Brezina [2] made the following observation in regard to the meteorite:

A lumpy grain of the size of a nut which fell out during the cutting shows the imprint of the neighboring grains. Upon the section surface are to be seen bent Neumann lines with somewhat bright yellow-colored porous crystals of troilite.

After acquisition of the principal part of the mass by the Vienna Museum the structure was studied by Berwerth [3] with the following results:

The analysis by Eakins led Linck to class Mount Joy as a hexahedrite, and when later Brezina, on a piece broken from the surface, observed Neumann lines the meteorite was classed as a breccialike hexahedrite. For the purposes of investigation and material for exchange the mass at the Vienna Museum was sawed in two parts in the direction of its principal section, and the smaller part cut into corresponding smaller plates parallel with this section. The faces obtained were so large and their character so remarkable that a complete investigation of the iron is in preparation; here the only endeavor will be to correct the error regarding its structure which has crept into literature. The preparation of the faces for exhibition showed without question that Mount Joy belongs to the octahedral irons, and by its very coarse structure should be placed among the last of the octahedral irons classed as having coarsest lamellæ. The general structure of Mount Joy is that of a coarse-grained mass, the coarse grains of which are intergrown and so elongated with a certain regularity in one direction that the grains have a relatively short rodlike shape. From this shape and the position of the grains arises an appearance of Widmanstätten figures that is plain to the eye on a large section. The fine crystalline structure of the single grains makes the figures more distinct, since the grains show a similar course of Neumann lines, luster, and sheen. Contrary to the usual structure of octahedral irons with more compact band systems, Mount Joy shows by reason of the more granular than lamellar formation a disconnected network of figures. A regular inclusion of fine rhabdite is common to the grains. As regards the appearance of the etched surface the grains show two characters. Along the section the course of the Neumann lines is shown plainly. In another part of the mass the Neumann lines show only very weakly. This disguised appearance of the lines comes from the fact that the mass of the grains has a composition of two fields, one of which is depressed and the other appears swollen on the etched surface. This gives a spongy or shagreened appearance. In certain sections this etching of the fields is oriented. The two fields show parallel strise and resemble the perthitic structure seen in twin feldspars. Of other components which occur in the meteorite, troilite is present only in relatively small quantity in scattered nodules of medium size. Single nodules contain white and lustrous crystalline inclusions. The troilite is regularly surrounded by a coating of schreibersite. Schreibersite appears in larger skeletonlike crystals in the iron grains, also inclosing the troilite and interspersed between the grains. Where the spaces between the grains are open wide and are cleft a dark oxidation product of iron taking a good polish accompanies the schreibersite. These fillings are commonly regarded graphitic. Graphite seems, however, to be everywhere lacking. Where these oxidized interspersions are extensive there may also be seen an earthy yellow silicate. To the above may be added the statement that the manner of the octahedral structure of Mount Joy, showing its composition of great cubic crystalloids, requires a change in the present classification of iron meteorites. Probably a revision of the so-called breccialike hexahedrites will be required and its members put into the octahedrite division. Thus Sao Julíao belongs, doubtless, to the octahedral irons. Further, it is indicated that all iron meteorites possess an octahedral structure and that the meteorites of hexahedral structure which have fallen to our earth are simply fragments of octahedral irons of very coarse structure.

The mass is somewhat distributed but is chiefly in the possession of the Vienna Museum (171,860 grams).

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Mount Ouray. See Ute Pass.

MOUNT VERNON.

Christian County, Kentucky.
Latitude 36° 55′ N., longitude 87° 25′ W.
Ironstone. Brecciated pallasite (Pb), of Brezina.
Found 1868; described 1903.
Weight, 159.2 kgs. (351 lbs.)

This meteorite was first described by Merrill,[1] as follows:

The United States National Museum has recently come into possession of a heretofore undescribed meteorite from the farm of Capt. S. T. Fruit, in Mount Vernon Township, about 7 miles northeast of Hopkinsville, in Christian

County, Kentucky. The meteorite, which is a pallasite, has been known for some 35 years by the occupant of the premises, where it served as a convenient stone on which to clean his boots after crossing the muddy fields. Although recognized as of a peculiar type of stone, no suspicion of its meteoric nature was entertained, and it was only when the zinc and lead mining excitement of 1902 caused a sample of it to be sent to Mr. E. O. Ulrich, of the United States Geological Survey, with a request for information, that its true nature became known. It is through the influence of Mr. Ulrich that the specimen was obtained for the National Museum.

Prolonged exposure has, naturally, brought about a great amount of oxidation to the exterior portion of the material. More than that, the rough usage to which the exposed portion was subjected, and the breaking away of small masses by the curious and the prospector, has so obscured the original form that little of value on this subject can be said. The mass, as it came to the museum, is in the form of a rude prism some 55 cm. in height, with sides measuring 33 cm. and 36 cm., respectively. Although badly oxidized, two of the sides show rough pittings.

As stated above, the stone is a pallasite. It differs, however, from the usual pallasites in that, while those may properly be described as spongy masses of iron containing silicate minerals, this is really a mass of silicate with a cementing of iron, the proportion of iron, so far as can be determined from examination of the exterior of the mass, or of the small pieces which have been broken away, being much less than in the case of the pallasite of Kiowa County, Kansas. From the Admire pallasite, described by the present writer in the Proceedings of the United States National Museum for 1902, it differs in that the silicate (in this case olivine) occurs in large rounded blebs rather than in sharply angular fragments. In this respect also it differs from the Eagle Station, Kentucky, pallasite.

The mineral composition of this meteorite, so far as determined, has already been suggested. The main mass of the material is of olivine in rounded blebs and in sizes varying from 5 to 25 mm. in diameter. These are quite closely compacted, with the usual nickel-iron alloy in the interstices, and serving as a binding constituent, and in smaller proportions the customary phosphide and sulphide.

Although the meteorite has not yet been fully investigated, it is of interest in bearing out certain observations by the writer in the case of the Admire, Kansas, meteorite, viz, the olivines are often shattered, with thin plates—mere films or veinlets—of the phosphide extending up through them, as described in the paper already quoted.

A slab will be sawn from the entire length of one side of the mass for the purpose of showing its internal structure and securing material for study, the main mass being kept intact, after the usual custom of the museum. It is expected that later more complete analyses will be made and a more detailed description given.

The weight of the mass as received was 351 pounds (159.21 kgs.). It will be known as the Mount Vernon meteorite.

A later detailed account was given by Tassin,[2] as follows:

The meteorite here described was found on the farm of Capt. S. T. Fruit, in Mount Vernon Township, about 7 miles northeast of Hopkinsville, Christian County, Kentucky. Although known for some 35 years, its meteoric origin was not suspected until 1902, and the first published account and preliminary description was given by Dr. George P. Merrill, in the American Geologist in 1903.

A cut surface shows the mass to be a pallasite of the Krasnojarsk type (Pk), consisting essentially of nickel iron occurring in cohering spongiform or reticulated masses containing olivine and varying amounts of troilite, schreibersite, carbon, chromite, and lawrencite.

The nickel-iron constituent comprises about one-third of the mass of the entire surface as cut, and serves as a matrix in which are contained rounded blebs of olivine varying in size from 1 to 30 mm. in diameter. Dislodging the olivine blebs will in general disclose a very thin, black, specular film more or less completely lining the entire cavity, and which is rich in carbon and usually contains some chlorine as chloride, together with more or less sulphur as sulphide. Next to this is frequently found a more or less continuous layer of schreibersite or troilite, or both. These in turn are followed by the nickel-iron constituent made up of kamacite, tænite, etc.

The olivine blebs are quite commonly penetrated by cracks in all directions. These cracks may or may not be filled with other substances. In the former case they are charged either with metallic iron, the black, specular chlorine-containing material above referred to as commonly surrounding the olivine, and which often contains chromite, with limonite (probably resulting from the oxidation of the specular substance), and which also contains chromite, or, and this but rarely, with schreibersite or troilite.

The mass contains, approximately, the following percentage composition, calculated from the results of several analyses:

Olivine	63.15
Nickel iron	33.12
Schreibersite	1.95
Troilite	.69
Chromite	1.00
Carbon	.09
Chlorine	trace
	100.00

This agrees fairly well with the composition of the mass as determined by the measurement of the areas of its constituents, the mean of some 300 measurements giving the following values:

Olivine	61.75
Nickel iron	36.52
Schreibersite	1.35
Troilite	.38

Some 400 grams in all of the mass were taken for separation and analysis, and in the several portions of this the following were separated:

The nickel-iron alloy.—This constituent approximates one-third of the whole. It occurs in cohering spongiform masses of irregular shapes, some of them measuring a centimeter along their greatest diameters, while others are merely hairlike filaments.

Etching shows that the mass of the iron constituent is made up of a darker colored alloy in which is seen fine lines of a tin-white color, which are in part oriented and in part penetrate the mass in zigzag shapes. Bounding this eutectic is seen a band of bright, white iron, which varies in width from a line to a millimeter.

Examined under the glass the mass of the iron constituent appears to be made up of minute octahedrons arranged in fine lamellæ, and considered as a unit may be defined as a granular octahedrite containing more or less numerous troilite and schreibersite areas.

Two portions of this constituent, each weighing 10 grams, were taken for analysis, and after treating with dilute acid for the separation of schreibersite, tænite, etc., were examined as follows: In one the silicon, iron, aluminum, copper, cobalt, nickel, and sulphur were determined; in the other the carbon and phosphorus, with the following results:

Iron	82.520
Nickel	14.044
Cobalt	0.949
Copper	0.104
Sulphur	0.288
Silica	0.808
Aluminum	0.410
Carbon	0.465
Phosphorus	0.390
Chlorine	trace
	99.978

Tænite occurs in very thin, brittle, tin-white lamellæ, with a specific gravity of 7 at 20.1° C., and having the following composition:

Iron	63.99
Nickel	35.98
Cobalt	0.10
Copper	trace
Phosphorus	0.04
	100.11

The material was strongly magnetic, but did not possess polarity.

Schreibersite occurs fairly abundantly, approximating as it does 1.35 per cent of the mass by measurement and 1.95 per cent by analysis. It is found bounding the olivine areas and occasionally penetrating or contained in them. The more common occurrence is, however, as blebs, veins, or filaments in the nickel-iron constituent. The mineral has a brilliant tin-white color, is strongly magnetic, possessing polarity, and in one instance was undoubtedly crystallized, but, unfortunately, the specimen was so brittle that it fell to pieces on attempting to measure it.

An analysis gave the following:

Iron	64.990
Nickel	18.905
Cobalt	0.105
Phosphorus	15.700
Copper	trace
	99.700

Troilite occurs commonly associated with the black specular material lining the cavities containing the olivine in the nickel-iron constituent. It varies in its dimensions from a coating a line in thickness to masses 2 or more millimeters thick by 10 mm. in length. Grains and flakes of troilite are occasionally contained in masses of the nickel-iron alloy and may then be associated with schreibersite areas. Further, it may occur as isolated grains or flakes and filling cracks in the olivine areas.

The material analyzed was obtained by treating the metallic portion with mercury bichloride, and after its solution separating the troilite and schreibersite from carbon, silicates, etc., with the magnet and from each other by lixiviation. The material thus obtained had a specific gravity of 4.759 at 18° C. and the following composition:

Iron	62.99
Nickel, Cobalt	.79
Phosphorus	trace
Sulphur	36.35
	100.13

The specular material lining the olivine cavities is essentially a graphitic iron containing sulphur and chlorine. The material analyzed was far from being homogeneous, as it was separated mechanically with the aid of a glass. The composition was as follows:

Iron	84.900
Nickel, Cobalt	5.039
Silica	2.990
Carbon	2.810
Sulphur	1.750
Phosphorus	1.470
Chlorine	0.100
Alumina	0.940
	99.999

Chromite occurs quite abundantly, varying in size from microscopic grains to a crystal 1 mm. in diameter. The crystals are more or less perfect octahedrons, rarely modified by other forms, and then only by the dodecahedron (110), as noted in one instance. They are brilliant black in color with a metallic luster; nonmagnetic; have a specific gravity of 4.49 at 18° C., with the following composition:

Chromic oxide	64.91
Alumina	9.85
Magnesia	4.96
Ferrous oxide	17.97
Silica	1.38
	99.07

Olivine occurs in more or less rounded masses which, when carefully extracted, show well-marked facets. These facets are probably not to be referred to any crystal forms, since no zonal relations could be established after repeated measurements. The mineral is commonly brownish in color and only occasionally honey yellow. The blebs are more or less cracked and the cracks filled with foreign material, as graphitic iron, limonite, chromite, etc. Some of the clearest grains, which under the glass were quite free from impurities, were selected for analysis, with the following results:

Silica	35.70
Magnesia	42.02
Ferrous oxide	20.79
Ferric oxide	0.18
Alumina	0.42
Manganese	0.14
Nickel oxide	0.21
Phosphorus	trace
	99.46

The meteorite is somewhat distributed, but is chiefly in the possession of the U. S. National Museum.

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