

# THE PICKING TABLE



Robert Mayo Catlin, Manager of Mines, New Jersey Zinc Company, 1906-30.

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The  
**PICKING TABLE**  
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ABOUT THE COVER PHOTOGRAPH

Robert Mayo Catlin is shown here in his office. A vignette of Robert Mayo Catlin was featured in the "Franklin Yesterdays" section of *The Picking Table*, Vol.28, #2, pp 7-8. Unfortunately, it was impossible to locate a photograph of this great man at that time. We are indebted to the Franklin Mineral Museum archives for this rare, but faded, photograph of Catlin. This man was both strong-willed and foresighted. The new methods he brought with him made the local mines more profitable. Likewise, it was Catlin with his empathy for people, which turned Franklin into a liveable place for the miners and their families. If you missed the above mentioned article, you owe it to yourself to read it.

\* \* \* \* \*

# from the Editor's Desk

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

## **Franklinfurnaceite — added information.**

The formal description of "franklinfurnaceite" by Dunn, *et al.* (1987) was abstracted in the last issue of *The Picking Table*. The full text of a brief communication on this subject from Dr. Pete J. Dunn, Department of Mineral Sciences, Smithsonian Institution, Washington, D.C., follows:

Dear Omer

Subsequent to the acceptance and typesetting of the description of franklinfurnaceite, I noted a comment in the catalogue of the late, great, Lawson Bauer. By comparing his comment with his specimen, I can now inform you that franklinfurnaceite was found in the 436 pillar, 3rd slice below the 700 level, in the Franklin Mine. Mr. Bauer obtained the specimen from Charles Davidowsky in April of 1949.

Sincerely,  
Pete J. Dunn

## **Coverage of the Sterling Mine closing.**

It has been decided that *The Picking Table* will delay the proposed article covering the closing of the Sterling Mine. Further lapse of time will add to both objectivity and perspective. Likewise, more historical facts concerning the mine itself would add greatly to the value of such an article. The Editorial Board will continue its efforts along these lines.

## **30th Anniversary Issue**

*The Picking Table* will have prevailed for 30 years come 1989. It is planned that this anniversary issue be a large one (at least 32 pages) and, hopefully, one that will become a collector's item. We considered having a color issue in the past; nothing has changed regarding the cost of such an undertaking. However, it may be possible to just have a cover with color photographs. The idea is being pursued vigorously.

## **New Advertisers**

Please give proper attention to our advertisers. Among the recent additions to the group are: Girdauskas Minerals, The Fluorescent Mineral Society, and the North Jersey Mineralogical Society. We appreciate their patronage!

## **FOMS Mineral Photography Contest**

This contest is open to FOMS members only. Winning photographs (two micro and two macro) will be printed in future issues of the *Picking Table* on a regular basis. The purpose of this twice-a-year contest is to stimulate members in this aspect of the hobby. Black and white photography is reputed to be more difficult than color photography. Since the text of our publication is confined to black and white, it is appropriate that members acquaint themselves with the problems associated with black and white photography of minerals. The rules are as follows:

1. All photographs must be of Franklin-Sterling Hill minerals, and must be submitted in the form of 3" x 5", black and white prints.
2. All photographs must be accompanied by full details concerning the specimen depicted. This descriptive information includes: species name; color description if unusual for the species; specimen size in inches, centimeters, or millimeters; names of associated minerals if any; the name of the collection which the specimen represents; the name of the photographer; and type of equipment and film used in making the photograph.
3. All entries for use in the Spring, 1989 issue must be mailed to and received by the Editor prior to November 10, 1988. This will permit the Editor to provide a standard label format for all entries. The judging by the officers and Board of Trustees will take place on the day of the November FOMS meeting when it is most convenient for them to view the entries jointly. At the time of the judging, the photographer's name will not be linked to the photographs.

All prints will be trimmed to fit the width of a column in the *Picking Table*. Take this into consideration when composing the photograph. No more than two entries in each of the micro and macro categories will be accepted from a member. The decisions of the officers and Board of Trustees will be final. It is anticipated that the competition will be fierce. The deadline for competition entries for use in the Fall, 1989 issue will appear in the Spring, 1989 issue.

Column continued, see *Editor*, page 9.

# NOTES FROM THE LABORATORY

&

## Changes to the list of species from Franklin and Sterling Hill

Dr. Pete J. Dunn  
Department of Mineral Sciences  
Smithsonian Institution  
Washington, D.C. 20560

John L. Baum, Curator  
Franklin Mineral Museum  
Evans Street  
Franklin, N.J. 07416

### Additions to the list

**Anandite:** This species has been found in a calcite-willemitite-pyroxene-gahnite-sphalerite assemblage at Sterling Hill. A professional description is anticipated and will be reported in a future issue of *The Picking Table*. Anandite is a barium iron mica.

**Orthochrysotile and lizardite:** Preliminary work on the serpentines by Dr. Fred Wicks and one of the authors (PJD) has confirmed clinochrysotile. Additionally, orthochrysotile and lizardite have been found among the Franklin serpentines. Antigorite, if extant locally, is very rare.

**Villyaellenite:** This is a light-pink, radiating arsenate from Sterling Hill. It is a Ca-Mn arsenate, and the only known specimen is in the Franklin Mineral Museum. The formal description, when published, will be abstracted in *The Picking Table*. This is the third occurrence worldwide of villyaellenite.

### Deletions from the list

**Anthophyllite:** Re-examination of the specimen at Harvard University, which was first called anthophyllite, has found it to be an amphibole similar to tremolite, and not anthophyllite.

### Nomenclature changes

**Allanite-(Ce):** Franklin allanite has been shown to be Ce-dominant. In keeping with recent IMA rulings, the correct mineral name for this material is allanite-(Ce), which replaces allanite.

*The Picking Table*, Fall 1988

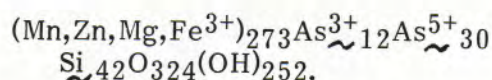
### Changes to the Unique List

**Schallerite** has been found in Italy. Details will be released after formal publication of the results. It is deleted from the Unique List.

**Marsturite** has been found in the Molinello Mine in Italy, and published by A. Palenzona. It was confirmed by one of the authors (PJD); it is the color of Franklin manganaxinite, but bladed in habit. It is deleted from the Unique List.

### New Formula

**Mcgovernite** has the tentative formula:



It will be published in the October issue of *The American Mineralogist*.

\* \* \* \* \*

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# THE BUCKWHEAT DOLOMITE —

## Fissure Mineralization of Paleozoic Age

Warren Cummings  
1191 Parkside Avenue  
Ewing, New Jersey 08618

In their paper "Minerals of the Buckwheat Dolomite" Peters, *et al* (1983) state that "very little information is available on the geologic setting of the Buckwheat dolomite". Palache's (1935) vague note of a "vein like mass" of vuggy dolomite seems to be the best historical description. However, as a result of collecting and observation in recent years by FOMS members, particularly on field trips to the Lime Crest and Franklin (Farber) quarries, the nature of the Buckwheat dolomite can be put into better focus.

The Buckwheat dolomite appears to be the most extensive and species rich example of a group of closely related mineral occurrences scattered about the region. These mineral occurrences have many features in common that indicate they are hybrids, to varying degrees, between Mississippi Valley type and Alpine cleft type hydrothermal mineralization. Many, such as the fluorite crystals in cavities in Leithsville dolomite (Lower Cambrian) found at the Franklin Mine mill site in 1986, are unquestionably of Paleozoic age and there is strong circumstantial evidence that all of them belong to this period.

Alpine clefts are best developed in the central massif of Switzerland (Weibel, 1966). The typical cleft is an open fissure or gash, most often in schist or gneiss, where deep ground or metamorphic water has reacted with the country rock and recrystallized it. Fluid circulation tends to be sluggish, resulting in a system dominated by rock chemistry rather than fluid chemistry. The recrystallization is largely isochemical but can involve ions introduced from beyond the local area of the cleft. Temperatures of deposition determined for cleft minerals range from 200°C to 500°C (Roedder, 1967; Weibel, 1966). Clefts usually occur in highly deformed regions that have undergone rapid tectonic thickening by nappe development or the stacking of imbricate thrust slices. The mineral assemblages in clefts can be large and diverse but are usually dominated by quartz, feldspars, epidote, and chlorite.

Mississippi Valley type (MVT) deposits derive

their name from the region where they are best developed, although distribution is worldwide. MVT mineralization occurs on all scales and includes some of the world's largest concentrations of lead and zinc (but not copper). MVT systems are, therefore, the subject of voluminous literature. A good summary is given by Anderson and Macqueen (1982).

MVT deposits form under low to moderate temperature conditions (80°-200°C) from chloride-rich sedimentary formation brines migrating out of deep basins. The brines, driven by compaction or gravity, travel long distances through the basin, accumulating metals, reduced sulfur, and other ions as they go (Sverjensky, 1984). The deposition site is typically in brecciated carbonates near the edge of the basin or on an arch between basins where the flow of the migrating brines is structurally focused and directed to more shallow, cooler depths. The simple mineral assemblages, usually some mix of the common sulfides (pyrite, marcasite, sphalerite, and galena), calcite, dolomite, fluorite and barite, crystallize in the open spaces of the breccias. At the deposition site the system is fluid dominated and there is very little wall rock alteration. Replacement of the country rock does occur, for example, in the Illinois-Kentucky fluorite district, but this is not common.

In their ideal, classical forms, Alpine cleft and MVT deposits result from quite different circumstances. However, although the highly deformed, tectonically thickened settings where Alpine clefts occur are not conducive to large scale MVT mineralization, small or trace occurrences are common. In the Franklin region the variety of post-Grenville age mineralized fissures and breccias covers the entire spectrum from typical Alpine cleft to typical MVT. Franklin is at the northwestern edge of the Reading Prong Precambrian terrain. This is a zone of intense Paleozoic age thrust faulting and tectonic thickening along the southeastern margin of the Appalachian sedimentary basin. Precambrian and Paleozoic rocks are in close proximity, either in normal sedimentary or thrust fault con-

tact (Lyttle & Epstein, 1987; Ratcliff, *et al.* 1986). Both cleft and MVT localities are found within this zone but are rare or absent elsewhere in the Precambrian highlands.

The most spectacular examples of cleft crystallization seen in recent years are the ferroaxinite pockets near Bridgeville, New Jersey (Cummings, 1983), but there are many others. These are not better known because (1) specimen grade material is mostly limited to the more reactive but less abundant calcic gneisses (amphibolites, skarns, etc.), and (2) most are like the axinite pockets at the Gooseberry Mine rather than those at Bridgeville, i.e. very small and spatially unpredictable except in the most general terms.

MVT deposits are widespread in both the Paleozoic and Precambrian rocks of the Franklin region. Although they also tend to be small and isolated, a few were large enough to be detected in geochemical surveys and were prospected by the New Jersey Zinc Company. Fortunately, they occur in the Lime Crest and Franklin (Farber) quarries which provide excellent exposures and are subject to regular collecting. All the local MVT examples observed to date are open space fillings in fissures. In many cases the fissure filling nature of the MVT deposit is quite evident because of contrasting mineralogy and texture between the fissure and the enclosing country rock, or because of the presence of obvious fault structures such as breccia fragments or gashes. However, when the country rock is Franklin marble the evidence for open space filling is sometimes more subtle. This is because the principal vein-filling mineral can be a coarsely crystalline white calcite that resembles the Franklin marble. The contact between the coarse calcite vein filling and the marble is usually marked by (1) a color change in the calcite from white, in the vein, to grayish, in the marble and (2) concentrations of small pyrite crystals and scattered crystals and small masses of sphalerite, galena and fluorite at the contact but always distinctly within the white calcite. Stylolites, a solution feature formed at a joint, bedding plane, or other juncture between adjacent units of soluble rock, are often found in the marble near MVT veins but do not usually mark the contact. These stylolites appear as jagged wavy lines in cross section, as very irregular surfaces showing areas of striation, and as an accumulation of insolubles (mostly graphite).

In many of the local examples the mineral assemblage is typical MVT. In a few, however,

silicates and oxides more typical of clefts also occur. At the Franklin (Farber) Quarry veins of dolomite, some coarsely crystalline, some virtually identical to the Buckwheat dolomite, all with small cavities, are seen quite frequently. These vuggy dolomites are often associated with obvious fault zones. Like the Buckwheat dolomite, the cavities contain mostly dolomite, quartz, and calcite with sporadic chlorite, muscovite, feldspar, and pyrite. At the Lime Crest Quarry vein material was found in the south end of the pit consisting of very coarse dolomite, scattered sphalerite grains, and elongated gashes filled with quartz or drusy dolomite. The numerous cavities contained muscovite, feldspar, pyrite, and rutile as well as secondary minerals, such as the hemimorphite which attracted attention initially. Although as many as 41 minerals have been listed from the Buckwheat dolomite, most are either rare or secondary oxidation products. The basic mineral assemblage includes only six abundant minerals (dolomite, calcite, quartz, pyrite, sphalerite, chlorite) and four minor minerals (muscovite, feldspar, rutile, and apatite). Considering this assemblage, the similarity between the Buckwheat dolomite and the dolomites at Lime Crest and Franklin (Farber), where the geology is more discernible, becomes more readily apparent. The broad spectrum of mineralization in the Franklin region indicates that the mineral assemblage at a given site depends on local variations in the "plumbing" system, through which the mineralizing fluids circulated, and the timing of the fluid movement within the sedimentary-tectonic evolution of the Appalachian basin. These major factors, in turn, control temperature, fluid source and flow rate, and many other complexly interrelated parameters that are beyond the scope of this paper.

It appears that Palache's (1935) description of the Buckwheat dolomite as a "vein like mass" was a correct interpretation. The fissure in the Franklin marble in which the Buckwheat dolomite was localized was in close proximity to, and probably transected, the Franklin orebody, the Cork Hill gneiss, and the Cambrian age Hardyston and Leithsville formations. The mineralizing agent was probably Paleozoic formation waters migrating out of the then young sediments through open fissures in the brittle basement gneisses. The formation waters were brines relatively rich in magnesium and effected the complete dolomitizing of the sheared marble. After dolomite deposition had reduced permeability and fluid flow, the water/rock ratio was reduced to the point where the system became strongly rock-dominated. Since the brine was

already in equilibrium with dolomite and calcite, its chemistry began to reflect the silicates and other minerals scattered through the marble. Consequently, the micas, feldspars, rutile, and apatite are concentrated in what were the last remaining open spaces, and were deposited just before mineral deposition totally clogged the "plumbing" system. The fault containing the Buckwheat dolomite was apparently later reopened and a calcite-sphalerite assemblage superimposed itself upon the existing minerals.

In summary, the Buckwheat dolomite occurred in a vein in the classic sense: a porous, permeable fracture filled with minerals deposited from water-rich brines at elevated temperatures. Deposition took place in three stages: (1) early fluid dominated (dolomite), (2) later rock dominated (silicate-oxide), and (3) fluid dominated following refracturing (sphalerite-calcite). The mineralogy is more diverse than in other regional examples because of the Buckwheat's location at the complex junction of several distinct geologic units.

The timing of the formation of the Buckwheat dolomite, and all the other manifestations of the widespread Paleozoic age hydrothermal overprint, is uncertain. The most likely time of disposition is the late Ordovician during either the last stages of or immediately following the Taconic deformation episode. The Taconic was the period during which most of the massive crustal movement took place in the Franklin region. It also involved sediments that were young enough and "juicy" enough to cause significant fluid movement in response to tectonic loading, compaction, and rapidly increasing temperature. However, post-Taconic sedimentary burial was substantial and Alleghanian deformation significant, so a later date for the Buckwheat dolomite is possible. The answers to some of the remaining questions about the Buckwheat are to be found in fluid inclusions in the various minerals.


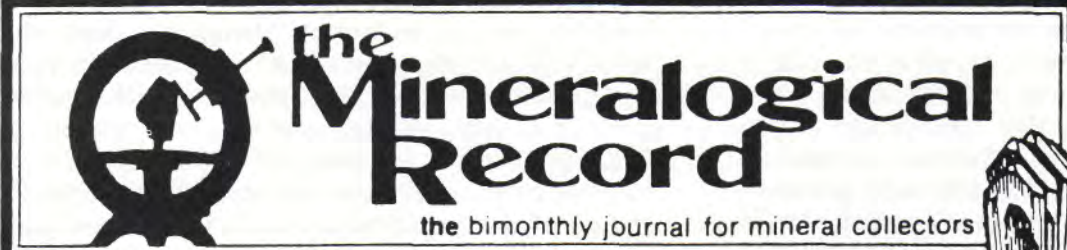
From these inclusions estimates can be made of the temperature of deposition and the fluid chemistry. The determination of the  $K_{40}/Ar_{40}$  ratios of the microcline and muscovite can provide an estimate of the age.

#### Acknowledgments

The author wishes to thank Mr. Tom Peters, of the Paterson Museum, and the editorial staff of the *Picking Table* for their review of this paper and their helpful suggestions.

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# Franklin Yesterdays

## DISPOSAL OF THE STANTON COLLECTION

**[Editor's Note:** John L. Baum, Curator, Franklin Mineral Museum, has found in the Museum's archives some correspondence describing the disposal of the Stanton Collection. Read consecutively, the letters reveal an interesting scenario, which has a "kick" at the end, and all of which took place over sixty years ago. The cast of characters include: David Jenkins, Chief Chemist for the New Jersey Zinc Company; Charles Palache, Harvard professor of mineralogy, Curator of the Harvard Mineral Collections, and author; August Heckscher, executive in the Lehigh Zinc and Iron Company, manager of their operation at Franklin, first manager of the New Jersey Zinc Company following consolidation, and philanthropist on Long Island where he donated a State Park. As you read the characters come alive and you find yourself sharing a Franklin yesterday.]

April 1st 1927

Professor Charles Palache  
Department of Mineralogy & Petrography  
Harvard University  
Cambridge, Mass.

Dear Professor Palache:

I regret very much to inform you that Mr. George Stanton passed away at the Franklin Hospital early this morning. As you probably know he was having some intestinal trouble and went down to Philadelphia last week for an examination. Evidently the doctor could find nothing wrong with his gall bladder but as I understand it matters became acute this week and he underwent an operation for gall bladder trouble. As near as I can understand from the physician it was probably a blood clot that caused the trouble.

We certainly have lost a good friend in his death. It leaves our mineral investigation up in the air somewhat as he was our chief source of the rare specimens that have been brought in recently.

Sincerely yours,  
/signed/ David Jenkins

**[Editor's Note:** Unfortunately, Palache's reply is lost but the story falls together quite nicely anyway.]

The Picking Table, Fall 1988

April 6th 1927

Professor Charles Palache  
Department of Mineralogy & Petrography  
Harvard University  
Cambridge, Mass.

Dear Professor Palache:

Wish to acknowledge receipt of your letter relative to Mr. Stanton. As you can realize nothing definite could be ascertained from Mrs. Stanton at this time as to the disposition of the mineral collection, as she is very much broken up and has made no plans for the immediate future, although I believe she expects to remain in Franklin if possible.

In view of the assistance Mr. Stanton has been to us I am writing to ask you if a few words of commendation for the work he did in the collection and preservation of the new Franklin minerals could be published in the American Mineralogist. I know from our own point of view we have Mr. Stanton to thank for much of the information we have obtained relative to the source of arsenic in our products and I believe also the work on call it what you may, freidelite (friedelite) or schallerite, as the source of the chlorine we have been finding in the oxide. If possible we would like very much if you deem it advisable, that this article relative to Mr. Stanton should come from you.

Sincerely,  
/signed/ David Jenkins

Oxford Street  
Cambridge, Massachusetts  
April 8, 1927.

Mr. D. Jenkins,  
The New Jersey Zinc Co.,  
Franklin, N. J.

My dear Jenkins:

I have yours of the 6th of April and can quite understand that nothing can be done with regard to the Stanton Collection just at this time. As to an article in appreciation of his work, as you suggest, I will be glad to write it and suggest the enclosed as an appropriate form.

I received the package containing the three

specimens of Franklin minerals loaned to you. It arrived safely.

I suppose that Mr. Bauer recognizes that we are doing nothing on the Franklin minerals containing arsenic but are waiting for his chemical results before making any further move.

Yours very truly,  
/signed/ Charles Palache

P.S. will you please make necessary changes in this short notice and comment on it freely. I do not feel well satisfied with it. Return it to me with your comments and I will have it rewritten.

C.P.

**[Editor's Note:** The short notice, which Palache prepared for the American Mineralogist, follows in its entirety.]

The writer has just received word that Mr. George Stanton of Franklin, New Jersey passed away as a result of an operation at the Franklin Hospital. All mineral collectors who have an interest in Franklin minerals will regret the death of Mr. Stanton. He was a most enthusiastic collector and had done much to bring to light some of the interesting and new species that have been described from there in recent years. As one of the underground shift-bosses, he had opportunity to see minerals in the mine and was in close cooperation with the chemists of the company to whom he brought his rare specimens for identification. The study of the distribution in the Franklin mine of minerals carrying arsenic, lead and chlorine has become of vital importance to the satisfactory purification of the ore. The minerals in which these elements occur were unknown and a careful search checked by frequent chemical analyses was made to locate them. In this way not only was the lead content of hardy-stonite established but the nature of several recently described minerals such as chlorophoenicite and cahnite was determined. It was Mr. Stanton who discovered both of the last minerals in the mine. His death will not only be a great loss to the chemical work which the staff is thus doing but also to mineralogists since specimens of many of these rare Franklin species were chiefly collected by Mr. Stanton's care.

April 9th 1927

Professor Charles Palache  
Department of Mineralogy & Petrography  
Cambridge, Mass.

Dear Professor Palache:

Since writing you last I have talked with Mrs. Stanton about her husband's collection and she advised me that she wished to sell the collection,

not in parts, but as a unit and I am afraid she would not consider the price you offered as she figures it is worth \$3500.00. Of course I can see your point of view as there are probably many things in there that would be duplicates, but if you do not care to consider it we thought we would try, if possible, to help her find a purchaser. As we know Mr. Herscher (Heckscher) is trying to build up his collection he has in his museum at Huntington, L.I., we looked on him as a prospective buyer.

Sincerely yours,  
/signed/ David Jenkins

Oxford Street  
Cambridge, Massachusetts  
April 12, 1927.

Mr. D. Jenkins,  
The New Jersey Zinc Company,  
Franklin, N. J.

My dear Jenkins:

I have yours of April 9, 1927, in regard to the Stanton Collection. As I wrote before I felt that my offer was probably too low, but on the other hand, there are many things in Mr. Stanton's collection that would be of practically no value to us. I would be glad to offer \$2500 for the collection and that is certainly the limit we are able to go. While I should be sorry not to have it come here I do not think it worth more than that sum to us. I would be glad to have you offer Mrs. Stanton that amount on our behalf. I assume that would include what duplicate materials there were in his hands at the time of his death.

Yours very truly,  
/signed/ Charles Palache

April 20th 1927

Professor Charles Palache  
Department of Mineralogy & Petrography  
Harvard University  
Cambridge, Mass.

Dear Professor Palache:

Please pardon me for not acknowledging your letter before this late date. Mr. Bauer and I have looked over the article regarding Mr. Stanton and we both feel it expresses exactly our ideas relative to Mr. Stanton.

I spoke to Mrs. Stanton regarding your offer of \$2500 and she still feels that the collection is worth more money. It might be to your advantage if you found the opportunity to visit Franklin and talk over this question with Mrs. Stanton. From what Bauer tells me he has seen some of the minerals in the attic and he thinks there are quite a few specimens that may interest you such

as chlorophoenicite, and I believe he mentioned other rare specimens. Of course, as I mentioned to you in my previous letter I am going to find out from Mr. Hayes if Mr. Hekscher (Heckscher) might not be a possible buyer, as we told Mrs. Stanton we would endeavor to sell the collection for her. As I said before, I realize from your point of view the collection would not be as valuable to you as to some other collector who has no such collections of Franklin minerals as the Holden and Hancock collections, but I do not feel that she will sell the collection for one cent less than \$3000, which we feel is a fair price. Whether we can get it or not is another question.

Mr. Bauer is working hard on the Franklin and Sterling Hill minerals containing arsenic, also the chondrodite, and in a few days I believe he will have some results for you.

Sincerely yours,  
/signed/ David Jenkins

Oxford Street  
Cambridge, Massachusetts  
April 25, 1927.

Mr. D. Jenkins,  
The New Jersey Zinc Company,  
Franklin, N. J.

My dear Jenkins:

Yours of the 20th is at hand but has been delayed in answer by my absence on a vacation. I will send the note on Stanton to the American Mineralogist. As to his collection, I have, of course, no question that as much should be obtained for it as possible but do not feel that I can offer more than \$2500. I shall be sorry not to obtain it because it contains many of the newer finds which were not in the older collections but I feel that I have offered the most that we can afford. I fear it is impossible for me to get to Franklin at the present time as we are in the midst of a very busy season at the end of the term.

Yours very truly,  
/signed/ Charles Palache

April 26th 1927

Mr. August Heckscher  
50 East 42nd Street  
New York City.

Dear Sir:

I spoke to Mr. Hayes about a mineral collection at Franklin that is for sale at the present time and he advised me to write to you direct.

The collection is owned by a lady whose husband died recently. He was a very keen mineralogist and I think without a doubt that his collection is the most representative of the newer minerals found in Franklin. As his widow wishes to dispose

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of it at once we were wondering if you would care to consider it. I think she is asking \$3500 for it but I believe it can be bought for \$3000.00.

Very truly yours,  
/signed/ David Jenkins

New York  
April 28, 1927.

Mr. D. Jenkins,  
The New Jersey Zinc Company,  
Franklin, New Jersey.

Dear Mr. Jenkins:

Before his death my good friend, Mr. Frederick A. Canfield, who had been in touch more or less and was familiar with all the collections of Franklin minerals in your vicinity, told me that there was not one that he considered worth in the aggregate more than \$1000. as all of them are fragmentary and the best of the collections have been culled out and either sold or given away.

Under the circumstances I would not care to pay anything like as much as \$3000. for any collection now in sight.

Many thanks for the suggestion.

Sincerely yours,  
/signed/ A. Heckscher

May 3rd 1927

Mr. August Heckscher  
50 East 42nd Street  
New York City.

Dear Mr. Heckscher:

It was not my wish to advise you of a mineral collection for sale that was not equal in value to the price asked. Mr. Canfield I know positively never saw the Stanton Collection, and on the afternoon of the day I received your letter this collection was sold to Professor Charles Palache for Harvard University for the sum of \$3000.00. He advised me that he felt the University had made a very good bargain in securing the collection for this price.

Very truly yours,  
/signed/ David Jenkins

\* \* \* \* \*

(Continued from page 2) **Editor**

**Stephanie Obodda**

Our congratulations to a fellow F.O.M.S. member, Stephanie Obodda, Short Hills, New Jersey. In case you missed the feature article about this young lady, see *Rocks and Minerals*, July/August, 1988, pages 321-322. Our hats are off also to her parents, Herb and Moni Obodda, for the fine example they are setting for other collectors and dealers who have children. The hobby is in dire need of youth in its ranks and the Obodda story is an inspiring one.

\* \* \* \* \*

# UNCOMMON SULFOSALTS

## FROM STERLING HILL

**Dr. Pete J. Dunn**  
Department of Mineral Sciences  
Smithsonian Institution  
Washington, D.C. 20560

In early 1982, John Kolic called to my attention some black, prismatic crystals in weakly-red-fluorescing calcite. The sample was found in the hanging wall of the east branch of the west vein on the 900 level at Sterling Hill. After dissolution of the calcite matrix in weak acetic acid (HCL can harm many non-carbonate minerals), the black prismatic crystals were examined using X-ray diffraction and electron microprobe methods.

Preliminary results indicated they were baumhauerite, but a number of factors, including the presence of some antimony, prompted a much more detailed investigation of this mineral, involving both myself and Dr. Joel Grice of the National Museum of Natural History, in Ottawa, Ontario, Canada. The results of these studies have confirmed that the crystals are baumhauerite. The analytical data are: Pb 50.3, Sb 10.5, As 16.2, S 23.1, sum=100.1 weight percent. This approximates a baumhauerite,  $Pb_3(As,Sb)_4S_9$ , with As:Sb near 3:1.

Acid dissolution of the host calcite resulted in the finding of a number of other species. Associated non-opaque minerals include diopside, re-algar, barite, fluorapatite, and tourmaline (presumably uvite or dravite). Additional opaque minerals are molybdenite, tennantite, arsenopyrite, and seligmannite.

The baumhauerite crystals (Figures 1 and 2) are usually associated with molybdenite, and are less commonly found on diopside. They are black in color, with a high luster. Seligmannite was found, after calcite dissolution, unattached to other species; the aggregates (Figures 3 and 4) are distorted in form, highly lustrous, and black in color. Tennantite was observed as small irregular grains. Arsenopyrite was very varied in habit; one of the more attractive aggregates is shown in Figure 5. Most of the minerals depicted herein occurred in crystals or aggregates only a millimeter in size. Baumhauerite and seligmannite were new-to-the-deposit when found.

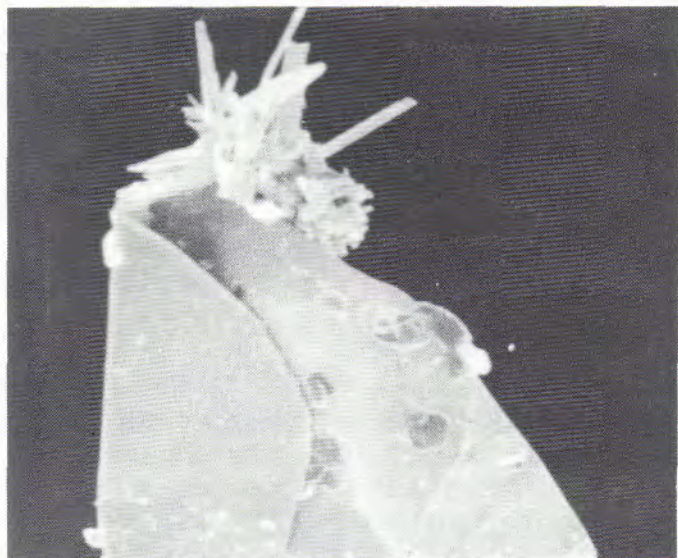


Figure 1. Cluster of baumhauerite crystals on a molybdenite crystal (100x).

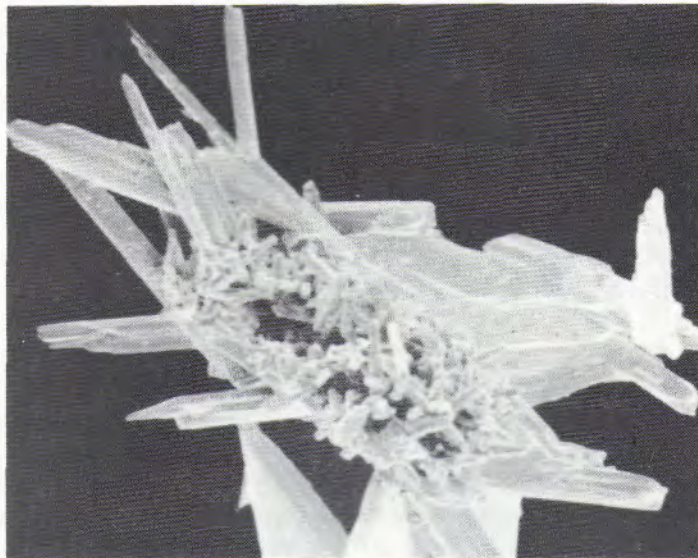


Figure 2. Same cluster as shown in Figure 1, from a different angle (200x).

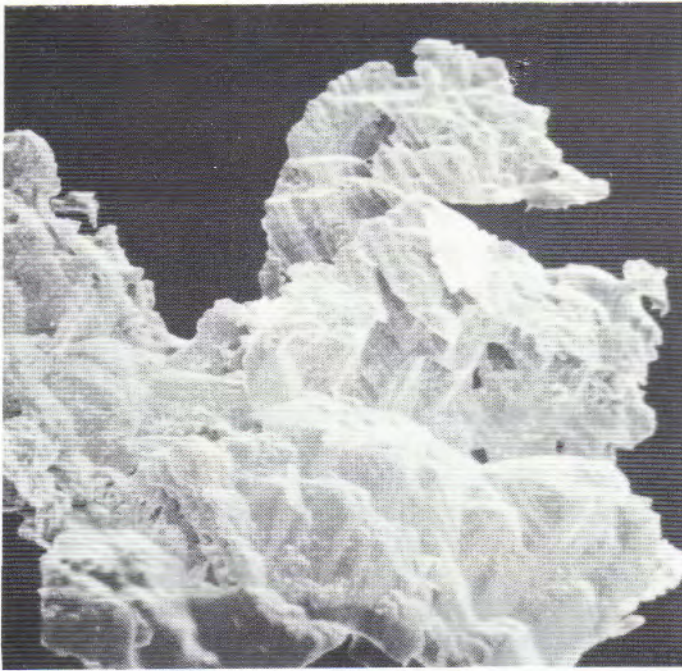


Figure 3 (upper left). Large composite grain of seligmannite (75x).

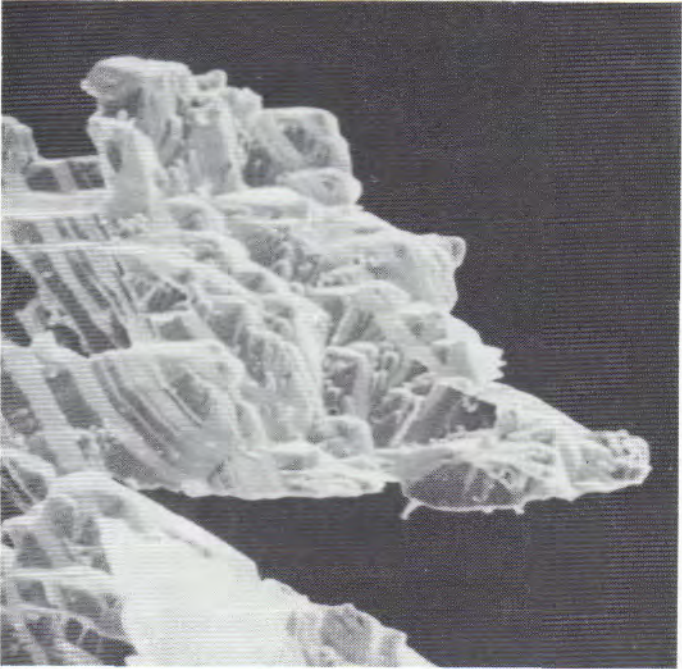
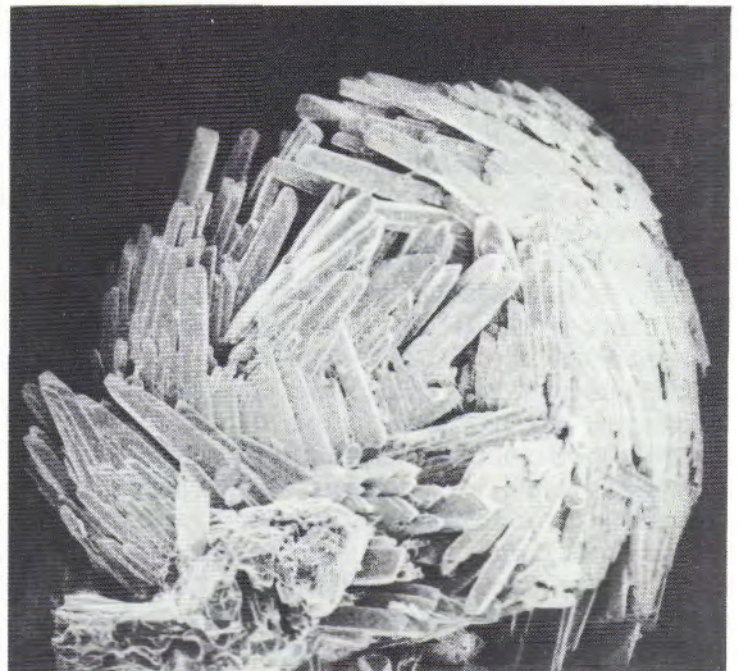



Figure 4 (lower left). Seligmannite: top right-most portion of Figure 3 (200x).

Figure 5 (below). Aggregate of arsenopyrite crystals, approximately 2 mm in diameter.





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**PROGRAM - shortly thereafter; Programs**  
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 Museum is Sat., Sept. 17, 1988.**

# Mineral Notes

## Research Reports

### Franklinfurnaceite

The following is an author's abstract of a paper entitled "The franklinfurnaceite crystal structure: the missing link between chlorites and micas." The authors are Donald R. Peacor, Roland C. Rouse, Department of Geological Sciences, University of Michigan, Ann Arbor, MI 48109, and Sturges W. Bailey, Department of Geology and Geophysics, University of Wisconsin-Madison, Madison, WI 53706. The abstract appears in the program for the 1987 Annual Meeting of the Geological Society of America, which was held at the Phoenix Civic Plaza in Phoenix, Arizona on October 26-29, 1987.

The crystal structure of franklinfurnaceite,

$\text{Ca}_2\text{Fe}^{3+}\text{Mn}_3^{2+}\text{Mn}^{3+}(\text{Zn}_2\text{Si}_2\text{O}_{10})(\text{OH})_8$ , space group C2,  $a=5.483(7)$ ,  $b=9.39(3)$ ,  $c=14.51(1)$  Å,  $\beta=97.04(8)$ ,  $z=2$ , has been determined and refined to a residual of 0.035. The crystal structure is chlorite-like, having a 2:1 layer and gibbsite-like interlayer, but is also mica-like, with Ca occupying sites between tetrahedral six-rings and octahedral interlayers. Considered as being a stuffed derivative of chlorite, it is the first example of a type IIa structure (IIa-1). Zn and Si are ordered in alternate tetrahedral sites. The octahedral layers are uniquely tri- and dioctahedral with  $\text{Mn}^{3+}$  and divalent cations ordered in the octahedral sheet of the 2:1 layer, and  $\text{Fe}^{3+}$ , vacancies and divalent cations ordered in the interlayer.

The large tetrahedral Zn atom permits the tetrahedral rotation  $\alpha$  to be exceptionally large ( $23.5^\circ$ ), in turn allowing anions to form a nearly ideal, 3-dimensional closest packing sequence ...CABABCABC... This creates a well-defined octahedral site for Ca analogous to those in brittle micas and causes the structure to be of type IIa. These and other space aspects of the structure imply that Ca should not be present in the structures of common rock-forming chlorites, but may occur only in chlorites of type IIa having dioctahedral interlayers and substantial substitutions of cations of charge +3.

\* \* \* \* \*

12

### Cuprostibite & domeykite

An article entitled "Cuprostibite, domeykite, native copper and native lead from the Franklin Mine, New Jersey (USA)" appeared in the April, 1988 issue of *N. Jb. Miner. Mh.*, pp 145-148. The authors are E.A.J. Burke, Institute of Earth Sciences, Free University, Amsterdam, The Netherlands, and P.J. Dunn, Department of Mineral Sciences, Smithsonian Institution, Washington, D.C. The following is an abstract of that article.

#### **Introduction**

Cuprostibite and/or copper arsenides associated with native metals (silver and copper) have been previously reported from Langban, Sweden and environs. A sample of willemite from Franklin, New Jersey presents a similar paragenesis. Electron-microprobe analyses were performed using natural and synthetic compounds as standards. An on-line ZAF program was used to correct apparent concentrations.

#### **Mineralogical Notes**

Alpha-domeykite, cuprostibite, native copper, and native lead were observed in all possible combinations. These minerals occur in complex intergrowths, as inclusions and stringers of separate phases, and as infillings of fractures and cleavages. Individual grains rarely exceeded 30  $\mu\text{m}$ . Analyses of the largest grains gave for domeykite Cu 71.3, As 28.2, total 99.5 wt.%, and for cuprostibite Cu 50.1, Sb 48.8, total 98.9 wt.%; values which agree with their theoretical composition. Both native copper and native lead were found to be 99.5 wt.% pure. The grains of native lead tarnish rapidly in air. Their presence was overlooked during reflected-light study of a polished section. Native lead was noticed only during the microprobe investigation. Silicate inclusions accompany these opaque minerals in the willemite. Associated diopside contained up to 11 wt.% MnO and up to 3 wt.% ZnO; serpentine up to 7 wt.% MnO and 3.5 wt.% ZnO; chlorite up to 20 wt.% MnO and 11 wt.% ZnO; and hendricksite up to 15 wt.% MnO and 16 wt.% ZnO. The willemite itself had an average composition of ZnO 69.5, MnO 3.34, FeO 0.07,  $\text{Al}_2\text{O}_3$  0.07,  $\text{SiO}_2$  28.0, total 100.98 wt.%.

*The Picking Table, Fall 1988*

## Discussion

All associations of cuprostibite and copper arsenides with native metals depict a characteristic multiplicity of intergrowth relations. Therefore, the transport of several elements and their deposition from solution is indicated. Explanation of such phases in the Swedish occurrences employ the following mechanisms: decomposition and/or exsolution of "high-temp" compounds (Burke, 1986), breakdown of sulfosalts by decreasing sulfur fugacity (Halenius & Alinder, 1982), and redox reactions between sulfides and manganese oxides at low temperatures (Bostrom, 1981). There are two additional characteristics found at Franklin in addition to the above mentioned intergrowth relations. First, native lead occurs in assemblages of lead silicates (Foote, 1898; Palache, 1935; Dunn *et al.*, 1984; Dunn, 1985). Next, the cuprostibite/domeykite/native metals association occurs with Ca-Mn-Zn silicates as infillings of cavities in willemite.

The formation of cuprostibite, domeykite, and native metals requires an environment of low sulfur fugacity. The components for these minerals can originate from the breakdown of other minerals in alkaline hydrothermal solutions, which give rise to metal-rich fluids. Copper and lead, upon crystallization from these fluids, are necessarily concentrated in separate mineral phases because they cannot be incorporated in the Ca-Mn-Zn silicates.

\* \* \* \* \*

## Sepiolite Asbestos

An article authored by Mark Germine recently appeared in *Environmental Research*, 42 (1987), pp 386-399. It was entitled "Sepiolite Asbestos from Franklin, New Jersey: A Case Study in Medical Geology." The following is an author's abstract of the article.

"Asbestiform sepiolite has been found in a zinc deposit at Franklin, N.J. The host rock is Precambrian Franklin marble. Pseudomorphous foliated texture and cross-cutting relationships indicate replacement of talc by sepiolite. Sepiolite is manganoan, while talc contains little manganese, suggesting differences in manganese substitution in these minerals and providing evidence against solid-state replacement. Sepiolite from Franklin is of moderate crystallinity and consists of soft, flexible mass-fiber. Comparison with other sepiolite samples suggests that increased crystallinity among sepiolites parallels increased fiber length, while disorder appears to be associated with flexibility. Length and aspect ratio (length/width) distribution support toxicological

equation of asbestiform sepiolite with the regulated asbestos materials.

The data presented here suggest that talc can be unstable in a low-temperature hydrothermal environment, altering under certain conditions to form sepiolite. In a wider context, sepiolite may be expected to precipitate at the end-stages of hydrothermal mineralizations in some talc deposits and in carbonate and calc-silicate rocks. Many occurrences of sepiolite in these rocks may have been overlooked due to similarities with other minerals. The fact that sepiolite has been previously unrecognized and misidentified at Franklin is a case in point. Since there is evidence suggesting that sepiolite is fibrogenic and carcinogenic, its potential occurrence in consumer talcs and crushed-stone products has environmental health implications. Similarities in composition and other analytical parameters may cause sepiolite to be mistaken for fibrous talc or chrysolite in environmental samples."

*The author's purpose for writing the article goes far beyond describing a Franklin mineral species. Mr. Germine points out in the first sentence of the introduction that "Existing U.S. Federal regulations define asbestos as the fibrous or asbestiform varieties of a serpentine mineral (crysotile) and five amphibole minerals (riebeckite, grunerite, anthophyllite, tremolite, and actinolite)." To most of us sepiolite is "meerschaum." The recognition of sepiolite in an asbestiform habit is quite recent. An abstracted physical description of the study specimen and the chemical data follow.*

The Franklin sepiolite specimen belongs to the American Museum of Natural History in New York City, (Listed as serpentine and under catalogue #18392). It is a tabular mass covered chiefly by tan-colored talc, measures approximately 20 cm in length, and has shallow depressions ( $\frac{1}{2}$  to 1 cm in diameter) filled with leathery masses of sepiolite. The sepiolite, itself, is very light tan. It is composed of woolly aggregates consisting of matted fibers and flat-lying fiber bundles measuring up to 8 mm. These sepiolite mats often display a finely layered texture (pseudomorphous after foliated talc). These sepiolite fibers are soft and flexible, and, in light of its other properties, equivalent to other mass-fiber types of asbestos. Smooth, lenticular inclusions of talc (up to 3 mm in diameter) are positioned in parallel to the paper-thin masses of sepiolite.

The Franklin sepiolite was analyzed by electron microprobe and by X-ray diffraction. Traces

of sulfur were noted in disaggregated sepiolite during TEM examinations and EDX scans. These suggest that sepiolite alteration was caused by sulfur-rich solutions. The electron microprobe analyses yielded the following weight percents when recalculated to 100 percent assuming  $8\text{H}_2\text{O}^+$  and  $6\text{H}_2\text{O}^-$  per molecule:  $\text{SiO}_2$  54.07,  $\text{MgO}$  23.75,  $\text{MnO}$  2.92,  $\text{Al}_2\text{O}_3$  0.06,  $\text{FeO}$  0.05,  $\text{CaO}$  0.06,  $\text{NaO}$  0.12,  $\text{K}_2\text{O}$  0.02,  $\text{H}_2\text{O}^+$  8.22, and  $\text{H}_2\text{O}^-$  10.96.

\* \* \* \* \*

**Mica**

An article appeared in *Chemical Physics Letters*, 129,(1986),#1, pp48-54, entitled "Vibrational population lifetimes of  $\text{OH}(\nu=1)$  in natural crystal-line micas." The author is E.J. Heilweil, Molecular Spectroscopy Division, National Bureau of Standards, Gaithersburg, MD 20899. Only a brief comment on this article is warranted because the content is outside the scope and interests of the membership.

This paper, written for physicists, presents picosecond infrared saturation-recovery measurements on a Sterling Hill mica sample which is a thin cleavage flake approximately 2" x 1.5", and black in color.

\* \* \* \* \*

**Friedelite**

In the *Canadian Mineralogist*, 21 (1983), pp 7-17, appeared an article entitled "The Pyrosmalite Group of Minerals. II. The layer structure of mcGillite and friedelite." The authors are: Tohru Ozawa, Yoshio Takéuchi and Tsutomu Takahata, Mineralogical Institute, Faculty of Science, University of Tokyo, Hongo, Tokyo 113, Japan; Gabrielle Donnay and J.D.H. Donnay, Department of Geological Sciences, McGill University, 3450 University Street, Montreal, Quebec H3A 2A7. This paper is very technical; a Sterling Hill friedelite was included in the study. The following are selected statements taken from the authors' abstract.

"The present study of mcGillite and friedelite by high-resolution transmission electron-microscopy and electron diffraction reveals their common basic one-layer monoclinic structure ( $C2/m$ ) .....The twin lattice is a rhombohedral superlattice.....Repeated twinning is universal; commonly the twin domains are only a few layers thick, a phenomenon we call 'incipient twinning' when the crystals do not grow to sufficient size to give sharp X-ray reflections.....The basic X-ray reflections that characterize the monoclinic structure, which are sharp in mcGillite, are diffuse in friedelite, which may thus be regarded as a disordered equivalent of mcGillite."

\* \* \* \* \*



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The Fluorescent Mineral Society is devoted to increasing the knowledge 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

## IN MEMORIAM

**Frederic V. G. Bird (1909 - 1987)**

Fred and his wife, Rebecca, have been members of the F.O.M.S. since 1967. Their mineral collecting began on the dumps at Franklin, and although they traveled much since then, they both retained a great attachment to Franklin—the place where their mutual love of minerals was born.

Fred passed away suddenly last October at age 78, in Ouray, Colorado. Many of you remember Fred as a mineral collector but know little else of him. His was an interesting and zestful life. He was born in London and educated as an engineer at Cambridge. Trains always fascinated him, and he worked on the British Railway as an engineer, and later in France on the Paris-Orleans-Midi line. He worked on a Mercury Arc Rectifier research project and lost his hair (at age 25), in addition to acquiring an ulcer because of the fumes. During World War II, he was engaged constantly in repairing Britain's vast electrical network, the "GRID", in London and environs. Later, Fred developed an overwhelming passion for the Alps, and continued his engineering profession in Switzerland. It is there that he joined Oerlikon, which led to his traveling to put huge plants into operation in South Africa, Casablanca, and the Ruhr and Rhone Valleys.

Fred and Rebecca were married in 1952 in Zurich. During their long residence in Switzerland, Fred joined the firm of Brown-Boveri, and belonged to the Swiss Alpine Clubs of Bernina and Lauterbrunner. While with Brown-Boveri, the most noteworthy of his engineering activities was the reinstallation of the Unformerstation in Wengen-Berner Oberland. This power plant provides the electricity to run the famous mountain railway that reaches the Jungfrau Joch — one of the most fabulously beautiful spots in the Alps. While living in the Alps, the Birds became occupied with hunting minerals and crystals. The Sommerloch Tunnel and the Lengenbach Quarry were collecting sites they frequented. The Rockies and the Arizona desert became their collecting grounds later in life when they resided in Ouray in the warmer months and retreated to Tucson for the winters.

Fred Bird will be missed by his Franklin friends and those elsewhere. The F.O.M.S. sends its heart-felt condolences to Rebecca. We wish her many more years of good health and mineral collecting.

\* \* \* \* \*

## THE FALL ACTIVITY SCHEDULE--1988

### The FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY, Inc.

The regular activities of the Society consist of lecture programs, field trips, and micro-mineralogy study sessions. The regular meetings of the Society are held at Kraissl Hall, Franklin Mineral Museum, Evans Street, Franklin, New Jersey, on the third Saturday of March, April, May, June, September, October, and November. The pre-meeting activities begin at 12:30 p.m. and the meetings begin promptly at 1:30 p.m. The lecture program will precede the business meeting. Visitors are welcome to attend both the Society's lectures and business meetings. Consult the following seasonal schedule for specific time and place of other activities.

\* \* \* \* \*

- |  |               |  |
|--|---------------|--|
| <b>Saturday</b><br><b>September 17, 1988</b>                   | Program:      | <b>"New Jersey Minerals"</b> by Joseph Cilen   |
|  | Field Trip:   | <b>Franklin (Farber) Quarry</b> on Cork Hill Road, between Franklin and Ogdensburg, N.J. 9 a.m. to 12 noon.  |
|  | Micro-Group:  | Kraissl Hall, 10 a.m. to noon. Bring scopes & specimens.   |
| <b>Saturday</b><br><b>October 1, 1988</b>                      | Dinner:       | <b>10th Annual F.O.M.S. Dinner.</b> All details on next page.  |
| <b>Saturday &amp; Sunday</b><br><b>October 1 &amp; 2, 1988</b> | Show:         | <b>32nd Annual Franklin-Sterling Mineral Exhibit,</b> Franklin Armory, Franklin, N.J. See next page for guest speakers.  |
| <b>Saturday</b><br><b>October 15, 1988</b>                     | Program:      | <b>"Harvard's Franklin-Sterling Hill Collection highlights"</b> by Omer S. Dean. Both photomicrographs and macro.  |
|  | Field Trip:   | <b>Bodnar/Edison Quarry,</b> Rudeville, N.J. 9 a.m. to 12 noon.  |
|  | Micro-Group:  | Kraissl Hall, 10 a.m. to noon. Bring scopes & specimens.   |
| <b>Sunday</b><br><b>October 16, 1988</b>                       | Field Trip:   | <b>Lime Crest Quarry,</b> Sparta, N.J. 9 a.m. to 3 p.m.(weather and attendance permitting).  |
| <b>Saturday</b><br><b>November 19, 1988</b>                    | Program:      | <b>"Coping with the problems of selecting, building, and using ultraviolet lamps and lanterns for collecting and displaying fluorescent minerals"</b> by David E. Snell, Curator, Earth and Mineral Sciences Museum, Pennsylvania State University, University Park, PA. |
|  | Mini-Program: | <b>An Iron-Arc Lamp Demonstration</b> by Richard C. Bostwick. A great opportunity for you to check out the fluorescence of your barylite specimens. Don't forget to bring them.  |
|  | Field Trip:   | <b>Franklin (Farber) Quarry</b> on Cork Hill Road, between Franklin and Ogdensburg, N.J. 9 a.m. to 12 noon.  |
|  | Micro-Group:  | Kraissl Hall, 10 a.m. to noon. Bring scopes & specimens.   |

**THE TENTH ANNUAL F.O.M.S. DINNER, OCTOBER 1, 1988. DON'T MISS IT!**

- The Place:** The Lyceum Hall, The Immaculate Conception Church, 75 Church Street, Franklin, New Jersey (about 5 minutes by auto from the Franklin Armory, site of the 32nd Franklin-Sterling Mineral Exhibit).
- The Time:** Social Hour begins at 6:30 p.m.; dinner begins at 7:00 p.m.
- The Food:** Dinner will be served family-style at your table by our new caterer, Pine Island Caterers. The meal includes: fruit punch, salad, roast beef, potatoes, a vegetable, gravy, bread and butter; kilbasy and sauerkraut; ice cream and coffee.
- Master of Ceremonies:** Richard C. Bostwick, raconteur extraordinary
- Guest Speaker:** Demetrius C. Pohl, American Museum of Natural History, New York City. His talk is entitled "The Similarities in Mineralogy between Franklin, New Jersey, and Broken Hill, New South Wales."
- The Auction:** Items for auction will include: mineral specimens, books, mining artifacts, photographs, and Franklin memorabilia. Your donation of items for auction will support the Society's educational causes and will be most appreciated.
- The Auctioneers:** The notorious Richard Hauck and/or an "unidentified but notable" accomplice.
- The Price:** \$12.50 per person. Space is limited to 100 persons maximum. Act now, avoid disappointment.
- Reservations:** Joseph & Helen Warinsky  
695 Suffern Road, Teaneck, N.J. 07666  
Phone (201) 836-4048
- \* \* \* \* \*

**GUEST SPEAKERS FOR THE 32nd ANNUAL  
FRANKLIN-STERLING MINERAL EXHIBIT**

This gem and mineral show can be even more enjoyable if you budget your time so that you can hear the guest speakers during your visit to this "beehive of activity" at the Franklin Armory. If your purse strings need a rest, chances are that your feet need a rest, too. Let the speakers raise your aspiration level before you return to your favorite exhibits and favorite dealers.

- Saturday, October 1 at 1:00 p.m.:** Demetrius C. Pohl, American Museum of Natural History, will stage one of his so-called "Dog & Pony Shows" to the delight of all mineral enthusiasts in attendance.
- Saturday, October 1 at 3:00 p.m.:** Omer S. Dean, FOMS, photomicrographer and micromounter, will speak on "Special problems and questions facing the Franklin micromounter; can one remain a 'purist'?"
- Sunday, October 2 at 1:00 p.m.:** Richard C. Bostwick, FOMS, astute collector and recognized authority on mineral fluorescence, will speak on "Franklin-Sterling Hill fluorescent mineral responses to ultraviolet radiation."
- \* \* \* \* \*

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