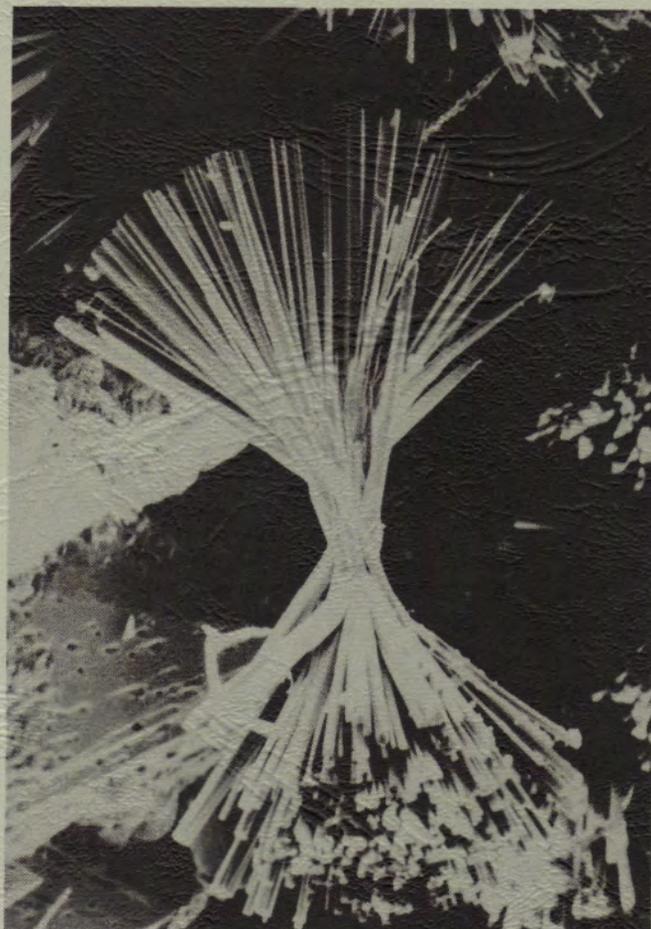
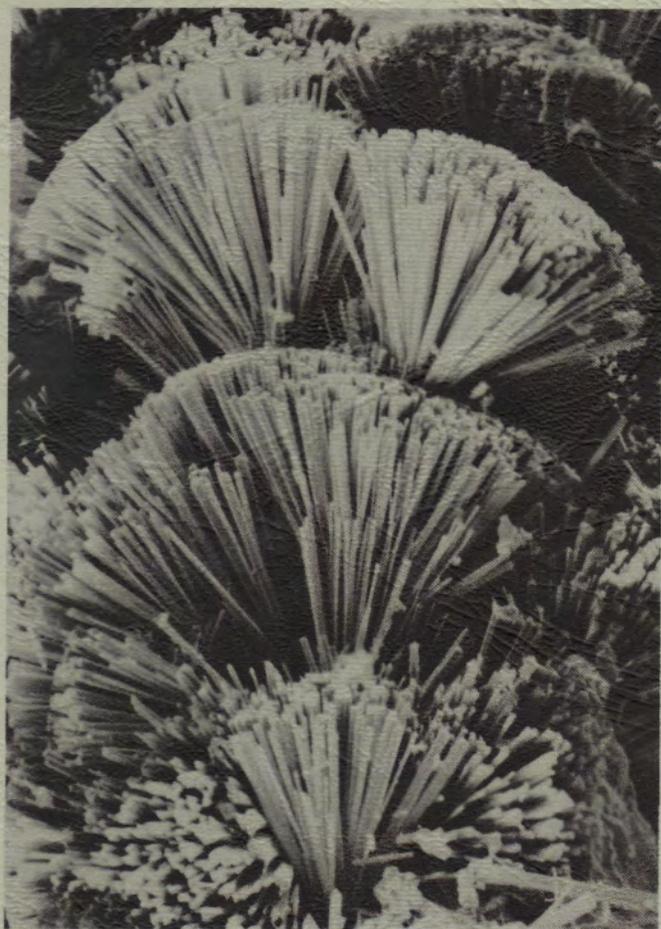


THE PICKING TABLE



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THE PICKING TABLE

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FMM Curator's Message

The Franklin Mineral Museum may be closed to the public for the winter, but work goes on nevertheless. A new roof is being constructed above the main building to relieve the weight of possible heavy snowfalls, which has been a cause of concern. Negotiations to transfer plantsite material to the Buckwheat Dump are held up by the State. The owners are willing. An exchange exhibit will be on view at Rutgers-New Brunswick starting in January and treasures of the Rowe collection will be in Franklin for a year. An architect has been engaged to design a suitable hall to display the Wilfred Welsh collection of worldwide minerals and fossils. It is expected that construction can take place during the current year.

John L. Baum

About the Cover Photos

About the Cover SEM Photos

Willemite from Franklin, New Jersey, in a very uncommon habit. The specimen is one of etched and recrystallized zincite, upon which are these "bow-tie" bundles of willemite crystals. Individual crystals have a triangular cross-section. The field of view is a maximum of 300 microns for the isolated cluster, and 200 microns for the individual cluster.

BREITHAAPTITE FROM THE NICKEL-ARSENIDE ASSEMBLAGE AT FRANKLIN, NEW JERSEY

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INTRODUCTION

Breithauptite, NiSb, was discovered recently during petrographic examination of two specimens from the nickel-arsenide assemblage at Franklin, New Jersey. The mineral previously was unknown from the locality and occurs as microscopic blebs with pararammelsbergite in areas where both minerals have replaced antimonian nickeline.

The nickel-arsenide minerals at Franklin were recovered from a single pocket in the late 1880s during the sinking of the Trotter shaft, below a mass of andradite at a depth of about 340 feet (Koenig, 1889). The amount of material in place was said to total several hundred pounds (Palache, 1935, p. 29), of which an unknown portion was recovered and preserved as specimens. Nickeline (NiAs) and rammelsbergite (NiAs₂) are the principal minerals of the assemblage, but the cobalt minerals safflorite (CoAs₂) and skutterudite (CoAs₂₋₃) are present also (Oen *et al*, 1984). The presence of nickel and cobalt minerals in such concentration at Franklin was unusual in that both elements are but trace constituents of the Zn-Mn-Fe orebody and, beyond this one occurrence, are essential to few of its minerals. Antimony, too, is represented by few species at Franklin; the discovery of breithauptite brings the total number to six, along with berthierite, cuprostibite, romeite, yeatmanite, and zinkenite.

DESCRIPTION

The specimens containing breithauptite are polished, cross-sectional slices about 10 x 7 cm in area through a dendritic mass of arsenides whose individual branches diverge upward and terminate in rounded protrusions embedded in coarse-grained calcite-fluorite gangue. The dendrites show a consistent outward zonation from nickeline at the base to the "white arsenides" pararammelsbergite, rammelsbergite, safflorite, skutterudite, and löllingite toward the tips. The breithauptite occurs within a narrow zone bordering nickeline and forms anhedral microscopic blebs, most less than 0.1 mm in maximum dimension, that are either embedded in pararammelsbergite or distributed along the contact of that mineral with nickeline.

Attention was first called to the breithauptite by its strong and distinctive pink to violet reflection pleochroism and, under crossed polars, its very strong to extreme anisotropism; these properties alone are sufficient to identify the mineral. Attempts to free a pure grain for X-ray study were unsuccessful due to the microscopic grain size of the mineral, and chemical data are not yet available because the U.S. Geological Survey microprobe remained nonfunctional during the course of our study. Nevertheless, the optical properties of breithauptite are so distinctive that "it can only be confused with niccolite" [nickeline] (Ramdohr, 1980, p. 625). Such confusion is precluded in the present instance by the occurrence of the two minerals side by side. Relative to nickeline the associated breithauptite shows stronger reflection pleochroism, more intense anisotropism, and a deep pink to violet rather than a coppery color.

TEXTURAL RELATIONS AND ORIGIN

Replacement and growth textures among the various minerals of the nickel-arsenide assemblage at Franklin were described at length by Oen *et al* (1984). To their information we append here only those observations specific to the occurrence of breithauptite.

Breithauptite in the samples studied is confined to the transition zone between nickeline and the "white arsenides", specifically to those areas where the original nickeline has been replaced by pararammelsbergite. Textural evidence for replacement includes corrosion of nickeline along its contact with the overlying pararammelsbergite and the presence within the pararammelsbergite of small, residual masses of nickeline in varying stages of preservation. Single grains of copper-colored nickeline partly altered to white pararammelsbergite are common within this zone. Elsewhere, where the overlying mineral is instead rammelsbergite, the nickeline is in sharply formed, euhedral crystals showing no evidence of reaction along their upper surfaces.

Breithauptite in the replacement zone occurs in minor amounts (<1%) in two associations. The first and most common is as nearly equant, clustered droplets and blebs 0.04 mm or less in di-

ameter, embedded in pararammelsbergite. The second is as isolated grains along the nickeline-pararammelsbergite contact, where the breithauptite forms elongated blebs as much as 0.11 mm in length with their long dimensions commonly parallel to the contact. Nowhere was breithauptite observed to be wholly enclosed by nickeline, nor was it anywhere observed not in contact with pararammelsbergite. These observations suggest that breithauptite, along with much of the pararammelsbergite, formed as a replacement product of the nickeline during growth of the dendrites. The microprobe data of Oen *et al* (1984) show the Franklin nickeline to contain 1.9-2.6% Sb, and so the occurrence of breithauptite in the replacement assemblage is not surprising.

ASSOCIATED MINERALS

Only brief descriptions of associated minerals are given below, pending examination of additional specimens. Species marked with an asterisk (*) have been confirmed by X-ray camera methods.

Arsenides and Sulfides

Gersdorffite, NiAsS: Identification tentative. Occurs along the fringes of the dendrites as small, isotropic cubes showing cubic cleavage. Reported also by Holmes (1945) and by Oen *et al* (1984) from other specimens as narrow growth layers from the interiors of the dendrites.

Löllingite, FeAs₂: Occurs along the outermost parts of the dendrites as a crust, typically over rammelsbergite, of elongated, tin-white grains projecting into the calcite gangue. Identified in other samples as nickeloan löllingite by Oen *et al* (1984) from microprobe data. Analogous material from our sample, however, gave for some grains an X-ray pattern matching that of safflorite, (Co,Fe)As₂. The two minerals are difficult to distinguish on the basis of optical properties. Probably both are present.

Nickeline, NiAs: Abundant as anhedral, granular aggregates in the basal parts of the dendritic mass; decreases in abundance upward in the growth direction of the dendrite lobes. Coppery red in color and thereby readily distinguished from the other arsenide minerals.

***Pararammelsbergite**, NiAs₂: A replacement product of nickeline. Occurs as white, untwinned, equigranular aggregates intergrown with sparse, minute grains of breithauptite within the replacement zone between earlier nickeline and later, overlying rammelsbergite.

***Rammelsbergite**, NiAs₂: Second in abundance after nickeline in the dendrites. Rims pararammelsbergite and nickeline in the lower part of the dendritic mass and forms the cores of den-

drite lobes in the upper part. Strongly resembles pararammelsbergite but shows several orientations of polysynthetic twin lamellae.

***Safflorite**, (Co,Fe)As₂: See löllingite for description. Occurs in outermost parts of dendrites; grayer in reflected light than underlying rammelsbergite and pararammelsbergite.

***Skutterudite**, (Co,Ni)As₂₋₃: Occurs locally along dendrite tips as a thin crust on rammelsbergite and also as small (0.9 mm) euhedral crystals embedded in calcite. White, but slightly darker than adjacent rammelsbergite, and isotropic.

Sphalerite, (Zn,Fe)S: Occurs as small (0.4 mm diameter), gray, translucent, anhedral grains either intergrown with the arsenides near the dendrite tips or embedded in calcite nearby.

Unknown mineral: Opaque; bluish gray in polished section; isotropic; estimated reflectivity about 30%. Rare; occurs as tiny grains <0.01 mm in maximum dimension within the pararammelsbergite replacement zone. Chemical data needed to establish identity with confidence; possibilities consistent with the limited optical data include tennantite, tetrahedrite, and vaesite, the latter two so far unknown from Franklin.

Oxides

Hematite, Fe₂O₃: Occurs in minute amounts as steel-gray masses intergrown with magnetite, along the contact between magnetite and the arsenide dendrites.

Magnetite, Fe₃O₄: Forms black grains 1.0-1.5 cm across, embedded in calcite near the dendrites and locally in contact with them.

Gangue minerals

Calcite, CaCO₃: The most abundant of the gangue minerals enclosing the arsenide dendrites. Coarse-grained, white to pale gray masses.

Fluorite, CaF₂: Occurs as coarse-grained masses several centimeters across. Color variable, from violet to pale brownish yellow.

Secondary weathering products

"Pimelite", (Ni,Mg)₃Si₄O₁₀(OH)₂: Not analyzed, but probably is the major component of the fine-grained secondary green material that lines grain boundaries and fracture surfaces in the calcite-fluorite gangue. Identified by Faust (1966) as the principle constituent of the material earlier described as desaulesite by Koenig (1889). Mentioned also by Oen *et al* (1984).

DISCUSSION

The nickel-arsenide assemblage at Franklin, discovered in the late 1880s, remains unique among

the area's mineral occurrences to this day. Despite—or perhaps because of—its highly abnormal nature, it was studied only infrequently after its initial description by Koenig (1889). Nickeline was recognized early by virtue of its distinctive coppery color, but the associated white arsenides for decades thereafter were thought to be a single mineral, chloanthite, with idealized composition NiAs_2 . The listings by Dana (1892) and Kemp (1893) of rammelsbergite and smaltite (=skutterudite) among the minerals of the Franklin deposit provided some early suggestion of mineralogic complexity in this assemblage, but these were regarded by Palache (1935) as probable mistakes for chloanthite until the X-ray diffraction work of Holmes (1935, 1945) proved otherwise. Decades more passed until the publication of a detailed account of the textural relations and chemical composition of the various minerals of this interesting assemblage (Oen *et al.*, 1984); it was at this time that the presence of antimony in more than trace amounts was documented.

That breithauptite remained unnoticed for 100 years following the discovery of nickel minerals at the Trotter mine doubtless is attributable to its microscopic grain size, restricted distribution in a narrow replacement zone, and its presence in no more than accessory amounts. It cannot be seen with a hand lens, nor is it readily viewed with low-magnification stereoscopic microscopes; magnifications of $>150\times$ with an ore microscope and a polished section are required for effective study. To date we have verified the presence of breithauptite in two specimens and strongly suspect its presence in a third. The

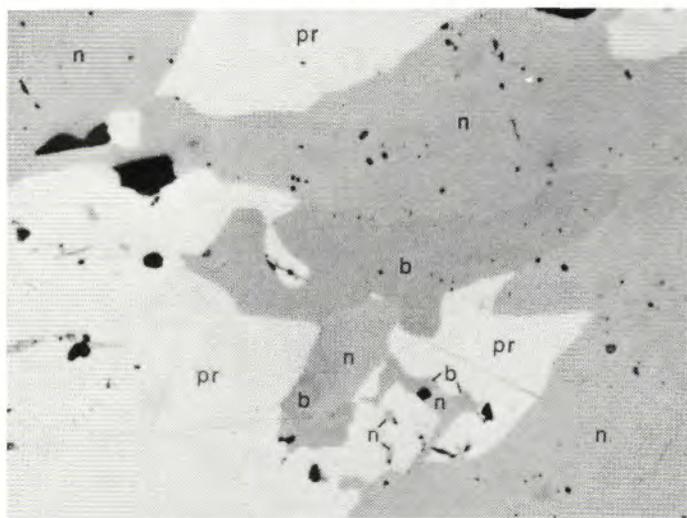


Figure 1. Anhedral grains of breithauptite (b, medium gray) in contact with nickeline (n, pale gray) and pararammelsbergite (pr, white). Long dimension of largest breithauptite grain is 0.10 mm. Black areas are pits in polished surface.

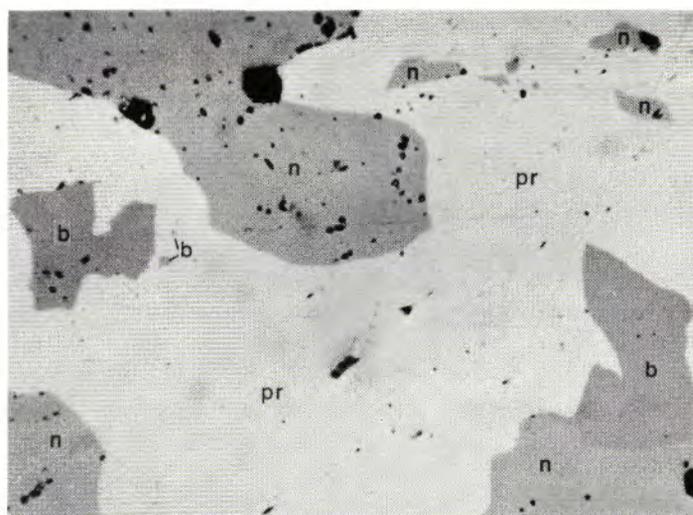


Figure 2. Irregular grains of breithauptite embedded in pararammelsbergite (left side of photo) and locally in contact with nickeline (right side of photo). Small masses of unreplaced nickeline surrounded by pararammelsbergite appear in upper right. Symbols as in Figure 1. Narrow lines crossing photo are polishing scratches. Width of horizontal field of view is 0.14 mm.

specimens described here are #LA275 from the collection, now dispersed, of Lee Areson and #226 in the collection of Richard Hauck of Bloomfield, New Jersey. A third specimen, not examined by us but which probably also contains breithauptite, was illustrated in the Spring/Fall issue of *The Picking Table*, 26, page 15 (1985), and is housed at Harvard University under catalog #117576. All three specimens so nearly match in details of dendrite form and matrix texture that they obviously derive from the same large mass, separated only by the width of a saw cut.

ACKNOWLEDGEMENTS

The assistance of Richard Hauck in providing material for study is much appreciated. We acknowledge also the helpful comments of Peter J. Modreski, Pete J. Dunn, and James C. Cole.

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* * * * *

CALCSILICATES FROM THE 1680 LEVEL OF THE STERLING MINE

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Early in the summer of 1977, the author observed some interesting calcsilicate specimens from Sterling Hill which included grossular, vesuvianite, wollastonite, and violet-red apatite. The majority of the specimens were collected by the mine geologist, Bob Svecz, at the 1680 level of the Sterling Mine, Ogdensburg, New Jersey. The author recalls no more than two dozen specimens having been recovered.

The assemblage is in white calcite which gives no discernible response under ultraviolet radiation. Tan grossular is abundantly dispersed throughout the calcite as grains and masses to about 1cm. Scattered throughout the matrix are grains and cleavage masses of green to bluish-green diopside. Finally, variable amounts of vesuvianite, graphite, apophyllite, fluorapatite, and wollastonite occur in some specimens. Identity of all species was made by X-ray powder diffraction (CuK α radiation) using published JCPDS data for comparison. Descriptions of the interesting accessory minerals are given below:

Apophyllite (fluorapophyllite?)

$KCa_4Si_8O_{20}(F,OH)\cdot 8H_2O$: druses of pearly-white platy crystals to 1mm liberally coating shallow solution cavities (uncommon).

Fluorapatite

$Ca_5(PO_4)_3F$: dull violet-red masses and

* * * * *

crude crystals to 1cm (uncommon).

Graphite

C : gray flakes and platy masses scattered in calcite (common).

Vesuvianite

$Ca_{10}Mg_2Al_4(SiO_4)_5(Si_2O_7)_2(OH)_4$: brownish-yellow grains and anhedral crystals to about 3mm scattered throughout calcite (moderately common).

Wollastonite

$CaSiO_3$: small white masses scattered in calcite-grossular. Although generally uninteresting, one or two notable specimens consisting of prolific silky white cleavable masses to 5cm in calcite were recovered. The wollastonite fluoresces an attractive light orange under short-wave, and very pale yellow under longwave, ultraviolet radiation.

The described calcsilicate assemblage is consistent with a metamorphic origin. All minerals were previously known from the Franklin mines. To the author's knowledge, this is the only known occurrence of vesuvianite from Sterling Hill. It is also the source of several excellent wollastonite and apophyllite specimens from this unique deposit.

MANGANPYROSMALITE CRYSTALS FROM OGDENSBURG, NEW JERSEY

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Abstract

Crystals of manganpyrosmalite are documented for the first time from the zinc-manganese deposits of Ogdensburg, New Jersey. They occur along the periphery of a sphalerite pod within the orebody of the Sterling Mine. Electron microprobe analysis showed the crystals to be an intermediate composition of the pyrosmalite series, averaging FeO=20.87 wt% and MnO=30.77 wt%. Indices of refraction were determined to be $\omega=1.680(2)$ and $\epsilon=1.647(2)$, and $D_{\text{meas}}=3.13$. Unit cell dimensions were determined to be $a=13.39(1)\text{\AA}$ and $c=7.13(1)\text{\AA}$.

Introduction

Manganpyrosmalite, $(\text{Mn}, \text{Fe}^{+2})_8\text{Si}_6\text{O}_{15}(\text{OH}, \text{Cl})_{10}$, is a member of the pyrosmalite group which also includes ferropyrosmalite $(\text{Fe}^{+2}, \text{Mn})_8\text{Si}_6\text{O}_{15}(\text{Cl}, \text{OH})_{10}$, schallerite $(\text{Mn}^{+2}, \text{Fe}^{+2})_8\text{Si}_6\text{As}(\text{O}, \text{OH}, \text{Cl})_{26}$, nelenite $(\text{Mn}, \text{Fe}^{+2})_{16}\text{Si}_{12}\text{As}_3^{+3}\text{O}_{36}(\text{OH})_{17}$, friedelite $\text{Mn}_8\text{Si}_6\text{O}_{15}(\text{OH}, \text{Cl})_{10}$, and mcGillite $(\text{Mn}, \text{Fe}^{+2})_8\text{Si}_6\text{O}_{15}(\text{OH})_8\text{Cl}_2$. All members have layered structures with stacking variations along the c-axis direction. McGillite shows considerable stacking disorder and a high chlorine content (6.36 wt%) Donnay *et al.* (1980). Schallerite contains significant As^{+3} in substitution for silicon which has not been noted in other members of the pyrosmalite group except for nelenite. In general, all the minerals contain Mn^{+2} and/or Fe^{+2} as the major cation, and OH and Cl in varying amounts. Donnay *et al.* (1980) provides an excellent summary of the chemical analyses and crystal data of the pyrosmalite group minerals.

The pyrosmalite series is divided into two members, ferropyrosmalite ($\text{Fe} > \text{Mn}$) and manganpyrosmalite ($\text{Mn} > \text{Fe}$) (Fron del and Bauer, 1953; Vaughan, 1986). Many recent authors have not adopted the usage of the name manganpyrosmalite even though their compositions had $\text{Mn} > \text{Fe}$. Consequently it appears from the literature that pyrosmalite (ferropyrosmalite) is common with respect to manganpyrosmalite when, in fact, the opposite is true.

The pyrosmalite series is most frequently found

in metamorphosed-metasomatized Fe-Mn deposits associated with sulfides. An exception is found at Nant Francon, North Wales, where pyrosmalite occurs in an iron-rich slate in contact with an intrusive rhyolite (Brown, 1959). A search of the literature revealed that the $\text{Mn}/(\text{Mn} + \text{Fe})$ ratios of the pyrosmalite series range from 0.413 to 0.850.

In 1980, one of the authors (FJP) identified crystals of a member of the pyrosmalite series by X-ray powder diffraction in a sample supplied by Mr. Ewald Gerstmann of Franklin, New Jersey. Because the powder patterns of the minerals ferropyrosmalite and manganpyrosmalite are very similar, the crystals were analysed by electron microprobe techniques and the optical properties determined in order to ascertain their true identity. It was determined the crystals were manganpyrosmalite. This is the first occurrence of euhedral manganpyrosmalite at the Sterling Mine, and they are significantly different in composition from the original Sterling Mine occurrence of massive manganpyrosmalite described by Fron del and Bauer (1953). This is shown in Table I.

Occurrence

The manganpyrosmalite crystals occurred on the 1400 level of the Sterling Mine in an area designated as the hanging wall drift. The crystals were found along a pod, approximately 25cm in diameter, of dark gray sphalerite in a wall of white calcite. The red fluorescence of the calcite gangue under shortwave ultraviolet radiation, which is seen only in or near the orebody where the manganese activator is present, locates the pod within the orebody proper even though no ore minerals were in association. The dark sphalerite veins at the Sterling Mine are thought to be hydrothermal in origin. Although their exact age is not known, these veins postdate the ore minerals, franklinite and willemite.

Because of limited exposure by mining operations, less than a dozen specimens and some micromounts were recovered. Calcite covering

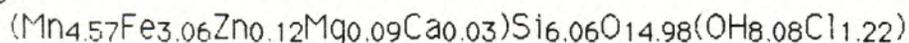
Table I. Microprobe Analyses of Sterling Mine Manganpyrosmalite Crystals.

	1	2	3	4	Average* ³	Fron del and Bauer(1953)
SiO ₂	34.41	34.83	34.14	34.98	34.59	34.13
FeO	21.97	20.65	21.27	19.58	20.87	12.43
MnO	31.34	31.27	29.54	30.94	30.77	39.09
ZnO* ¹	0.91	0.91	0.91	0.91	0.91	1.94
MgO	0.33	0.38	0.36	0.38	0.36	0.74
CaO	0.20	0.19	0.19	0.20	0.19	nil
H ₂ O* ²	7.62	7.50	7.60	7.40	7.53	8.18
Cl	3.78	4.26	3.86	4.62	4.13	3.80
Σ	100.56	99.99	97.87	99.01	99.35	100.44* ⁴
OH=Cl	-0.85	-0.96	-0.87	-1.04	-0.93	-0.86
Σ	99.71	99.03	97.00	97.97	98.42	99.58

*1. Average from wet chemical analysis.

*2. Calculated based upon Σ (OH + Cl) = 10.

*3. Formula from average:



*4. Includes 0.13% As₂O₅.

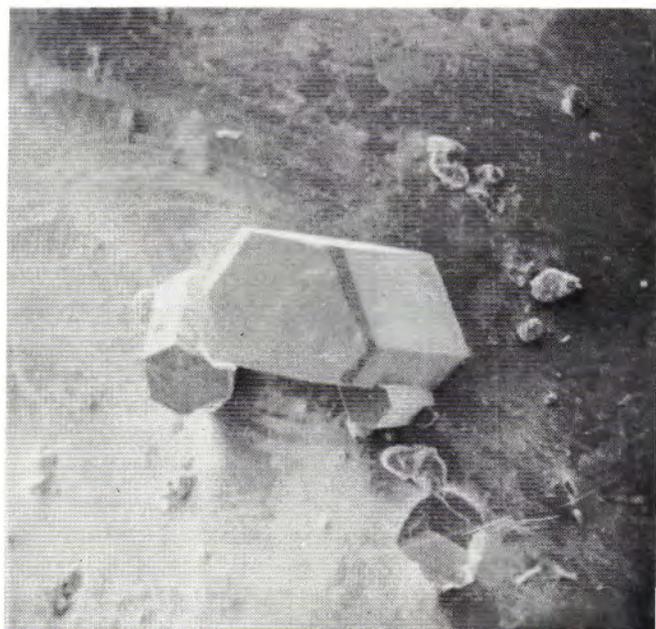


Figure 1. Euhedral manganpyrosmalite crystal from the 1400 level, Sterling Mine, Ogdensburg, New Jersey, showing an unusual bevelled termination, 100X. SEM (Scanning Electron Microscope) photograph by Robert Honeycutt.

the manganpyrosomalite crystals was removed by an aqueous solution of 5% hydrochloric acid. The crystals were found either in the sphalerite, or along its periphery in the calcsilicate rims. In the latter case, they are set on either crusts of tiny sphalerite tetrahedra or green diopside druses with bladed calcium-magnesium amphiboles.

Physical properties

The manganpyrosomalite crystals usually consist of simple hexagonal prisms in combination with the basal pinacoid, and rarely exceed 2mm in length. They are transparent, and pink to orange in color. There was no observable response under ultraviolet radiation. A few crystals were observed to contain minute black inclusions of an unidentified mineral. Density was determined using the Berman Balance to be 3.13 gr/cm³. Lattice cell parameters were determined by precession camera methods to be $a = 13.39(1)$ and $c = 7.13(1)$ Å. A photograph of a crystal is found in Figure 1.

The indices of refraction were measured employing a tungsten filament light source at 22°C with a quartz wedge monochromatizer and Supper spindle stage. The oils were recalibrated prior to measurement. The indices were: $\epsilon = 1.647 \pm 0.002$ and $\omega = 1.680 \pm 0.002$.

The range of values for the pyrosomalite series in the literature for ϵ is 1.631 to 1.650, while ω varied from 1.662 to 1.682. The values in this study fall toward the higher end of these ranges, but are similar to those given by Winchell (1951) and by Stillwell and McAndrew (1957).

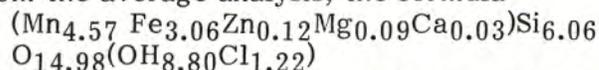
The Gladstone-Dale relationship was calculated for the average analysis obtained in this work. Using the k values of Mandarino (1976), K_C and K_P were determined to be 0.219 and 0.210, respectively. $1 - (K_P/K_C)$ gave a value of 0.041, indicating good agreement between the chemical and physical data.

Chemistry

The manganpyrosomalite crystals from the Sterling Mine were analysed using a nine - spectrometer ARL-SEQM automated electron microprobe operating at 15kV with a beam current of 15 milliamps. Standards for the major elements were Tiburon albite for silicon, norbergite for magnesium, synthetic Ba-chlorapatite for calcium, Marjalahti forsterite for iron, and synthetic tephroite for manganese. In addition, the elements aluminum, potassium, sodium, chromium, titanium, barium, fluorine, sulphur, phosphorus, and strontium were analysed for,

but were either not present or present in insignificant amounts. Arsenic was analysed for semi-quantitatively, but was not present. The microprobe data were calculated on a basis of 25 (O,OH,Cl). The data were corrected by computer using the procedure of Bence and Albee (1968). Zinc was determined by Galbraith Laboratories, Knoxville, Tennessee, using wet chemical methods. Hydroxyl was calculated from the observed analyses assuming $\Sigma(OH+Cl)=10$.

Microprobe analyses of four points on the manganpyrosomalite crystals are given in Table 1. There was no aluminum or arsenic substituting for silicon, and no fluorine in place of chlorine. A line-scanning analysis on one crystal confirmed compositional homogeneity within that crystal. Mn/(Mn + Fe) varied between 0.580 and 0.612. The Sterling Mine crystals are an intermediate compositional member of the pyrosomalite series. With Mn > Fe, they are manganpyrosomalite. From the average analysis, the formula



was derived, which is in good agreement with the accepted formula. The observed M:Si ratio was 1.30 compared with the ideal value of 1.33. The low observed value may result from a low zinc analysis caused by a lack of adequate sample for analysis.

Acknowledgments

The authors wish to thank Mickey Gunter and Todd Solberg for their technical assistance. We also thank Dr. John Speer and Dr. Carl A. Francis for a critical reading of the original manuscript and their many helpful suggestions.

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* * * * *



THE "DRILL-HOLE" FRANKLINITE

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In the extensive collection of Franklin-Sterling Hill mineral specimens at Harvard University, there are few that have the curiosity value of HU-119692, the "drill-hole" franklinite. This unusual specimen consists of a group of franklinite octahedrons, slightly modified by the dodecahedron, the largest measuring about four inches on the side. These crystals are perched on a matrix composed of white calcite, red willemite, and grains of franklinite. The specimen measures 8 x 6 x 5 inches. At top center of the specimen are two franklinites, the larger one more or less in the center, while the smaller one sits to its left. Both are partially pierced by the drill hole which passes horizontally through the left side of the larger, and through the body of the smaller crystal. At the bottom side of the horizontal hole, the contact of the two crystals is revealed where they crystallized in the creamy white calcite. Figure 1 is a rough plan drawing of the two crystals depicting their juxtaposition.

The specimen sits in a large wall cabinet just below eye-level, making the drill hole immediately apparent to the viewer. Visitors are usually delighted to see such an anomaly as this museum-class specimen with a hole in it. Those familiar with rocks, minerals, and mining operations are usually mystified. How did such a specimen ever survive the drilling, the impact of the blast, the crush of the falling ore, or the scrabbling of recovery?

The story begins in 1976 when Jim Kaufmann of Jim's Gems acquired the piece from a miner

named Bill Bihn. Reportedly, Bihn had found the piece stashed away near one of the stations close by the shaft. As a cageman, he had access to all the levels down to 1850'. Who had put it aside? Where had it been originally stashed? It may have, like some especially unusual specimens, passed through the hands of several miners who, one after the another, had found it in one secret cache and re-stashed it in another for later recovery, only to find it gone when the time came to 'liberate' it. In any case, Bihn got the specimen to Jim Kaufmann, and Kaufmann sold it to the Harvard Mineralogical Museum where it now resides.

The author, at the behest of Carl Francis, undertook to track the specimen's history as best it could be established. After some futile exercises with telephone and letter, the writer was fortunate enough to find that Richard C. Bostwick knew something about its history. Bostwick generously offered to do a little more research on the question to fill in some of the blanks. His efforts, together with his encyclopedic knowledge of Franklin-Sterling Hill mineral occurrences and associations, and area specimens (both usual and unusual), assured the best possible answer would emerge.

The pertinent parts of the story are found in these paragraphs taken from his letter to me: "Don Phister was (then) a section boss, in the Middle Section. He thinks the specimen was found in mid-1976, in 1020 Stope four cuts below the 1300 Level. There were apparently several

areas of coarsely crystallized calcite very rich in large franklinite crystals. Don remembers that one or more areas were hit every other cut (a cut = about 10') on the way up from 1400 Level, and that every time they were found, all work stopped for collecting. One of the franklinite 'patches' he remembers was at least 4' x 6' in size. He also remembers barring down a crystal 3" on an edge and selling it (later). Perhaps a more vivid memory is that of missing one on the underside of a chunk which he threw to Bill Jennings, one of the miners in the stope; Don saw the crystal as the chunk left his hand. That specimen, which might be called the 'Hey, Bill, check this out ...oops!' specimen, is now in the Pinch Collection."

broke loose while a round was being fired in the stope but before the firing sequence had reached THAT hole, and that it was found on the top of the muck pile when the miners went back in to see what the blast had done and wash down the muck to quell the fumes from the blasting. The explosive they were using was a mixture of ammonium nitrate with fuel oil. (It is also possible that the drill hole had been made to hold a roof bolt, in which case there never would have been any explosive in the hole.)"

I wanted to talk to the man who was on the scene when the specimen might have been found. I called Don Phister (as Bostwick had suggested) and Don reiterated essentially what he had told to Bostwick. However, it gave me the opportunity to get some more background and I'm a glutton for background!

Don had worked in the Ogdensburg mine for some time before becoming the section boss. In this time, he had often been distressed to see good specimens hauled away when the section boss, unsympathetic to specimen retrieval, would not allow the men on his crew to rescue a piece or two. When Don became section boss, he allowed his men a few minutes after each charge was blown to check for specimen material. (He maintains he had a happier and more productive crew as a result.) It was during this kind of interval or break to check out what the charge had brought down that the scene, which he had described to Bostwick, took place. More than likely, it was this kind of tableau -- the men moving into the smoky darkness of the stope, lights moving around the new interior space and the muck pile, the hoses splashing water on newly exposed ore -- in which someone spotted the franklinite crystals. Probably there was a moment's hesitation when the miner realized that the crystals were less than perfect, and it almost was thrown back on the pile, but the strangeness of the piece stopped the rejection, and better judgment dictated that it be saved. Probably we will never know -- but we can have fun with the speculation.

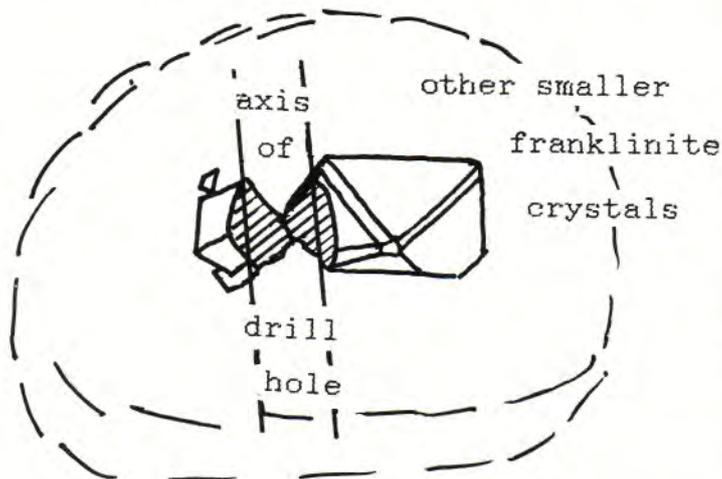


Figure 1. The "drill-hole" franklinite specimen as seen from above. Not to scale. Hand sketch by F.W. Miller.

Bostwick, at another point says "Don did not see the Drill Hole (specimen) at the time, nor is he sure exactly where it came from in the stope."

So we are left with a bit of unknown -- with the presumably explosive-packed drill hole right through it, how could this specimen have survived? Bostwick goes on to look at the possible reasons: "The reason given for the survival of the piece was that the rock containing it

* * * * *

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* * * * *

from the Editor's Desk

Omer S. Dean
10 Bumble Bee Lane
Norwalk, CT 06851

Needed: An Editor or two Co-Editors

The next issue of this journal will be my last as your Editor. FOMS needs a capable person or persons to become familiar with the Editor's function and the Society's equipment (current or new) during the preparation of the next issue. Following publication of the next issue, the person or persons will assume the role of Editor or Co-Editor as the case may be. I am willing to continue as a member of the Editorial Board. A smooth transition is in the best interests of *The Picking Table* and the Society. Interested persons should contact me at the address above.

A new column—"Peripherals"

We have several columns now which appear irregularly in *The Picking Table*. Examples are "Harvard Corner" and "Franklin Yesterdays".

* * * * *

In this issue a new column called "Peripherals" will debut. An appreciation of Franklin-Sterling Hill and its minerals can be increased in numerous ways. Among these is knowing more about the mineral world outside the Franklin area (by way of contrast), and more about peripheral activities (hence, the name) of mineral collecting, which make it a meaningful whole. The amount of space dedicated to this column must be kept small. View it as the "lighter" touch in an otherwise "somewhat heavy" and "insular" journal. This issue contains two brief articles by Dr. Alfred Standfast. One deals with photomicrography, the other is a biographical sketch. A possible future article deals with understanding the use of Miller indices. Read, learn, and enjoy!

PERIPHERALS

PART 1.

IMPROVED PHOTOMICROGRAPHY

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Binghamton, NY 13905

Frequently I'm asked questions about the equipment I use for photographing Franklin micros. The following are some of the salient points.

The objective lens is the essential element of the simple microscope. If it contains an iris diaphragm, marked improvement in the depth of field should result, along with a sharper image. Various focal lengths are available (80mm, 50mm, 35mm, 20mm, etc.) and all have diaphragms. With a proper adapter, the objective can be mounted on an auto-bellows, the length of which can be varied more or less, about 16cm.

An ocular mounted on top of the bellows makes a compound microscope (Figure 1). For photomicrography, different magnification photo-oculars (2.5X, 5x or greater) will vary the size of the image. The assembly must be mounted on a rigid, vertical stand.

A 35mm reflex camera without a lens may be mounted on a bellows above the compound microscope assembly (Figure 2). Focusing is best accomplished using a specimen holder that can be varied in height, rather than adjusting the entire assembly. *(Continued on page 20)*

THE FRANKLIN-STERLING HILL AREA MINERAL SPECIES LIST (12/31/89)

Key: Species followed by dates were first described from this area during the year indicated. Species in boldface type remain unique to the area. An asterisk indicates further confirmation is required.

Acanthite	Canavesite	Fluoborite
Actinolite	Carrollite	Fluorapatite
Adamite	Caryopillite	Fluorapophyllite
Adelite	Celestine	Fluorite
Aegirine	Celsian	Forsterite
Akrochordite	Cerussite	Franklinfurnaceite -1987
Albite	Chabazite	Franklinite -1819
Allactite	Chalcocite	Friedelite
Allanite-(Ce)	Chalcophanite -1875	Gageite- 1910
Alleghanyite	Chalcopyrite	Gahnite
Almandine	Chamosite	Galena
Analcime	Charlesite -1983	Ganomalite
Anandite	Chlorophoenicite -1924	Ganophyllite
Anatase	Chondrodite	Genthelvite
Andradite	Chrysocolla	Gersdorffite
Anglesite	Clinochlore	Gerstmannite -1977
Anhydrite	Clinochrysolite	Glaucochroite -1899
Annabergite	Clinoclase	Goethite
Anorthite	Clinohedrite -1898	Gold
Anorthoclase	Clinohumite	Goldmanite
Antlerite	Clinzoisite	Graphite
Aragonite	Clintonite	Greenockite
Arsenic	Conicalcite	Grossular
Arseniosiderite	Connellite	Groutite
Arsenopyrite	Copper	Grovesite
Atacamite	Corundum	Guerinite
Augite	Covellite	Gypsum
Aurichalcite	Cryptomelane	Haidingerite
Auroraite	Cuprite	Halloysite*
Austinite	Cuprostibite	Halotrichite
Azurite	Cuspidine	Hancockite -1899
Bakerite	Datolite	Hardystonite -1899
Bannisterite -1968	Descloizite	Hastingsite
Barite	Devilline	Hauckite -1980
Barium-pharmacosiderite	Digenite	Hausmannite
Barylite	Diopside	Hawleyite
Barysilite	Djurleite	Hedenbergite
Bassanite	Dolomite	Hedyphane
Bastnaesite-group mineral	Domeykite	Hematite
Baumhauerite	Dravite	Hematolite-like mineral
Bementite -1887	Dypingite	Hemimorphite
Berthierite	Edenite	Hendricksite -1966
Biotite	Epidote	Hercynite
Birnessite	Epsomite	Hetaerolite -1877
Bornite	Erythrite	Heulandite
Bostwickite -1983	Esperite -1965	Hexahydrite
Brandtite	Euchroite	Hodgkinsonite -1913
Breithauptite	Eveite	Holdenite -1927
Brochantite	Fayalite	Huebnerite
Brookite	Feitknechtite -1965	Humite
Brucite	Ferrimolybdite	Hyalophane
Bultfonteinite	Ferristilpnomelane	Hydrohetaerolite -1935
Bustamite	Ferro-axinite	Hydrotalcite
Cahnite -1927	Flinkite	Hydroxyapophyllite
Calcite	Fluckite	Hydrozincite

Illite	Natrolite	Serpierite
Ilmenite	Nelenite -1984	Siderite
Jacobsite	Neotocite	Sillimanite
Jarosewichite -1982	Newberyite	Silver
Jerrygibbsite -1984	Niahite	Sjogrenite
Johannsenite -1938	Nickeline	Skutterudite
Johnbaumite -1980	Nontronite	Smithsonite
Junitoite	Norbergite	Sonolite
Kaolinite	Ogdensburgite -1981	Spessartine
Kentrolite	Ojuelaite	Sphalerite
Kittatinnyite -1983	Orthochrysotile	Spinel
Koettigite	Orthoclase	Starkeyite
Kolicite -1979	Orthoserpierite	Sterlinghillite -1981
Kraisslite -1978	Otavite	Stilbite
Kutnohorite	Oyelite-like-mineral	Stilpnomelane
Larsenite -1928	Parabrandtite -1987	Stilpnomelane (Mn-dominant)
Laumontite	Pararammelsbergite	Strontianite
Lawsonbauerite -1979	Parasymplesite	Sulfur
Lead	Pargasite	Sussexite -1868
Legrandite	Pectolite	Svabite
Lennilenapeite -1984	Petedunnite -1987	Synadelphite
Leucophoenicite -1899	Pharmacosiderite	Talc
Linarite	Phlogopite	Tennantite
Liroconite	Picropharmacolite	Tephroite -1823
Lizardite	Pimelite	Thomsonite
Loellingite	Powellite	Thorite*
Loseyite -1929	Prehnite	Thortveitite
Magnesiohornblende	Pumpellyite-(Mg)	Tilasite
Magnesioriebeckite	Pyrite	Tirodite
Magnesium-Chlorophoenicite -1924	Pyroaurite	Titanite
Magnetite	Pyrobelonite	Todorokite
Magnussonite	Pyrochroite	Torreyite -1929
Malachite	Pyrophanite	Tremolite
Manganaxinite	Pyroxmangite	Turneaureite -1985
Manganberzeliite	Pyrrhotite	Uraninite
Manganese-hoernesite	Quartz	Uranophane
Manganhumite	Rammelsbergite	Uranospinite
Manganite	Realgar	Uvite
Manganosite	Retzian-(La) -1984	Vesuvianite
Manganpyrosomalite -1953	Retzian-(Nd) -1982	Villyaellenite
Marcasite	Rhodochrosite	Walkilldellite -1983
Margarite	Rhodonite	Wendwilsonite -1987
Margarosanite -1916	Richterite	Willemite -1824
Marialite	Riebeckite	Wollastonite
Marsturite -1978	Roebblingite -1897	Woodruffite -1953
Mcallisterite	Romeite	Wulfenite
Mcgovernite -1927	Rosasite*	Wurtzite
Meionite	Roweite -1937	Xenotlite
Melanterite*	Rutile	Yeatmanite -1938
Metalodevite	Safflorite	Yukonite
Metazeunerite	Sarkinite	Zinalsite -1958
Microcline	Sauconite	Zincite -1810
Mimetite	Schallerite -1925	Zinkenite
Minehillite -1984	Scheelite	Zircon
Molybdenite	Schorl	
Monohydrocalcite	Sclarite -1989	
Mooreite -1929	Scorodite	
Muscovite	Seligmannite	
Nasonite -1899	Sepiolite	

SPECIES TOTALS

333 confirmed; 4 need further confirmation; 65 first described from area; 33 unique to area

The Sterling Hill Mining Company

[Editor's Note: This article is in large part a compilation of information abstracted from the Bob Jones articles in the August and December, 1989, issues of *Rock & Gem* and from Elaine Rose's article in the *New Jersey Sunday Herald*, dated Oct. 8, 1989.]

Introduction

The names Richard and Robert Hauck now take their place alongside names from the past such as William Alexander (Lord Stirling to you), Elias Ogden, Dr. Sam Fowler and his son, Col. Sam Fowler, Ashley Ball, John Farley, and others as owners of the properties encompassing Sterling Hill. Likewise, the Sterling Hill Mining Company takes its place with such company names as Sussex Zinc & Copper Mining & Manufacturing, the Passaic Mining Company, the Passaic Zinc Company, and the New Jersey Zinc Company. The purposes of these individuals and companies,

however, were not always the same. It is not exploitation of the mineralization that preoccupies the current owners and company; rather, it is the preservation of the site as a museum—a living reminder of the contribution of the mining industry to the history and economy of the area.

The scenario leading to the acquisition may be summarized as follows: The New Jersey Zinc Company ceased active operations on Good Friday, 1987, because of low zinc prices and high operating costs, a portion of which they attributed to local taxation. NJZ maintained only their water pumping operations until they made their decision to close the mine. Then NJZ salvaged equipment from the depths of the mine, sealed shafts, and removed contaminants during the months of November and December, 1987. NJZ abandoned the property still owing \$1.1 million in taxes to the Borough of Ogdensburg. The



Figure 1. Sterling Hill, footwall of east limb in foreground, cross member buckling in background, as viewed over the Passaic Pit. Bernie Kozykowski photo, 2/19/89.

Borough foreclosed on the NJZ property early in 1988 and spent the next year reviewing numerous development proposals for the 70-acre tract. Finally, bids were taken on the property and the sale was consummated in mid-June, 1989. The Borough received \$1,415,000 from a group composed of Sterling Hill Mining (the Haucks), Barki Associates, and Phillips Enterprises. The Haucks paid \$750,000 for their 30-acre tract. Eventually the Hauck holdings were reduced to 18 acres via a sale to Phillips. Phillips Enterprises plan to build a commercial, industrial park, and Barki Associates plan to operate a well care facility for the elderly.

Status of the property

The mine buildings have been well maintained and the Haucks have put new roofing on those needing it. The "Change House", with its wire baskets hanging from the ceiling, is unchanged. Much of the underground workings are just as the miners left them. The temperature in the mine is 56°F year round; thus, winter has no bearing on the various underground clean up operations which are in progress. Excavation operations, spearheaded by a group of former NJZ employees, uncovered a sealed underground complex during early August, 1989. This 6000 square foot complex, built circa 1915 and abandoned in the late 40's, housed the bosses' lunch room, separate changing rooms for miners and mill workers, and equipment storage rooms. [It is planned that this excavated area be refurbished and opened up to visitors within a few years.]

The water level in the mine is rising at a rate of 1 foot per day. It is estimated that 66 gallons of water were pumped every minute into the Wallkill River when the mine was operating. Last October, for instance, the water was up to the 1350' level — that's 1500 feet above the bottom of the mine. Dick Hauck wants to keep the mine dry down to the 500' level and indicates that he will apply to the EPA for a permit to pump water at the rate necessary to accomplish this.

The Plan

In cryptic terms, the purpose is to preserve, protect, and provide access to the orebody. The Haucks, with their creative flair, envision further study of the deposit by the scientific community, underground mine tours conducted by former NJZ miners, displays of mining equipment and memorabilia, walk-in adits, a gift shop, a food concession (located in the former NJZ offices), a nature trail, and a picnic area. Most importantly, the Haucks are determined that



Figure 2. The loading tanks at Sterling Hill (note railroad tracks have been removed). Bernie Kozykowski photo taken 2/19/89.

their Sterling Hill Mining Company will not be an adversary of the Franklin Mineral Museum but, instead, serve in a complimentary role.

An immediate goal is to complete the extension of an existing tunnel through to the surface, where it will overlook the Passaic Pit. This tunnel (180 feet long) will be fitted with huge UV lamps and be called the "Rainbow Tunnel". Dick Hauck indicates (personal communication) that July 1, 1990, is the target date for being open to the public. In the distant future, plans are the construction of an amphitheatre in one of the open mine pits, and the expansion of the nature trails.

Some observations

Bob Jones described several of the things he encountered during his October '89 visit to Sterling Hill in *Rock & Gem*, 19, #12, pages 32-34, 36, and 73. He speaks of the green-fluorescing red willemite in 500 Stope, then mentions a zone of blue-fluorescing hydrozincite in a tunnel situated at an angle to 500 Stope. Climbing to another level, Bob encounters orange-fluorescing wollas-

Figure 3. (Upper right) The Mill and its many loading tanks at Sterling Hill, Ogdensburg, N.J., December, 1915. Photo courtesy the archives, the Franklin Mineral Museum.

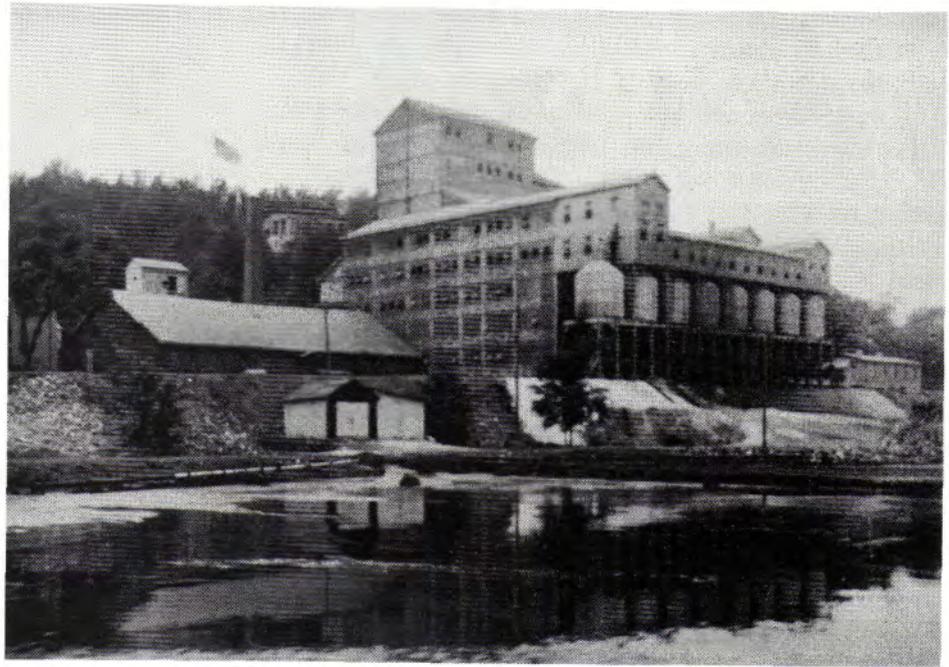
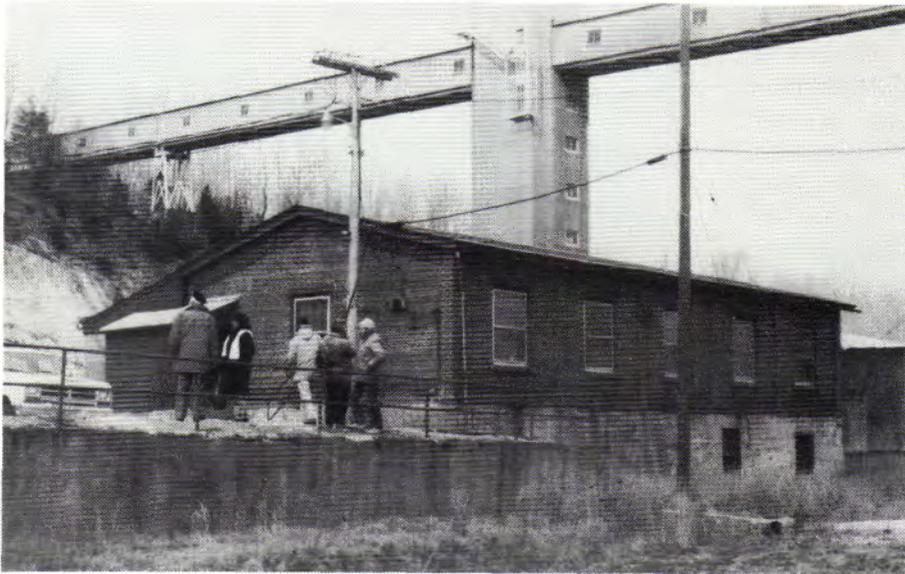


Figure 4. (Center left) The Mine Superintendent's office, Sterling Hill, Ogdensburg, N.J. Bernie Kozykowski photo, 2/19/89.



tonite. Breath-taking experiences in themselves, I'm sure. Then he relates that one could hear the fast flowing underground waters reaching the depths of the mine. Interesting to me, however, was his description of the postmining mineralization in one of the tunnels. There were stalactites of calcite (white, delicate, and straw-like) and snowy flows of calcite all created by the endless dripping and trickling of the waters. Obviously, there is something here for everyone to enjoy and appreciate. With 66 miles of tunnels in this 18 acre tract, it appears the Haucks can delight us with their creativity for many happy years to come.

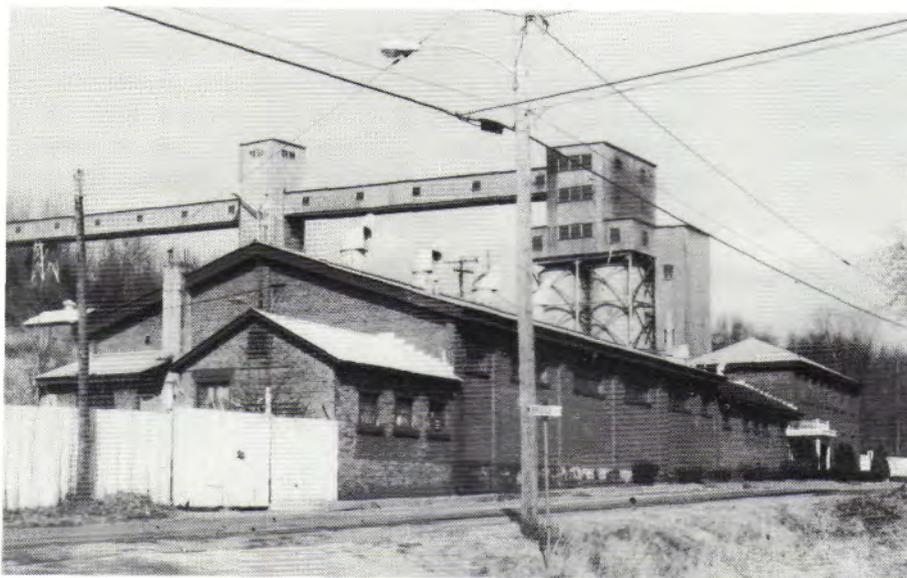


Figure 5. (Lower left) The "Change House", in the foreground, will be an important stop during guided tours in the future. B. Kozykowski photo, 2/19/89.

* * * * *

Mineral Notes

New To Science

Sclarite

An article entitled "Sclarite, a new mineral from Franklin, New Jersey, with essential octahedrally and tetrahedrally coordinated zinc: Description and structure refinement", written by Joel D. Grice, Mineral Sciences Division, National Museum of Natural Sciences, Ottawa, Ontario K1P 6P4, Canada, and Pete J. Dunn, Department of Mineral Sciences, Smithsonian Institution, Washington, D.C. 20560, appeared in the *Amer. Min.*, **74**, 1355-1359 (1989). The following is the authors' abstract of that article.

Abstract

Sclarite, ideally $(\text{Zn,Mg,Mn})_4\text{Zn}_3(\text{CO}_3)_2(\text{OH})_{10}$, is a new mineral species from the Franklin mine, New Jersey. It occurs as 1.5-mm clusters of clear, colorless crystals associated with leucophoenicite, gageite, zincite, and willemite. The mineral has a vitreous luster and white streak. It is brittle with no apparent cleavage and has a Mohs hardness of 3-4. Sclarite is biaxial positive with $\alpha = 1.648(1)$, $\beta = 1.664(1)$, $\gamma = 1.702(2)$, $2V_{\text{meas}} = 63.4(6)^\circ$, $2V_{\text{calc}} = 67^\circ$, with strong dispersion $r \gg v$. It is monoclinic, space group $A2/a$, with $a = 16.110(7)$, $b = 5.432(1)$, $c = 15.041(10)\text{\AA}$, $\beta = 95.490(4)^\circ$, and $Z = 4$. The strongest X-ray powder-diffraction lines are $[d(\text{\AA}), I, hkl]$ 7.50(10)(002), 3.75(4)(311,004), 3.63(5)(113,311), 3.53(4)(113,204), 3.398(2)(402), 2.934(2)(313), 2.621(5)(115), 2.500(4)(513,006). An electron-microprobe analysis gave FeO 0.1, MgO 6.7, MnO 4.2, ZnO 62.0, CO₂ 12.67 (calc.), H₂O 12.97 (calc.), total 98.6 wt%; $D_{\text{obs}} = 3.51(5)$ and $D_{\text{calc}} = 3.547 \text{ g/cm}^3$. The structure has been refined to $R = 0.069$. It is isostructural with loseyite, with Zn atoms occupying both the octahedral and tetrahedral sites. The mineral is named after Professor Charles B. Sclar of Lehigh University.

Editor's Note: The following is of interest to mineral collectors. The information is abstracted from the sections of the full article as indicated.

Introduction

Sclarite was found during a systematic examination of late-stage carbonates from Franklin. It is the Zn analogue of loseyite; also, it is a rare example of a mineral in which essential Zn is both octahedrally and tetrahedrally coordinated. The holotype specimen resides in the Smithsonian Institution, catalogue # NMNH B13671; a portion of this holotype specimen is in the National Museum of Natural Sciences, Ottawa, under catalogue #53777. There are no other known specimens. The new species is named for Dr. Charles B. Sclar, Professor of Geology, Lehigh University, in recognition of his long-standing interest in the genesis of this deposit, and the fact that he has supervised much of the recent sophisticated work on Sterling Hill primary ores.

Physical Properties

Sclarite forms in slightly divergent arrays; clusters measure 1.5-mm and single crystals 0.2-mm with the arrays appearing like very coarsely surfaced spherules. Sclarite crystals are platy on {001}, elongate parallel to [010], and have a minor {100} side pinacoid. Although individual sclarite crystals are colorless and transparent, aggregates have a grayish white, turbid appearance. Sclarite has no discernible fluorescence under LW or SW ultraviolet.

Occurrence

The matrix for sclarite is granular, calcite-free, willemite-franklinite ore, with minor zincite, and exhibiting minor shearing. The surface of the specimen appears weathered because it is coated unevenly with sparce leucophoenicite, sparce secondary zincite, and abundant, dense, microcrystalline, fibrous gageite. Perched upon these minerals are 1-mm spherules of light pink to grayish pink rhodochrosite, more gageite and chlorophoenicite, and these, in turn, are coated unevenly and sparsely with sclarite, which is intimately associated with secondary zincite and the soft, white, unnamed zinc-magnesium carbonate [described by P.J. Dunn, *Min. Record*, **17**, 126-127 (1986)]. Also present, in this secondary assemblage, is a fine dust-like dispersal of minute willemite.

* * * * *

Research Reports

Tourmaline

An article entitled "A reconnaissance of the boron isotopic composition of tourmaline", written by George H. Stewart, Department of Geological Sciences, Memphis State University, Memphis, TN 38152, and Paul B. Moore, Department of Geophysical Sciences, University of Chicago, Chicago, IL 60637, appeared in *Geochimica et Cosmochimica Acta*, **53**, 911-916 (1989). The following is the authors' abstract of that article.

A preliminary investigation of the boron isotopic composition of tourmaline from some boron-rich associations has been made. The results for tourmaline from metasedimentary parageneses (n=12) range from $\delta^{11}\text{B} = -22$ to $+22$ per mil. These data mainly fall between the boron isotopic compositions of normal marine sediments with $\delta^{11}\text{B} = -2$ to $+5$ per mil and seawater with $\delta^{11}\text{B} = +39.5$ per mil. Tourmaline samples from granitic pegmatites (n=6), on the other hand, range from $\delta^{11}\text{B} = -12$ to -5 per mil. The data provide a rudimentary indication of the range of boron isotopic variation in tourmaline, some of the processes leading to this range, and some possible geochemical tracer applications.

Editor's Note: This article is too technical for most of our readers. Only one specimen from the Franklin-Sterling Hill area (U.S.N.M. #C3285, a Franklin Marble uvite from Sterling Hill) was utilized as part of this study.

* * * * *

Sonolite and Jerrygibbsite

An article entitled "The crystal structures of sonolite and jerrygibbsite", written by Toshio Kato, Institute of Earth Sciences, Yamaguchi University, Yoshida, Yamaguchi 753, Japan, Yoshiaki Ito, Department of Geological Sciences, University of Washington, Seattle, WA, and Nobuo Hashimoto, NEC Kansai Nippon Denki Soft Ware Corporation, 1-chome, Shiromi, Higashi-ku, Osaka, Japan, appeared in *N. Jb. Miner. Mh.*, **1989**, H.9, 410-430, Stuttgart (1989). The following is the authors' abstract of that article.

The crystal system of sonolite which contains Ca ions has been refined to an R of 0.048 using 1315 reflections. The small Mg ions are concentrated in M(3) site, and large Ca ions are in M(2)₅ and M(2)₆ sites and in accordance with the results of cation distribution in humite group

minerals. A speculation about the hydrogen distribution in the humite group minerals is described. The crystal structure of jerrygibbsite has been determined and refined to an R of 0.088 using 854 reflections. The jerrygibbsite structure is unit-cell-twinned-sonolite by b/4 glide plane.

Editor's Note: This article is very technical and beyond the scope of most of our readers. The jerrygibbsite used in the study is from Franklin, New Jersey, and the sonolite is from the Hokkejino mine, Japan.

* * * * *

Rutile

An article entitled "Rutile fibers in surface waters in northern New Jersey", written by John H. Puffer, Rutgers University, Mark Germino, New Jersey Medical School, and Gerard P. Maresca, Rutgers University (all located in Newark, NJ 07102), appeared in *Arch. Environ. Contam. Toxicol.*, **16**, 103-109 (1987). The authors' abstract is shown below.

Transmission electron microscope (TEM) analyses of surface water samples from the northern New Jersey area indicate that rutile (TiO₂) is a consistent contaminant, with fiber concentrations ranging from 0.2 to 1.5 million fibers per liter (MFL), and averaging 0.7 MFL. Concentrations of rutile fiber were comparable to or somewhat higher than asbestos concentrations in ambient surface water samples. Rutile is a component of bedrock in the drainage areas studied, and is also widely used commercially. The data favors a bedrock origin for most of the rutile observed. Analysis of hydraulic parameters indicates that rutile in the surface water samples is entirely in the Wentworth clay range, with Stokes' diameter of less than 2 microns, and suggests a high degree of sorting control over suspended particles. Since the samples were all from actual or potential sources of drinking water, the results suggest that a substantial amount of rutile is ingested via surface water supplies by the general population. The health effects of such ingestion are unknown.

Editor's Note: This article is beyond the scope of the Society's usual interests. However, the Franklin Pond, located on the Precambrian Franklin Marble, receives drainage from that formation, and is one of six water sources involved in this study.

* * * * *

Baumite discredited

Stephen Guggenheim, Department of Geological Sciences, University of Illinois, Chicago, IL 60680, and Sturges W. Bailey, Department of Geology and Geophysics, University of Wisconsin, Madison, WI 53706, have written an article entitled "An occurrence of a modulated serpentine related to the greenalite-caryopilite series". The article appeared in *Amer. Min.*, **74**, 637-641 (1989). The following is the authors' abstract of that article.

Abstract

Transmission electron microscope (TEM) and X-ray powder-diffraction studies indicate that material described as the Zn- and Mn-rich serpentine mineral baumite contains predominantly submicroscopic coherent intergrowths of 7-Å and 14-Å phases. The 7-Å phases include at least two polytypes (group A and either group B, C, or D) of lizardite and a modulated 1:1 layer silicate similar to those of the greenalite-caryopilite series. The 14-Å phase includes a dominant chlorite-*Ibb* structure. A chrysotile-like phase is present also, although it is rare. Semiquantitative chemical analyses indicate that all phases are Zn- and Mn-rich, but crystal-chemical arguments are used to suggest that the greenalite-caryopilite-like phase is relatively Al poor. The modulated 1:1 layer silicate differs structurally from greenalite and caryopilite by having island-like domains of about 30 Å (vs. 21.3-23.3 Å for greenalite and 16.7-17.2 Å for caryopilite). Accompanying veinlets appear to be lizardite-*1T* altering to chlorite-*Ibb* and chlorite-*Iba*, with these phases chemically distinct from those more directly associated with the modulated 1:1 layer-silicate phase.

Editor's Note: Much of this study is beyond the scope of our readers. However, the following was abstracted from the Introduction and the Conclusions sections of the original article, and may be of interest.

Introduction

Baumite and "brunsvigite" from the Buckwheat dump at Franklin, New Jersey, were described by Frondel and Ito (1975). Likewise, they reported "pennine" from a franklinite ore specimen. Baumite is brownish-yellow in thin section, and occurs in fine-grained, dense black masses up to a foot across. The greenish black "brunsvigite" is found in low-temperature hydrothermal veinlets crossing the baumite. Today the "brunsvigite" is properly designated as manganoan zincian chamosite and the "pennine" as clinochlore. These minerals contain large amounts

of MnO (ranging from 5.5 - 12.3 wt%) and ZnO (from 4.75 to 9.6 wt%). Alumina in the chlorites range from 13.1 to 14.0 wt%; for baumite, 6.6 wt%.

Clinochlore had been found associated with baumite by P.J. Dunn (personal communication, 1988), but that work was unpublished. A reinspection of that material by Dunn confirmed that baumite served as a "breccia cement" in a low-temperature cavity or vein filling and amounted to only 25% by volume of the material. This breccia was composed of baumite, chamosite, white willemite (crystallites 1 x 3 cm in size), white granular calcite, franklinite, aegirine, and brown stilpnomelane. The specimens studied by the authors include the baumite type material from Harvard, catalogue #HU 114072 and an uncatalogued specimen labeled "brunsvigite" from J.L. Baum. The current study concludes that the baumite and the chamosite are submicroscopic coherent intergrowths of 7-Å and 14-Å phases plus minute amounts of other materials. This material, among other things, contains a new mineral, which cannot be documented adequately to give it species status because it is intimately admixed with other phases. Also present in the baumite is curled asbestiform particles, lizardite, and a talc-like phase. The "brunsvigite" (chamosite) associated with baumite appears to be pseudomorphs of lizardite. The transformation of the lizardite and chamosite to chlorite is incomplete. Thus, the chlorite intergrown with the modulated serpentine differs from the chlorite described as chamosite.

* * * * *

Franklin-gahnite exsolution intergrowths

Editor's error of omission corrected

Editor's Note: On page 19, in the *Picking Table*, **30**, #2 (1989), the journal reference for an abstracted article was omitted inadvertently. The original article appeared in *Economic Geology*, **83**, 1447-1452 (1988). That article was entitled "Experimental determination of the $ZnFe_2O_4$ - $ZnAl_2O_4$ miscibility gap with application to franklinite-gahnite exsolution intergrowths from the Sterling Hill zinc deposit, New Jersey", and the authors were Antone V. Carvalho III, Sun Exploration and Production Company, 12121 Wickchester Lane, P.O. Box 1501, Houston, TX 77251, and Charles B. Sclar, Department of Geological Sciences, Lehigh University, Bethlehem, PA 18015.

* * * * *

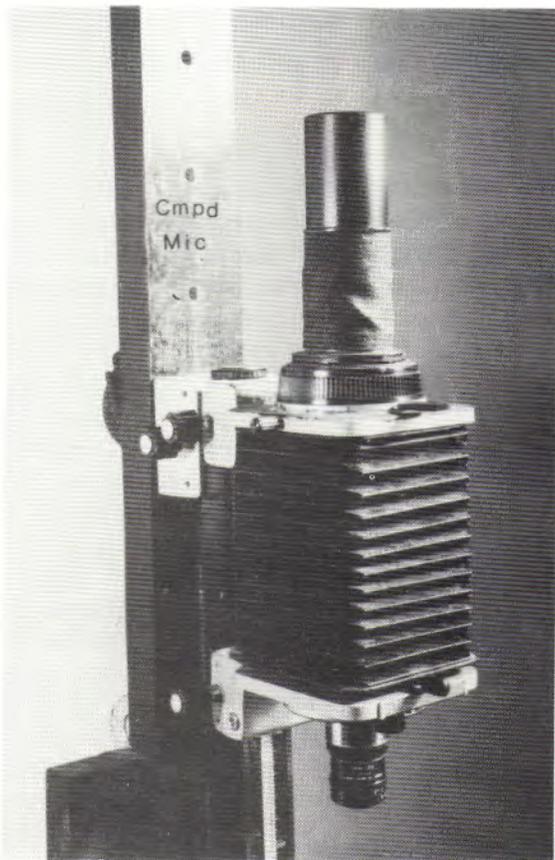


Figure 1. Compound microscope. Note objective at bottom and photo-ocular at top.

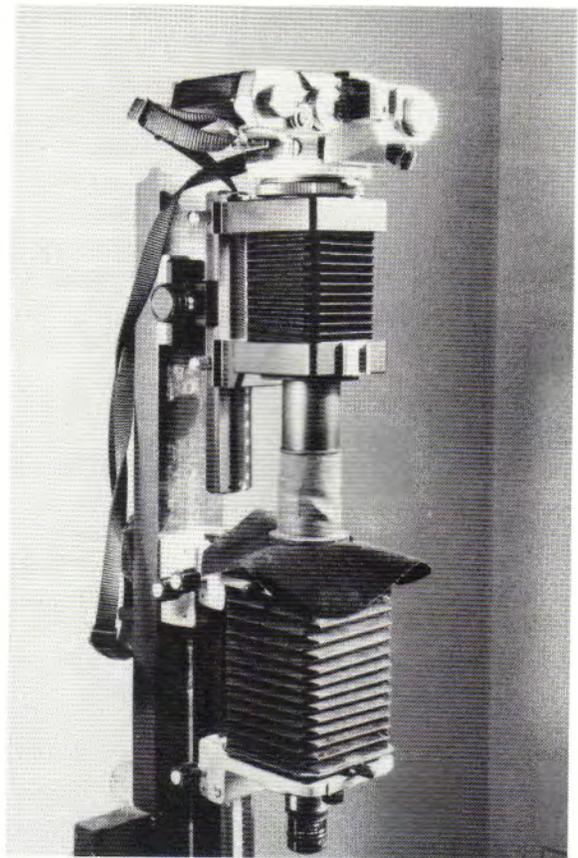


Figure 2. SLR setup for photographing through the compound microscope.

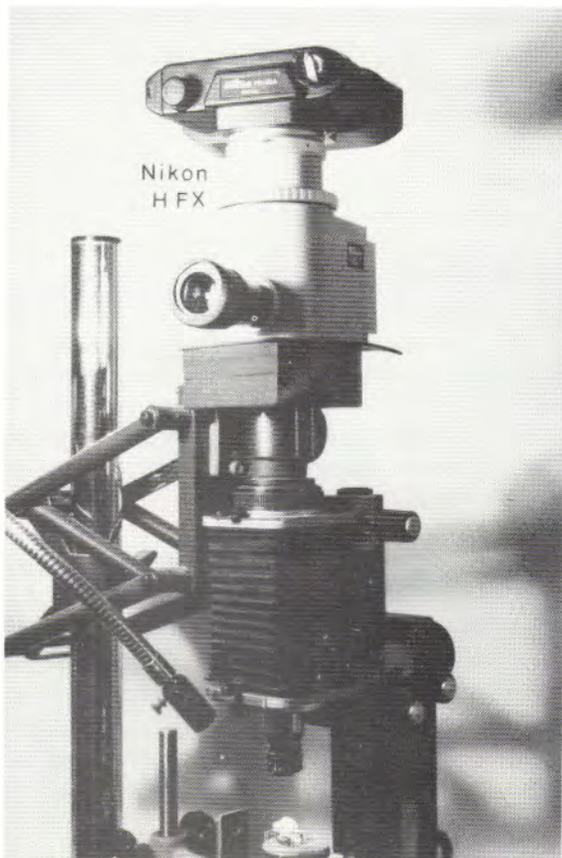


Figure 3 (at left). The Nikon HFX unit mounted on the compound microscope. The umbilical wiring to the HFX unit and the control box do not show. Note adjustable specimen pedestal at bottom, and the fiber optics light source coming in from the left.

Greater magnification requires more illumination, such as a cooler, fiber-optic lamp. The room should be darkened and as vibration-free as possible. Exposure calculation can be complicated but eventually attained through trial and error.

More expensive, but greatly improved results can be obtained with silicon diode metering such as Nikon Microflex HFX or similar equipment from Bausch & Lomb, Olympus, etc. These units contain a beam-splitting prism with ocular finder and electronic calculator for automatic exposure control. A leaf shutter and film-holding dark box completes the unit. This can be mounted above any tri-ocular microscope or the assembled compound microscope described above (Figure 3).

Using the HFX, the clear image is far superior to ground-glass viewers found in reflex cameras. Also, and equally important, the margins of the photograph are accurately delineated.

Proper color can be obtained by matching the proper film to the proper light source. I have had good results with tungsten EPY Ektachrome

* * * * *

50 and an EKE lamp (3200° K) or with tungsten KPA Kodachrome 40 used with an EJA lamp (3400° K). The lamps mentioned above are for fiber-optic generators. Please note that fiber-optic generators vary in output voltage. The EJA lamp, for example, must be used in units with a 21 volt output such as the MK II.

PERIPHERALS

PART 2.

WOLLASTONITE AND DOCTOR WOLLASTON

Alfred L. Standfast, M.D.
32 Oak Street
Binghamton, NY 13905

The mineral named in the 1800s for this great man was first recovered locally from the depths of the Franklin mine, and was identified by John L. Baum in 1944. Palache (*Professional Paper 180*) indicated, that on purely chemical grounds, bustamite could be regarded as manganese wollastonite. Under short wave ultraviolet light wollastonite's vivid orange fluorescence rivals and occasionally exceeds in intensity the bright green fluorescence of willemite.

But who was Wollaston? There are many geographical places named after him in England and Greenland, a lake in Saskatchewan, islands in Chile, and a peninsula in Canada's Northwest Territories. He was born in East Dereham, Norfolk, England in 1766. He received his medical degree in 1793. He practiced medicine several years but gave it up to do personal research, mainly in chemistry. The *Encyclopedia Brittanica* states that William Hyde Wollaston was eccentric and reserved, lived alone, and kept most of his secrets to himself.

Platinum was his specialty. In 1802, he isolated palladium and discovered rhodium in crude platinum. He made a fortune in his development of the practical uses of platinum, which had puzzled others because of its insolubility and high melting point. He was a secretary of the Royal Society and gave up his opportunity to be president to Sir Humphry Davy in 1820.

His work with alkali oxalates, sulfates, and carbonates was extensive. He studied the making of geometrical arrangements of elementary atoms, foreshadowing the work of Jacobus Hendricus Van't Hoff. He proved titanium and columbium (now called niobium) to be elements. But this wasn't all. He studied optics and found the dark lines in the solar spectrum (Fraunhofer lines) making the natural boundaries of the simple colors. His invention of the reflecting goniometer revolutionized the study of minerals and crystals. He also devised the camera lucida for making micro-drawings accurately. Besides all this, he made the "Wollaston doublet" lens for microscopists and adapted concavo-convex lenses for use by oculists. Astronomy was also one of his hobbies.

In physics, Wollaston did research and found the magnetic needle was deflected by an electric current. This was one of the discoveries, no doubt, which started Michael Faraday on the right track for all his marvelous discoveries in the field of electricity and electric motors.

In 1828, Wollaston was partially paralyzed by a brain tumor. He dictated all of his secret discoveries for publication after his death. Yes, Wollaston was quite a man! Yet how many people ever hear of his many contributions to science?

* * * * *

LEHIGH UNIVERSITY



and the

FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY



present a
SYMPOSIUM
entitled

"CHARACTER AND ORIGIN OF THE FRANKLIN-STERLING HILL OREBODIES"

on May 19, 1990 at Lehigh University

SPEAKERS (Listed alphabetically)

Avery Drake
U.S. Geological Survey, Reston

Clifford Frondel
Harvard University

Craig A. Johnson
Yale University

Peter R. Leavens
University of Delaware

Robert W. Metsger
Manager, Sterling Mine

Paul Brian Moore
University of Chicago

Charles B. Sclar
Lehigh University

PLACE:

"Mountain Top", Building "A",
Lehigh University
Bethlehem, PA 18015

DATE & TIME:

May 19, 1990
Coffee: 9:30 a.m.
Speakers: 10:00 a.m. to 5:00 p.m.

ADMISSION:

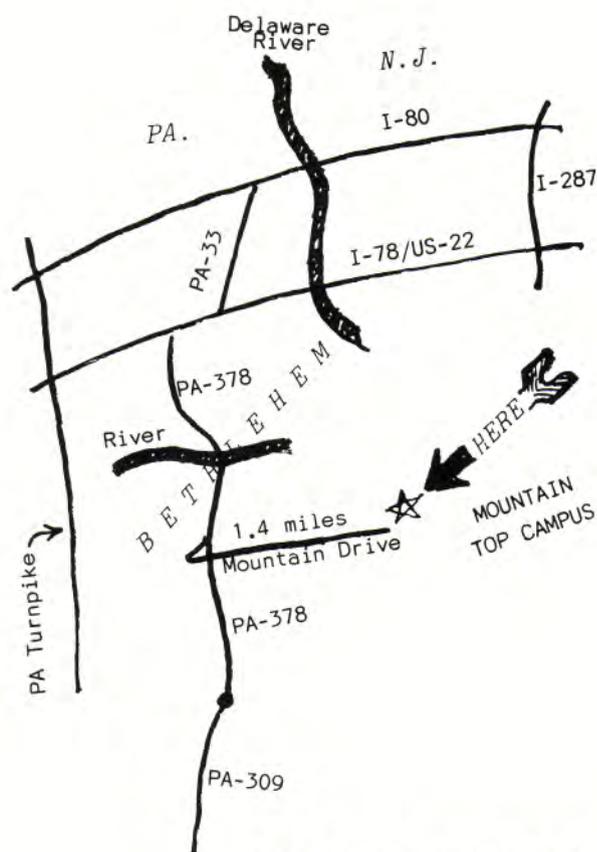
\$5.00 (Regular)
\$3.00 (Student)

SYMPOSIUM RECORD:

Includes all presentations
Available at extra cost

FOR FURTHER INFORMATION:

Call: Dr. Sclar at Lehigh
Phone: (215) 758-3658



MAP IS NOT TO SCALE

NOTE: Mountain Drive is 5.0 miles south on PA-378 from I-78/US-22 and 4.8 miles north on PA-378 from PA-309. Follow the PA Route 378 signs.



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The FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY, Inc.



The regular activities of the Society consist of lecture programs, field trips, and micro-mineralogy study groups. The regular meetings of the Society are held on the third Saturday of March, April, May, June, September, October, and November. Unless otherwise specified, lecture programs will be followed by business meetings. The seasonal schedule below shows **time and place in bold face** for all activities. Except for March and November meetings, held at the Hardyston Township School, all others take place at **Kraissl Hall, Franklin Mineral Museum, Evans Street, Franklin, New Jersey.**

* * * * *

MARCH 17, 1990 (Saturday)

NOTICE: Today's activities are at the **Hardyston Township School**, Route 23, Franklin, N.J. There will be **no** Field Trip, Micro/Study Group, or Business Meeting.

- Program #1 **9:30 a.m. - 1:45 p.m.** Mineral Exchange Program--**SWAP & SELL. Public invited.**
- Program #2 **2:00 p.m.** **"The Rowe Collection at Rutgers University"**
by William Seldon.

APRIL 21, 1990 (Saturday)

NOTICE: The business meeting, lecture, and Micro/Study Group meeting will be held in **Kraissl Hall, Franklin Mineral Museum** today.

- Field Trip: **9:00 a.m. - noon** **Old Andover Iron Mine**, Limecrest Road, Andover, N.J.
- Micro-Group: **10:00 a.m. - noon** Bring your favorite Franklin micros for viewing. Bring your scope and trading material. Leader: Ralph Thomas
- Program: **1:30 p.m.** **"Willemite/Calcite and other Neat Things from the Far West"** by Manny Robbins, author, and *Rocks & Minerals* columnist.

APRIL 28 & 29, 1990 (Saturday and Sunday)

NOTICE: The 18th Annual Gem, Mineral & Jewelry Show, sponsored by the NJESA, at the Rec Center, William Paterson College, Wayne, N.J. The show theme for exhibitors is copper.

MAY 19, 1990 (Saturday)

NOTICE: The normal F.O.M.S. activities will **not** take place today. Instead, members should attend the Lehigh University & F.O.M.S. co-sponsored **Symposium** entitled **"Character and Origin of the Franklin-Sterling Hill Orebodies"**, which is being held at **Lehigh University**. See page 22 for admission costs, the list of speakers, and directions to Lehigh.

JUNE 16, 1990 (Saturday)

- Field Trip: **10:00 a.m. - noon** **Buckwheat Dump**, Evans Street, Franklin, N.J.
- Micro-Group: **10:00 a.m. to noon** **Kraissl Hall**, Franklin Mineral Museum, Franklin, N.J. Franklin micro classics for viewing. Bring a scope. Leader: Omer Dean
- Program: **1:30 p.m.** **"Amphiboles of the Franklin Marble"** by Mark Germiné

JUNE 17, 1990 (Sunday)

Field Trip: **9:00 a.m. -noon** **Bodnar/Edison Quarry**, Rudeville, N.J. (Crystal Springs).

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**COLOR SLIDES AND COLOR PRINTS AVAILABLE FROM
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Photomicrographs of Franklin-Sterling Hill minerals by Dr. Alfred L. Standfast

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**SPECIAL ANNOUNCEMENT
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Copper is the theme
for both
the 18th Annual
Gem, Mineral & Jewelry Show
sponsored by the NJESA
to be held April 28 & 29 at the Rec Center
William Paterson College
Wayne, New Jersey
and
the 34th Annual
Franklin-Sterling Mineral Exhibit
sponsored by the
Franklin Mineral Museum
to be held October 6 & 7
at the Franklin Armory,
Franklin, New Jersey



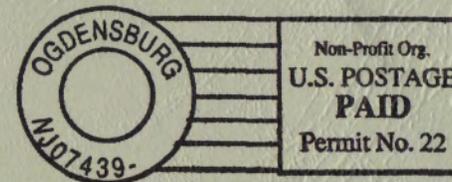
Fluorescent Mineral Society

The Fluorescent Mineral Society is devoted to increasing the knowledge of its members in the luminescence of minerals with emphasis on fluorescence and phosphorescence. The Society is international in its membership. It promotes increased knowledge in this interesting hobby with emphasis on collecting, displaying and understanding. To help all members, it publishes an interesting bi-monthly newsletter called the *UV WAVES* and an annual, *THE JOURNAL OF THE FLUORESCENT MINERAL SOCIETY*. This stresses the scientific side of the hobby while the *UV WAVES* highlights the usual and ordinary applications of common interest to you. Membership information may be obtained by writing:

The Fluorescent Mineral Society
P.O. Box 2694
Sepulveda, CA 91343

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