THE MOUNT VERNON METEORITE.

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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, Ky. Although known for some thirty-five years, its meteoric origin was not suspected until 1902, and the first published account and preliminary description was given by Dr. George P. Merrill,[a] in the American Geologist in 1903, from which the following is taken:

> The meteorite, which is a pallasite, has been known for some thirty-five years by the occupant of the premises, where it served as a convenient stone on which to clean 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.
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> 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, have so obscured the original form that little of value on this subject can be said. The mass [Plate III], as it came to the Museum, is in the form of a rude prism some 55 centimeters in height, with sides measuring 33 centimeters and 36 centimeters, respectively. Although badly oxidized, two of the sides show rough pittings. The weight, as received, was 351 pounds (159.21 kilos).

GENERAL STRUCTURE AND COMPOSITION.

A cut surface (Plate IV) 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.

[a] Merrill, George P. A Newly-found Meteorite from Mount Vernon, Christian County, Ky. American Geologist, xxxi, March, 1903, p. 156.

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 millimeters 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.

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 three hundred measurements giving the following values:

Olivine	61.75
Nickel-iron	36.52
Schreibersite	1.35
Troilite	.38

THE MINERALOGICAL COMPOSITION.

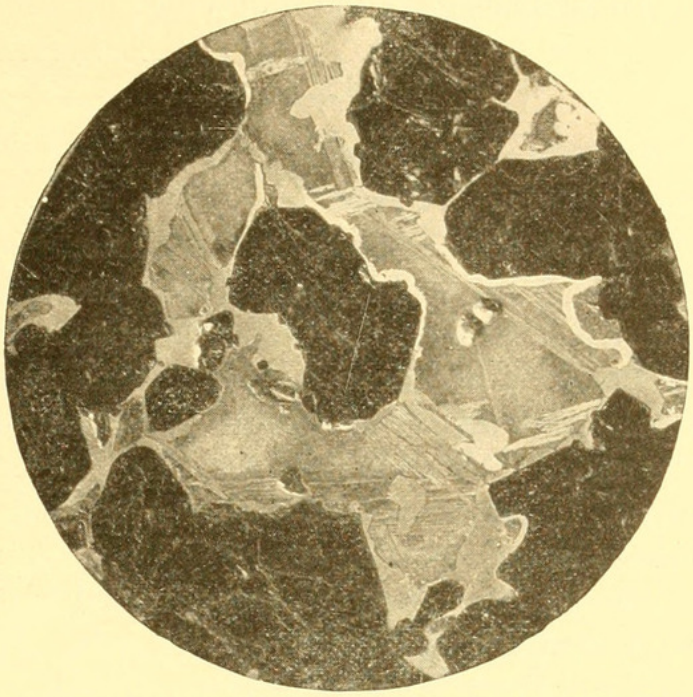
Some 400 grams in all of the mass were taken for separation and analysis, and in the several portions of this the following were separated:

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 hair-like 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 (see figure), 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.



SECTION (MAGNIFIED) SHOWING STRUCTURE OF THE METALLIC PORTION.

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	.949
Copper	.104
Sulphur	.288
Silica	.808
Aluminum	.410
Carbon	.465
Phosphorus	.390
Chlorine	Trace.

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
Nickelc	35.98
Cobalt	.10
Copper	Trace.
Phosphorus	.04

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	.105
Phosphorus	15.700
Copper	Trace.

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 millimeters 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

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	.100
Alumina	.940

Chromite occurs quite abundantly, varying in size from microscopic grains to a crystal 1 millimeter in diameter. The crystals are more or less perfect octahedrons, rarely modified by other forms, and then only by ∞ 0 (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

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	.18
Alumina	.42
Manganese	.14
Nickel oxide	.21
Phosphorus	Trace.