

THE PICKING TABLE



NO. 1 • SPRING 1983 • VOLUME 24

JOURNAL of the FRANKLIN-OGDENSBURG MINERALOGICAL SOCIETY, INC.

from the Editor

NEW COVER

This issue appears with a new cover. The titles were redesigned by artist Jeffrey Donnellon of Swan Lake, New York. His design provides a much needed highlight for many of the lesser graphic innovations introduced in recent issues.

Future issues will utilize the same typography while featuring changing cover scenes which will portray related history or mineralogy in pen and ink form.

INTERESTING READING

This issue returns to Sterling Hill with an article by Stephen B. Sanford with an enlightening geological overview of the orebody, and remarkable photomicrographs of recent mineral occurrences by Dr. Alfred L. Standfast taken from the John Kolic collection.

History can frequently be as interesting as mineralogy, particularly when the two are combined. John L. (Jack) Baum offers an in-depth look at the Parker mine and its famous minerals with a thought provoking map.

A BRIEF POLICY

It is with great hesitation that we have, in articles in this issue, 'edited-out' references to working places currently in production at the Sterling Hill mine. We have done so at the request of the new management of the New Jersey Zinc Company, Inc., as a gesture of our desire to cooperate with them as they work to deter trespassing upon their properties. We do so only for that reason, and only for the short period of time required for them to deal with their problem, beyond which we see little benefit.

Serious thought, given to a suggestion that this policy be continued beyond a reasonable time, has led to the rejection of such a proposal, finding it to be archaic in origin and contrary to our purpose of enlightenment.

DUES ?, OF COURSE THEY'RE PAID!

Our new Treasurer has asked that we remind you that your membership in the Society must be renewed with the new year.

The PICKING TABLE

Journal of the Franklin-Ogdensburg
Mineralogical Society, Incorporated



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 courtesy of Jeffrey Donnellon, Swan Lake, NY

Improving our Image.

The Picking Table, Spring 1983

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In Memorium

"President and Co-Founder"

Frank Z. Edwards

1910 - 1982



Frank Z. Edwards passed on quietly in his sleep Wednesday evening, September 8, 1982 at his retirement residence in Palm Bay, Florida. He was born on February 6, 1910 in Brooklyn, New York, where he spent his younger years and later attended City College of New York, where he made Phi Beta Kappa, later to graduate from Rutgers University. Prior to his retirement in 1971, Frank was the Eastern Sales Representative for Anacortes Veneers, a division of Publishers Paper, owners of the L.A. Times.

His interest in mineralogy developed later in life than most, piqued by the advent of the annual mineral shows held in Franklin each Fall, which he soon became a part of as an exhibitor and later a dealer. The demands of his newly discovered avocation soon encouraged Frank, along with Sunny Cook, Dick Hauck and John Hendricks, to found the Franklin-Ogdensburg Mineralogical Society.

He served as President of the Society for two years, 1960 and 1961. It was during his term as President that Frank experienced his greatest period of challenge, and what he personally considered to be his greatest moment with the Society, as he directed the first Symposium on Franklin Mineralogy and Geology. That unique assembly represented an unprecedented gathering of scientific and technical expertise, which also stands as one of this Society's finest hours.

It was also during his term as President that he inherited the post of Editor of the *Picking Table*. It is as Editor of this journal that we are most familiar with Frank. He authored dozens of articles along the way, although only a few carried by-lines. The time he spent gathering and editing each issue, some thirty-six in all, is incalculable. He carried on for eighteen years, often inspiring others, through times often barren, that would have frustrated the efforts of a lesser person.

He laid the foundation and built the superstructure, not only for a journal that has grown to a singular reputation of excellence, but for a Society as well.

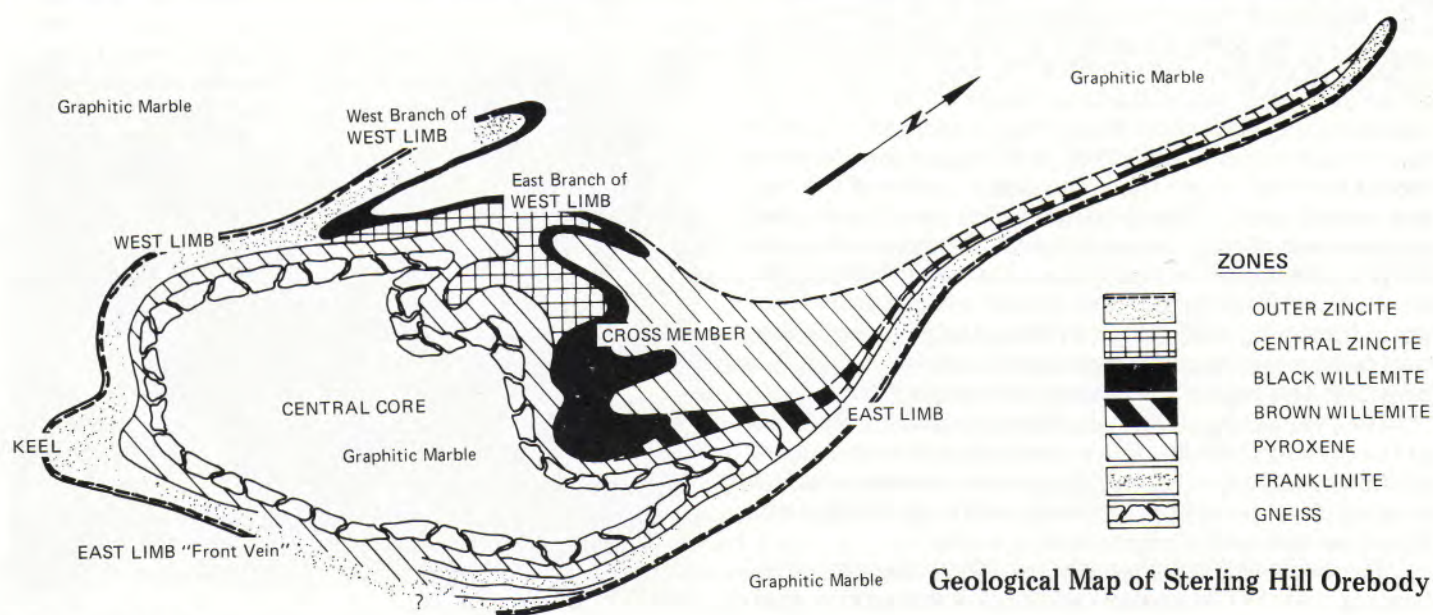
He leaves his widow, Alice C. Edwards, at home, a son, Richard H. Edwards of Benecia, California, a daughter, Dr. Susan Beatty of Malvern, Pennsylvania, eight grandchildren and eight great-grandchildren.

All of us are certainly better to have known, worked and played with Frank Z. Edwards. His sense of purpose and dedication remains with us.

Recent mineral occurrences at Sterling Hill

by:
Stephen B. Sanford

photography by:
Alfred L. Standfast, M.D.



after Metsger et.al. (1958)

INTRODUCTION

It has been several years since we last described recent mineral occurrences at Sterling Hill. During that time there have been numerous discoveries of minerals both new to science and to the locality, descriptions of which have appeared in the *Picking Table*, and new occurrences of mineral species previously found to occur at Sterling Hill. It is toward the latter that our attention has been directed

THE STERLING HILL OREBODY

In the past we have made reference to various parts of the Sterling Hill orebody when pinpointing a mineral find's specific locality. To lessen any confusion that may arise from this practice, we present a generalized map of the orebody. This orebody, a very complex structure, was described in detail by Metsger, *et.al.* (1958), and it is from their map that ours is derived.

The Sterling Hill orebody, like its counterpart in Franklin, is enclosed within the Franklin marble, sometimes referred to as the "white limestone." A true marble, it is characterized by its graphite content, which is lost within several feet of the ore, and by irregular bands of silicate minerals, some of which appear to represent ancient ash falls.

The Outer Zincite Zone, forming the orebody's periphery, is composed of normal red-willemite ore which usually possesses an external envelope of zincite enriched ore in places forming, with non-magnetic franklinite, the "metalliferous porphyry" of Nuttall (1822).

The Central Zincite Zone has, rather than a distinct zincite-enriched portion, a fairly uniform scattering of disseminated zincite patches. It forms the east branch of the west limb of the orebody and the western portion of its cross-member. It too is composed of red-willemite, ore, which appears to be enriched with arsenic, and non-magnetic franklinite.

The *Black Willemite Zone* is composed of black willemite ore and magnetic franklinite; zincite is virtually unknown. Sphalerite and loellingite are not uncommon. This zone forms the eastern portion of the orebody's cross-member and a narrow band that parallels the two branches of the west limb. The color of its ore notwithstanding, the lack of secondary arsenate minerals, with the exception of brandtite, and the presence of graphite provide features that make this the most unusual of the ore zones.

The *Brown Willemite Zone* is composed of brown willemite ore and magnetic franklinite; it appears to be a zincite-free hybrid of the red and black ores. It forms the eastern most portion of the orebody's cross-member and appears to extend to the north beneath the footwall of the east limb as intermittent bands of ore.

The *Pyroxene Zones* are large and highly variable in composition. In many places they consist solely of diopside grains disseminated in marble. In other places, they are rich in rhodonite, franklinite, gahnite, zincianmicas, spessartine garnet and barian orthoclase feldspar. Fine specimens of these species come from this zone.

The *Gneiss Zone* is a petrologically complex band of crystalline gneisses surrounding the barren central core of the orebody. An interesting feature of this zone is the extensive fragmentation which it has undergone. Rather than a continuous band or bed, it is broken into isolated blocks between which the once plastic marble of the central core flowed. Geochemically, this zone functioned as a reservoir during metamorphism. During the dry, water-free metamorphic event, there flowed at intervals from these hydrous rocks, variable amounts of water into the surrounding marble. As a result, the CO₂ concentration fell enough to allow wollastonite to form, and it is here that this highly fluorescent mineral is found.

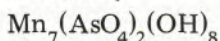
The *Franklinite Zone* is continuous with the east limb of the orebody. Owing to a composition almost entirely of that mineral species, which is here magnetic and low in zinc, this zone was not economically exploitable and therefore inaccessible to extensive study.

The *Central Core* is composed of normal graphite-bearing marble considered indistinguishable from that which surrounds the orebody at its perimeter.

The *Mud Zone* has replaced a major portion of the central core from the surface to a depth of nearly 700 feet. Mining of this zone, other than at the surface, has not been extensively undertaken. Subsequently, little is known of its origin or mineralogy at depth. Its surface workings were once famous for brilliant "maggot ore" hemimorphite.

RECENT MINERAL OCCURRENCES

Allactite



An impressive find of allactite was made recently just below the 1300 foot level of the central zincite zone of the cross-member. The matrix is compact willemite-franklinite ore. The allactite forms 0.5 cm sword blades in fanlike sprays in brecciated, copper stained, mineralized veinlets. Only a couple of specimens were preserved.

A parallel vein near the allactite find yielded fine alleghanyite crystals. The crystals occur as thin elongated brown tablets rising above fields of calcite. Later mineralization embedded them in pastel blue sphalerite.

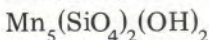


Figure 1 Sherry colored allactite crystal sprays with sword blade terminations. \approx 0.5 mm.



Figure 2. Twinned dark-pink alleghanyite crystals on matrix.

Alleghanyite



Crystals of alleghanyite have been recovered from the east limb of the orebody above the 500 foot level. They occur as mounds of equant baby-pink crystals, commonly twinned polysynthetically on all of their faces. These mounds, together with rhodochrosite rhombs and balls, lay buried beneath long fibers of free-standing white sussexite. The sussexite, of necessity, was sacrificed to expose the other species. The matrix assemblage was typical for the east limb, consisting of franklinite, zincite, manganese humite (presumably alleghanyite), and red-willemite disseminated in calcite.

Barite



A pillar working the ore of the cross-member of the orebody above the 1500 foot level has yielded a spectacular find of barite. The barite occurs as tan-white non-

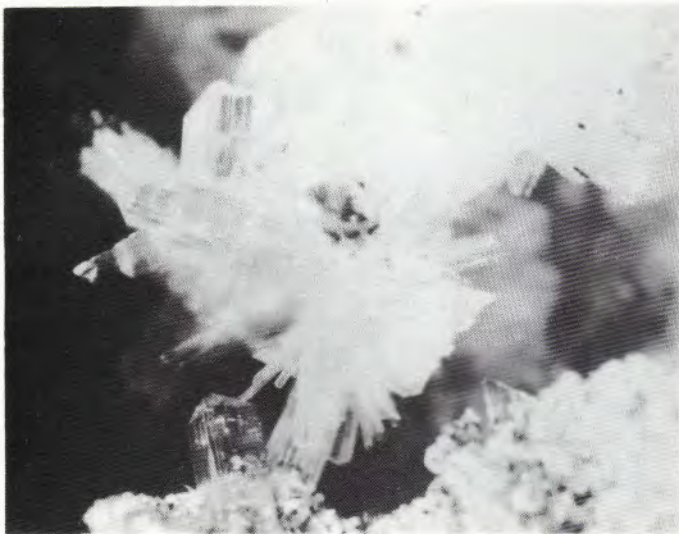


Figure 3 Colorless brandtite crystals to 1.0 cm. in length.

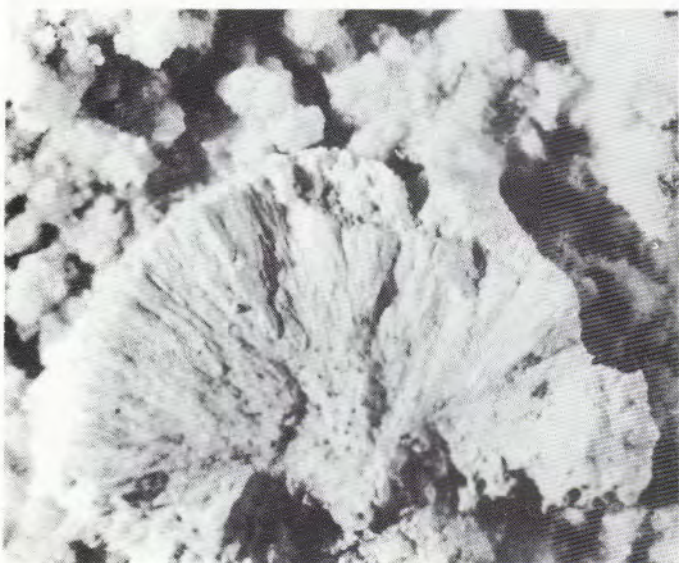


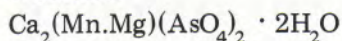
Figure 4. White chlorophoenicite hemisphere. 2.0 cm.



Figure 5 Octahedral fluorite crystal.

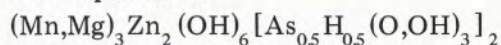
fluorescent blades up to 2 cm in length. The crystals are arranged in groups up to 4 cm wide, scattered across a background of sparkling black hetaerolite crystals. Here and there, the barite is complimented by calcite crystals to 0.5 cm in length. The matrix consists of lean franklinite ore with minor red-willemite.

Brandtite



Brandtite, now known from virtually all of the working places of the black willemite zone, has been found in months past in particularly nice specimens with quartz. The quartz is rosy in hue and post-dates the arsenate species. For this reason, it frequently appears to be penetrated by free-standing needles of brandtite, some which attain a length of nearly 1.0 cm. This particular find was made just above the 1500 foot level.

Chlorophoenicite



A single specimen was recently seen in which chlorophoenicite occurred as a unique fibrous chalky-white hemisphere nearly 2.0 cm in diameter. It was attached to the drusy calcite lining of a large vug contained within typical east limb ore. The veinlet from which it was recovered was intercepted by a working place just below the 800 foot level. The veinlet ran perpendicular to the footwall in a vertical direction. Some of the veinlet was filled with sphalerite, and the whole appeared to be continuous with veinlet systems above.

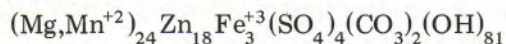
This same working place has yielded large quantities of red-willemite crystals in recent years. They appear red-brown in color and form prisms up to 6.0 cm in length and 2.5 cm in width.

Fluorite



Recalling the discovery of abundant stilbite and heulandite on gneiss several years ago along with a nearby find of brown axinite crystals with actinolite, the locality has been reexamined and a small number of very fine specimens of octahedral fluorite, both colorless and purple, have been uncovered. The crystals occur up to 1.0 cm in size and are associated with fields of green epidote crystals, long dark green actinolite crystals and brown axinite crystals.

Hauckite

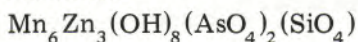


The east limb of the orebody intersected by a working place above the 500 foot level has yielded good specimens of hauckite. In this instance the seam in which it occurred was basically a pyrochroite veinlet, common to this part of the east limb, which also contained well developed chlorophoenicite, zincite, rhodochrosite and an unknown white carbonate. Unlike previous occurrences, this find did not include lawsonbauerite. The hauckite appears as pale yellow hexagonal plates exhibiting a rose like structure against the snow white background of the unknown white carbonate.

Another find of hauckite was made in the east limb of the orebody just above the 900 foot level. Here it was accompanied by pyrochroite and sussexite; all were con-

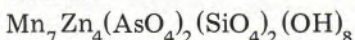
tained in vuggy carbonate encrusted cavities. The hauckite appears much darker than that described above and approaches the yellow-orange color common to secondary Sterling Hill zincite micro-crystals.

Holdenite



Holdenite has been encountered in the cross-member pillar that produced the above described barite. Here, holdenite which is usually a resident of the red ore of the east branch of the west limb, was found where the brown willemite ore began to grade into black willemite ore. In appearance it is light lavender in color and more markedly granular than previous occurrences.

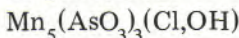
Kolicite



A working place below the 1200 foot level in the west limb of the orebody has produced one of the most aesthetically pleasing finds in recent years. Kolicite, occurring as highly transparent lustrous red-brown crystals, was found associated with splendid franklinite crystals, snowy chlorophoenicite, and occasionally lavender holdenite of exceptional perfection. The kolicite is of such perfect transparency that the background is clearly visible thru the crystals. Broken crystals which were also encountered with this find were orange in color typical to earlier finds.

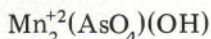
We note that while the locality of this find is in the arsenic-poor west limb, the veinlet containing the kolicite traverses both the west limb and east branch of the west limb. Presumably, the arsenic required for the formation of these minerals gained access to this area thru the veinlet system.

Magnussonite



Early in 1980, magnussonite was found for the first time in some abundance in an undercut pillar that worked the cross-member portion of the central zincite zone near the 800 foot level. The magnussonite occurs as glassy green to dark brown grains adjacent to zincite. They are about 0.5 mm in size and require a sharp eye to spot. During its early development, this pillar had been an important source of akrochordite, allactite, alleghanyite, and sarkinite.

Sarkinite



The central zincite zone within the orebody's cross member has been a recent source of deep red sarkinite crystals. They appear simple in form, occurring as small clear groups exhibiting their vivid color in sharp contrast to the dull etched willemite and franklinite of the enclosing veinlet walls.

Some years ago it was pointed out that veinlet walls in the orebody were strongly affected by the passage of hydrothermal fluids (*responsible for the deposition of veinlet species*) and it is just such a simple paragenesis that is described here. In most veinlets, the original walls are invisible beneath the series of species deposited, one after another, by various pulses of geochemical activity.



Figure 6 Red-brown kolicite crystals on matrix with lavender holdenite crystals.



Figure 7 Red sarkinite crystal groups in vug.

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ACKNOWLEDGEMENTS

We wish to thank Mr. John Kolic of Rockaway, New Jersey for the generous use of his collection for photography, and for providing invaluable first-hand insights into these recent mineral occurrences.

The PARKER

Mine

by John L. Baum

The Parker shaft was completed on April 19, 1894, and at a depth of 950 feet a drift, an underground tunnel with no horizontal connection with the surface, was driven westward, contacting the orebody on July 15, 1894, at a distance of 315 feet. The saga of the sinking of the Parker shaft was related in the *Picking Table*, 23, No. 2, 6. The story of the mine which the shaft made possible, while less dramatic, is equally of interest because it supplies background knowledge concerning a great mineral discovery and important developments in the concentration of local ores.

At this time the west limb of the orebody had been explored by mining to a depth of 400 feet in the Trotter mine, and to almost as much in the Taylor mine which was the enlargement of the old Buckwheat mine on the east limb of the orebody. Nothing north of the northward surface termination of the orebody's west limb had been explored except by the Parker drill holes, so that the work from the Parker shaft was entirely in new ground.

The Lehigh Zinc and Iron Company, which had done the successful exploration drilling upon which the Parker shaft had been planned, transferred its Parker lease and the services of Superintendent J.A. Van Mater, to the Sterling Iron and Zinc Company.

The Lehigh Zinc and Iron Company continued operating the Trotter mine and the New Jersey Zinc and Iron Company the Taylor mine.

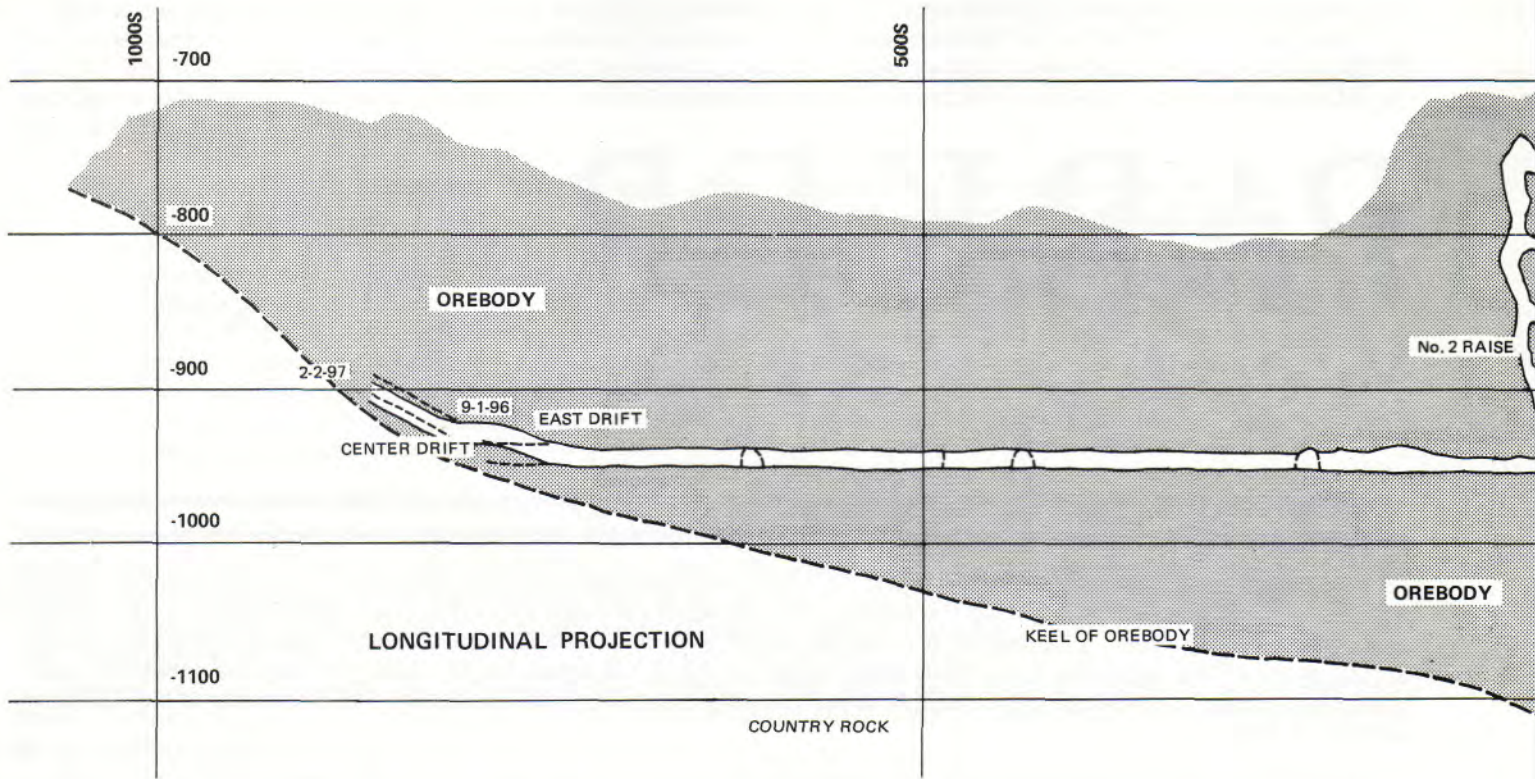
Van Mater, who sank the Parker shaft, and developed the lower portions of the mine, has left us an account of his stewardship up to the end of 1899, and the following mining and milling statistics are largely his. It helps to understand that the orebody is in places a hundred or more feet thick, has a termination on the south end shaped like the prow of a canoe, and that the bottom of the orebody is a keel like the bottom of the canoe. The whole is inclined, top to the west, so that our canoe has tipped somewhat on its side, and its sides become our hanging (upper) and foot (lower) walls that contact barren rock.

The drift from the Parker shaft had roughly a square cross section and at a distance of 200 feet from the shaft turned somewhat and intersected the ore at right angles, which was a remarkable fact considering that the ore was not where it was supposed to be. A few lenses of feldspathic rock were encountered in the white marble, as well as numerous tight planar fractures called joints by geologists, and a fault zone near the ore contact. Disseminated ore thirty feet wide was crossed before solid ore was penetrated. From that point on, few drifts were run that were not in ore so that the development of the initial deep levels paid for itself.

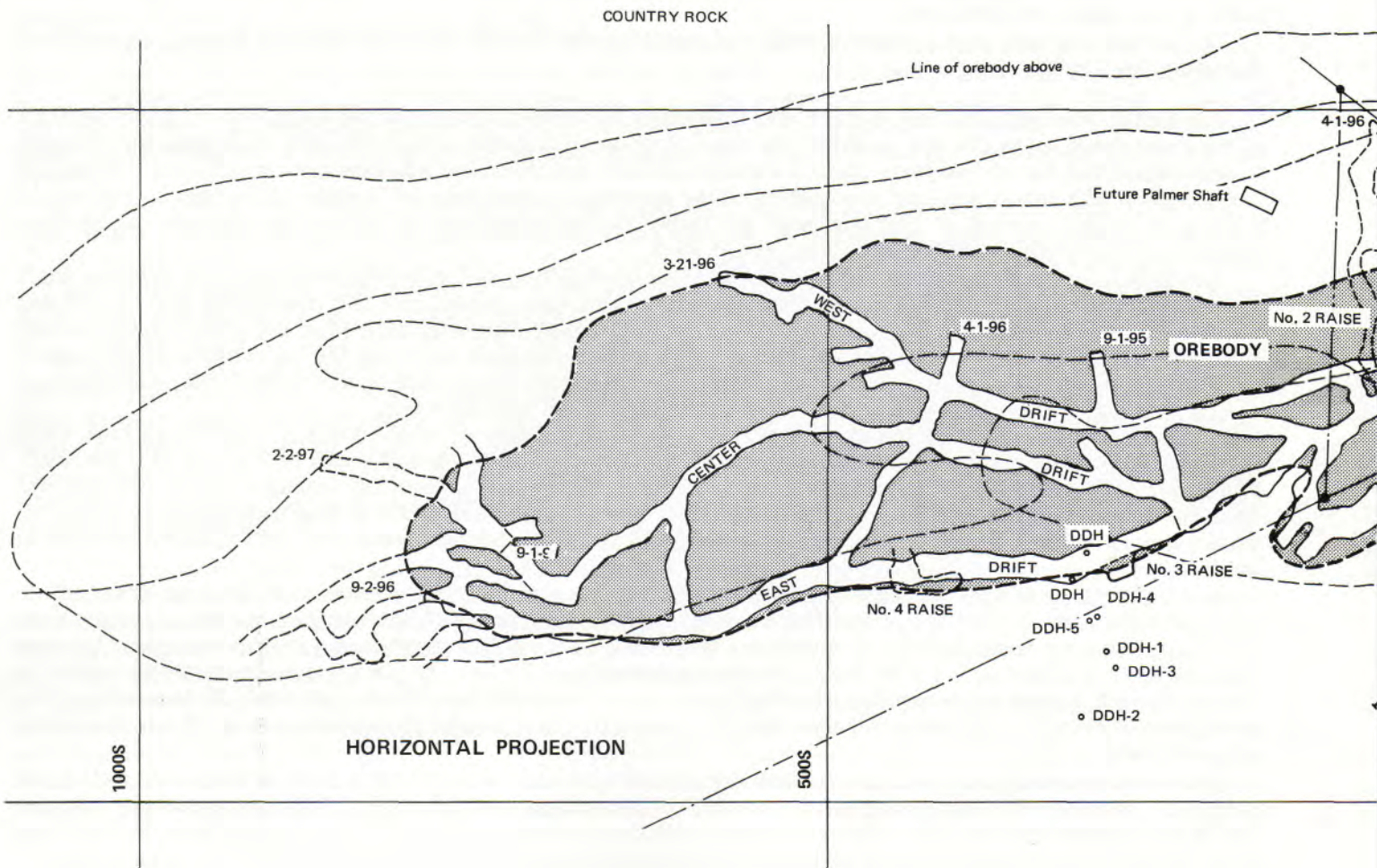
A change introduced with the Parker mine workings was to measure all levels vertically from the surface, using the collar of the Parker shaft as a zero datum plane. Thus, the 950 level was at a depth of 950 feet near the shaft. Miners know that drifts slope toward the shaft to permit drainage and to favor ore haulage. In the older Trotter mine the levels, such as they were, had been measured down the inclined shafts so that today we appear to contradict ourselves when we say the Trotter mine was only 400 feet deep, and yet a 500 level is shown on original sections.

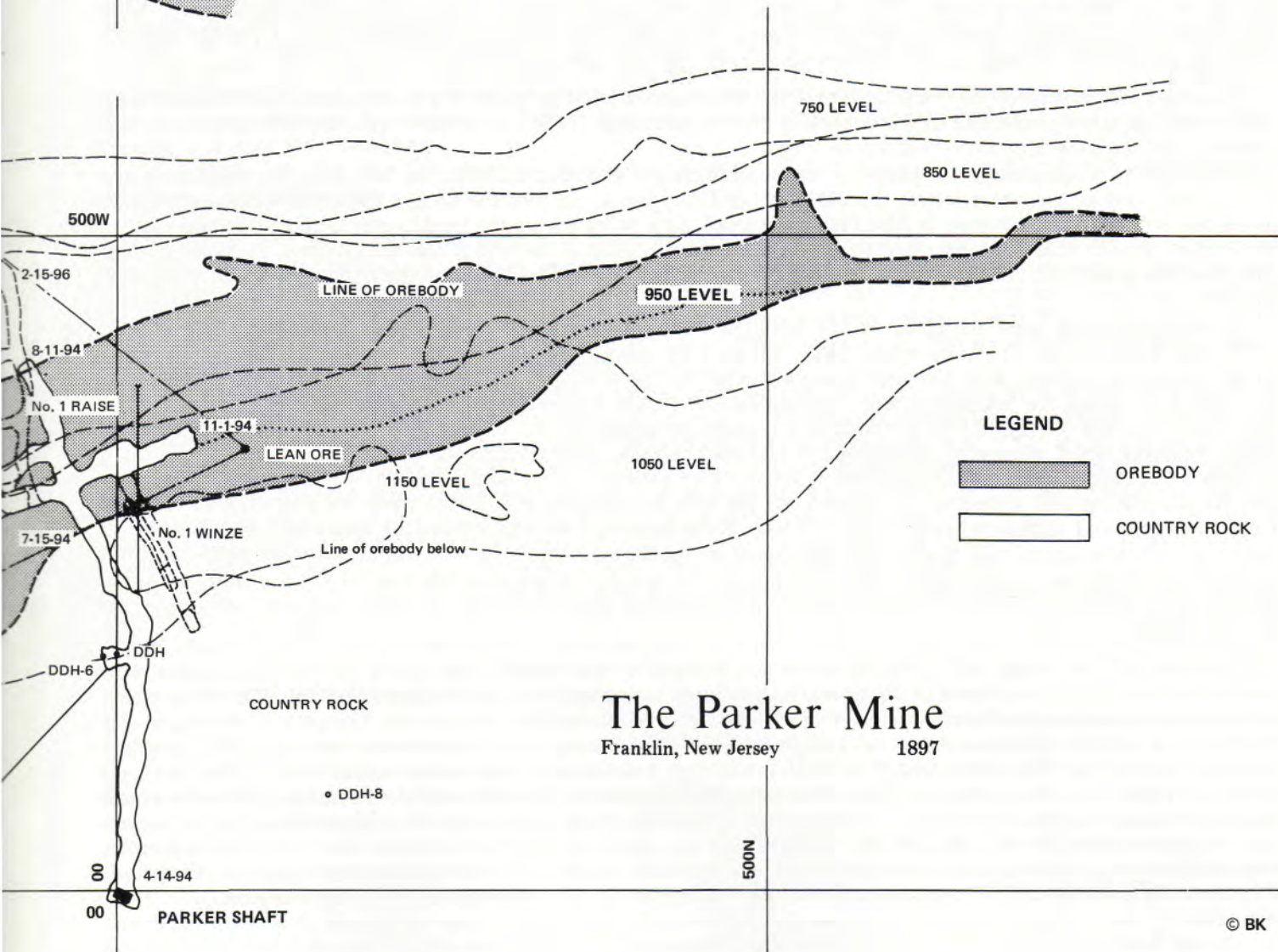
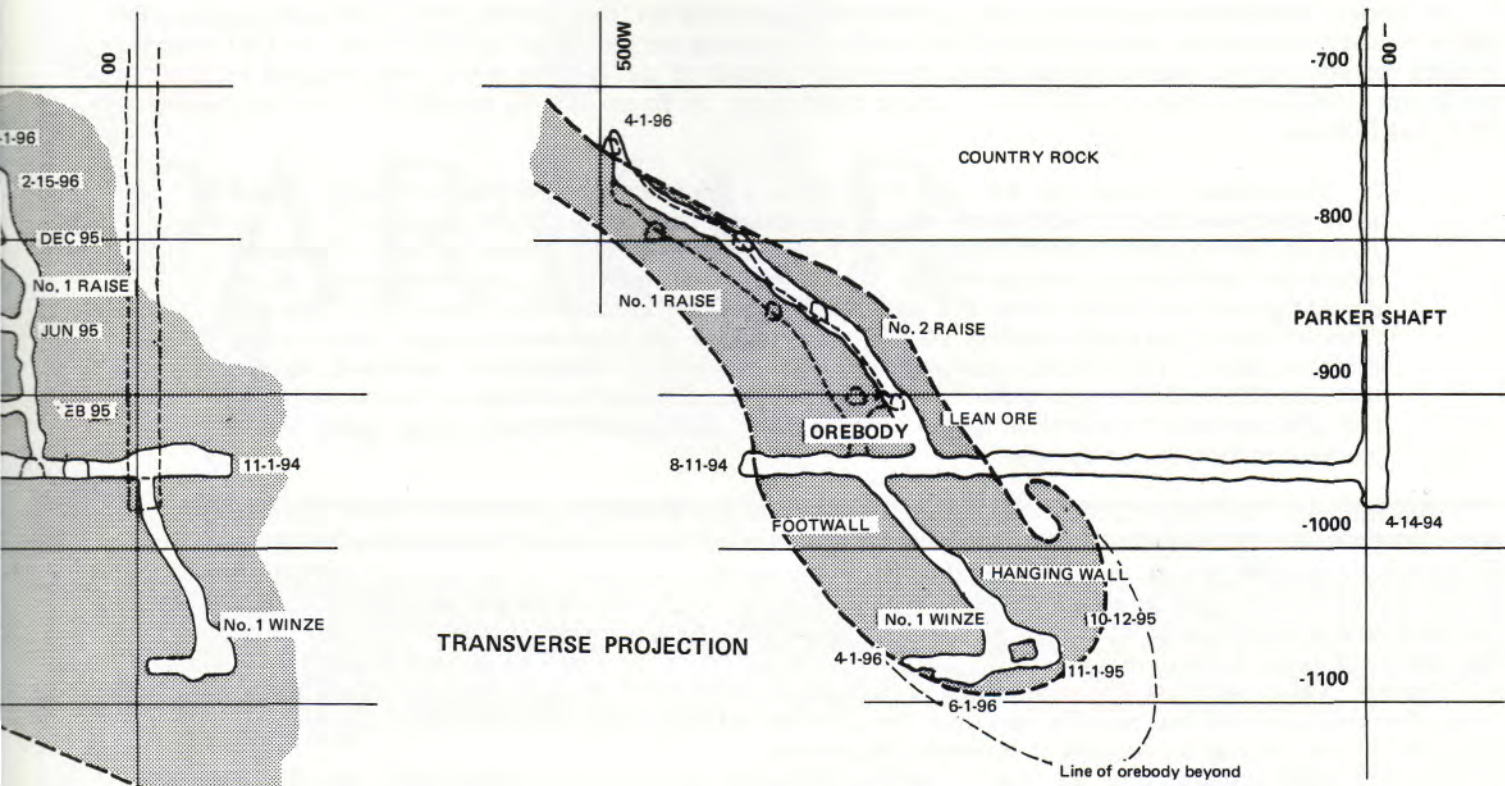
On the initial or 950 level there were drifts on the hanging and footwalls and another between them, all extending to the south until they encountered the northward plunging keel. They were then continued up the slope of the contact for a short distance to determine structure. Two winzes (underground shafts) were sunk between the 950 level and the keel, one 60 feet in length and the other 175 feet. Exploration drifts were also carried to the north until a great pegmatite intrusion was encountered, over 200 feet of it on this level. At this point in the work, two raises 20 to 30 feet apart were started upward like two parallel inclined chimneys. It was the beginning of 1895.

The raises were stopped at a distance measured upward on the incline at 300 feet because they were at the property line, but not before they had passed through the prime example of Palache's (1935) pneumatolytic products which he credited to pegmatite contact reactions. By now the time was April of 1896. A year later, Penfield and Foote (1897) were to publish the description of roebingite from here, but found on the Parker mine dump.



Prepared from drawings by A.W. Pinger dated JAN 1945, reputedly after original undated drawings of the Sterling Iron & Zinc Company.





The mineral locality encountered in the adjacent twin raises put up from the 950 level went unrecognized for half a century, when what remained was mined with surrounding ore recovered in 1945-1946. At that time the locality was studied and numerous specimens preserved. Details of the locality were later provided by Hurlbut and Baum (1960) and Albanese (1960). A further description by Baum (1975) appeared in the *Picking Table*, 16:1,9 as follows:

"Immediately above the 800 foot level, about 15 feet into the ore from the hanging wall (east edge) and close to the north side of the Palmer shaft pillar (center portion of the ore-body) occurred a vein system arranged in an H pattern as viewed in vertical section. The veins connected with potash feldspar above. The veins, a foot or so wide, consisted largely of andradite garnet and hendricksite but there were local concentrations of bancockite near the floor of the 10 foot high working place and of other silicates and native copper closer to the feldspar above. The silicates such as roeblingite, bancockite, clinohedrite, xonotlite, rhodonite, datolite and others post date emplacement of the feldspar and represent a reworking of the adjacent vein by solutions which have corroded cavities and formed spongy zones in the garnet-bancockite vein system."

From this spot came large amethystine clinohedrite crystals of exceptional habit and color, as did rare glassy crystals of cahnite. The rare lead silicate roeblingite and ganophyllite were found in brief abundance accompanied by datolite, willemite, prehnite, and rarer grovesite. Here too was the source of the mineral charlesite which was considered to be ettringite for so many years. One inch sprays of thompsonite and even larger sprays of xonotlite were found here, as was what may be the most remarkable native copper specimen to come from Franklin, and presently in the Richard & Elna Hauck Collection on exhibit at the Franklin Mineral Museum.

Albanese (1960) reported the zone which encompassed these veins, as extending downward to the 900 foot level. Certainly the area was prolific, and since the old raises of the Parker era were encountered here, there can be no doubt concerning the sources of the early discoveries

Palache (1935) reported that the original hardystonite was found "in the Parker shaft" and the first glaucocroite on the Parker mine dump. The two were observed together in later workings adjacent to the old Parker mine raises which merged into one opening, judging by the area which later workings ran into. Thus the mystery of the mine location of many of the Parker mine dump rare silicates was solved in the mid-1940's.

Although ownership of the various properties was consolidated in 1897, it was some time before the Parker mine workings were connected to the others, if only because the Parker mine started at the bottom and worked upward, and the others had reversed the process.

With the consolidation of the property ownerships, raises were put up from the 950 level for ventilation and an ore pass. From the point where the 950 level drifts to the south met the keel, a slope was driven downward along the contact for a distance of 964 feet northward, to a point where the keel began to rise. Development of the Parker mine continued at ever increasing volume until the limit of the steam and air production of the surface plant had been reached, with the concentrating plant treating more than 500 tons per day at capacity, at the end of 1899.

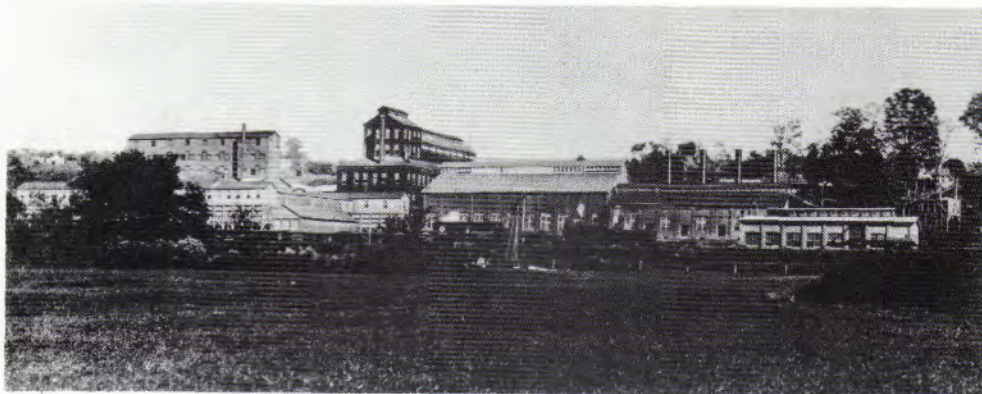
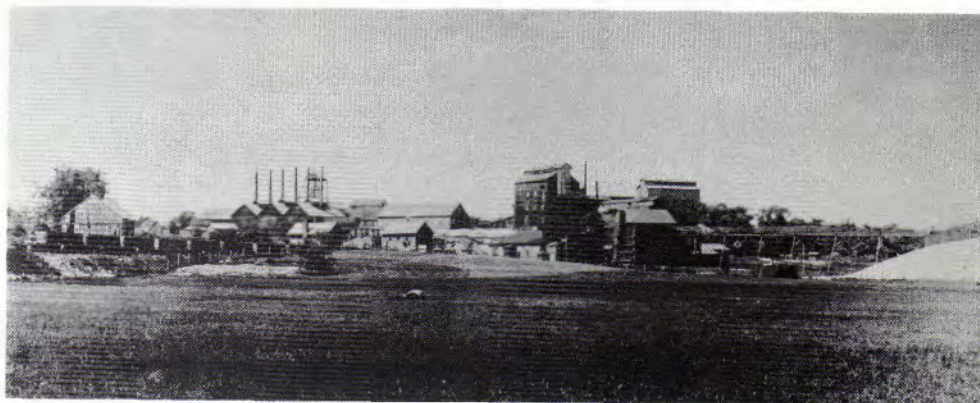
At the time there were workings on the 950, 900, 850, 800, and 750 levels, with a total length of workings of 11,060 feet divided as follows: raises 1478, winzes 220, stopes 964, drifts 6555, and cross-cuts 1793 feet. All of this was accomplished with the ventilation afforded by the one shaft which served to carry men, supplies and ore, and with mules for haulage power. The mules were taken out each evening and released at the shaft, upon which they bolted for the stable without any further encouragement. Mining costs for the first 11 months of 1899 including taxes, insurance, pumping and all other charges, were \$1.235 per ton

When the Parker shaft was abandoned in 1910, to be used only for natural ventilation thereafter, it was capped with a grating and access to its opening on the 950 level fenced off. In the 1940's a long drift was carried from the north end of the orebody on the 850 level in the hanging wall and connection was made with the Parker shaft. A constant heavy rain poured past the opening, sparkling in the beams of the miner's cap lamps, and not a timber was to be seen in the shaft. All had fallen to the bottom. A sump at the base of the old shaft collected water, and a drillhole conveyed it down to the pumps below the 1150 level. Today a concrete slab covers the former surface opening.

The first concentrating mill at Franklin was constructed by the Sterling Iron and Zinc Company adjacent to the Parker shaft. Until that time any concentrating of ore on the sites consisted of hand picking. The Buckwheat mine dump was the result of such hand separation, and much of it was later recovered. Cooperation between the Sterling Iron and Zinc Company and the Lehigh Zinc and Iron Company at Franklin was encouraged by the fact that they shared two directors. Ore from both properties undoubtedly was treated at the Lehigh Zinc and Iron Company plant in South Bethlehem, Pennsylvania until all of the Franklin properties were merged. It was in South Bethlehem that John Prince Wetherill, a principal in both firms, developed an electro-magnetic device that would pull franklinite from finely crushed ore. Lehigh Zinc and Iron, which mined iron and zinc in the Friedensville, Pennsylvania area, had acquired the Trotter mine at Franklin in 1888. It was through this established relationship that Sterling Iron and Zinc undertook to build the crushing and concentrating plant at Franklin.

On October 1, 1895 ground was broken for the new Parker mill and on June 28, 1896 the crusher and the first half of the separator house were commenced. The Wetherill separators were used. The other half of the separator house soon followed, and in little more than a year, capacity was almost doubled. The separators needed improvement from the first and a major change was made during a week in April 1897 when the mine was drowned out, an advancing heading having encountered a fissure which tapped the Parker shaft water source at a point below and well away from the original intercept. The mill workers used the parts from the earlier machines to build the second generation, and as the mill's output increased, demand for its products soared, including willemite concentrate for export. The mill served well, and costs for the first 11 months of 1899 were 67.86 cents per ton. A new mill to treat the entire production of the consolidated Franklin mine was started along the railroad by the Wallkill River in 1900 and Parker mine and mill became history by 1911 when the new inclined Palmer shaft, entirely in the rock to the west of the orebody, undertook to raise all the ore.

**Mill No. 1
Parker Shaft
1899**



**Mill No. 2
DL&W Railroad
1905**

The man who made so much of all this possible, John Prince Wetherill, came by his talents and opportunities naturally. His father, Samuel Wetherill, was an inventor and member of a prominent and successful Philadelphia family, and being in a business which produced lead white for paint resolved to substitute zinc white for the purpose. This led him to join the newly formed New Jersey Zinc Company in 1850 at its smelter in Newark, New Jersey, where he invented the Wetherill furnace which made zinc white directly from Franklin ore. In 1853 he built the Lehigh Zinc and Iron Company works at South Bethlehem, Pennsylvania to work on Pennsylvania ores. In 1881 Charles W. Trotter contracted to supply the Lehigh Zinc and Iron Company with Franklin ore from the Trotter mine. The opportunity was now afforded for John Prince Wetherill to experiment on Franklin ore and through Trotter's inability to deliver as promised, for the Lehigh Zinc and Iron Company to enter the Franklin area. J.P. was by now General Manager of the Lehigh Zinc and Iron Company, new owner of the Trotter mine, and a director of the Sterling Iron and Zinc Company as well, and his strange looking but effective electro-magnetic separators helped to make the re-born New Jersey Zinc Company a power in the American mining business.

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MINERAL NOTES

A Mineral New To Science

The scientific discoveries of 1982 in mineralogy were prolific. Franklin and Sterling Hill were clearly in evidence, largely through the efforts of Mr. Pete J. Dunn of the Department of Mineralogy, Smithsonian Institution, Washington, DC, and his colleagues. In all, Mr. Dunn revealed five locally occurring mineral species as being new to the science. The first, retzian Nd, was abstracted in the Spring 1982 issue of the *Picking Table*. The remaining four were subsequently announced through the year by Mr. Dunn and await formal description at which time they will be abstracted in the *Picking Table*.

BOSTWICKITE

“Bostwickite, a hydrated calcium manganic-silicate, found in the Franklin mine, occurs as minute dark-bronze to red-brown fibrous rosettes on lean weathered ore characterized by its fluorite content. The mineral has been named for Richard C. Bostwick, in recognition of his work with fluorescent minerals from Franklin and Sterling Hill.”

NELENITE

“Nelenite, originally described with the name “ferroschallerite” from the Franklin mine, has been restudied and is now a new species. It is named in honor of a Smithsonian chemist, Joseph Nelen. It occurs associated with tirodite and actinolite in several parageneses from the Franklin mine.”

JERRYGIBBSITE

“Jerrygibbsite is a new manganese silicate from the Franklin mine. It is a member of the humite group and has been named for Dr. Gerald V. Gibbs of Virginia Polytechnic Institute and State University, in recognition of his contributions to the mineralogy of the humite group.”

CHARLESITE

“Charlesite is a new calcium aluminum boron sulfate hydroxide hydrate. It was described years ago under the name “ettringite” but is now a new and valid species and part of the ettringite group. It is named for Charles Palache in recognition of his contributions to mineralogy, in particular his contributions to the mineralogy of Franklin and Sterling Hill.”

Research Reports

In the Spring 1982 issue of the *Picking Table* we announced the discovery of a mineral new to science as being found in the Franklin mine, Franklin, NJ. It was named jarosewichite in honor of Eugene Jarosewich, chief chemist in the Department of Mineral Sciences at the Smithsonian Institution in Washington, DC. The describing article by Pete J. Dunn of the Department of Mineral Sciences, Smithsonian Institution, Washington, DC, *et.al.*, entitled “Jarosewichite and a related phase: basic manganese arsenates of the chlorophoenicite group from Franklin, New Jersey,” appeared in the *American Mineralogist*, 67, 1043-1047 (1982), which we quote:

JAROSEWICHITE $\text{Mn}^{3+}\text{Mn}^{2+}(\text{AsO}_4)(\text{OH})_6$

Introduction

"In early 1981, Mrs. Alice Kraissl of River Edge, New Jersey, called to our attention some dark red crystals. They were then assumed to be carminite, associated with flinkite. The crystals had originally been noted by Cook (1973) and he described them as carminite without providing the data which led to this identification. However, the material did not appear to have the usual appearance of carminite and an investigation of the assemblage was undertaken. Our study revealed that it is not carminite but that it is a new mineral, herein described as jarosewichite.

Jarosewichite is named in honor of Eugene Jarosewich, chief chemist in the Department of Mineral Sciences at the Smithsonian Institution, in recognition and appreciation of his many contributions to mineralogy through analysis of minerals, meteorites and rocks, and especially in the area of electron microprobe analysis. The mineral and the name were approved by the Commission on New Minerals and Mineral Names, IMA. Type material is preserved in the Smithsonian Institution under catalog number NMNH 148972. Identical material, obtained from the same sample, is in the personal mineral collection of Mrs. Alice Kraissl, who generously donated the type material. Another sample is in the Mineralogical Museum at Harvard University (109463), and is identical in every feature."

Occurrence

"Jarosewichite occurs at the Franklin mine, Franklin, Sussex County, New Jersey. The type specimen was collected on the dumps and nothing is known of its location in the mine. The specimen consists of massive green andradite intergrown with franklinite. The ore is vuggy and the vugs are lined with a dark brown druse of an unknown mineral, the X-ray powder diffraction pattern of which suggests it is in the friedelite group. Upon the brown druse are 0.5 mm crystals of hausmannite and sharp euhedral crystals of cahnite and allactite. Cahnite is coated with a light brown film and, in turn, with fascicles of flinkite and jarosewichite, which appear to have formed at the same time. Some jarosewichite encrusts flinkite, indicating it was the last phase formed. The associated minerals were identified by X-ray powder diffraction."

Physical and optical properties

"Jarosewichite is dark red in color and appears to be black except in thin splinters or crystals. The luster of fracture surfaces is sub-vitreous and the streak is reddish orange. Cleavage was not observed. The Mohs' hardness is approximately 4. The density, determined using heavy liquid techniques, is $3.66(4) \text{ g/cm}^3$, in excellent agreement with the calculated value of 3.70 g/cm^3 .

Optically, jarosewichite is biaxial (—) with refractive indices $\alpha = 1.780(5)$, $\beta = 1.795(5)$ and $\gamma = 1.805(5)$. $2V$ is 78° , calculated from the refractive indices due to minute crystal size which prohibited accurate measurements. The orientation is $X = a$, $Y = b$ and $Z = c$. Pleochroism is weak, $Z > X$, with $Z =$ dark brownish red and $X =$ medium brownish red. Calculation of the Gladstone-Dale relationship, using the constants of Mandarino (1976) yields: $K_c = 0.224$ and $K_p = 0.217$. Jarosewichite does not respond to ultraviolet radiation.

Most of the jarosewichite occurs as aggregates which are barrel-shaped, have a rough, irregular surface, and physically resemble some synadelphite, particularly that from Sterling Hill. A few very small crystals, up to 0.5 mm in length, were observed. They are euhedral with flattened habit, elongated on a , and tabular on b . The best crystals, for which only a limited number of faces could be observed for the $[100]$ zone, have $[010]$ as the dominant form and $[021]$ as a less prominent form, as determined using a two-circle optical goniometer."

Chemical composition

"Jarosewichite was chemically analyzed using an ARL-SQM electron microprobe. The standards used for analysis were manganite (Mn), synthetic olivenite (As), synthetic ZnO (Zn), and hornblende (Ca, Mg, Fe). No other elements with atomic number greater than 9 were found with a wavelength-dispersive scan. A spectrographic analysis proved the absence of boron. Type chlorophoenicite (Dunn, 1981) was used as a control standard. Water could not be directly determined due to extreme paucity of material; it is calculated by difference. The oxidation state of As is inferred from the As^{5+} present in the associated cahnite and flinkite, both of which are intimately associated with jarosewichite. The oxidation state of Mn could likewise not be determined. We have assigned the 4 Mn per formula unit to $\text{Mn}_1^{3+}\text{Mn}_3^{2+}$ using the Gladstone-Dale relationship as a guide.

The resultant analysis is in excellent agreement with the theoretical end member formula for jarosewichite, $\text{Mn}^{3+}\text{Mn}_3^{2+}(\text{AsO}_4)(\text{OH})_6$, for which the weight percents are Mn_2O_3 17.14, MnO 46.20, As_2O_5 24.95, H_2O 11.71, = 100.00 percent."

X-ray crystallography

"Single crystals were studied using standard precession and Weissenberg techniques. The resulting photographs showed that jarosewichite is orthorhombic with space group $C2/m$ $2/m$ $2/m$, $Cmm2$ or $C222$, with $a = 6.56(3)$, $b = 25.20(10)$ and $c = 10.00(5) \text{ \AA}$."

A paper entitled "Hodgkinsonite from Franklin and Sterling Hill, New Jersey: a review" by Pete J. Dunn of the Department of Mineral Sciences, Smithsonian Institution, Washington, DC and Richard C. Bostwick of Lebanon, NJ, recently appeared in the *Mineralogical Record*, 13, 229-232 (1982). The following is quoted from that important paper:

HODGKINSONITE $Zn_2Mn(SiO_4)(OH)_2$

Introduction

"Hodgkinsonite, a zinc manganese hydroxyl silicate, was originally described by Palache and Schaller (1913) from the Franklin mine. Subsequently, the occurrence of hodgkinsonite at the Sterling Hill mine was noted by Cook (1973). Although the mineral occurs at Sterling Hill, the reddish microcrystals on seams in ore do not compare with the beautiful pink seams, veins and euhedral crystals found in the Franklin mine."

Physical and optical properties

"Hodgkinsonite is characteristically reddish pink, pink, or violet-pink. Some samples appear black due to the inclusion of finely divided franklinite or euhedral franklinite. Although rare, some samples may have a dull, blackish tarnish, presumably due to secondary formation manganese oxides. Hodgkinsonite with a light orange color is known from Franklin and Sterling Hill.

Hodgkinsonite is fluorescent in longwave ultraviolet light. This fluorescence is a dull, weak, pinkish red color. It has one perfect cleavage. For samples without crystals large enough for cleavage observations, the previously mentioned fluorescence is useful in identification. Hodgkinsonite is readily soluble in acids."

Morphology

"The crystal morphology of hodgkinsonite was initially described by Palache and Schaller (1913) and further modified by Palache (1914). Palache (1935) added new data, so complete, as to need no amplification here.

Most hodgkinsonite crystals are prismatic and euhedral. The majority are elongated on *c* with an elongation ratio of approximately 4:1. Hodgkinsonite crystals vary in size from microscopic to about 20 mm, but most well formed crystals do not exceed 5 mm in length. A typical cluster of Franklin hodgkinsonite is shown in Figure 1."



Figure 1. Typical cluster of hodgkinsonite crystals from the Franklin mine.

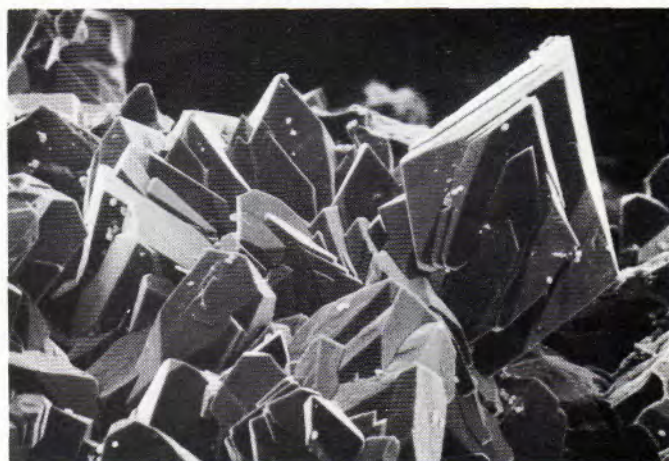


Figure 2. Hodgkinsonite druse from the Sterling Hill mine.

Occurrence

"At Franklin, in general, specimens with euhedral crystals are usually formed on rich ore composed of franklinite and willemite and notable for its paucity of calcite. The best known assemblage is that of slightly violet hodgkinsonite associated with a boxwork of white bladed barite and white barrel-shaped calcite crystals. In most such specimens, hodgkinsonite follows willemite and barite in the deposition sequence and is, in turn, followed by additional franklinite and in some instances, carbonates. Specimens consisting of massive hodgkinsonite are sometimes associated with willemite, franklinite, barite, zincite, pyrochroite and calcite. Some less common associated minerals include susexite, chlorite, hetaerolite, serpentine, tephroite, andradite, clinohedrite, cahnite, esperite, pyrobelonite, larsenite and adelite. The last seven associations are relatively uncommon.

At Sterling Hill, hodgkinsonite is frequently associated with hetaerolite, chlorophoenicite and zincite, on ores of varying degrees of richness. In addition, hodgkinsonite is also found associated with a number of rare arsenates in assemblages of which few specimens are known, indicating it can exist over widely varying geochemical conditions. Cook (1973) initially noted Sterling Hill hodgkinsonite as a pinkish brown botryoidal coating and as very small reddish brown microcrystals. Most Sterling Hill hodgkinsonite occurs as druses of microcrystals in which the recognition of individual forms is nearly impossible. Well-formed crystals, such as are shown in Figure 2, are quite uncommon at Sterling Hill."



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

- Saturday**
March 19, 1983
- FIELD TRIP:** Mineral Exchange Program SWAP & SELL - FOMS Members Only - Hardyston Township School - 10:00 A.M. to 2:00 P.M.
- MICRO-GROUP:** Hardyston Township School - 10:00 A.M. to Noon - THIS MEETING ONLY
Micro-mineralogy study sessions will resume at Kraissl Hall next month.
- LECTURE:** Franklin After Dark - Richard C. Bostwick, Spex Industries, Metuchen, NJ
-
- Saturday**
April 16, 1983
- FIELD TRIP:** Old Andover Iron Mine - Limecrest Road, Andover, NJ - 9:00 A.M. to Noon.
- MICRO GROUP:** Kraissl Hall - Franklin Mineral Museum, Franklin, NJ - 10:00 A.M. to Noon.
- LECTURE:** To Be Announced - Pete J. Dunn, Department of Mineral Sciences, Smithsonian Institution, Washington, DC
-
- Saturday**
May 21, 1983
- FIELD TRIP:** Buckwheat Mine Dump - Evans Street, Franklin, NJ - 10:00 A.M. to Noon.
- MICRO GROUP:** Kraissl Hall - Franklin Mineral Museum, Franklin, NJ - 10:00 A.M. to Noon.
- LECTURE:** To Be Announced
-
- Sunday**
May 22, 1983
- FIELD TRIP:** Limecrest Quarry - Limestone Products Corporation of America, Limecrest Road, Sparta, NJ - 9:00 A.M. to 3:00 P.M. - Interclub Outing.
-
- Saturday**
June 18, 1983
- FIELD TRIP:** Franklin Quarry (formerly Farber quarry) - Limestone Products Corporation of America, Cork Hill Road, Franklin, NJ - 9:00 A.M. to Noon.
- MICRO GROUP:** Kraissl Hall - Franklin Mineral Museum, Franklin, NJ - 10:00 A.M. to Noon.
- LECTURE:** To Be Announced
-

DAILY FRANKLIN ATTRACTIONS

Buckwheat MINERAL DUMP - Entrance thru the Franklin Mineral Museum, Evans Street, Franklin, NJ - Open April thru November - Admission \$1.50 adult; \$.75 student - Hours coincide with museum.

Franklin MINERAL MUSEUM and MINE REPLICA - Evans Street, Franklin, NJ - Open April thru November - Admission \$1.50 adult; \$.75 student - Closed Monday - Open Tuesday and Wednesday by group reservation only. Open Open Thursday thru Sunday with daily schedule, except Sunday morning.

Gerstmann FRANKLIN MINERAL MUSEUM - 14 Walsh Road, Franklin, NJ - Open year round DAILY - No admission fee - Donations accepted - Mr. Ewald Gerstmann, Curator.

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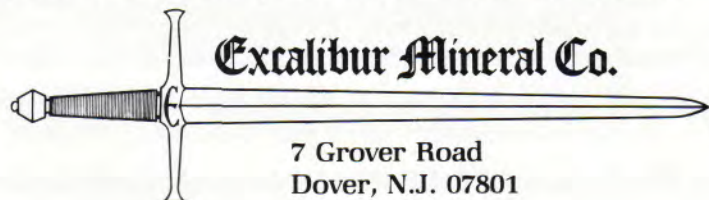
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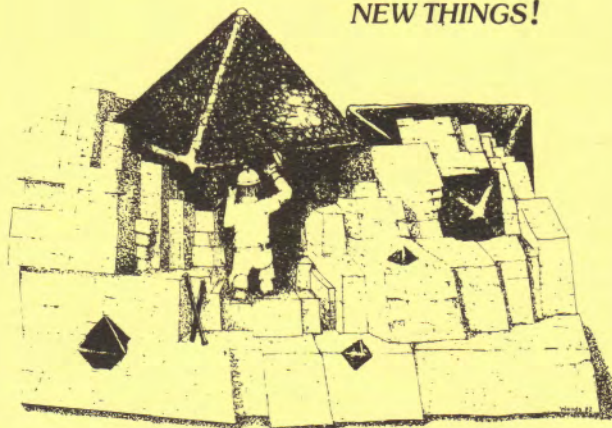
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