temperatures, but they never showed any discomfort. The museum staff was pleased that the rocks didn't cause any problems, but they expressed their own complaints about often unbearable working conditions during the summer months.

The Buckwheat Dump was turned over to expose fresh material for the collectors. This is done periodically and it results, at times, in finding minerals that were reported to have been collected on the dump years ago.

Another parcel of the Trotter mine property was donated to the museum by F&R Associates, LLC. Preservation of this historical mine site is important. The museum thanks the Phillips family for these donations.

Plans for future use of these properties have yet to be determined.

Exhibits

Many new mineral specimens were added to the museum's collections. This is an ongoing process as new, significant items become available. The Franklin-Sterling Hill collections benefited with additions from the Philadelphia Academy of Natural Sciences acquisition. Several donated and purchased worldwide mineral specimens were catalogued into the collections displayed in the Welsh Room. New display cases were added to the wall in the fossil room. The trilobites have been expanding their population and additional space was required to house them.

Wall cases were also added to the fluorescent display room. These will be filled with an orderly display of fluorescent minerals with labels. The display's intent is to provide as many fluorescent species as is practicable. Specimens for display will come from the museum's collections as well as from several collectors who will loan some of their fluorescent rocks. Three cases will show short wave responses and one will display long wave response minerals.

The displays in the lobby cases feature minerals from the collections of Earl Verbeek and Ray Latawiec. Minerals new to the deposit such as pyroxferroite, (the "moon rock,") and opal are displayed in a separate case in the local room. With these new minerals the total number for the deposit is now 357.

The museum's traveling exhibit speakers, board members Ray Latawiec and Fred Young, presented a program of the local

minerals and New Jersey fossils to the Newark Historical Society.

Mineral Science

In conjunction with our partnership with the Hudson Institute of Mineralogy (HIM), a mineral new to the deposit was identified. Opal was discovered by Dr. Steven Kuitens on the Buckwheat Dump. The museum's mineral science curator, Joe Orosz, working in collaboration with Tony Nikischer (HIM), verified opal as a new mineral for the deposit. A copy of the article published in the *Mineral News* is included in this issue of *The Picking Table*.

Specimens of bementite with sphalerite were collected on the Buckwheat Dump. This combination was not known prior to this discovery. The identification was confirmed by the HIM. Also confirmed was a specimen of smithsonite from the museum's collection. Since this mineral is not common to the deposits, analytical identification was required to verify it. Many of the labeled smithsonites in collections are questionable.

Colby College studied the pyroxferroite/pyroxmangite assemblages found on the museum's Taylor Road property, and identified biotite and titanite minerals in the assemblage. There are a total of 13 minerals in this rock.

Research

New Jersey geologist, Richard Volkert, continues his research on the age of the Franklin-Sterling Hill ore deposits as well as the geology of the New Jersey Highlands. This research, funded by the Franklin Mineral Museum, the Franklin-Ogdensburg Mineralogical Society Inc. and the Sterling Hill Mining Museum has determined that the Franklin limestone, precursor to the Franklin marble, was deposited about 1.3 billion years ago. The metals iron, zinc and manganese were metamorphosed into the current mineral assemblages of franklinite, zincite, and willemite at 1050-1025 million years ago. This was during the geological Proterozoic era, a time of few and primitive fossils including Fred Young's favorite, stromatolites.

Acquisitions

The museum continues to purchase Franklin-Sterling Hill collections.

Donations are preferred, but virtually all of the rocks and minerals coming into the inventory are purchased. Specimens worthy of addition to the permanent collection are identified by family or collector on the display labels.

Other News

The fall gem and mineral show was successful despite a reduction in the attendance. The weather predictions were for two days of steady rain and winds and this probably discouraged some folks from coming to the show. However, there were a few showers, no wind, and the weather was not nearly as bad as predicted.

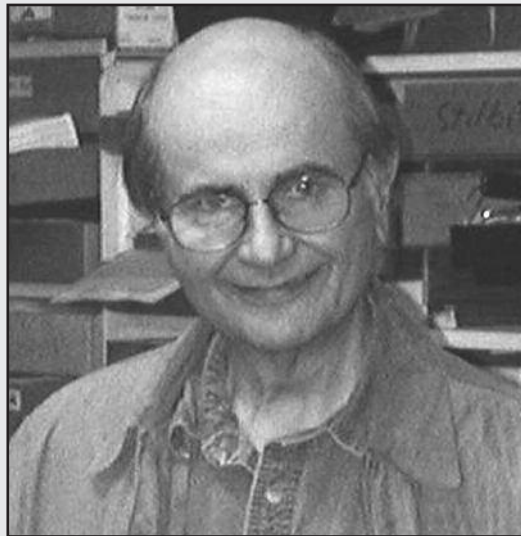
Group reservations for visits to the museum were good despite the high travel costs and cutbacks in school field trips. Attendance increased slightly over calendar year 07. Mineral sales were also higher than the prior year.

The Earth Science Week open house was held on October 12th. Several lectures were provided by Ray Latawiec and Fred Young. Attendance was good for this event.

The fall night dig on November 1st drew 140 collectors. Many collectors with out-of-state car license plates joined in the fun. This event is a successful annual activity and it is a good fund raiser for the museum. A large esperite was found. So, the dump still yields good minerals.

The calendar year 08 inductee to the museum's "Hall of Fame" is Robert Mayo Catlin (1853-1934). He was hired by the New Jersey Zinc Company from South Africa where Catlin worked as a mining engineer. He established the top-slice mining method at Franklin. This significantly increased the removal of ore and made the deposit more valuable economically. Catlin's contributions to the community included a hospital, an improved water system, paved streets, a community center, a bank, a general store and establishment of law and order in the town of Franklin.

Besides the great museum staff that the manger, Doreen Longo, has in place, there are a few volunteers whose efforts must be recognized. Steve Sanford assists with the identification of rocks and minerals coming into the museum through donations and purchases. His knowledge of Franklin-Sterling Hill minerals is second to none. The computerized collection catalogs are constantly being revised and updated by Anne Wronka. She is also available to help with numerous other curator's office functions and manages the museum's school science awards program. Verizon provides corporate funds to the museum for the volunteer efforts of Paul Shizume. Without his efforts, particularly during the mineral shows, this elderly collections manager/show treasurer would find reason to be AWOL for the shows. And not to be overlooked, Herb Yeates, who manages the museum's website from his residence in Florida, provides updated information as required. Thanks to these folks in an era where volunteerism is nearly extinct.



Joseph P. Orosz (1946-2008)

The Franklin-Sterling Hill mineral collecting community lost a friend and a significant contributor to the mineral science of this mining district on December 26, 2008.

Joe was a life member of the Franklin Mineral Museum (FMM) and the Sterling Hill Mining Museum. He was a member of the Franklin-Ogdensburg Mineralogical Society, Inc., the New York Microscopical Society and several other mineral clubs in New Jersey.

He was a board member of the FMM. Since he was proficient in determining the optical properties of minerals, Joe was given the title of Science Curator for the museum. In this role he determined the optical properties of many minerals which were beyond visual identification. The identification of two recent minerals, pyroxferroite and opal, occurred through Joe's efforts in conjunction with the assistance of the Hudson Institute of Mineralogy.

Joe had recently accepted a position as associate editor of *The Picking Table*, the journal of the Franklin-Ogdensburg Mineralogical Society, Inc., and authored one article appearing in this issue. He also provided the technical review of other articles appearing in this issue.

His friendly demeanor and his volunteer scientific efforts on behalf of the local mineral community will be missed.



The Franklin Mineral Museum

32 Evans Road/P.O. Box 54, Franklin, N.J. 07416
(Between Main Street and Buckwheat Road)
Phone: (973) 827-3481
www.franklinmineralmuseum.com



Exhibited by means of guided tours: Franklin-Sterling Hill mineral specimens, educational exhibits in mining methods and history, including a life-size replica of underground workings, artifacts, gemstones, zinc uses, and a 32-foot-long fluorescent mineral display.

Included in the tours is the Jensen-Welsh Memorial Hall, built especially to contain the Wilfred Welsh collections of fossils, Native American relics, and worldwide minerals and rock specimens assembled for teaching purposes.

Mineral collecting on the Buckwheat Dump. Ample parking. Picnic grounds. Gift shop offering for sale: local and worldwide minerals, fluorescent specimens, agate slabs, onyx carvings, UV lamps, hammers, mineral books, T-shirts, postcards, and much more.

Separate admission fees to the Museum and the Buckwheat Dump. Admission to the Museum includes guided tour.

OPERATING SCHEDULE:

Open to the public

March: Weekends Only

April 1 - December 1:

Monday through Friday: 10 a.m. - 4:00 p.m.

Saturday: 10 a.m. - 5:00 p.m.

Sunday: 11 a.m. - 5:00 p.m.

Closed Easter, July 4th, and Thanksgiving

Groups by reservation, please

Franklin, New Jersey

"The Fluorescent Mineral Capital of the World"

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30 Plant Street, Ogdensburg, NJ 07439
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Food concession and picnic area
And much more!

Mineral collecting is allowed on-site every day the museum is open. On the last Sunday of each month (or other times for groups by prior arrangement), an expanded collecting area will be open for a nominal additional fee. Contact the museum office for details.



Schedule of operation:

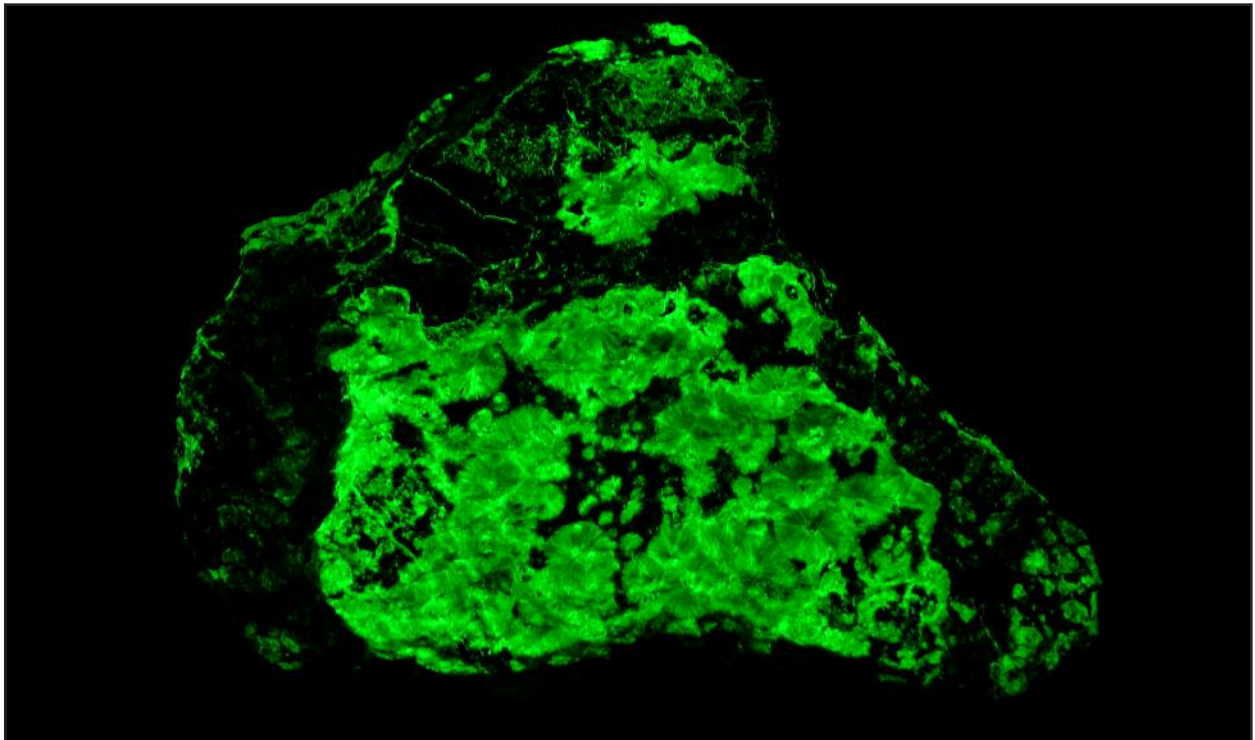
March: Open seven days a week, weather permitting, 10:00 AM to 3:00 PM. Group tours daily by appointment; public tours weekends only at 1:00 PM.

April 1 through November 30: Open seven days a week, 10:00 AM to 3:00 PM. Group tours daily by appointment; public tours daily at 1:00 PM.

December: Open seven days a week, weather permitting, 12:00 PM to 3:00 PM. Group tours daily by appointment; public tours weekends only at 1:00 PM.

The temperature in the mine is 55°F.

Sterling Hill Radiating Willemite



Collected by Fred Lubbers on July 31, 2008 at Sterling Hill's Mine Run Dump

Description: radiating white willemite on serpentinized contact with primary willemite/franklinite ore. At least 25 complete rosettes, to a maximum diameter of 11 mm. Maximum length of specimen, 6.25 inches; max. width at 90°, 4.5 inches; max. thickness, 1.125 inches. White willemite face max. length, 4.125 inches; max. width at 90°, 2.375 inches.

Odd feature: two pale pink secondary willemite veinlets transect the entire thickness of the piece, through the primary willemite/franklinite as well as through the radiating willemite layer. The veinlets appear to follow the path of least resistance through crystal partings in the radiate masses and the borders between rosettes, whereas they run a more or less straight course through the primary ore.

Photos by Tema Hecht