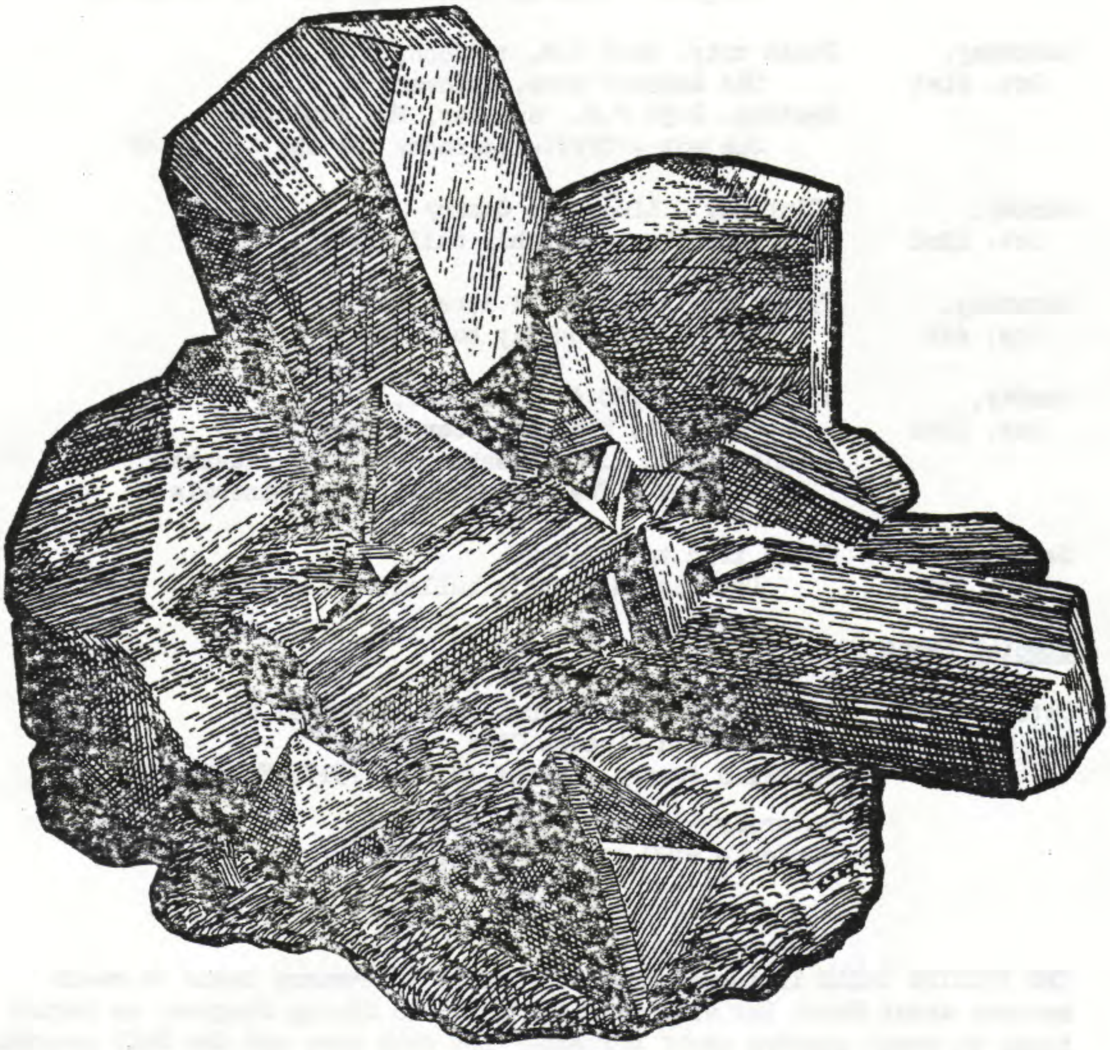
THE PICKING TABLE

JOURNAL OF THE FRANKLIN·OGDENSBURG MINERALOGICAL SOCIETY



VOLUME 8 AUGUST 1967 NUMBER 2

CLUB PROGRAM - FALL 1967

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 announced at 2:30 P.M.

Saturday, Sept. 9th	Field trip, N. J. Zinc Co., Friedensville, Pa.
Saturday, Sept. 16th	Field trip, 9:00 A.M. to Noon, Cellate Quarry, Franklin, N. J. Meeting, 2:30 P. M. Speaker, Dr. Arthur Montgomery Subject - Optical Mineralogy for the Collector
Saturday, Oct. 21st	Field trip, 9:00 A.M. to Noon, Old Andover Mine, Andover, N. J. Meeting, 2:30 P.M. Speaker, Mr. Paul Seel Subject - Crystallography for the Collector
Sunday, Oct. 22nd	"Club Day" Limecrest Quarry Details in monthly bulletin
Saturday, Nov. 4th	Field trip to a fossil location Details in monthly bulletin.
Sunday, Nov. 19th	Field trip, 9:00 A.M. to Noon, Charlotte Mine, Cranberry Lake, N. J. Meeting, 2:30 P.M. Speaker, Mr. John Albanese Subject - The Parker Shaft Lead Minerals
Saturday, Dec. 2nd	Field trip to a Museum Details in monthly bulletin

Special Event

October 14th - 15th	Eleventh Annual Mineral Show sponsored by the Franklin Kiwanis Club - at the Franklin Armory, Routes #23 and #517, Franklin, N. J. Saturday - 9:00 A.M. to 9:00 P.M. Sunday - 9:00 A.M. to 6:00 P.M.

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THE PICKING TABLE is issued twice per year; a February issue to reach members about March 1st with news and the Club Spring Program; 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. Front cover by Kenneth Sproson.

F.O.M.S. OFFICERS FOR THE YEAR 1967

President	Dr. Harry E. Montero	Box 120, RD 1, 480 Glen Road, Sparta.N
Vice President	John E. Sebastian, Jr.	36 Roxbury Drive, Kenville, N. J.
Treasurer	Julian M. Butler	712 Pemberton Avenue, Plainfield, N. J.
Secretary	Alice L. Kraissl	Box 51, North Hackensack, N. J.

TRUSTEES

F.O.M.S. Notes

The new cover of the Picking Table is the creation of Mr. Kenneth Sproson, an industrial designer by profession. The illustration is a line drawing of willemite and franklinite crystals from Plate 13, b, Palache's Bulletin #180. Now it is up to your editor to make the contents worthy of the cover.

Mr. Sproson, in his capacity as Field Trip Chairman, has also earned the approval and gratitude of many F.O.M.S. members for the fine collecting opportunities provided this Spring. He has scheduled an even more impressive program for this Fall as the Club calendar shows. Average attendance on the Spring field trips was 130 members; with a high of 302 for the Sterling Hill trip. Finds of good material were made at each locality.

The speakers scheduled for our Fall meetings are of the same impressive caliber as the men who addressed our Spring sessions. The topics to be discussed should interest all collectors, beginners to advanced. Literature which will interest or inform the mineral collector is always scarce. Papers by the informed amateur are rarely written or published; scientific literature is stereotyped or incomprehensible. Therefore, the only practical way for a collector to increase his knowledge is through listening to lectures of qualified speakers. When these are the best in their field, such as the speakers we schedule, attendance at Club lectures is well rewarded.

The business affairs of the Society are conducted by the Executive Board, which convenes after the departure of the speaker at our meetings. These sessions are not closed; they are open to all members. Your presence at any such meetings is always welcome.

A new administration is due for 1968. The members of the Nominating Committee are Frank Z. Edwards, chairman, John E. Sebastian, Jr., Richard Hauck, Dr. Harry Montero and Frederick A. Kraissl. Suggestions as to nominees may be given to any member of this committee. Volunteers or nominees are also requested for an unofficial position. The hardest worked in our society is Jack Butler, the Treasurer. He now needs an assistant to help with the sales and storage of Club literature and equipment. If you would like to work with Jack, please communicate with him or any member of the nominating committee.

The second weekend in October should be reserved for attendance at the Annual Franklin Kiwanis Mineral Show. This gets bigger and better every year and I am sure this year will be no exception. Attendance at this show is a must for every Franklin collector so red crayon these dates on your calendar.

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Trotter Mineral Dump

For Franklin collectors the greatest news in years is the imminent opening of a new collecting area. Recently the New Jersey Zinc Company sold their property on Mine Hill to Mr. R. S. Phillips. This included the Buckwheat Pit and the surface and underground workings entered through the Trotter Shaft. After consultation and investigation with Mr. Ewald Gerstmann and old miners familiar with the history of this location, it was determined that an extensive area, adjacent to the opening of the Trotter Shaft, had been used for many years as a dump for non ore material. The area is quite extensive, at least 200 ft. by 800 ft., and untouched since deposition. It is now planned to open up this area to mineral collectors, for a fee, sometime early in August after proper precautions have been taken and insurance coverage arranged. Mr. Gerstmann will be in charge of this new Trotter Minera Dump. For information write him at 14 Walsh Road, Franklin, N.J. 07416, or phone 827-3728, area code 201.

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Miscellaneous News Notes

Rockhounds the world over are alike in one respect. They embark on every collecting trip fortified with the certainty that this is the day that will produce THE prize specimen of their dreams. This universal dream needs no encouragement. So the following news item will just confirm the normal rockhound's belief; it will only surprise the uninitiated or those of little faith.

From Vienna, Austria, June 27, 1967, per London Express Service. "A giant emerald found in an abandoned mine in Carinthia, Austria's southernmost province, has made a five year dream come true for Max Blender, a 40 yea old shop assistant.

He can now open his own shop and marry the girl he has been courting for five years.

Max, an amateur geologist, has spent all his spare time at the abandoned emerald mines in the Harbach Valley. First worked by the early Romans, the mine was owned by a British company between the world wars. Through neglect, the workings became flooded and the mine was abandoned. A caretaker now issues licenses to casual searchers who comb the surface areas for emeralds. Max had a license and for ten years he scratched the surface vainly until at last, in the sandy bed of a brook running from the mine, he found the biggest emerald ever discovered in the area - a 189 carat stone of the deepest green.

A Viennese cutter ha said that when cut the stone will be about 40 carats and worth nearly $60,000. "A stone fit for the crown of a queen!"he added.

Also this item from Durban, South Africa, June 12, 1967 via Reuters:

"A diamond slightly larger than a golf ball and estimated to be worth $250,000 has been found in northeastern Lesotho. The diamond, said to weigh 601¼ carats, is believed to be the sixth largest in the world. The unusual gem was reported found by a 38 year old miner, whose name was given here as Mr. Mohap. The diamond is being held by the Lesotho Government until it can be sold."

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And, for the more informed collector, some interesting comments extracted from the acceptance speech made by Dr. Max H. Hey, upon the award of the Roebling Medal of the Mineralogical Society of America, San Francisco, Cal. Nov. 16, 1966.

"In 1928, I had the good fortune to be appointed an Assistant in the British Museum (Natural History). My time was shared between analytical work and work on the slip catalogue of the collection. There can be no better training in mineralogy. The slip catalog was started in 1904, and by 1928 it had progressed from the elements to midway through the silicates; I was started on the zeolites. For each specimen we had to collect all its history, to check the identity of the mineral, and to determine all the accompanying minerals; and in those days determinations weren't a matter of sending a fragment for an X ray powder photograph; - appearance, hardness, density, optics, and confirmatory chemical tests were the tools, and excellent tools they are. I still feel guilty when I have to send out a specimen for an X ray determinatio

"Parallel with this work on meteorite analysis has been work on the microanalysis of minerals; I am convinced that many, perhaps most, laboratories demand unnecessarily large amounts of material for analysis; 10 to 20 milligrams is ample for almost any mineral, and when the qualitative composition is known, a good analysis can sometimes be made on 1 to 2 milligrams. There really is no excuse for the chemist to demand more, and I hope mineralogists will press for a revision of obsolete notions in this field."

"Another activity that began as a small sideline and has developed into a major task started out of an inquiry into what silicates of magnesium were known in nature; this inquiry prompted the institution of a card index of minerals arranged by their principal constituent elements, an index originally intended for internal use in the Department of Mineralogy - and from this The Chemical Index of Minerals has grown."

"Finally, in 1965, I was asked to succeed Dr. Spencer as editor of the Mineralogical Magazine, a job I accepted with some trepidation. To maintain Dr. Spencer's standards of editorial practice was, I felt, a daunting task, but I am happy to say that almost without exception the amendments, excisions and compressions I have asked of authors have been accepted without demur and often with thanks. To my mind, every scientific paper can benefit from firm and thorough editing, and the editor's principal tasks are to keep all papers as concise as possible, and to ensure that the author says what he means -

it is surprising how often experienced authors write a passage that could be easily misread. Indeed, to my mind, far too few scientists today realize that the English language is a very delicate precision instrument capable of the finest distinctions, and handle it like a sledge hammer. I was brought up on a famous little book - Fowler's The King's English. I don't mind whether an author writes the King's English or the President's English. But I do object to new fangled private versions like the verb "to Filtrate". But perhaps an editor's most difficult task is to ensure that his journal is adequately indexed and cross indexed; certain well known journals are indexed in a very perfuntory fashion, and I, for one, would never submit a paper to one of these journals. I hope neither the Mineralogical Magazine nor The American Mineralogist will ever fall into this category."

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Mineralogical Data

Spencite

Our November field trip will be to the Charlotte Mine, Cranberry Lake, N. J., where among other radioactive minerals, the rare species Spencite is found. Recently this mineral was reanalyzed (Additional Data on the Composition of Spencite by O. I. Joensuu and C. O. Ingamells; The Canadian Mineralogist, Volume 8, part 5, 1966, pages 647-649). This analysis is given below. 32 different elements are listed in this analysis which probably sets a record.

Analysis of Spencite

Na_2O	.11% (Weight)	Ho_2O_3	.50% (Weight)
K_2O	.01	Er_2O_3	1.99
MgO	.50	Tm_2O_3	.31
CaO	7.81	Yb_2O_3	2.88
SrO	.05	Lu_2O_3	.27
Fe_2O_3	3.22	ThO_2	1.84
FeO	.00	Al_2O_3	3.87
MnO	.60	TiO_2	.27
Y_2O_3	17.77	B_2O_3	10.04
La_2O_3	.73	SiO_2	24.89
CeO_2	2.49	P_2O_5	.02
Pr_6O_{11}	.54	Cl	.45
Nd_2O_3	1.84	F	.44
Sm_2O_3	1.07	H_2O+	9.82
Eu_2O_3	.14	H_2O-	1.93
Gd_2O_3	1.61		100.27
Tb_4O_7	.34	Less O = F,CL	.28
Dy_2O_3	1.92		99.99

Pyroaurite

In 1941 Dr. Clifford Frondel made an intensive study of the minerals pyroaurite, stichtite, and hydrotalcite. During the course of his study he discovered and described three related minerals; sjogrenite, barbertonite, and manasseite. In 1965 pyroaurite was found at Sterling Hill. It occurred as micro, butterscotch colored, hexagonal, platy crystals usually standing on edge on a drusy white sugarlike coating of micro mooreite crystals covering brown willemite ore from the North Ore Body. Dr. Frondel's interest in this species still continues and he would like a Sterling Hill specimen for the Harvard collection and experimentation. If you would care to sell or trade such a specimen, please communicate with Dr. Frondel.

Barylite

"The first occurrence of the rare mineral barylite in Norway." by Saebo, Per. Chr. Norsk Geol. Tid., Vol. 46, 1966, p. 335-348, Min. Abst. March 1967, vol. 18, no. 1, page 42.

"Barylite was found in a new roadcut in the Lagen valley some 10 kilomet north of Larvik; associated with analcite, aegerine, and catapleiite. It was identified optically, spechtrochemically, and by the X ray powder method. Later the mineral was found in an old museum specimen from a Langessundsfjord pegmatite with analcite, helvite, zircon, aegerine, bastnasite, natrolite, muscovite and pyrophanite. The genesis is discussed; the barylite is of very late hydrothermal origin, and its paragenesis is very complex."

Hendricksite

"Hendricksite, A New Species of Mica, a paper by Clifford Frondel and Jun Ito appeared in the July 1966 issue of The American Mineralogist. Just slightly late was a paper "Zinc Mica from Franklin Furnace, N. J." by Evans, B.W. and Strens, R.G.J., in Nature, vol. 211, page 619, 1966. (Min. Abst. March 1967, volume 18, no. 1, pages 39-40.) The analysis given substantially agrees with those of Frondel/Ito. Abstract follows:

"Microprobe analyses (1 complete, 1 partial) and optical and X ray data are given for a dark mica that occurs in hancockite bearing rocks from Franklin Furnace. The complete microprobe analysis gave SiO_2 31.9%, Al_2O_3,13 Fe_2O_3 4.9%, TiO 0.35%, MnO 12.5%, ZnO 19.8%, MgO 2.7%, Li_2O 0.04% (optical spectrography), Na_2O 0.1%, K_2O 8.6%, CaO 0.02, BaO 0.3%, H_2O+ and F 3.95% (heating in air) H_2O- 0.95% = 99.6%. Other data α 1.598, β 1.658, γ 1.660. α pale yellow, $\beta = \gamma$ light chesnut brown, $\gamma = \beta$ × dispersion $r < v$ slight; a 5.34, b 9.312, c 10.329Å, 99.9°, polytype 1M; D calc 3.30 g/cm³.

Norbergite

"Substitutions in the olivine layer of norbergite" by Olav H.J. Christie - Norsk Geol. Tid., 1965; Min. Abst. June 1966, Vol. 17 No. 6, page 577.

"A series of compounds in the range $Mg_2SiO_4 . MgF_2$ - $Ca_2SiO_4 . MgF_2$ were synthesized and examined by X ray powder photographs. They all give the norbergite pattern. A complete series of mixed crystals appears to exist, in contradistinction to the case of Mg_2SiO_4 - Ca_2SiO_4 where the mixed crystal formation is very restricted. The structure of the olivine layers in norbergite appears to be stable during substitutions which are not possible in the olivine minerals themselves. Zn_2SiO_4 and Al_2BeO_4 norbergite analogues also have been synthesized."

Willemite

The following extract is from a paper by Sidney A. Williams, "The significance of habit and morphology of Wulfenite", The American Mineralogist, July 1966, vol.51, no. 7, pages 1212-1213.

"As a guide to Eh and pH of crystallization, samples were pigeonholed according to close temporal association with one of five species commonly found with wulfenite. These are cerussite, mimetite, willemite, hemimorphite, and plattnerite. Wulfenite earlier than or contemporaneous with cerussite was assumed to have formed in mildly acid waters at a fairly low Eh. Then, in order, association with mimetite, hemimorphite, willemite, and plattnerite indicates increasing pH and Eh. The conditions of all of these species are fairly well known with the exception of willemite. Some willemite, particularly that of acicular habit, has almost certainly formed under surface conditions of oxidation. Other willemite occurrences seem to be best explained by elevated temperatures as suggested by the work of Roy and Mumpton (1956). This seems to be especially true of crystals with short prismatic habit. Since wulfenite has also been grown under elevated temperatures and in hydrothermal conditions, it may be that some of the peculiarities of wulfenite found with willemite reflect elevated temperatures."

In another paper, H. W. Sheffer found that the well formed,orange red, hexagonal prismatic crystals of willemite from six localities in New Mexico and Utah contain 47 to 350 p.p.m. of Germanium whereas the massive green variety from Franklin contains no detectable Germanium.

Yeatmanite

Paul B. Moore in his paper "Catoptrite and yeatmanite - stuffed pyrochroite structures?" (Am. Min., Sept-Oct 1966, volume 51, page 1494) gives data obtained by an X ray study of catoptrite. The structure of this mineral, not yet fully determined, is shown to be closely related to pyrochroite. Also that reorientation of the yeatmanite cells reveals a close relationship to that of catoptrite.

?Sursassite

Our members will be interested in a letter (6/18/67) from Dr. W.B. Thomas to your editor:

"Here is a new one from Franklin. A note from Dr. Clifford Frondel - "Your mineral probably is identical with a famous unknown from Franklin, known to F. A. Canfield and called "jerseyite" by him. It was tentatively identified by Palache as arseniosiderite, but this is wrong as the mineral is a Mn silicate possibl identical with sursassite. We never had enough to work with, and a specimen would be very welcome." I sent a piece to J.A. Oldenburg as he had been working to get enough for analysis so he has some. What I could spare I sent."

When more is known about this mineral, we will advise you in The Picking Table.

Voltzite/Wurtzite

In his talk on "Franklin Minerals, Past and Present" at our May 20th meeting, Dr. Clifford Frondel advised Society members that specimens of wurtzite from Sterling Hill were actually specimens of voltzite. The fascinating story of this species is given later in this issue of The Picking Table; the official scientific paper will appear some time in the future. Hey's entry on Voltzite is as follows:

#3.4.7a Voltzite. $4[Zn(S,As)]$ or $4[(Zn,As)S]$, with very considerable lattice vacancies; probably tetragonal; X ray powder photographs are indistinguishable from those of Blende, but the mineral has a distinct birefringence.

Dana's 7th Edition of System of Mineralogy - Vol. 1, page 230 gives the following on Voltzite:

"In implanted spherical globules, and as a radially fibrous or thin lamellar crust. Sometimes shows a pearly cleavage surface. Hardness 4-4½. Sp.gr. 3.7-3.8. Luster vitreous to greasy. Color dirty rose red, yellowish, brownish. An oxysulfide of Zinc, Zn 69.38, S 27.22, O 3.40 total 100.00. Modern analyses are lacking for this species of unusual composition. (For early analyses see Dana 107, 1892). Presumably occurs always as a secondary incrustation. From the Elias mine, near Joachimstal, Bohemia, on galena, sphalerite and other sulphides; from Geroldseck near Lahr, Baden. First found at the Rosieres mine near Pontgibaud, Puy-de-Dome, France. Named after the French mining engineer, Philippe Louis Voltz (1785-1840)."

The occurrence of Voltzite at Sterling Hill was described to your editor by Mr. Albert Smith, who with his working partner, Miklos Soos, made the original find in 1934. The two men were working on 2100 stope, when, 30 feet above the 1680 ft. level, they ran into a water pocket or fissure which they eventually followed up to the 1600 ft. level. This fissure averaged 1/2" in width but frequently pocketed up to 12" wide. Much of the fissure was filled with a soft, heavy manganese mud similar to that of the Mud Zone. As they continued mining up the stope and the fissure they came upon a pocket of beautiful shiny black irridescent stalactite of voltzite.

Note: The last sentence should read "came upon a pocket with a beautiful shiny black iridescent stalactite of voltzite. "

It was about 18" long, from 8" to 10" in width, and had a hollow center. To Mr. Smith it looked like a hornet's nest with the bottom cut off. The mass broke during removal and was then divided into about 16 pieces. Of these at least half have been lost or destroyed through ignorance. One specimen was given to Dr. Bauer by Mr. Smith for analysis and identification; probably this is the piece in the Harvard collection. (Dr. Bauer's analysis showed sphalerite plus - and, because of the irridescence, he thought that that 'plus' was some form of oil.) Several months later another mine crew ran into the same fissure above the 1500 ft. level and followed it almost to the 1400 ft. level. In several pockets these miners found loose specimens of Voltzite with a less attractive dull black appearance rather than the bright, irredescent surface found earlier. These were the only two finds made of Voltzite at Sterling Hill.

Bannisterite/Ganophyllite

In the question and answer period following his talk on May 20th, Dr. Frondel advised our members that one of the two occurrences of ganophyllite at Franklin had been found to be identical with a new mineral called Bannisterite, which will be described soon in a scientific paper. The glistening light brown crystallized mineral found in veins in Parker Shaft material remains as ganophyllite. The dark brown, sometimes bronzy, platy or micaceous appearing brown masses found in a number of associations (sometimes called the early find of ganophyllite by collectors) is the material to be called bannisterite.

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Our speaker of May 20th, Dr. Clifford Frondel, charmed his listeners with a most interesting and informative talk. Since many of our members cannot attend meetings, this talk is presented herewith. The Society thanks Dr. Frondel for both his talk and the privilege of reproduction.

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FRANKLIN MINERALS, PAST AND PRESENT

by

Dr. Clifford Frondel

It is an absolute delight for me to be here and I must immediately thank the Club, and the officers thereof, for the opportunity to come and speak to you and to participate in your wonderful field trip of this morning. Certainly it was the best organized, and I might add the most productive field trip that I have been on, I think, ever and it is a great credit to this organization and to the mineralogists of the region to organize a trip of this kind.

I have made many field trips to Franklin. I became interested in mineralogy in High School, through the good offices of a teacher. He introduced me to elementary books on the subject and took me on collecting expeditions to localities near New York City. I remember the Branchville pegmatite and the Great Notch zeolite localities but we were unable to go much further afield. At that time, I spent summers at a Boy's Camp near Glenwood on Pork Chop Mountain. The summer following my introduction to mineralogy, I decided to go to that mecca of all mineralogists, Franklin. Well, it was a long walk - I don't know how many miles - perhaps 15 to 20. But one summer day I set out and walked down Pork Chop Mountain to McAfee where the big quarry was working. I went in and put some specimens in my knap-sack, then continued down Hamburg Road, saw some abandoned mine kilns off towards the railroad tracks and went over there. The collecting was pretty good; I put a few more minerals in my knapsack, then continued to trudge down the road towards Franklin. I finally arrived there in the middle of the afternoon and immediately walked down Main Street and off the little side street that goes over towards the big pit on Mine Hill. I stood on the lip of that and looked in and saw this marvellous syncline structure, just the way it was described in the book. And then the realities of geology, and especially of this type of structure, became apparent to me. I had read about it but when I actually saw it there, then I think that my career as a geologist and a mineralogist really crystallized.

I suppose the ambition of every baseball rookie when he starts his first game in the major league, is to step up to the plate and hit a home run. Certainly, the first ambition of every amateur collector is to go out in the field the first time and pick up a new mineral. Then you have reached the heights right at the very beginning. And this did happen to me. I sat down on the edge of the big pit to rest after my long walk. I picked up a few specimens nearby and I very clearly remember one of them (perhaps it was not the first, but it may have been). This was a piece of calcite with some franklinite and some large crystals of a bronzy red mica, which I said to myself was phlogopite. This was, I believe, in 1918 or 1919.

However, it took me about 46 or 47 years to realize that that specimen I had picked up was, in fact, a new mineral. It was Hendricksite which, as you know, was described in the American Mineralogist last year.

Actually, this is one of the best ways to find minerals at Franklin. The conventional way and, perhaps the hardest way, is to find a little microscopic tuft of crystals, hidden in the crevice of a specimen. Actually, the best hunting today for new minerals at Franklin and Sterling Hill is among the more common species; these species that are so common that you take them for granted and do not look at in detail. The so-called manganophyllite or phlogopite or biotite as it is variously referred to in Palache's Professional Paper and in other publications is a good example. It was just too obvious - nobody bothered to look at it and I cannot claim credit for doing so myself. The recognition that this mineral was, in fact, the zinc member of the mica family was almost accidental. I became interested in the amount of manganese that was present in manganophyllite or this variety of phlogopite. I began to make analyses of this mineral from various localities all over the world - Langban and other known localities, including Franklin. When I made an X ray spectrographic study of the Franklin manganophyllite, I got a great big peak signifying the presence of a lot of manganese, which did not surprise me at all. But also on the same chart was another great big peak. I did not have the least idea as to what it was; it did not belong there. So I checked the wavelength and it proved to be zinc. So then I made a systematic examination of all the specimens and found that while this mineral had a lot of manganese in it, there was a great deal more zinc. It was then I realized that this was a new mineral - 45 years late.

The study, in this way, of rock forming and other common minerals at Franklin and Sterling Hill also will be rewarding. In this talk I will tell you of some of my suspicions as to what is new and unusual in the way of the commoner minerals here at Franklin.

Actually, the manganese member of the phlogopite group is not known - that is - a mica in which manganese is the dominant element. Manganese is present in a small amount in all of the micas, including the phlogopite group. But hitherto it has never been found so that in terms of atomic percent it is the dominant constituent. It is almost certain that it will sooner or later turn up at either Franklin or Sterling Hill and will probably be found in a real darkish, brownish, black color. I went through the entire Harvard collection in connection with this search and made chemical analyses of some 40 to 50 specimens. I failed to find one that had more manganese than zinc or iron or magnesium. I would not be at all surprised if some of you, in your own collections, representing material collected personally, do have specimens of micas with a high manganese content and thus a new mineral. And, if you do not know how much manganese, send it to me and I will determine that for you.

You might wonder as to the ways in which we find new minerals. Often this is purely by accident. For example, our study of Hendricksite. When I was looking at additional specimens to find a high manganese member, I also looked at specimens from the great deposit at Langban, Sweden for manganophyllite is rather common there. I went through hundreds of specimens and measured the indices of refraction. (This gives a pretty good indication of the amount of manganese that is present.) Lo and behold, I did find one specimen that had an extremely high index of refraction. I was sure that this was the manganese member of the group so I asked for an analysis of it and sat back and waited for the chemist, Dr. Ito to return with the result. I would have made a wager that he would smile and say, "high manganese" but when he came in, he was not smiling. He looked at me and said "high barium". And sure enough, the reason why the index of refraction of that particular Langban specimen was so high was that it was loaded with barium. As a matter of fact, it was the barium member of this mica group. So, that is how you find a new species, mostly good luck and by accident.

It was a revelation to me to see members of this group out working in the open pits at the south end of Sterling Hill. It looked like the California Gold Rush but even more energetic and extremely well organized and disciplined. It was even more amazing to me to see how successful you were in finding specimens of jeffersonite. You do know that jeffersonite is one of the oldest minerals found in this country. It was one of the first new minerals described in the United States about 1820 and was named after President Thomas Jefferson.

Well, here we get back again to this matter of the obvious - the obvious which often goes unrecognized. Not so long ago I made a study of the pyroxenes from Franklin and Sterling Hill. You know these are supposed to be hedenbergite/diopside. Members of this particular group are alkaline, yet to my surprise, when I made a detailed chemical study of some of the common pyroxenes from this locality, I found they contained a large and hitherto unrecognized amount of sodium together with ferric iron. This proved that these pyroxenes were members of the so-called aegerine/augite series and quite different from the hedenbergite/diopside members.

The crystals in the Harvard collection that I analyzed were labelled Jeffersonite. Well, this was interesting. It required a new look at the chemistry of jeffersonite. So it became important to get an original specimen of jeffersonite, one that was actually described by Lardner Vanuxem and his associates back in the 1820's. If you have an exact type specimen then a description becomes meaningful. Well, I searched all over, went to all of the big collections in this country and even wrote to the British Museum for an original specimen dating back to those early days. No one had such a specimen. Today I realized, in part through comment made by my friend Jack Baum, that the place where you were collecting this morning on the wall of the Noble Pit, was exactly the same place where Vanuxem and his partner collected the original jeffersonite. If I had only had the good fortune to learn this two or three years ago, I think that the study I wrote, and ultimately published on the Mineralogy of Jeffersonite, may have been different.

Well, I am to talk about old minerals and new minerals - and we have at Sterling Hill a most exceptional mineral that is both extremely old and extremely new. If any of you have specimens of this mineral you own something that is extremely valuable in a monetary sense as well as extremely rare and curious. I am referring to the so-called botryoidal sphalerite or "wurtzite", that wart-looking zinc sulphide that was found at Sterling Hill about 1935. I secured my specimen from L. H. Bauer and thought I had every known specimen. I arrived here yesterday and found that Gerstmann has 3 or 4 specimens, 2 or 3 specimens are in the Franklin Museum, and there are several others around.

Now I am going to tell you the history of this mineral. The proper name is not wurtzite but voltzite. Voltzite is a most exceptional mineral and one of the least known. This is because there are no specimens preserved of voltzite. It was first found by a French engineer named Fournet in 1831 at a mine in France, and he published a description in a very out-of-the-way French technical journal. Hardly anyone has ever read the original description, which states that this mineral is a zinc sulphide but that it also contains an organic component. In other words, when you dissolve it in acid, you get a residue of hydrocarbon and Fournet described this in great detail. It is hard to believe that a hydrocarbon can be an intergrowth component of a mineral, especially of zinc sulphide, on a crystal or chemical basis. It is difficult to explain how an organic molecule may become involved in the crystal structure of zinc sulphide. Organic molecules are too large and they have the wrong shape and dimensions to substitute into the structure. This has always been known and as a matter of fact, after Fournet published his first description in 1833, the mineralogists of the world refused to believe him. Whenever they wrote another reference book or paper about the subject, they eliminated all reference to the organic component.

By the 1850's and 1860's, the reference and text books described voltzite, Fournet's mineral, as a kind of zinc sulphide and completely dismissed the organic constituent he found in it. You can still read these old descriptions and you'll read wrong descriptions, for this has continued to the present day. As a matter of fact, in the Sulphide Volume of Dana's System of Mineralogy, you will find that voltzite is described as a kind of zinc sulphide. It is called a zinc oxysulphide. There is not enough sulphur to combinde with the zinc so the residue or remainder was supposedly oxygen; and so an oxysulphide. Not one word in this description or in any book for a century mentions the organic component. This was forgotten until 1935 when some miners down in Sterling Hill (I have forgotten exactly where) found a big stalactitic mass hanging down in a water course of this shiny, brown, botryoidal mineral. They did not know what it was, but took it out, naturally, in their lunch boxes and under their arms. Some of it ultimately reached L. H. Bauer, who looked at it and said, "Well, that looks to me like ordinary sphalerite." However, he made some simple chemical tests and it did take a good zinc reaction; he dissolved it in hydrochloric acid and it gave off a lot of hydrogen sulphide. He would have stopped then, but by chance he happened to look at the bottom of the beaker and found a considerable residue.

Now zinc sulphide should dissolve in hydrochloric acid or in any acid without any residue unless it is a strongly oxidizing acid, in which case you might get some sulphur. But this was not a sulfur residue so, being a good scientist, he investigated the residue and found to his surprise that it was an organic matieral - a hydrocarbon of some kind. He made a complete chemical analysis and found in fact that it was a zinc sulphide plus an organic compound. Unfortunately, about this time Mr. Bauer died. Eventually the specimen passed on to me and I continued the investigation. It took ten years to unravel the mystery and a good number of years before I had the sense to go back to Fournet's original description to see what this zinc oxysulphide actually was. When I did read, then I realized that Fournet actually had a mixture of zinc sulphide and an organic component and that this was exactly the same as the material from Sterling Hill. So here are two known occurrences of the same mineral finally recognized 130 years apart.

You know this is one of the wonders of being a mineral collector. There is always the opportunity to find a rarity such as this and to contribute something new to our store of scientific knowledge. Certainly the crystal chemistry and the structural crystallography of voltzite is most unusual and, I think, constitutes a most important contribution to these subjects. If any of you have specimens of this mineral, treasure them. And, if you don't want them, give them to me. I will give them a good home. How many of you do have specimens of voltzite? You know, yesterday when I came down here I thought that I had all that were known (and I must thank John Albanese, for he helped me obtain some added specimens.) Hold on to your specimens for they are most unusual and to this moment we do not have the final answeer. I think that this substance will prove to be an extremely fine-grained mixture on a colloidal scale, of ordinary zinc sulphide, ZnS, the wurtzite kind and another substance, an organometallic compound of zinc. These are known synthetically but the compounds that have been made in the laboratory are not very stable and I don't think occur in nature. It seems to me this is a mixture of a new and very different kind of zinc, an organometallic compound of zinc. Maybe somebody can get back to the locality at Sterling Hill and there look about for organic materials that might possibly become included in with zinc sulphide.

Anyone who wants to find a new mineral at Franklin would be well advised, as I indicated earlier, to look not for an unusual lead silicate or some microscopic crystals hiding in a cavity, but to look at the more common minerals. I have already spoken to you about a high manganese mica. I'll wager that within a year someone here will find a high manganese mica from either Sterling Hill or Franklin - most likely at Sterling Hill becasuse the micas there have barely been studied. Other good bets are the high manganese pyroxenes. I don't mean "Johannsonite," which is a high manganese pyroxene, but the pyroxenes of alkali and ferric iron, including jeffersonite. These are the members of the augite or the aegerine/augite solid solution series. These minerals are characteristically high in iron and all so far described contain more iron than manganese. I believe that probably down in the big open pit where we were working this morning, someone will find a high manganese variety of jeffersonite which would be a valid new species.

Also, the garnets here have not been given the attention they deserve. Scientifically, it appears that virtually all the garnet at Franklin and Sterling Hill is andradite. Well, I have one or two specimens of a very fine grained pink garnet that we know is grossularite, a calcium aluminum instead of calcium iron. Also there was some nice bright red garnet found years ago at Franklin that we think is the manganese garnet, spessartite. But this is very rare and I have never really seen a convincing specimen.

I was told many years ago that some of the andradite at Franklin contains water and that it is not really andradite but a different species. There is a water-containing garnet known under the generic name of hydro-garnet and I think that hydro-andradite is, or was, a common mineral at Franklin. The specimens I have seen were not in big crystals. They were very fine grained, light tan aggregates and apparently contained something like 6% or 7% by weight of water - and that is a lot of water for a garnet. A description of this mineral is planned. This undoubtedly will stimulate further search in local collections for additional occurrences. As a matter of fact, the pink, fine-grained garnet we call "glossularite" almost certainly is a water-containing analog of grossularite for which the name "hydro-glossularite" would be more appropriate. A detailed study of the garnets of the two localities wold really be worth while.

Much more work has been done on the rare minerals at these two localities than has been done on the common ones. As a result, there are some serious gaps in our knowledge about the mineralogy of these two places, since an understanding of the origins of deposit is based principally on the common minerals of the deposit, not on the handful of rare minerals. You can only determine the origin from the main species present, such as the franklinite, willemite and the accessory silicates like the feldspars and the micas.

Since the garnets of these two deposits have been neglected, some of you may well specialize on the garnets. This is where a semi-professional collector can make a very important contribution to science. Suppose a professional mineralogist, experimental petrologist or geochemist decided that he would like to study garnets at Franklin. How, where and from whom is he going to get the study material? It would be most difficult for a scientist to go to Franklin and collect the specimens himself. The mine is gone and you must spend a lot of time not only to collect on the dumps but to make extensive surveys of the local collections, and then survey the major collections in universities and museums throughout the country. It could take that scientist several years before he found and acquired the specimen material needed for his research. This, however, some of you could do just for a hobby. It is perfectly possible for you to scout out the garnets or the micas or the pyroxenes in the local collections. Then, extend this by your own collecting activities in the accessible dumps of Franklin and make a really definitive study. As a matter of fact, iy is the only way in which he will ever get adequate material. I strongly recommend that course to you. Specialize in something!

Let's look at the feldspars. Who would ever come to Franklin to study the feldspars? You come to Franklin for barysilite and larsenite, you know - the real interesting minerals. No one comes here to study the feldspars. That is why the extremely interesting feldspars that were present in the ore body of Franklin have remained, almost to date, virtually unknown. There was a description by Bauer and Berman and probably Palache a long time ago, of a few barium feldspar specimens from the Parker shaft. Almost all of the feldspar at Franklin contains more or less barium and some of it contains a lot of barium (that is not hyalophane, the proper name for an orthoclase feldspar which contains a small amount of barium.) Since it contains so much barium it is actually the barium feldspar called "Celsian", which is a very rare mineral all over the world. It may well prove that the best locality for Celsian is Franklin. I am afraid that most of the celsian was thrown out on the dump, but I did see a pretty good specimen in Gerstmann's collection. You know how the feldspars, the whiter feldspars from Franklin look (not the hard, vitreous appearance of an orthoclase or microcline from a pegmatite) but a little softer and with a slightly higher luster - almost a greasy luster. Well this is the typical appearance of hyalophane. Celsian is also like that but with a very distinct bluish cast. If in your barium feldspar specimens you find a mottling, the bluer part is celsian.

Also interesting about these barium feldspars is that they are always found associated with lead minerals - barysilite, nasonite and others. I will not be surprised when sooner or later somebody finds a lead feldspar here at Franklin. There are good reasons for believing that a lead feldspar can form. As a matter of fact, a lead feldspar has already been synthesized. This would have the same chemical composition as the calcium end member of the plagioclase series. In other words, it would be the lead analog of anorthite. Such a feldspar should be found immediately associated with Hardystonite or other lead containing minerals and probably in immediate association with barium feldspars. It would be easily identified by anyone familiar with optical mineralogy because it would have the same general optical properties as anorthite with extremely high indices of refraction because the lead ion is much more refractive than the calcium ion. It might even fluoresce and certainly would have a very high adamantine or semi-adamantine luster. No one has made a systematic search for this as yet, but if and when made, it should be rewarding.

Then we have the manganese oxides. These are a lot of fun except that they are miserable to work with. They are often a black powder. I got a sack full of the most interesting black powder today from one of the small "mines" that was being operated down in the Noble pit. But what do you do with a black powder? You cannot measure the hardness or get any crystallography. You must use a scientific laboratory in order to work with these fine-grained manganese minerals. X ray diffraction is necessary. Some manganese oxides are not powders - some are dense, extremely hard, and very fine grained. They all look alike whether they are hard and dense or loose and powdered and without X ray data or a complete chemical analysis, you are lost. Undoubtedly among the material that has come out over the years from the Passaic and the Noble pits, there are a half dozen undescribed new manganese or zinc manganese oxides. I know this for sure, because the discovery and description of the mineral "woodruffite" was not the result of an exhaustive search and study of hundreds of specimens, but just one specimen picked up at random, powdered, analyzed and X rayed. It proved to be new and different. I believe that if anyone did have a hundred different specimens of these fine grained, dense manganese oxides from these two localities, the chances are excellent that they would find one, two or three new minerals. Actually the black material that was being thrown up out of the impromptu jeffersonite mines today looked very unusual. I would not be surprised if it was birnessite, a rare manganese mineral from Sterling Hill. I will not know until I obtain either a spectrographic analysis or an X ray study. But because these are hard to identify, do not lose your interest in the manganese oxides. It is fun to collect all kinds of minerals but try not to stick only to the big crystals with nice form or the minerals that fluoresce. There are other wonders in nature and some of them are fine grained and dirty looking. Save these along with the others and if you cannot handle the identification, then ask someone with access to instrumentation to analyze them for you.

I think a great stimulus to mineralogy here locally would be some kind of identification service. Then if you found a real puzzler, you know you could take it to somebody for chemical or optical work. Mr. Bauer fulfilled this function for a long time. It was difficult to go to him,after all he did work for the N. J. Zinc Co. Perhaps some arrangement can be made between the Club or the Museum and one of the big universities or museums with research facilities. Then the real puzzlers or specimens which look potentially interesting could be accurately identified. I will be happy to do a certain amount of this but as you can guess, everyone is busy these days. So, if an announcement was made to the effect that the so-and-so museum would identify mineral specimens, I am sure that by return mail they would receive 85,000 specimens for identification. This simply can not be done. If you believe you have something really interesting, use some discrimination and elimination by easy tests you can make yourself. There are many things you can do - solubility in acid, fusibility, flame reaction, hardness, density - such tests will go a long way towards the identification of your mineral. Then if it is still interesting and hard to identify, send it to me although I may put it in a corner and probably forget about it!

I am afraid that I have been rambling and taking up a lot of your time when you could be out in the sunshine. So again, my heartfelt thanks for this most welcome invitation, which has been a great pleasure to me. I am sure that I will always remember not only the events of this morning, but also the route I took in my car yesterday when I came down by way of Sussex, through Glenwood, down "Pork Chop" Mountain, through McAfee and into Hamburg - all along the same route I walked with my pack - a most pleasant and moving reminder of a day 45 years ago.

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