

# THE PICKING TABLE



THREE HUNDRED FOOT LEVEL, FRANKLIN MINE

NO. 2 • AUTUMN 1984 • VOLUME 25

JOURNAL of the FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY, INC.

# from the Editor

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## FRANKLIN CELEBRATION AT HARVARD

The Harvard Mineralogical Museum Association, formed only a few years ago, is planning to celebrate the 50th Anniversary of the publication of *The Minerals of Franklin and Sterling Hill*, Sussex County, New Jersey - U.S.G.S. Professional Paper 180 by Professor Charles Palache, on Saturday, June 1, 1985 at the University.

Harvard University and Franklin have enjoyed an exceptional relationship for over a century. Harvard was the center of mineralogical research during the highly-productive years of the Franklin-Sterling mines, and through the efforts of Dr. Palache and others, became the repository of several very important suites of Franklin-Sterling Hill minerals, most notably of which are the Hancock, Losey, Stanton, Trofimuk and Bauer collections.

The events of the day will include displays of major Franklin-Sterling Hill mineral exhibits, the presentation of a series of technical papers, and several short talks on the localities. The principal speaker will be Dr. Pete J. Dunn, the leading authority on contemporary Franklin-Sterling Hill mineralogy, of the Smithsonian Institution. The events of the day will be culminated by a dinner banquet in the evening.

We strongly encourage you to attend this special celebration. The events will be open only to members of the Harvard Mineralogical Museum Association. If you have not already joined the HMMA, as many of us have, we urge you to do so simply by sending your annual membership dues in the amount of \$25.00 to the Harvard Mineralogical Museum Association, 24 Oxford St., Cambridge, Mass., 02138. Various degrees of sustaining membership are also available. Join us at Harvard in June for *our* celebration.

## READER RESPONSE

Letter to Editor

Dear Sir,

"The study of the chemical impurities in fluorescent calcites published by G.J. DeMenna<sup>1</sup> is indeed a very useful addition to Franklin mineralogy. Nevertheless, the origins of color and fluorescence can only rarely be established from such results; the conclusions drawn by DeMenna regrettably can not be supported by the data for the following reasons.

"The causes of color and/or fluorescence are extremely complex and have been described in detail<sup>2</sup>. Color and fluorescence can be caused by as little as 0.001% of an impurity, as in the boron which causes the blue color in

certain diamonds. An impurity can produce an increasing intensity of color and/or fluorescence as its concentration increases, but these intensities can again decrease at yet higher concentrations in some systems due to "concentration quenching," as in ruby. Other impurities can also act as quenchers, as DeMenna mentions, but even at very low levels; in addition several such "quenchers" could be presented, so that even a multifactor study based on many dozens of analyses might not give an unequivocal answer.

"This question may not be resolved until synthesis permits the examination of calcite specimens containing one impurity at a time, two at a time, and so on. This is the process that was required to solve the causes of color in both amethyst and blue diamond<sup>3</sup>. Until this type of work is done, there can only be guesses but, regrettably, not certainty.

"References:

1. G. J. DeMenna, *Picking Table*, 25, 3-4 (Spring 1984)
2. K. Nassau, *The Physics and Chemistry of Color*, Wiley, New York, 1983.
3. K. Nassau, *Gems Made by Man*, Chilton, Radnor, PA, 1980.

Kurt Nassau, PhD  
170 Round Top Road  
Bernardsville, N.J. 07924"

*Subsequent discussions with private parties having detailed knowledge of exhaustive studies conducted by chemists of the New Jersey Zinc Company further support Dr. Nassau's methodology and what's more, indicate that manganese and lead, indeed, play significant roles in influencing fluorescence in calcite.*

*Ed.*

## A MOMENT, PLEASE!

The demands of an infant private practice in architecture are remarkably great and simply cannot be ignored as with the obligations to family. In light of such growing pressures, I find I must honestly assess my effectiveness in other areas as well.

This will be my last regular issue of the *Picking Table* with me serving as Editor. The commemorative issue, thought of as developing to coincide with the twenty-fifth anniversary of the Society, now past, is delayed, but not forgotten. It is now planned as a special issue in the not too distant future.

I would like to thank the many people who supported me during my tenure as editor, particularly the late Frank Z. Edwards, along with Lee Areson, Jack Baum, Warren Cummings, Pete Dunn, Dick Hauck, John Kolic, Steve Sanford, Al Standfast and so many others who have contributed along the way, and most of all, the membership for its loyalty and patience.

BTK

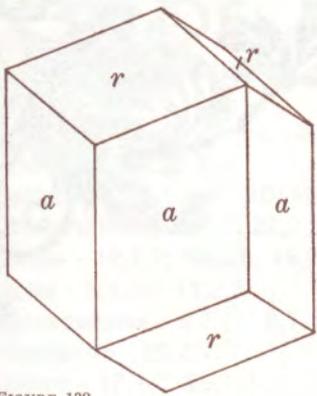


FIGURE 132

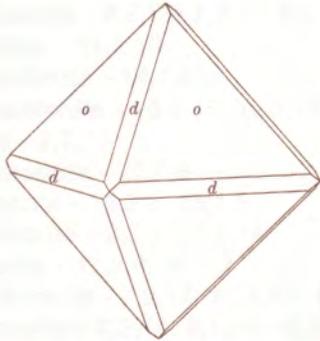


FIGURE 39

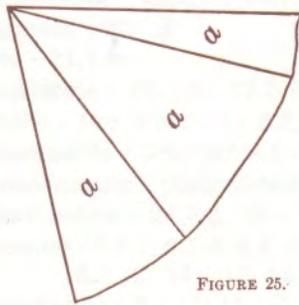


FIGURE 25.

Willemite-132, Franklinite 39, and Zincite - 25, from USGS Prof, Paper 180.

# The PICKING TABLE

Journal of the Franklin-Ogdensburg Mineralogical Society, Incorporated



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Twenty-Five Years.

*The Picking Table, Autumn 1984*

1



# Historic Franklin Minerals and their LABELS



by  
**Philip P. Betancourt, PhD**  
410 Chester Avenue  
Moorestown, NJ 08057

## **Introduction**

Keeping the labels of Franklin and Sterling Hill minerals along with the minerals themselves can add a historical note to the specimens, but it also means more than a casual interest in curiosities. The ore bodies are so complicated, and so much information on them has already been lost, that any scrap of news on finds, associations, or occurrences can be of potential value to further research. A mineral with its original label, for example, can usually be dated to a general period or even to a specific date and this can identify the piece as coming from a particular find in the mine even if some future discovery looks identical to the unaided eye.

## **Discussion**

The labels noted here, both old and new, give added dimensions to their specimens.

(1.) Franklinite from Franklin. John Calvert was one of the great 19th century British collectors. He inherited a fine mineral collection (the Baltimore collection) and made it even larger, often outbidding the British Museum of Natural History and other large European institutions in

his quest for specimens. He was also something of an eccentric. As Peter Zodak once wrote, "With him collecting was a mania. To indulge it he traveled tens of thousands of miles, suffered innumerable hardships, and spent his money, as the phrase has it, like water" (Zodak 1943: 240-241). Calvert began collecting before 1850 and lived to be 90. The collection was general with only a few Franklin pieces. It had lain neglected for many years when it was purchased by Martin L. Ehrmann in 1938 and brought to New York. This piece is an incomplete lustrous franklinite crystal, 1" in size, on massive franklinite with minor zincite and tephroite. It is a good example of the 19th century Franklin specimens which found their way to Europe.

(2.) "Caswellite" from Franklin. This label could not be lost because it was glued to its specimen, a 1½" x 2" piece of "caswellite" associated with garnet and rhodonite. It is from the collection of F.G. Himpler, who died about 1904, and a second label indicates it was a gift from Mr. Caswell after whom the mineral was named. Himpler labels are easily recognized by their rounded corners and turn-of-the-

century writing. The Himpler collection stayed in the family's boarded up house in Hoboken until it was bought by John Albanese in the early 1960s and dispersed.

239 CALVERT COLLECTION 1513  
 239  
 Franklinite and  
 Zincite, with  
 Tephroite 379  
 Franklin, N.J.  
 1.50

Figure 1.



Figure 2.

928  
 No. Dana. HANCOCKITE (Monoclinic)  
 Franklin, N.J.  
 3 1/2 x 2 x 2

Gift Chas. Hoadley

Figure 3.



Figure 3.

(3.) Hancockite, from Franklin. This 2" x 3" piece of hancockite was once in the collection of Charles Hoadley, a collector of the early years of the century who co-authored a check list of Franklin-Sterling Hill species in 1925 (Hoadley and Broadwell 1925). His collection was purchased by Warner and Grieger in 1943 and sold, but this specimen had been given to R.B. Gage many years earlier. The label marked Franklin Furnace indicates a date before 1923 when the town's name was changed to Franklin.

(4.) Kraisslite from the Sterling Hill Mine, Ogdensburg. A recent "classic", kraisslite with its Franklin Mineral Museum label and the notation that the piece came from the collection of Fred and Alice Kraissl marks the specimen as one of the pieces brought out of the West Vein of the Ore Body in the late 1970s.

FRANKLIN MINERAL MUSEUM, INC.

Collector  
 KRAISSL  
 \$ 1.00  
 KRAISSLITE, ILME ON  
 SLICKENSIDE  
 FRANKLINITE-WILLEMITE-CALCITE

Figure 4.

WILLIAM  
 FORIK  
 COLLECTION

Selenite-  
 Anhydrite ?  
 Sterling Hill Mine  
 Ogdensburg, NJ  
 JIM'S GEMS  
 1581 Rt. 23, Wayne, N.J. 07470  
 (201) 628-0277

Figure 5.

(5.) Gypsum from the Sterling Hill Mine, Ogdensburg. An unusual gypsium specimen, 3" x 5" in size, is a brilliant shiny white with a fibrous structure and green fluorescence under short wave. It is labeled "selenite - anhydrite?", a justifiable uncertainty, but X-ray diffraction has confirmed the gypsum and indicated the presence of willemite which explains the fluorescence. As the back of the label indicates, the specimen is from the collection of Bill Forik, identifying it as from a discovery noted in print by John Albanese in 1961: "Prior to the recent temporary closing of the Sterling Hill mine, a fibrous variety of gypsum was found. In the William Forik, Ogdensburg, collection is a specimen, about 3x5, of fibrous gypsum which looks like spun glass" (Albanese 1961: 145).

(6.) Quartz from Franklin. An interesting find of doubly terminated quartz crystals was found at Franklin in 1927. A vein of blue riebeckite fibers cut through the ore, with the vein lined with calcite and hematite. Tiny needle shaped quartz crystals were within the riebeckite (then called crocidolite). The quartz was studied by Charles Palache (1928; 1935: 36), and a drawing of one crystal was reproduced in his *Professional Paper* no. 180 (Palache 1935: Fig. 24). The label for this specimen, a 1/2" long crystal in the collection of Ewald Gerstmann, shows it is one of the Harvard specimens Palache studied.

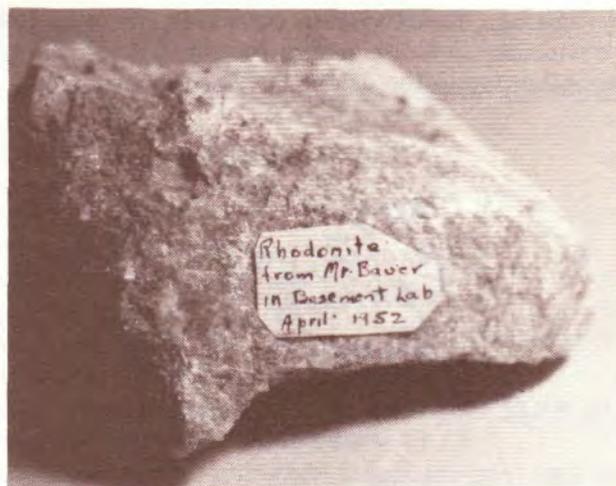


Figure 8.

89792

QUARTZ  
Franklin  
Sussex Co., New Jersey

---

Palache C. (1928) Am. Mineral., 13, 297-329.  
L.H. Bauer November 15, 1981

MINERALOGICAL MUSEUM, HARVARD UNIVERSITY  
 CAMBRIDGE, MASSACHUSETTS

Figure 6.

33,875 24-

**CASWELLITE**  
 AN ALTERED BIOTITE.  
 Silicate of calcium, magnesium, iron, etc.  
 Monoclinic.  
 FRANKLIN FURNACE,  
 SUSSEX CO., NEW JERSEY.  
 DR. A. E. FOOTE, PHILADELPHIA.

Figure 9.

(9.) "Caswellite" from Franklin. A piece of "caswellite" and green willemite about 2" x 3" is accompanied by this label from the A.E. Foote company. Foote sold many Franklin minerals at the end of the 19th century and into the early 20th century, until the business came to a close at the beginning of World War I.

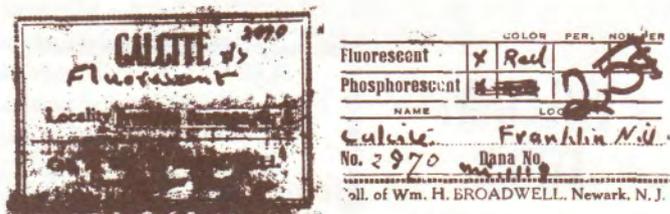


Figure 7.

(7.) Calcite from Franklin. These two labels from the Broadwell collection go with a small piece of common Franklin calcite, fluorescent red under short wave ultraviolet. William H. Broadwell (1877-1947) was a printer and photographer who was one of the three founders of the Newark Mineralogical Society, in 1915. His collection was general, with more than 3000 micromounts and many larger specimens (for further reading see Yedlin 1977 and Schiller 1978). This calcite was his no. 2870.

(8.) Rhodonite from Franklin. Lawson H. Bauer (1889-1954) gave a bright pink rhodonite to Ken Fisher in 1952. Fisher, an English teacher, was the first Vice President of the FOMS. He was a resident of Upper Darby, Pa. As chief chemist for the New Jersey Zinc Company for over 40 years, Bauer made a great many contributions to Franklin-Sterling Hill mineralogy (Fron del 1955).

#### References

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*I would like to thank many people for giving me information on early collectors, especially Lee Areson, Jack Baum, Ewald Gerstmann, Dick Hauk, and Leonard Morgan, and I am particularly indebted to the late Frank Edwards who gave me innumerable anecdotes, with a fine twinkle in his eye.*



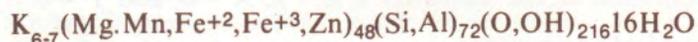
# Mineral Notes



## New To Science

In the Autumn 1983 issue of the *Picking Table* we announced the discovery of the new mineral *lennilenapeite*. The formal description of this new species recently appeared in the *Can. Min.*, 22, 259-263, in a paper entitled "Lennilenapeite, the Mg-analogue of stilpnomelane, and chemical data on other stilpnomelane species from Franklin, New Jersey," by Pete J. Dunn of the Smithsonian Institution, Donald R. Peacor of the University of Michigan and William B. Simmons of the University of New Orleans, from which the following abstract was prepared:

### LENNILENAPEITE



#### **Introduction**

During the process of characterization of the minerals associated with nelenite, a new manganese arsenosilicate member of the friedelite group (Dunn & Peacor 1984), we noted the occurrence of a closely associated black, lustrous mineral in small flattened aggregates that range up to 1 cm across. Although an X-ray powder-diffraction pattern of this mineral indicated that it is a stilpnomelane, the

intimate association with triodite, nelenite and rhodonite (all with Mn or Mg dominant) indicated that it should be chemically analyzed for Mn and Mg to determine the extent of solid solution of these elements in stilpnomelane. Stilpnomelane has Fe as the dominant cation; the limits of solid solution of other cations in this species are ill-defined. We therefore carried out analyses on a number of stilpnomelane-group minerals from Franklin because the dominant solid-solution there, in many silicate phases, involved Mn for Mg. The results of this study include new data on the solid solution of both Mn and Mg for Fe in stilpnomelane. The Mn-dominant phase at Franklin is shown to be similar to parsettensite, and the Mg-dominant species is described herein as the new mineral, *lennilenapeite*.

Lennilenapeite is named in honor of the *Lenni Lenape* indians, who inhabited the Franklin area and were presumably the first to find the deposits at Mine Hill and Sterling Hill, which cropped out in full view. The words "Lenni Lenape" mean "the original people" in the Algonquin language of the time.

#### **Physical and Optical Properties**

The type lennilenapeite forms dense black lustrous

aggregates of platy crystals. The brown color of these aggregates is not apparent in a hand specimen, but it is readily observed in thin chips under a binocular microscope. The streak is brown, and the mineral is brittle, unlike many samples of stilpnomelane. There are two directions of cleavage; (001) is perfect and (*hkO*) is imperfect. The hardness (Mohs) is approximately 3. The lustre is vitreous, inclining to resinous. The density, determined using heavy-liquid techniques, is 2.72 g/cm<sup>3</sup>.

Optically, lennilenapeite is sensibly uniaxial negative with  $2V = 0$ . It has strong pleochroism: *X* faint brown to colorless, *Y* = *Z* dark brown; absorption  $Y = Z > X$ . The indices of refraction are  $\alpha = 1.553(2)$  and  $\beta = \nu = 1.594(4)$ . There is no discernible fluorescence in ultraviolet radiation. The more abundant material described by Frondel & Ito (1965) occurs as aggregates of platy yellowish green crystals with a distinctly bronze lustre.

### Occurrence

Lennilenapeite occurs in two different assemblages from the Franklin mine, Franklin, Sussex County, New Jersey. One of these contains nelenite, triodite, franklinite and willemite. These species occur as coarse-grained aggregates have a pegmatitic texture. Lennilenapeite occurs as small (5mm) clusters of bladed crystals within triodite, willemite and nelenite, but is concentrated at the contacts between these species. Another occurrence was noted by Frondel & Ito (1965). In this assemblage, lennilenapeite occurs as light green to light brownish green druses of platy crystals on sphalerite and dolomite. These druse coatings were referred to as "chlorite" in the older literature. These specimens are composed for the most part of morphologically interesting sphalerite crystals up to 1 cm across; they might be those referred to and illustrated by Palache (1935).

Occurrence of lennilenapeite in two such markedly different assemblages, the latter of which is low-temperature and hydrothermal, indicates that it might be a common phase at Franklin, but one that was overlooked in the past.

### Franklin Ferristilpnomelane

In the course of examining several samples of stilpnomelane from Franklin, we encounter one that is dark red in color; it gives a strong reaction for Fe<sup>3+</sup>, and is intimately associated with green, prismatic hedenbergite of composition Ca<sub>0.93</sub>Na<sub>0.008</sub>(Fe<sub>0.80</sub>Mn<sub>0.04</sub>)(Si<sub>1.98</sub>Al<sub>0.02</sub>)O<sub>6</sub>, based on  $\Sigma(\text{Si} + \text{Al}) = 2$ . Results of our microprobe analysis of this specimen are in excellent agreement with unpublished data for a ferric-iron stilpnomelane. The analysis was performed by Dr. Ito at Harvard University.

### A Mn-Dominant Stilpnomelane

As mentioned previously, we found four samples of black stilpnomelane associated with nelenite, triodite and rhodonite, but only one of these is Mg-dominant. The other three were found to be Mn-dominant.

The physical properties of this Mn-dominant stilpnomelane are similar to those of lennilenapeite from this assemblage. This phase is black;  $D(\text{meas}) = 2.75$ ; g/cm<sup>3</sup>; [001] cleavage is good.

Parsettensite, first described by Jacob (1923), is commonly accepted as the Mn analogue of stilpnomelane. It is not our intention to analyze the status of parsettensite

at this time. If indeed parsettensite is a member of the stilpnomelane group (definitive proof is still lacking), then the Mn-dominant phase we describe here can simply be considered as parsettensite that shows considerable solid-solution of other elements.

Further studies are necessary to describe fully the limits of solid solution within the stilpnomelane group.

A study of leucophoenicite produced a mineral species new to science and the locality in the Spring of 1983. The formal description entitled "Jerrygibbsite, a new polymorph of Mn<sub>9</sub>(SiO<sub>4</sub>)<sub>4</sub>(OH)<sub>2</sub> from Franklin, New Jersey, with new data on leucophoenicite," by Pete J. Dunn of the Smithsonian Institution, Donald R. Peacor of the University of Michigan, William B. Simmons of the University of New Orleans and Eric J. Essene of the University of Michigan, appeared in the *Am. Min.*, 69, 546-552, from which the following abstract was prepared:

## JERRYGIBBSITE



### Introduction

During a systematic survey of the chemical composition of specimens of leucophoenicite by electron microprobe analysis, several samples were found to be another, but closely related phase. The powder X-ray diffraction data, combined with the chemical analyses, implied that this material was a new manganese member of either the humite or leucophoenicite groups. Our subsequent investigation has confirmed that this phase is a new mineral.

We take great pleasure in naming this mineral jerrygibbsite in honor of Dr. Gerald V. Gibbs, Professor at Virginia Polytechnic Institute and State University, in recognition of his outstanding contributions to the science of mineralogy and the society of mineralogists.

### Description and physical properties

Jerrygibbsite occurs as a massive mineral in interlocking anhedral crystals, up to 0.5 x 2.0mm, which display a typical metamorphic texture; there are no euhedral crystals. The hardness (Mohs) is approximately 5.5. The streak is light pink. The luster is vitreous on both cleavage and fracture surfaces. There is one imperfect cleavage, parallel to (001). The density is 4.00(2) g/cm<sup>3</sup>.

Jerrygibbsite is medium violet-pink in color and light pink in thin-section. It does not fluoresce when exposed to ultraviolet radiation. Grains typically exhibited lamellar structure, parallel to (002). Optically jerrygibbsite is biaxial negative with  $2V = 72^\circ$ . The indices of refraction are  $\alpha = 1.772(4)$ ,  $\beta = 1.783(4)$ ,  $\nu = 1.789(4)$ . Jerrygibbsite is not pleochroic; dispersion is moderate to strong  $r \pm v$ . The orientation of the indicatrix is  $Z = a$ ,  $X = b$ , and  $Y = c$ .

### Chemical composition

Jerrygibbsite was chemically analyzed with an ARL-SEM-Q electron microprobe. The ratio of M<sup>2+</sup> ions to silicon is in reasonable agreement with the 9:4 ratio of sonolite, which is consistent with the relation that jerrygibbsite is a polymorph of Mn<sub>9</sub>(SiO<sub>4</sub>)<sub>4</sub>(OH)<sub>2</sub>.

### X-ray crystallography

Cleavage fragments have been studied using Weissenberg

and precision single-crystal techniques. The photographs show that jerrygibbsite is orthorhombic with a space group  $Pbmn$  or  $Pbn^2$ , with refined unit cell parameters  $a = 4.85(1)$ ,  $b = 10.70(1)$ , and  $c = 28.17(3) \text{ \AA}$ . The space group identification is somewhat tentative as extinction rules are not as well defined as usual due to the presence of classes of systematically weak reflections.

Our original attempts to obtain high-quality powder diffraction patterns were unsuccessful due to contamination by other phases. The principal contaminating phase is leucophoenicite although other Mn-humites such as alleghanyite also are found with jerrygibbsite.

No jerrygibbsite pattern is entirely free of peaks of leucophoenicite.

### Occurrence

Jerrygibbsite occurs in specimens from the Franklin Mine, in Franklin, Sussex County, New Jersey. Three specimens have been characterized. No data have been preserved as to the geological occurrence(s) within the Franklin orebody. Inasmuch as the three known specimens were all labelled leucophoenicite, and because jerrygibbsite also resembles the Mn-humites from Franklin, it is quite possible that other samples may repose misidentified in public or private systematic collections, particularly those of Franklin minerals.

Jerrygibbsite occurs in contact with franklinite, willemite, sincite, and sonolite in a very colorful and uncommon assemblage. The mineral resembles some leucophoenicite, but is decidedly more brown and violet-colored than most leucophoenicite. As with leucophoenicite and members of the Mn-humites, jerrygibbsite is not easily recognized without X-ray or chemical data. In one of the type specimens jerrygibbsite occurs in contact with dark brownish-pink sonolite.

A notable characteristic of the jerrygibbsite assemblages, compared with those of most leucophoenicite, is the virtual absence of calcium-bearing minerals, which are almost invariably found associated with leucophoenicite. This is, however, only a rule-of-thumb; leucophoenicite has been found, albeit rarely, without associated calcium-bearing phases. These latter observations are of a general nature, based on the examination of a large number of specimens.

### Discussion

The chemical, X-ray diffraction, and other data for jerrygibbsite clearly shows that it belongs to the humite or leucophoenicite group of minerals, but the precise nature of the relation is ambiguous.

There is strong circumstantial evidence that jerrygibbsite is a member of the leucophoenicite group because of the close association of these minerals.

Leucophoenicite and jerrygibbsite are relatively rare polymorphs of  $Mn_7(SiO_4)_3(OH)_2$  and  $Mn_9(SiO_4)_3(OH)_2$ , respectively. They occur at Franklin, New Jersey, where sonolite, alleghanyite, and tephroite also occur, in parageneses similar to those of the Mn-humites. Neither jerrygibbsite nor leucophoenicite is known to occur in the very similar deposit at Sterling Hill, New Jersey, suggesting very localized conditions might be needed for the formation of these phases.

In the Spring of 1983 we announced the discovery and naming of several mineral species new to science and the Franklin-Sterling Hill deposits. The last of those has been formally described in a paper entitled "Nelenite, a manganese arsenosilicate of the friedelite group, polymorphous with schallerite, from Franklin, New Jersey," by Pete J. Dunn of the Smithsonian Institution and Donald R. Peacor of the University of Michigan, which appeared in *Min. Mag.*, **48**, 271-275, from which the following abstract was prepared:

### NELENITE



### Introduction

A SCHALLERITE-LIKE mineral was described by Bauer and Berman (1930) and named *Ferroschallerite* in allusion to the high iron content. It was re-examined by Frondel and Bauer (1953), who considered it to be a variety of friedelite considered at that time to be polytypically related to schallerite. We have examined this material in light of current knowledge of the crystal chemistry of friedelite and schallerite and have found it to be a unique and valid species. The old name, *ferroschallerite*, is a misnomer in that this material is not the Fe-analogue of schallerite and does not have the schallerite structure. Hence, we have renamed it to avoid confusion.

We take pleasure in naming this new mineral nelenite in honour of Joseph A. Nelen, Chemist at the Smithsonian Institution, in recognition of his contributions to the chemistry of minerals, in particular his analytical studies of the complex arsenosilicates of manganese which are found at Franklin and Sterling Hill.

### Physical and optical properties

Nelenite is light to medium brown in colour and transparent, with no apparent colour-zoning. The cleavage is perfect, parallel to (0001), and is developed only with moderate difficulty. Cleavage plates are flat and highly lustrous, and it is this quality and appearance of the cleavage that immediately distinguishes nelenite from the other members of the friedelite group, which have cleavage fragments with slightly or grossly wrapped and curved surfaces. The streak is light brown. The hardness (Mohs) is approximately 5. The lustre of cleavage surfaces is vitreous; that of fracture surfaces is slightly resinous and decidedly duller than cleavage surface lustre. The density, determined using heavy liquid techniques, is  $3.46 \text{ g/cm}^3$ , in excellent agreement with the calculated value of  $3.45 \text{ g/cm}^3$  and  $3.44 \text{ g/cm}^3$  value obtained by Bauer and Berman (1930).

### Occurrence and description

Nelenite, then known as *ferroschallerite*, was found in 1925 by George Stanton (Palache, 1935). It reportedly came from pillar 1597, about 50 feet south of the Trotter shaft, at the Franklin Mine, Franklin, Sussex County, New Jersey.

The holotype specimen consists of massive light yellow willemite, which is rimmed by an impure stilpnomelane-like mineral, and which is adjacent to a firm breccia that composes most of the specimen. The breccia consists of

fragments of nelenite up to 45 x 30mm, which are in direct contact with a zincian, manganese actinolite, and which are surrounded by discontinuous rims of the stilpnomelane-like mineral. The cementing medium of the breccia is white calcite, and very thin films of calcite permeate the incipient cleavage of some nelenite fragments. Cotype samples NMNH R7824 and H-92791-a are of the paragenesis. Although Bauer and Berman (1930) indicate that triodite (known to them as zinc-manganese-cumingtonite) was associated with nelenite (known to them as *ferroschallerite*) it is now clear that their statement applied not to the analysed holotype, but to other specimens described below.

The examination of additional samples in public and private collections indicates that there is considerable variances in the parageneses of nelenite, unlike schallerite (Dunn et al., 1981), which is quite limited in its known occurrences.

It appears that there are a number of diverse assemblages for nelenite, in addition to the holotype breccia, which was likely derived from the assemblage represented by H92791-c, consisting of massive microcline and actinolite, and which has Mn:Fe:Zn ratios similar to the holotype for both nelenite and the associated actinolite.

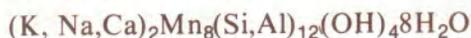
All of the samples are coarse-grained, with the major phases present in crystals exceeding several centimetres in diameter. Contacts are sharp and the texture is pegmatitic, except for the holotype breccia. Several unanalysed specimens appear to be from a sheared amphibole-nelenite assemblage and some of the nelenite is associated with, and altered to talc.

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## Research Reports

New chemical data were offered in a recent paper entitled "Ganophyllite from Franklin, New Jersey; Pajsberg, Sweden; and Wales: new chemical data," by Pete J. Dunn of the Smithsonian Institution, Donald R. Peacor of the University of Michigan, Joseph E. Nelen of the Smithsonian Institution and Robert A. Ramik of the Royal Ontario Museum, which appeared in *Min. Mag.*, 47, 563-566. Elements of that article pertaining to Franklin appear in the following abstract.

### GANOPHYLLITE



#### Abstract

Ganophyllite from Franklin, New Jersey, Pajsberg, Sweden, and the Benallt Mine, Wales, has been chemically reinvestigated. Twelve new analyses confirm the general structure of Kato (1980) and yield the tentative formula  $(K, Na, Ca)_2Mn_8(Si, Al)_{12}(OH)_4 \cdot 8H_2O$ . There is little solid solution among octahedral cations, and the Si:Al ratio is nearly constant at 10:2. Ca and (Na = K) are apparently differentiated, but all examined ganophyllites are K-rich. Much of the water content is loosely bound and the upper

limit of water content is not well defined. Ganophyllite is relatively invariant in chemical composition from locality to locality.

#### Excerpt

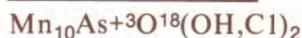
The Franklin specimens are from two separate assemblages. Analyses 1-5 (Table I) are of ganophyllite with a pseudohexagonal habit, associated with clinohedrite, datolite, willemite, reoblingite, and charlesite, a detailed discussion of this paragenesis is given by Dunn et al. (1983). Analyses 6-10 are of elongate, prismatic ganophyllite, which occurs on euhedral manganaxinite and rhodonite crystals. This is the assemblage studied by Larsen and Shannon (1922, 1924).

There are no significant differences between the different assemblages from Franklin.

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A recent paper entitled "Magnussonite: new chemical data, an occurrence at Sterling Hill, New Jersey, and new data on a related phase from the Brattfors mine, Sweden," by Pete J. Dunn of the Smithsonian Institution and Robert A. Ramik of the Royal Ontario Museum, appeared in the *Am. Min.*, 69, 800-802. Essential elements of that paper pertaining to the species and its Sterling Hill occurrences are presented in the following abstract:

### MAGNUSSONITE



#### Abstract

New chemical analyses of magnussonite samples from Långban, Sweden, and Sterling Hill, New Jersey, support the original formula for this phase. Seven new microprobe analyses, including a water determination by TGA-EGA, support the Mn:As ratio determined in recent structural study which proposed the formula  $Mn_{10}As^{+3}O^{18}(OH, Cl)_2$  for magnussonite, but differ in two respects:  $(OH) > Cl$ ;  $4(OH, Cl)$  per 12 As instead of two. Cu is present in all isometric magnussonite but its role is unclear. The new formula is  $Mn_{10}As_6^{+3}O_{18}(OH, Cl)_2$  with  $Z = 16$ .

#### Sterling Hill occurrence

The original Sterling Hill occurrence, noted by Frondel (1961) was of a very small amount of green material associated with zincite and an impure selvage on a slickenside of willemite-franklinite-calcite ore (H-95036, NMNH 147730).

A new occurrence was recently founded by John Kolic, a miner in the Sterling Hill Mine. Here it is associated with abundant zincite, minor kraisslite, and a light-brown microgranular mineral related to hematolite. The color varies from light brown to green, but examination of material of both colors revealed no significant variations in composition or X-ray powder diffraction patterns. In spite of the recovery of perhaps a dozen samples, magnussonite is present only in very small amounts and must be considered very rare at Sterling Hill.

#### Magnussonite composition

Because the Sterling Hill material is identical in physical,

optical, and X-ray characteristics with the A material, we assume that it also contains (OH). Calculation of a chemical formula for Sterling Hill sample #147308, on the basis of As = 6, yields:  $(\text{Mn}_{9.11}\text{Cu}_{0.58}\text{Zn}_{0.46}\text{Fe}_{0.08}\text{Mg}_{0.07})\Sigma_{10.37}\text{Aa}^{3+}_{6.00}\text{O}_{18.37}(\text{OH}_{1.32}\text{O}_{0.68})\Sigma_{2.00}$ , presuming  $\text{H}_2\text{O}$  to be present in an amount needed to sum (OH + CL) to 2.00. We note that the previous analysis of Sterling Hill material by Lawson Bauer (in Frondel, 1961), performed on a very small amount of material, is in error. Our re-analysis of this sample (HU-95036) indicates that Bauer did not recover the Cu and Cl. However, he did find  $\text{H}_2\text{O}$ , in the amount of 0.58 wt.%, equivalent to  $(\text{OH})_{1.16}$ .

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Recent studies of lead calcium arsenate apatites from Franklin, New Jersey and Långban, Sweden has fostered a paper entitled "Hedyphane from Franklin, New Jersey and Långban, Sweden; cation ordering in an arsenate apatite," by Roland C. Rouse of the University of Michigan, Pete J. Dunn of the Smithsonian Institution and Donald R. Peacor of the University of Michigan, that appeared in the *Am. Min.*, 69, 920-927, from which the following abstract was prepared:

## **HEDYPHANE**



### **Nomenclature**

Hedyphane was originally described from the type locality, Långban, Sweden, by Breithaupt (1830). Foshag and Gage (1925) proposed that hedyphane be defined as material with  $\text{Ca} > \text{Pb}$ , leading to the formula  $(\text{Ca,Pb})_5(\text{AsO}_4)_3\text{Cl}$ . However, our electron microprobe survey of a large number of specimens from Franklin and Långban has failed to produce any lead-bearing specimens which conform to the criterion of Foshag and Gage. This calls into question the chemical analysis published by these authors who, in fact, noted that some of their material appeared to be slightly altered. Unfortunately, we were unable to locate the specimen they studied and thus it could not be reanalyzed.

The  $\text{Ca} > \text{Pb}$  criterion of Foshag and Gage creates a dilemma when one tries to formally define hedyphane. Although these authors proposed that hedyphane be considered the name for material with  $\text{Ca} > \text{Pb}$ , they were discussing their own material and not other, previously described hedyphanes, all of which contain substantial amounts of lead and whose Pb:Ca molar ratios approximate 3:2. We therefore propose that the name *hedyphane* be restricted to material which meets the following requirements: that Pb and Ca be major elements having a molar ratio of  $\sim 3:2$ , that As exceed P, and that Cl exceed F or (OH). Defined in this way, the ideal formula of hedyphane becomes  $\text{Ca}_2\text{Pb}_3(\text{AsO}_4)_3\text{Cl}$ .

### **Occurrence**

At Franklin, hedyphane occurs in a wide variety of assemblages and is the most abundant non-silicate lead mineral at this deposit, both in terms of volume and frequency of occurrence. Among the representative modes of occurrence of Franklin hedyphane are (a) As massive,

yellow to colorless, greasy-lustered material associated with barylite, copper, and curved, platy, massive calcite. (b) As colorless, yellow, or gray tabular dipyrramids associated with rhodonite, brite, and manganaxinite. The morphology of these euhedral crystals was described by Palache and Berman (1927) and Palache (1935). (c) As a yellow-to-brown-to-gray massive material, filling fracture seams in willemite-franklinite ore and frequently associated with rhodonite. (d) As stout, prismatic, colorless crystals, 6 x 6mm in size, associated with bright green willemite, bright pink rhodonite, and copper, all in a calcite matrix. The last-named assemblage is clearly secondary and coats a pre-existing, strongly fluorescent apatite of undetermined composition.

### **Physical description**

Hedyphane is translucent with a white streak and has a greasy to vitreous luster on crystal faces and fracture surfaces. The Mohs hardness is approximately 4. Cleavage is indiscernible, the fracture is even, and the mineral is moderately brittle. Density measurements made with a Berman balance gave values ranging from 5.71 to 5.85 g/cm<sup>3</sup>, with the latter value closest to that calculated from the ideal formula, namely 5.99 g/cm<sup>3</sup>. Optically, neotype hedyphane is uniaxial positive with a mean index of refraction between 1.95 and 1.965. The observation is in agreement with those of Palache and Berman (1927), who found Franklin hedyphane to have indices  $\epsilon = 1.958$  and  $\omega = 1.948$ .

Although the arsenate apatites from Franklin cannot in general, be unambiguously identified on the basis of their varied responses to ultraviolet radiation, the lead-bearing members (mimetite and hedyphane) have a very weak, light yellow fluorescence. Johnbaumite,  $\text{Ca}_5(\text{AsO}_4)_3\text{OH}$ , shows a strong orange fluorescence, which is characteristic of this mineral.

### **Solid solutions**

The majority of the samples studied were hedyphane, which is essentially fully ordered with calcium in the 4(f) site and lead in the 6(h) site.

Insofar as the minor elements in hedyphane are concerned, Sr is the chief cationic substituent in Franklin hedyphanes, whereas at Långban, this role is filled by Ba. The maximum SrO content observed in hedyphane is 8.4 Wt.%, equivalent to 0.88 Sr per 5 total cations. Both Ba and Sr substitute for Pb. This is consistent with their ionic radii, which favor their substitution for Pb rather than Ca. No samples were found with  $\text{Ba} > \text{Pb}$ .

Based on the previous definition of these arsenate apatites, i.e.,  $(\text{Ca,Pb})_5(\text{AsO}_4)_3\text{Cl}$  compositions with  $\text{Ca} > \text{Pb}$  being hedyphane and those with  $\text{Pb} > \text{Ca}$  being mimetite, Dunn et al. (1980) reported that most of the material from Franklin and Långban was calcian mimetite. That statement must now be revised in light of the recognition of hedyphane as an ordered species intermediate between the unnamed species  $\text{Ca}_5(\text{AsO}_4)_3\text{Cl}$  (mimetite). Most of the specimens described by Dunn et al. are now shown to be hedyphane. It should be noted, however, that true mimetite does, in fact, occur at both Franklin and Långban.



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- FIELD TRIP** Mineral Exchange Program - **SWAP, SELL & AUCTION** - FOMS Members Only  
Hardyston Township School - 10:00 A.M. to 2:00 P.M.
  - MICRO-GROUP** Hardyston Township School - 10:00 A.M. to NOON - This Meeting Only  
Micro-mineralogy study sessions will return to Kraissl Hall next month.
  - LECTURE** **MILL SITE SYMPOSIUM** - Slide Presentation by Bernard T. Kozykowski - Mill Site Mineral Suite Presentation by Jim Chunard - Graphic Presentation by Steve Misiur - Open Forum directed by Ron De Blois.
- 
- Saturday  
April 20, 1985
- FIELD TRIP** **Former NJZ Mill Site - Franklin, NJ** - 9:00 A.M. to NOON - FOMS Members Only
  - MICRO-GROUP** **Kraissl Hall - Franklin Mineral Museum- Franklin, NJ** - 10:00 A.M. to NOON.
  - LECTURE** **Recent Developments in FRANKLIN Research**, by Dr. Pete J. Dunn of the Smithsonian Institution, Washington, DC.
- 
- Saturday  
May 18, 1985
- FIELD TRIP** **Old Andover Iron Mines - Limecrest Road - Andover, NJ** - 9:00 A.M. to NOON.
  - MICRO-GROUP** **Kraissl Hall - Franklin Mineral Museum - Franklin, NJ** - 10:00 A.M. to NOON.
  - LECTURE** To be announced.
- 
- Sunday  
May 19, 1985
- FIELD TRIP** **LIMECREST QUARRY - Limecrest Road - Sparta, NJ** - 9:00 A.M. to 3:00 P.M.  
Interclub Outing - Schedule subject to participation.
- 
- Saturday  
June 15, 1985
- FIELD TRIP** **Franklin Quarry (formerly Farber quarry) - Cork Hill Rd., Franklin, NJ** - 9:00 to NOON.
  - MICRO-GROUP** **Kraissl Hall Franklin Mineral Museum - Franklin, NJ** - 10:00 A.M. to NOON.
  - LECTURE** To be announced.

Regular Society activities consist of field trips, micro-mineralogy study sessions, and lecture programs. Field trips vary as to time and location according to schedule. Morning micro-mineralogy study sessions take place from 10:00 a.m. to noon in Kraissl Hall at the Franklin Mineral Museum. Afternoon lecture programs begin at 2:00 p.m. at the Hardyston Township School, Route 23, Franklin, New Jersey. Pre-meeting activities begin at 1:00 p.m. - Lectures open to public.



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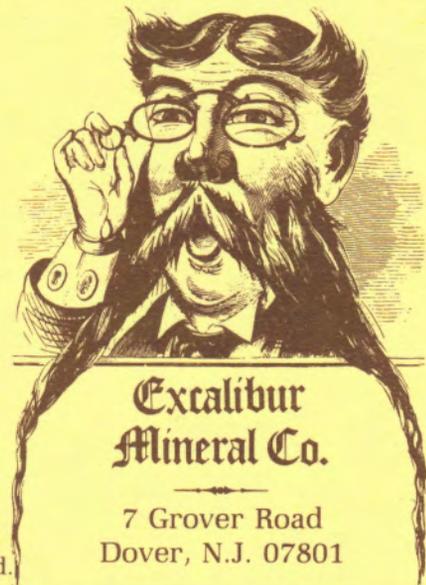
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