This page intentionally left blank.

A NEWLY FOUND METEORIC IRON FROM PERRYVILLE, PERRY COUNTY, MISSOURI.[1]

By George P. Merrill,
Head Curator of Geology, United States National Museum.

The iron described below was found by Mr. John Monaghan in August, 1906, on the farm of a Mr. Patrick Monaghan, about 1 mile west of the town of Perryville. It lay in an open field and was about three-fourths buried in the soil. Nothing is known regarding its fall. As secured by the United States National Museum the mass weighed 17.386 kilograms, including a 75-gram fragment that had been cut from it for testing. Allowing for waste in cutting, 17.5 kilograms would probably represent its original weight as nearly as obtainable. How much had been lost by oxidation from the exterior surface it is, of course, impossible to state.

The general appearance of the mass is well shown in figures 1 and 2, plate 44. The surface was almost completely coated with oxidation products, and scales of oxide could be readily removed by means of any hard, sharp instrument. Nevertheless, indications of surface fusion in its flight, in the shape of obscure, shallow pittings, were still evident, and are shown in the plate. In figure 2 two considerable pits, formed through the oxidation of troilite nodules, are in evidence. An etched surface of the iron brings out some rather unusual features. In structure the iron is an octahedrite, but the crystallization is so fine as to be almost microscopic. (See pl. 45.) The metallic plates aligned parallel with the octahedral face are rarely, if ever, a millimeter in thickness, and are lacking in uniformity throughout their lengths. They are also wavy, forming an irregular network of lines with a general octahedral trend as shown in figure 2 of plate 45. Parallel with these plates lie the extremely thin, almost microscopic plates of schreibersite, recognizable by the naked eye only by their bright metallic luster, and not at all differentiated in the photographic reproduction. The structure, on the whole, and particularly with reference to the uneven crystallization, as shown on an etched surface, more nearly resembles the iron of Ballinoo, West Australia,[2] than

[1] Catalogue No. 428, U. S. National Museum.

[2] Described by H. A. Ward, Amer. Journ. Sci., vol. 5, 1898, p. 136, and classified as a "Finest octahedrite, Off."

any other available for comparison in the national collections. According to the figures given by Brezina and Cohen,[1] however, it would seem to more closely resemble the Cowra iron. The plessite areas are very poorly developed, and in places wholly indistinguishable or quite lacking. Troilite occurs in the usual rounded nodules, the remainders of two larger forms showing at the top and bottom of figure 1, plate 45, and a smaller one at the immediate left of figure 2. The metal, it is well to note, is very tough and hard and can not be cut at all by the ordinary hacksaw used by metallurgists.

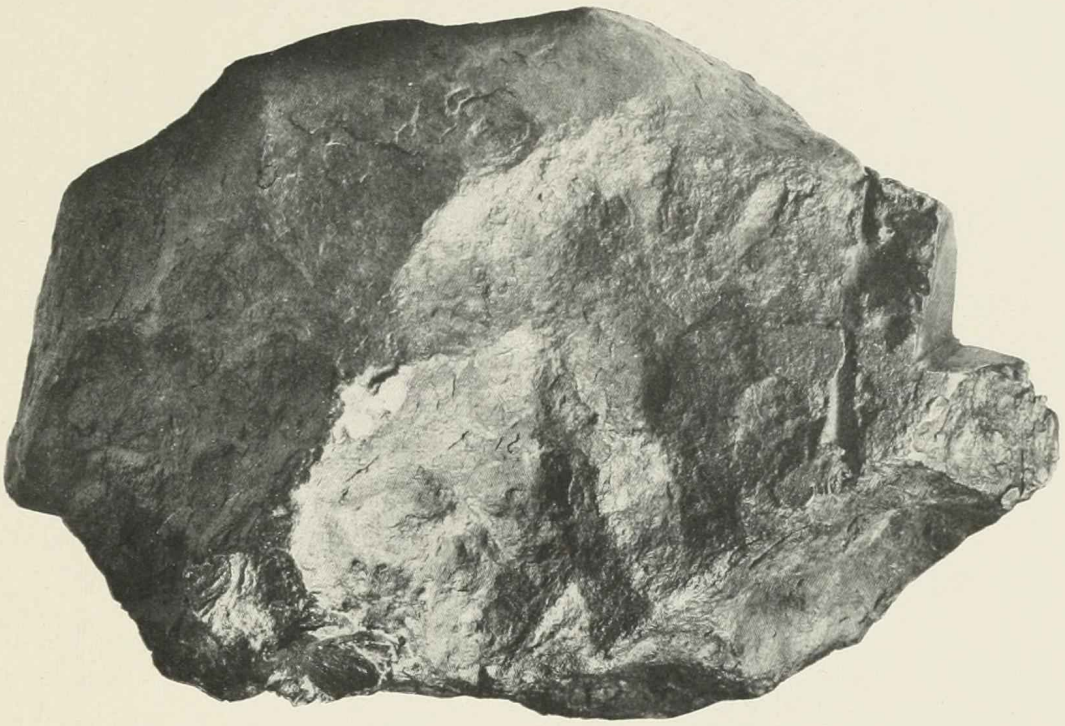
In connection with investigations on the minor constituents of meteorites carried on under a grant from the National Academy of Sciences it was possible to make a very thorough analysis of the iron, the analytical work being done under the supervision of Dr. J. E. Whitfield. These results are given in column 1 below. In column 2 is given the average of two analyses of the Ballinoo iron by Sjöström [2] and Mariner and Hoskins.[3]

	(1)	(2)
	Per cent.	Per cent.
Iron (Fe)	89.015	89.625
Nickel (Ni)	9.660	9.86
Cobalt (Co)	.545	.67
Copper	.025	.03
Manganese	None.	....
Phosphorus	.365	.49
Sulphur	.002	.03
Silicon	.003	Trace.
Carbon	.015	.02
Ferric oxide	.370	....
Iridium	Trace.	....
Palladium	Trace.	....
Platinum	Trace.	....
Ruthenium	Trace.	....
	100.00	100.725

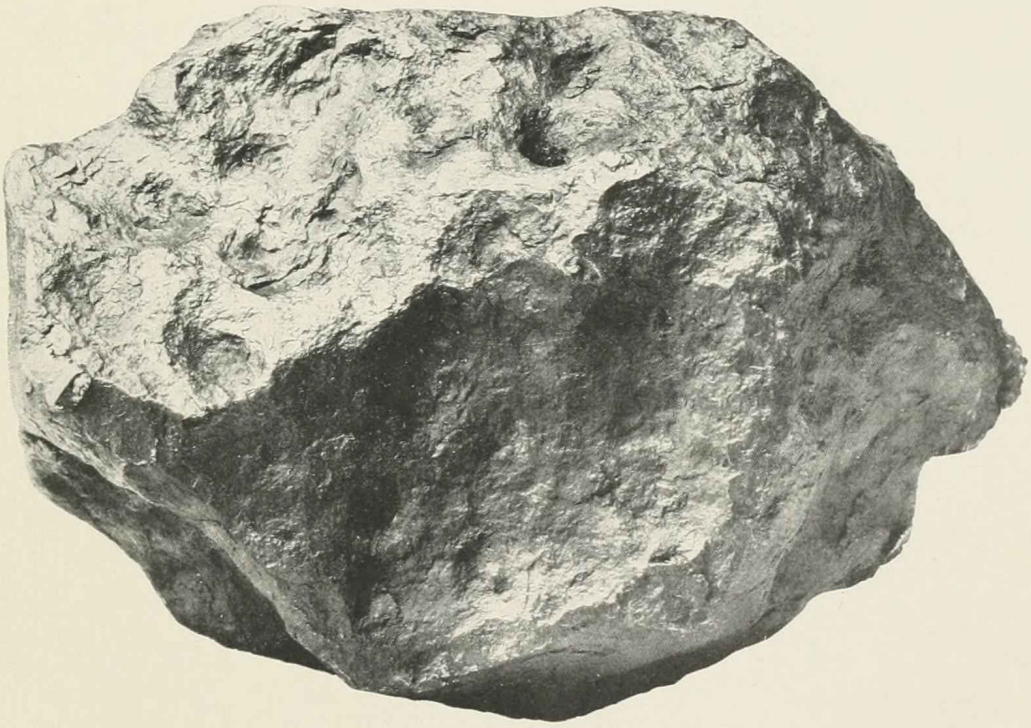
Specific gravity 7.61. Determined in picnometer flask at 22.4° C. and on chips showing no visible troilite.

The amounts of the rarer elements found in different samples of the iron were quite variable though always small. In one portion of 25 grams was found 0.004 gram of platinum, and in another of 100 grams but 0.002 gram. The precipitates of ammonium platinum chloride were in all cases colored faintly orange, indicating the presence of palladium, but in amounts too small for determination. In another 100-gram portion of the iron was found 0.014 gram of ruthenium and 0.028 gram of iridium, while yet another portion of equal weight yielded 0.0009 gram of ruthenium and 0.0011 gram of

[1] Die Struktur u. Zusammensetzung der Meteoreisen, pl. 29.
[2] Sitz. der k. Preus. Akad. Wiss., Berlin, Jan.–June, 1908, p. 21.
[3] Amer. Journ. Sci., vol. 5, 1898, p. 137.



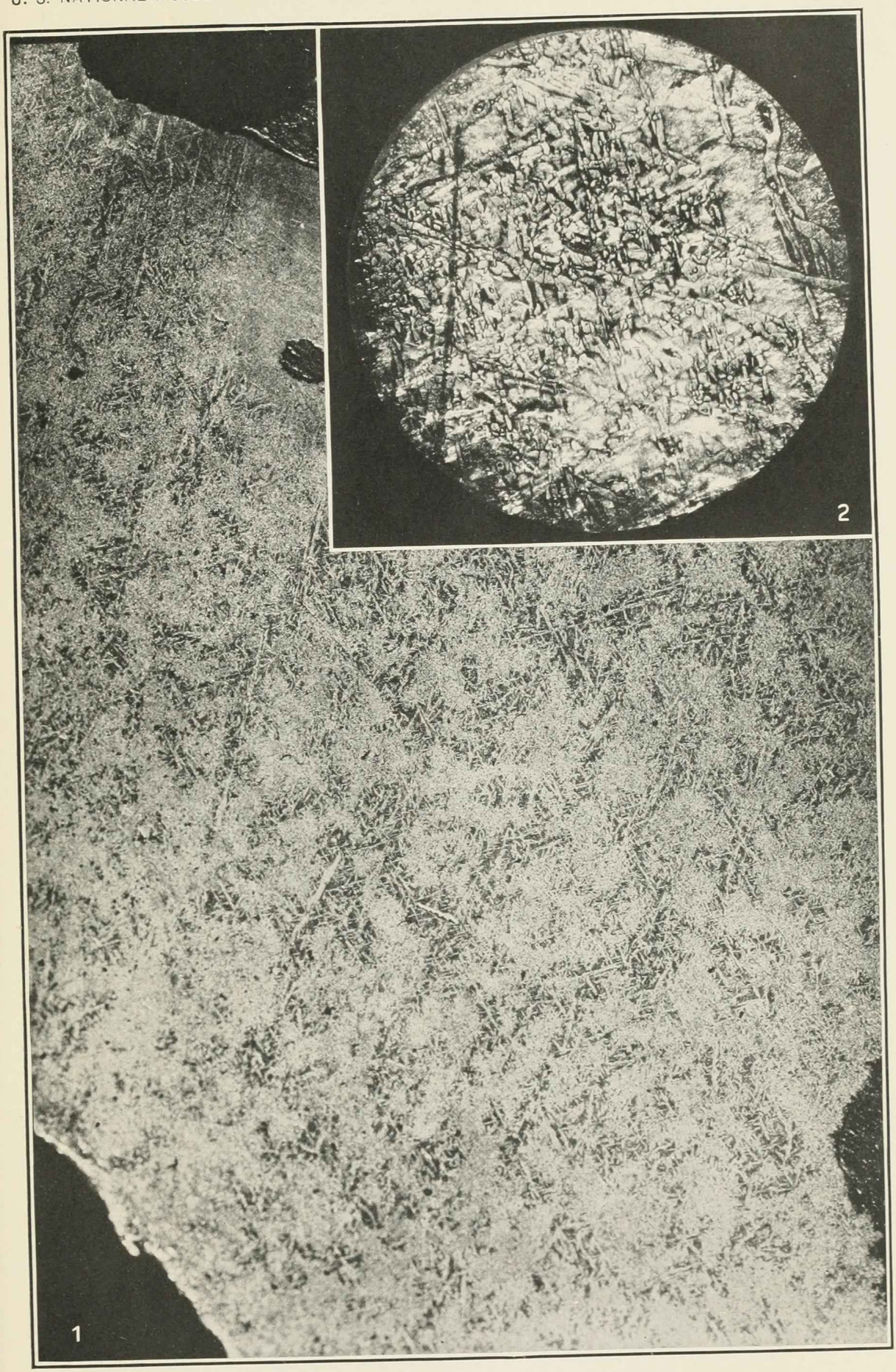
1



2

THE PERRYVILLE, MISSOURI, METEORIC IRON.

Fig. 1.—The specimen as received at the U. S. National Museum. About one-half natural size. Fig. 2.—The same in reversed position.



THE PERRYVILLE, MISSOURI, METEORIC IRON.

1. Etched surface enlarged about 2 diameters. 2. Magnified surface photographed under the microscope and by reflected light.

iridium. So far as the writer recalls this is the first authentic instance of the occurrence of ruthenium in a meteoric iron. Palladium was reported by Trottorelli [1] in the Collescipoli meteoric stone, but the amount (0.7745 per cent) is so great that taken in connection with other features of his analysis one is inclined to question the correctness of the determination. Davison [2] detected iridium in connection with platinum in the Coahuila iron.

The schreibersite separated out in process of analysis yielded:

	Per cent.
Phosphorus	14.00
Iron	51.10
Nickel	34.13
Cobalt	.30
	99.53

The nickel content of the schreibersite, it will be observed, is unusually high though not unprecedentedly so. Cohen [3] records 34.05 per cent in that of the iron of Magura; 33.15 per cent in that of Santa Rosa, Mexico; 32.99 per cent in that of Lime Creek, Alabama; 31.71 per cent in that of Bolson de Mapimi, Mexico; 36.17 per cent in that of Seelasgen, Germany; and 38.24 per cent NiCo in that of Cranbourne, Australia. The deducible formula conforms readily to Cohen's $(FeNiCo)_3P$, the iron, nickel, and cobalt being considered as variables. The nickel-cobalt content of the iron—10.205 per cent—it will be observed, is a trifle higher than the average in Cohen's Salt River group (9.55 per cent), as given by Farrington.[4]

This iron is very inactive, showing no signs whatever of polarity and taking the copper but slowly and unevenly, often only after an exposure of several minutes and perhaps complete evaporation of the sulphate solution.

[1] Ber. deut. chem. Ges., Berlin, vol. 24, 1891, p. 352.
[2] Amer. Journ. Sci., vol. 7, 1899.
[3] Meteoritenkunde, vol. 1, p. 132.
[4] Analyses of Iron Meteorites Compiled and Classified. Publ. 120, Field Columbian Museum, 1907.