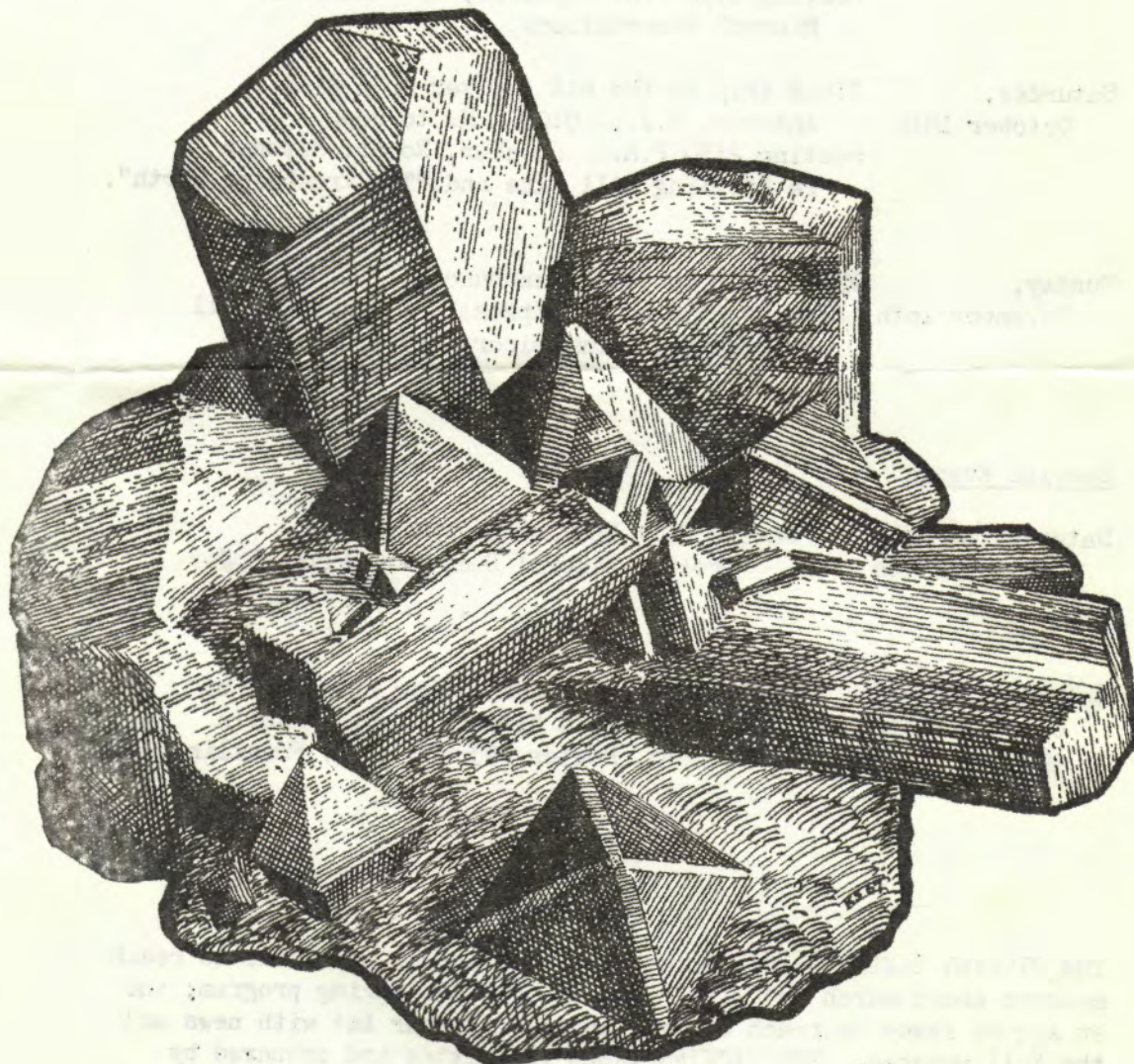


THE PICKING TABLE

JOURNAL OF THE FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY



VOLUME 10

AUGUST 1969

NUMBER 2

CLUB PROGRAM - FALL 1969

All meetings will be held at the Hardyston School, intersection of Routes #23 and #517, Franklin, N.J. Pre meeting activities start at 1:00 P.M. Speaker will be introduced at 2:30 P.M.

Saturday, Field trip to the Cellate Quarry -
Sept. 20th Cork Hill Road, Franklin, N.J. 9:00 A.M. to Noon
Meeting 2:30 P.M. Speaker, Dick Hauck re
Mineral Observations.

Saturday, Field trip to the old Andover Iron Mine,
October 18th Andover, N.J., 9:00 A.M. to Noon
Meeting 2:30 P.M. Speaker, Robert Metsger
re Sterling Hill Mine and "The Trembling Earth".

Sunday, Field trip - to be announced
November 16th Meeting 2:30 P.M. Speaker, Alexander Knoll
on Buckwheat Dump Mineralogy (continued)

Special Events

Saturday/Sunday Second Fall Rockhound Jamboree
Sept. 6th/7th Trotter Mineral Dump, Franklin, N.J.

Saturday/Sunday Twelfth Annual Mineral Show sponsored by
October 11/12 the Franklin Kiwanis Club, Franklin
Armory, Routes #23 and #517, Franklin, N.J.

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THE PICKING TABLE is issued twice a year; a February issue to reach members about March 1st with news and the Club Spring program; and an August issue to reach members about September 1st with news and the Fall program. THE PICKING TABLE is written and prepared by Frank Z. Edwards; the mimeo and typing by Louise W. Borgstrom; cover by Kenneth Sproson.

F.O.M.S. OFFICERS FOR THE YEAR 1969

President	John E. Sebastian, Jr.	36 Roxbury Drive, Kenvil, N.J.
Vice President	Alice L. Kraissl	Box 51, North Hackensack, N.J.
Secretary	Louis Benedict, Jr.	442 South 21st St., Livingston, N.J.
Treasurer	Julian M. Butler	712 Pemberton Ave., Plainfield, N.J.
Asst. Secty.	Frank Z. Edwards	100 West Shore Trail, Sparta, N.J.

TRUSTEES

Lee Areson '70	Frank Z. Edwards '70
Henry M. Althoen '69	Alexander F. Knoll '69
John L. Baum '69	Frederick A. Kraissl, '69
Alternate Trustee -	Richard Hauck '69
" "	Dr. Harry E. Montero '69
" "	William Spencer '69

COMMITTEE CHAIRMEN

Entertainment	Frederick A. Kraissl
Field Identification	Alexander F. Knoll
Field Trip	John E. Sebastian and Frank Z. Edwards
Finance	Julian M. Butler
Membership	Alice L. Kraissl
Nominating	Julian M. Butler
Picking Table	Frank Z. Edwards
Program	Frederick A. Kraissl
Safety	John E. Sebastian and Jack LaRue

F.O.M.S. Notes

For almost two hundred years, since the date of discovery, the minerals of the zinc ore deposits at Franklin/Ogdensburg have attracted and intrigued the mineral collector and the scientist. Often a single exposure to the beauty and variety of these minerals has resulted in a permanent desire to collect and learn more about them. Ten years ago the F.O.M.S. was organized to answer the needs of the Franklin collector. A statement of objectives made at that time follows:

"The Franklin Ogdensburg Mineralogical Society is a new organization established to provide a framework for a series of active programs designed to benefit the community, the collector and those interested in the minerals, mineralogy and geology of Franklin and Sterling Hill, New Jersey.

1. To establish, in cooperation with other interested groups, and maintain a sound, permanent museum of Franklin minerals in Franklin, N.J.
2. To develop new information on Franklin minerals and mineralogy, through cooperative scientific programs with universities and other organizations and individuals.
3. To obtain and make available accurate up to date information on Franklin minerals and mineralogy.
4. To facilitate collecting of Franklin minerals while conserving material for future collectors.
5. To facilitate identification of Franklin minerals.
6. To promote fellowship and the advancement of mineralogy and geology by providing meetings for those interested in the Franklin area."

A review of F.O.M.S. activities for the past ten years proves that these objectives have largely been achieved. Nevertheless, the prime purpose of the F.O.M.S. - that is to provide a meeting place, information and collecting opportunities for the Franklin collector is a continuous goal and remains constant and unchanged. Today, the need for this organization is greater than ever. Originally the founders of the Society anticipated an enrollment of fifty members. This figure was quickly surpassed and last year over eight hundred members paid dues to the F.O.M.S. Since new collectors are constantly attracted, our membership should continue to increase annually and the needs of our members require increasing attention.

As usual, the Executive Board and the working nucleus of the F.O.M.S. will pursue their efforts to make this Society even more interesting and useful to our members. But to help them achieve these ends, the advice, suggestions and criticism of every member is both required and requested. The F.O.M.S. is your club. Your active participation in club affairs can and will determine the direction and performance of the F.O.M.S. in future years. Please help and communicate with the Executive Board.

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A new administration to head the F.O.M.S. for the year 1970 will be elected in November. The recommendations of the Nominating Committee will be presented for acceptance at our October meeting. If you have a choice for representation on the Executive Board, please communicate your nomination to Jack Butler, Jack Baum or Frank Edwards, the members of the Nominating Committee.

We also need new faces on our Club committees. If you would like to participate actively in F.O.M.S. affairs and administration, please advise any member of the Executive Board.

Since its formation ten years ago, dues for the F.O.M.S. have been kept at \$2.00 per year. Despite constantly increasing costs, this low rate was maintained through careful management of club funds and the production of extra income through the sales efforts of our dedicated treasurer, Jack Butler. The largest club expenditures are for the printing and mailing of club bulletins and The Picking Table. The latest of numerous increases in postal rates has now made it impossible to operate the Club without a loss at the current rate of income. Therefore it is with extreme reluctance that the Executive Board has been forced to vote an increase in dues for the year 1970. The new rate will be \$3.00 per year; still a very reasonable charge for the services provided by the F.O.M.S. We hope that our members will understand the need for this increase and will continue to support the F.O.M.S. by retaining their membership.

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A number of members have advised us that their copies of the February issue of The Picking Table were received in mutilated or incomplete condition. Replacement copies have been mailed to such members. If, at any time, you fail to receive your copy of The Picking Table or receive a copy in poor shape, please advise us promptly so that we may send you another copy. The Post Office has been advised of the rough handling of our last issue and promises more careful handling in the future.

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Past F.O.M.S. President, Frederick A. Kraissl has been elected President of the Eastern Federation of Mineralogical Societies. While the F.O.M.S. is not a member of the Federation, it has always supported the aims of that organization and has appreciated their efforts on behalf of all mineral collectors. Officials of the Federation have always been dedicated people giving freely of their time and effort, often at considerable personal expense. Fred Kraissl is only the latest in a long line of able and conscientious executives. I am sure that he will provide the Eastern Federation with effective leadership. On behalf of all of our members, I extend our best wishes to both Fred and the Federation.

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Franklin Area News

During the past three months, after a series of hearings, the members of the Franklin Borough Council have decided that the Buckwheat Mineral Dump requires greater supervision. On July 3rd they passed a resolution requesting bids for the future operation of the Buckwheat Mineral Dump. On July 14th, when bids were opened, the only bidder proved to be the Franklin Mineral Museum, which proposed to pay a rental fee of 50% of the net proceeds from the operation of the Dump to the Borough of Franklin. Since that date, the Borough Council and a committee from the Franklin Mineral Museum have been working out details in an effort to arrive at an early agreement.

It appears certain that in the near future the Buckwheat Mineral Dump will be operated differently than in the past. One of the requirements of the Borough Council calls for the erection of a metal wire fence around the entire perimeter of the Dump. If the Mineral Museum bid is accepted, the sole entrance would be through the premises of the Franklin Mineral Museum on Evans Street, Franklin. Any members who wish to visit the Buckwheat Dump and find the old entrance closed, should proceed to the Franklin Mineral Museum where complete information as to the current status of the Dump will be available.

* * * * *

Several changes in the executive operating personnel at the Sterling Hill Mine were recently announced by the New Jersey Zinc Company.

Mr. Sterling S. Huyett has been elected a Vice President of the company. In addition to his title and position as general manager of manufacturing, Mr. Huyett will continue to be responsible for operations at the New Jersey Zinc Company manufacturing facilities at Palmerton, Pa., Gloucester City and De Pue, Ill.

Mr. R. L. Wood (who replaced Mr. Huyett as manager of the Sterling Hill Mine in 1965) has now assumed the title and duties of Divisional Manager of Mines. In his new capacity, Mr. Wood has the responsibility and overall direction of operations at Ogdensburg, N.J. and at company mines in Elmo, Wis. and Gilman, Colorado.

The previous assistant to the manager, Mr. C. R. Lattig, has now been promoted to the position of manager of the Sterling Hill Mine, Ogdensburg, N.J. Mr. Lattig joined the New Jersey Zinc Company at Ogdensburg in 1942 as mine foreman. He served as Mine Superintendent for 25 years and for the last two years as Assistant to the Manager.

We wish these men success in their new positions.

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In February of this year, Albert Smith of Ogdensburg, N.J. reached his 65th birthday and retired from his position as shift boss at the Sterling Hill Mine. Al spent 41 years with the New Jersey Zinc Company as a lumberman, drill runner, helper boss and finally shift boss. His knowledge of Sterling Hill minerals and their location in the mine is unsurpassed. Al has always been a good friend and a big help to the F.O.M.S. We extend our wishes to him for a long and happy retirement.

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On Sunday, May 18th, the Franklin Mineral Museum held an Open House day to present the new fluorescent room for public viewing and to take formal acceptance of the mineral collection presented to the Museum by Alice Kraissl.

Many local and area residents took advantage of this opportunity to visit the Museum. From their comments, they were greatly impressed and enjoyed the exhibits and special displays at the Museum.

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Other Notes

Mr. Paul E. DeSautels, Associate Curator, Division of Mineralogy, U. S. National Museum, Washington, D.C. has very graciously sent me copies of correspondence pertaining to Franklin mineralogy from the Roebling collection. Excerpts from this correspondence will be published in an early issue of The Picking Table.

The U. S. National Museum (Smithsonian Institute) features a special display of Franklin minerals as well as fine Franklin specimens in the systematic display. Visitors to Washington, D.C. should make every effort to visit the Gem and Mineral Hall at the National Museum. The displays are beautifully arranged and lighted and the specimen material on display is superb.

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Recently a neighbor of mine visited the Utah State Museum at Vernal, Utah. He was very much impressed with the display of fluorescent minerals which featured many Franklin specimens. The Utah Field House of Natural History was initiated to preserve and exhibit the unique reptile and mammal fossils of the famous Uinta Mountain and Basin area, in the place of their origin. In addition to the fossils and the fluorescent display, (which is rated one of the largest and finest in the country), a large room features a systematic display of minerals. Mineral and fossil collectors visiting the area would enjoy a stop at this Museum.

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Our Eastern collectors should be interested in a new book - "Mineralogy of Pennsylvania - 1922-1965" prepared by Dr. Arthur Montgomery. This volume brings Samuel G. Gordon's "The Mineralogy of Pennsylvania" up to date. The new book was sponsored by the Mineralogical Society of Pennsylvania. It is available from The Director of Scientific Publications, The Academy of Natural Sciences, 19th Street and Benjamin Franklin Pkwy, Philadelphia, Penn., 19103. Price is \$5.00 per copy plus 24¢ Pennsylvania Sales Tax.

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Mineral Notes

For several years we have been very fortunate in that Harvard University research has provided a wealth of information on Franklin minerals. Now it looks as if we are in for a dry spell. Dr. Clifford Frondel, on his sabbatical leave, is busy at the NASA laboratories, Houston, Texas, working on the moon specimens brought back by Apollo XI. David Cook, who contributed so much during the past year, has been drafted and was inducted into the U.S. Army on July 10th. Temporarily, therefore, our main source of scientific

news on Franklin minerals is suspended. However, upon the return, early next year, of Dr. Frondel, research at Harvard on Franklin minerals should resume and data on Franklin minerals continue to increase.

Djurleite (#253 of Verified Franklin Minerals)

One of the last identifications made by Dr. Frondel, on an old Franklin specimen in the Harvard collection, was another new mineral for the Franklin/Ogdensburg area - djurleite. Dr. Frondel is sure that more specimens of this mineral can be found in Franklin collections. Djurleite is always found in association with chalcocite but, unfortunately, verification can only be made by X-ray analysis.

Djurleite (Hey 3.1.3a) was originally described by Eugene H. Roseboom, Jr., U.S. Geological Survey, Washington, D.C. in the American Mineralogist, volume 47, September-October 1962, pages 1181-4. At the same time, djurleite was also found by and described by Nabiro Morimoto, in the Mineralogical Journal (Japan) volume 3, 1962, pages 338-344. Both scientists described the same mineral, shown by X-ray study to be identical with Djurle's synthetic $\text{Cu}_{1.96}\text{S}$ III. An analysis of natural material containing digenite gave $\text{Cu}_{1.91}\text{Fe}_{0.01}\text{S}$. Original data given by Morimoto is G. 5.63 and probably orthorhombic. It was forecast that djurleite should prove to be a common mineral as it had then been identified in specimens from Chihuahua, Mexico; Butte, Mont.; Tsumbeb, S.W. Africa; Samar, Philippine Islands; and Morococha, Peru. Morimoto's specimens came from four different Japanese mines. Other pertinent data from the Roseboom description follows:

"Until recently the only known sulfides of copper were covellite (CuS), chalcocite (Cu_2S), and digenite (about $\text{Cu}_{1.8}\text{S}$). Then Djurle (1958) described three polymorphs of a new synthetic compound, ($\text{Cu}_{1.96}\text{S}$). The writer has found the low temperature polymorph of this compound, Djurle's $\text{Cu}_{1.96}\text{S}$ III, in nature and proposes the name djurleite.

The identification of djurleite is based primarily on the close correspondence between X-ray powder diffraction data and those of Djurle's $\text{Cu}_{1.96}\text{S}$ III.

The main problem in the identification of djurleite is to distinguish it from chalcocite. The two minerals possess superficially similar x-ray patterns, differ chemically by only about 0.3 weight per cent S, and resemble each other under the metallographic microscope."

"All specimens of djurleite examined in polished section contain sufficient finely disseminated digenite, bornite or pyrite to render a chemical analysis meaningless in view of the small difference in composition between djurleite and chalcocite."

"In polished section, djurleite is similar to chalcocite in color, hardness and anisotropism. A polished section of chalcocite and two of djurleite gave identical results when etched with solution of HNO_3 , HCl , KCN , FeCl_3 , KOH , and HgCl_2 in the concentrations described by Short. The results

of the etching were essentially those described by Short for chalcocite except that all these specimens tarnished a faint yellow brown with HgCl_3 . The failure of these tests to distinguish between chalcocite and djurleite is not surprising in view of the small compositional difference and the probable similarity in structure."

Leucophoenicite-Baumite Series

Mr. Cook has advised that his paper on the new minerals of the Leucophoenicite-Baumite series should appear in the July-August or September-October 1969 issue of the American Mineralogist. The May-June issue was received by subscribers during the week of August 4th. The July-August issue should therefore be available early in October. A resume of this paper will appear in the next issue of The Picking Table.

Native Wire Silver from Sterling Hill

Ewald Gerstmann is justly proud of a fine wire silver specimen from Sterling Hill that he recently acquired. The specimen was found in vuggy material from the North Ore Body. The matrix is brown willemite ore, partially altered to a yellow serpentine with a clayey surface, and containing minor amounts of sphalerite and calcite, and banded by a $3/8$ " wide vein of franklinite. When the piece of ore was broken, a $3/8$ " vug was revealed in the franklinite vein. At the base of this vug is a soft black mineral, which is probably argentite. From this base rises a fine coil of wire silver, with several minor branches and shoots. This coil practically fills the entire vug. When the vug was exposed, the coil of wire silver was a pristine silver white and very attractive under the microscope. Although chemical analyses of Sterling Hill specimens have shown very small percentages of silver, I believe that this is the first specimen from Sterling Hill to show a visible amount of native silver.

Unusual Zincite Crystals.

Another unusual and fine Gerstmann specimen from Sterling Hill contains several clusters of unusual zincite crystals. The matrix is a pepper and salt ore, heavy with franklinite grains in calcite, plus some red brown willemite. On the surface of this ore are several areas with small depressions or vugs containing micro crystals of hetaerolite, hairs of chlorophoenicite, and little hedgehogs or clusters of recrystallized orange zincite crystals as elongated scalenohedrons with quartz like striations across the prisms. These clusters average about ten crystals and radiate from a common center. Verification was made at Harvard by x-ray analysis. Comment by David Cook - "This specimen is outstanding for the perfection of the crystals." A skilled crystallographer would enjoy fully describing the crystal faces of this specimen.

Anatase

In the last issue of The Picking Table, we described a find of anatase micro crystals by Dr. William B. Thomas. Since then, a number of other collectors have found specimens of anatase in the Buckwheat gray dolomite. Pat Gross personally showed me a very fine crystal of this species. Mr. Wayne Walton, Jr.,

of St. Paul, Minn. was kind enough to send me a picture of a nice crystal that he owns. Also, Dr. Thomas advises me that he has now found a total of twelve different specimens of anatase. Dr. Thomas advises collectors to recheck their brookite specimens for anatase crystallization.

Millerite

At the 1968 Kiwanis Show the writer displayed a specimen of millerite from Franklin. The millerite on this specimen occurs as fine elongated brassy hairs in massive epidote. These crystals showed positive on a nickel test and also have been identified as millerite by Drs. Frondel and Montgomery. Dr. Thomas was quite intrigued by this specimen and inaugurated his own search for additional millerite. Recently he wrote me as follows:

"I had a search in my Buckwheat material and found a piece that looked like pyrite mixed with sphalerite. I broke off a piece to examine for millerite. I believe that the piece you showed me at the Kiwanis Show is something like this. It also tests out for Ni and is in a sulfide mixture. So actually if you get away from the idea of looking only in vugs you can find millerite in the Buckwheat Dump. Also, I found a tinge of surface dark green desaulsite on some of the pieces. I am sending a piece of this material to Dr. Frondel as well as one of the blue anatase crystals."

Barysilite

Syntheses of various barysilite-like compounds has shown that the barysilite formula suggested by Ito and Frondel is probably incorrect. H.W. Billhardt in his paper "Syntheses of Lead Pyrosilicate and other Barysilite-like Compounds" (American Mineralogist, volume 54, March-April 1969, pages 510-21) sums up his work as follows:

"According to their investigations of barysilite Ito and Frondel (1967) suggested the formula $Pb_5X(Si_2O_7)_2$. The number of formula weights per unit cell would then be $Z=9$. This would only be in agreement with the space group $R\bar{3}c$ or $R3c$ determined by J. Lajzerowicz (1965) and given in this paper under the condition that Z and Pb of Pb_8 are isomorphic. We never observed an isomorphic exchange of X and Pb of Pb_8 . Therefore the formula $Pb_5X(Si_2O_7)_2$ is probably incorrect.

Chemical analyses of barysilite made by Bauer and Berman (1930) and G. Flink (reported by Glasser, 1964) have a Pb:X ration (X=Fe, Mn, Zn, Ca, Mg, K, Na) of about 4-5:1. Glasser interpreted these analyses as indicating the formula $3[Pb_4(Mn, etc)Si_3O_{11}]$. But even this formula is inconsistent with the single crystal data. Probably unpure barysilite was taken for these chemical analyses. As Ito and Frondel already pointed out, the barysilite X-ray powder diagram of Glasser contained nasonite $Pb_6Ca_4 [Cl_2/(Si_2O_7)_3]$.

Our experiments to replace more than one of the nine Pb cations by Sr, Ba and any other cation in "barysilite" failed. X-ray diffraction patterns and observations under the microscope always revealed some additional phases besides "barysilite". Therefore the proposed formula of Lajzerowicz $Pb_8X(Si_2O_7)_3$, is confirmed and the substituted cation X should occupy a special position in the barysilite structure."

Etringite

Moore and Taylor have determined details of the structure of ettringite, $\text{Ca}_6 \left[\text{Al}(\text{OH})_6 \right] (\text{SO}_4)_3 \cdot 26 \text{H}_2\text{O}$, by X-ray single crystal studies on natural material from Scawt Hill, Northern Ireland. (Nature, vol. 218, pages 1048-1049) (Min. Abst. volume 20, No. 1, March 1969, page 16).

Gamisgradite (=Hornblende)

A new analysis of material from the type locality by V. Majer gave SiO₂ 43.97; Al₂O₃ 11.90; Fe₂O₃ 4.85; MgO 13.08; MnO 0.44; CaO 11.16; Na₂O 1.94; K₂O 0.79; TiO₂ 1.91; P₂O₅ trace; H₂O⁻ 1.95; H₂O⁺ 0.26; total 100.42%. Gamisgradite is therefore a common hornblende and the name has been discredited by The Committee on Mineral Names of the I.M.A. (Am. Min. vol.53, November-December 1968, page 2106).

Friedelite

"Friedelite and its ferroan varieties from deposits of the Atasui region (central Kazakhstan)." by M.M. Kayupova. (Min. Abst., volume 20, number 1, March 1969, page 53). Abstract follows:

"Friedelite and its ferroan varieties are common in the Ushkatyn deposits of the Atasui iron ore region. The ferroan friedelite is dark brown, H 4½-5, sp. gr. 3.17; distinct pleochroism, from straw yellow to pale yellow; ϵ 1.625, ω 1.654. It developed replacing Fe-Mn carbonates; chemical analyses gave SiO₂ 31.76 and 31.53; As₂O₃ 2.37 and 2.90; Al₂O₃ 0.52 and a trace; MnO 45.82 and 41.58; FeO 8.14 and 12.20; H₂O 9.40 and 10.24; Cl 2.53 and 2.46; less O=Cl₂ 0.57 and 0.81 totaling 99.97 and 100.10. The d.t.a. curve has a strong endothermic peak at 595° - 680° and a weaker one at 725° - 825°; x-ray powder data are given. The Fe isomorphously replaces Mn²⁺ and As replaces some Si. The Atasui friedelite has SiO₂ 33.86; Al₂O₃ 0.37; MnO 50.39; FeO 1.12; ZnO 0.15; H₂O⁺ 10.95; Cl 3.30; less O=Cl₂ 0.76; total 99.29. ϵ 1.629, ω 1.664; sp.gr. 3.07."

Loellingite

Dennis Radcliffe and L. G. Berry report on "The Safflorite-Loellingite Solid Solution Series" in the American Mineralogist, volume 53, November-December 1968, pages 1856-1881. Of interest to Franklin collectors are several conclusions:

"Safflorite and loellingite have been considered as distinct mineral species. Loellingite being nearly pure orthorhombic FeAs₂ and safflorite monoclinic (Co,Fe)As₂ with a beta angle close to 90°.

The present investigators have found a complete range of compositions from CoAs₂ to FeAs₂ and, with only two exceptions, the lattice of these compositions is dimensionally orthorhombic with a marcasite like structure. Of the natural samples examined, 25 percent lie in the field of loellingite with less than 2 mole percent metals other than iron. The remaining 75 percent

are distributed fairly evenly along the CoAs_2 - FeAs_2 join. It is now recommended that loellingite be used for FeAs_2 with less than 3 mole percent CoAs_2 in solid solution and safflorite for the CoAs_2 - FeAs_2 series. This terminology is in keeping with that used by Berry and Thompson (1962), and with previous usage."

The cell dimensions, compositions and stoichiometry of natural and synthetic loellingite are given.

"The stoichiometry of loellingite has been investigated and shows defect structures similar to that of safflorite. In $\text{Fe}(\text{AsS})_2$ the sulphur content apparently controls the stoichiometry, i.e. with increasing sulphur, the amount of iron occupying the vacant arsenic lattice positions tends to decrease. This trend is also accompanied by a general increase of the metal-arsenic ratio. These solubility limits vary from $\text{FeAs}_{1.83}$ to $\text{FeAs}_{2.08}$ and may be compared with synthetic $\text{Fe}(\text{Fe}_{0.04}\text{As}_{1.96})_2$ which has a metal-arsenic ratio of 1:1.93 (Heyding and Calvert, 1960).

Samples from specific localities and thus environments may be characterized by a distinctive stoichiometry e.g. Edenville loellingite and loellingite from Franklin, N.J. In this latter case, Buerger (1932) and Peacock (1944) independently reported $\text{Fe}(\text{Fe}_{0.05}\text{As}_{1.92})_2$ which compares with the present determination of $\text{Fe}(\text{Fe}_{0.06}\text{As}_{1.94})_2$."

Mooreite

J.J. Finney reports on the "Unit Cell of Mooreite" in the American Mineralogist, volume 54, May-June, 1969, pages 973-5, as follows:

"Mooreite, $(\text{Mg,Zn,Mn})_8(\text{SO}_4)(\text{OH})_{14} \cdot 4\text{H}_2\text{O}$, is monoclinic although the space group is not $\text{P}2_1/\text{m}$ as previously reported but rather $\text{P}2_1/\text{a}$. The new unit cell has $a = 11.18$, $b = 20.28$, $c = 8.23$ Å and $\beta = 92^\circ 55'$ for which $Z = 4$. A new chemical analysis confirms the original formula except for one less H_2O molecule. The cell formula $(\text{Mg,Zn,Mn})_{32}(\text{SO}_4)_4(\text{OH})_{56} \cdot 12 \text{H}_2\text{O}$ is compatible with space group requirements. The calculated density based upon the present analysis is 2.52."

Norbergite

G.V. Gibbs and P.H. Ribbe report on "The Crystal Structure of the Humite Minerals: I. Norbergite" in the Amer. Mineralogist, volume 54, March-April 1969, pages 376-391. Abstract follows:

The crystal structure of norbergite, $\text{Mg}_2\text{SiO}_4 \cdot \text{MgF}_{1.8}(\text{OH})_{0.2}$ from Franklin, N.J. ($a = 4.7104(1)$; $b = 10.2718(3)$; $c = 8.7476(4)$ Å; $\text{Pbnm} = 3.177$ g/cc) was refined by least squares techniques to $R = 0.052$ using 867 intensities weighted by the range-estimate method (weighted $R = 0.024$). The structure is based on a slightly distorted hexagonal close packed array of anions with one half the octahedral sites occupied by Mg and one twelfth the tetrahedral sites occupied by Si. F is ordered in the array and bonded to three Mg; its temperature factor is twice that of four coordinated O.

Comparable bond lengths involving F and O indicate that the radius of F is 0.11 Å smaller than that of O.

As in forsterite, the dominant structural unit in norbergite is a zigzag chain of edge sharing octahedra lying parallel to z. A detailed study of the structure in terms of bond angle strains shows that the distortions from an ideal hexagonal close packed model can be explained qualitatively in terms of cation-cation repulsion across shared polyhedral edges. The Si-O bond lengths (1.635, 1.638 Å) opposite shared edges are significantly longer than that (1.612 Å) opposite the unshared edges of the tetrahedron."

Rhodochrosite/Manganosite

An investigation of the "Stability Relations of Rhodochrosite in the System - Manganese-Carbon-Oxygen" by J. Stephen Huebner (Amer. Mineralogist, volume 54, March-April 1969, pages 457-481) shows that "the common occurrence of rhodochrosite with hausmannite (Mn_3O_4) and its rare equilibrium association with manganosite (Mn_xO), bixbyite (Mn_2O_3) and pyrolusite (MnO_2) are natural expressions of the oxygen fugacity, carbon dioxide fugacity, and temperature dependence of the rhodochrosite stability field. Experimental data for reactions between rhodochrosite and the manganese oxides, supplemented by thermodynamic calculations are given."

"Manganosite is a rare mineral because it is stable only when temperature is high relative to carbon dioxide fugacity (at an f_{O_2} value within the manganosite field). Manganosite is expected to form only by the decarbonation of rhodochrosite or reduction of hausmannite. Most known occurrences of manganosite have formed by the decomposition of carbonate."

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Our readers should also be interested in the following article by Michael Fleischer of the U. S. Geological Survey, Washington, D.C., which appeared in the American Mineralogist, volume 54, May-June 1969, pages 960-1.

HOW MANY MINERALS?

The question is frequently asked, "How many minerals are there?"; the answers scattered through the recent literature vary widely, but are usually in the range 1,500 to 2,500. The difficulties involved in answering are perhaps more evident if the question is reworded: "How many of the existing mineral names (perhaps 10,000 to 20,000) are now considered to represent independent mineral species?"

The answer clearly depends on the definition of independent mineral species, as pointed out by Strunz (1966, p. 17-19), who gives the number as 1,580. Few textbooks or reference works discuss the problem at all; among the exceptions are Hey (1955) and Mason and Berry (1968). They point out that there are problems even in naming complete binary solid solution series. For example, the olivine series Mg_2SiO_4 - Fe_2SiO_4 , has been called by various writers one, two or six minerals (I call it two).

The four component columbite-tantalite series $(\text{Fe, Mn}) (\text{Nb, Ta})_2 \text{O}_6$, has been called one, two, or four minerals (I call it four).

At this point one might be tempted to generalize that a mineral can be called a different independent species for each predominant cation in each structural position, as I have done in the two examples cited. This does not work, however, even for the relatively simple plagioclase system $\text{Na AlSi}_3\text{O}_8$ - $\text{Ca Al}_2\text{Si}_2\text{O}_8$; it also does not correspond to the usually accepted dividing points in the series clinzoisite-epidote or clinzoisite-piemontite not to mention the complications in such groups as the pyroxenes, amphiboles, and micas. These are problems to be faced by the special committees on Mineral groups of the IMA Commission on New Minerals and Mineral Names, two of which (Pyrochlore group, Amphibole group) have begun their work, with others hoped for.

I have had occasion recently to compile a list of minerals, in connection with the revision of mineral definitions in the third edition (in preparation) of the American Geological Institute's Glossary of Geology and Related Sciences. My count, as of January 1, 1969, by arbitrary decisions, gives 1,950 mineral species; your count would doubtless be different.

During the years 1962-1966, the IMA Commission of New Minerals and Mineral Names approved 205 new mineral names, so that about forty new species are being added annually.

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Perhaps the most lucid explanation of the legal principles involved in the litigation over the zinc ore deposits at Franklin/Sterling Hill may be found in an article by Charles H. Shamel published in the Columbia School of Mines Quarterly, volume XXVII, number 1, November 1905, pages 1-27.

Since this is a very important chapter in the history of these deposits, the relevant portion of this article is given here for your records.

LAWS RELATING TO MINERALS

Charles H. Shamel

"In 1857, the New Jersey courts were called upon to wrestle with perhaps the most noted litigation that has ever arisen in the United States directly involving mineral definitions, lasting in varying forms for nearly half a century. This was concerning the franklinite deposits near Franklin Furnace, New Jersey. The character of those parts of the deposit affected by the litigation as shown to the court, is described in the parts of the opinion of the court quoted below. The importance and irrepressible character of the litigation, the inherent difficulties of the case as well as interesting features of some of the opinions of the various courts as they labored with scientific difficulties of the subject, complicated by

heroic efforts to right the supposed injustice attempted through alleged overreaching use of scientific distinctions and terms by early practitioners of "high finance" justify a somewhat extended statement of the litigation and citations from the opinions of the courts.

The possibility of this litigation was caused by Samuel Fowler who in 1848, being the owner of the Mine Hill tract of land conveyed to the Sussex Zinc and Copper Mining and Manufacturing Company "all the zinc, copper, lead, silver and gold ores and also all other metals or ores containing metals (excepting the metal or ore called franklinite and iron ores, when it exists separate from the zinc)." On the same day by another deed Fowler conveyed to the same company "all the metal, mineral, or iron ore, usually designated and known as franklinite, found or to be found in a certain tract of land" which tract of land was a part of the land conveyed in the first deed. This second deed did not affect any part of the tract of land in dispute but is referred to by the court as showing the understanding by the parties of the terms used. The Sussex Company in 1852 conveyed to the New Jersey Zinc Company, "all the zinc and other ores, except franklinite and iron ores" in the premises originally conveyed by Fowler to said Sussex Company, and also by a second deed "all the metal, mineral, or iron ore, usually known or designated by the name of franklinite found or to be found etc." in the same tract of land that Fowler had made similar conveyance of to said Sussex Company.

The terms used in this second deed between the two companies were identical with those of the Fowler deed to the second tract of land but as to the first deed between the two companies it will be observed that the language is not the same, for in the deed from the Sussex Company to the New Jersey Zinc Company the reservation was of "franklinite and iron ores" without the addition of the limiting word "when it exists separate from the zinc," consequently as to the first deed the interest conveyed to the New Jersey Zinc Company was not quite so extensive as the interest conveyed by Fowler to the Sussex Company. All the franklinite and iron ore was excepted whereas in the conveyance by Fowler only the franklinite and iron ore was excepted "when it exists separate from the zinc".

This residual interest (all the franklinite or iron ore mixed with zinc) of the Sussex Company passed to another corporation, the New Jersey Franklinite Company. The New Jersey Franklinite Company proceeded to mine the franklinite ore that they owned and in 1857 the New Jersey Zinc Company attempted to enjoin the New Jersey Franklinite Company "from further mining and removing of ore on two grounds (1) that the reservation of all the franklinite in the deed by the Sussex Company was fraudulent, which contention was decided against it by the court, and (2) (with which we are particularly interested in this connection) that the ore in question was a zinc ore which passed by the terms of the grant to the New Jersey Zinc Company". On this branch of the case the court said: "The incontrovertible fact is that the mass consists of zinc ore and franklinite in such close mechanical combination that neither can be taken from the mine without removing the other, which party by the terms of the deed has title? Each party claims the entire mass, one or the other must take it.

The ownership of the property is in no sense joint. No partition of their interest could be made. One or the other must be entitled to it. The deeds were not intended to convey, and do not convey, distinct interest in the same lode, vein, or stratum. Some test must be applied by which the title to each vein or distinct portion of a vein can be ascertained to belong to one or the other of the parties.

It is satisfactorily shown by the evidence that, as the dates of the deeds in which this controversy has its origin, and as late as the year 1853, the masses or veins of ore upon Mine Hill were regarded and known as franklinite. The ore was so called by the proprietors of the mines and by the miners themselves. It

was so described in scientific treatises and in geological reports. It was so classified and arranged in mineralogical cabinets and exhibitions. The mass was known not to consist entirely of that mineral. Pure specimens or crystals of franklinite were known to exist only in small and unimportant bodies, having no value for practical purposes. In the general mass of the ore, there was mingled with the franklinite, ores of zinc and other minerals in various proportions. But so far as was known, franklinite constituted the predominating element which gave character and title to the mass. Zinc ore had been discovered and used in at least one locality, but no well defined vein of zinc ore had been developed. Upon Sterling Hill, in the immediate vicinity, distinct, well defined veins of zinc and franklinite had been developed, and the zinc vein extensively worked. Here, as on Mine Hill, the ores were found to some extent in mechanical combination. Both veins contained more or less of each mineral. In the zinc vein the red oxide of zinc predominated; it formed the enveloping mass which gave name and character to the ore, and though grains of franklinite were found extensively disseminated throughout the mass it was universally known and designated as zinc ore. On Sterling Hill, the separate lodes, though in immediate contact, were generally well defined and distinguished by clear lines of demarcation. From the general geological character of the vicinity, it was anticipated that in the progress of investigation, a similar distinct and well defined vein of zinc ore would be developed upon Mine Hill. Upon this state of facts within the knowledge of the parties, there seems to be no room for rational doubt as to what the parties intended by the terms used in the deed as descriptive of the subject matter of the conveyance. By "zinc ores" was meant those veins of lodes in which the ore of zinc was the predominating ore, and franklinite, not the pure mineral of that name, which was never found except in small and detached specimens, but those veins are lodes in which franklinite predominate, and which was known and designated as franklinite ore. The instrument must be construed according to the mind and intent of the parties at the time it was executed.

The evidence abundantly shows that the term franklinite was in constant and familiar use to designate the ore or mass in which the mineral predominated. This decision would seem to be based on sound legal and scientific reasoning, so far as it related to the interpretation of the terms of the deed conveying the mineral. However, the case was appealed to the higher court and the decision of the chancellor was overruled.

In the Court of Errors and Appeals the want of good faith in not executing the deed by the Sussex Company so as to convey all its right to the New Jersey Zinc Company as had previously been agreed, seemed to appeal very strongly to this higher court; and by a divided vote (7 to 5) the decision of the chancellor was reversed and it was adjudged that the whole of the deposit belonged to the New Jersey Zinc Company.

It is a legal maxim that "hard cases made bad law" and the above cited opinion of the court is a striking instance for, in its endeavor to correct the injustice arising from the sharp practice of the Sussex Company in making the deed and obtaining an acceptance thereof and the negligence of the New Jersey Zinc Company in accepting a deed that did not fully carry out the prior contract between the two companies, this court evolved a decision that is a masterpiece of legal hair-splitting with, however, doubtless, an honest intention of promoting what they regarded as essential justice. After stating various transfers of this residual interest reserved as above stated and the organization of the Boston Franklinite Company and the profits of the promoters thereby, the court becomes eloquent and says: "What oceans of money they made no one can tell. All this while this zinc company pursued its plodding way, building oven after oven, furnace after furnace, and factory after factory expending in such improvements, upon the faith of this transfer of stock, over \$300,000, besides the very large consideration money it had paid, forcing success along the hard road of industry, developing, according to the true intent of its charter the ore of zinc; manufacturing their pure snow-white paint for the calls of commerce and comfort, convenience and elegance of life. They were the workers in the hive - they were the silk-worms painfully weaving their shrouds of silken thread, while this franklinite company toils not, neither does it spin- not an ounce of its boasted franklinite has it ever yet yielded to the demands of commerce. It springs at once into the butterfly stage of its existence whose only object in life is to spread its golden wings to the glittering sunshine and multiply its worthless species."

The court then proceeds to discuss the question of what the parties intended by the exception in the deed but leaving entirely out of account two facts that the chancellor states were established by evidence before him, (1) that in the similar deposit on Sterling Hill that a large deposit of red oxide of zinc had been found, and being close together, therefore the parties probably supposed the same condition to exist in the two deposits, and (2) that the difference between the terms of the contract and the deed were discussed between the directors of the two companies at the time the deed was accepted, so that they must have known that when franklinite was excepted from the grant something was meant by it. But the court nevertheless proceeds "what, then was meant by the parties at the time they used the term zinc ores in this deed? Did they mean this vein in dispute?" The evidence also shows that there were no other ores on the premises except this vein of franklinite and iron ores, and all the parties well knew it. Now, may we not ask, if it was not the intention to convey this vein by the name of a zinc ore, what did the parties intend it to be? It is apparent, that if they did not intend to convey this vein by the name of zinc ore it must have been the intent of both parties to convey nothing. I think these facts show that it must have been the intent to convey this vein by the name of a zinc ore, for there is nothing else upon which the deed could operate, and both parties must have known it.

There is nothing upon this property but this vein of franklinite and iron ore. The franklinite and iron ore are excepted in terms, and if this vein was meant to be excepted as franklinite the deed conveys nothing, as both parties must have known. Under these circumstances, we can draw no other conclusion than that the parties meant to convey something by the deed, and that could only, as both parties must have known, have been the vein in question. But it urged that the evidence shows that, at the date of the deeds, and as late as 1853, the mass or veins of ore in Mine Hill were regarded and known as franklinite, that the ore was so classified and arranged in mineral cabinets and exhibitions; that it was described in scientific treatises, geological reports, and was so called by the proprietors of the mines and by the miners themselves. But what do all these amount to if it appears by the overwhelming weight of other considerations, some of which we have indicated, that the parties to the deed, at the very time of the execution, intended to convey the vein in question by the name of zinc." The "overwhelming" "considerations" "indicated" is the legal quibbling in the above citation. This entertaining court then proceeds to describe how Berthier in 1821 having received from "Doct Fowler, who was a learned mineralogist" specimens of the mineral found in Mine Hill," resolved it into its elements and discovered that it was a new mineral species, and christened it by the name of franklinite, because it had first been found at Franklin Furnace, in Sussex County, New Jersey", and that this vein had been worked for zinc for sixty years but continues bitterly, "that the old acquaintance zinc was for some time, as is customary in such cases, overslaughed in the halls of the learned by this new born babe of science. But, this franklinite was the most useless iron ore that had been discovered. There it had laid for one hundred years within 300 yards of an iron furnace tortured in every shape that skill and avarice could put upon it to declare its hoped for usefulness, and the only thing ever successfully generated between it and the furnace was a salamander." Then this court proceeds to perpetually enjoin the Boston Franklinite Company from digging any of the franklinite ore in Mine Hill.

This settled the title to the south part of Mine Hill for a time, but later, as mentioned in the case of Meredith vs Zinc and Iron Co., 55 N.J. Eq.211 (p.215), a person who was not a party to the previous litigation, and who held an unsatisfied mortgage on the franklinite in the south half, foreclosed his mortgage and obtained title thereto. He then began suit in a federal court against the New Jersey Zinc Company, and as might have been expected, the Zinc Company was beaten. The result of the litigation was that the warring interests combined and the new company became the indisputable owner of all the ores in the south half of Mine Hill and of the zinc ores in the north half. In the meantime the title to the franklinite on the north half of Mine Hill became vested in the Lehigh Zinc and Iron Company and litigation broke out again. This litigation was not carried to the higher courts so that no reports of the same are available, but Prof. J.F. Kemp, who was employed as an expert geologist in the case, states that this second litigation involved the same old question of the construction of the reservation of the franklinite in the deeds. The Zinc Company kept the litigation in the state courts of New Jersey so as to have the benefit of the above New Jersey decision that the title to the franklinite passed to the Zinc Company, but they were nevertheless beaten in the litigation and gave up the attempt to obtain the franklinite deposits by virtue of a supposed legal title and again formed a combination with the opposing company, so that the entire deposit is now owned by one corporation and the possibility of litigation extinguished."

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