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Art. XXXI.—*Note on a New Meteoric Iron from Mount Edith, Ashburton District, West Australia*; by W. M. Foote.

This meteorite was found April 20th, 1913, by Mr. James Bourke of Boolaloo Station, Ashburton, W. A. Mr. Bourke

Fig. 1.

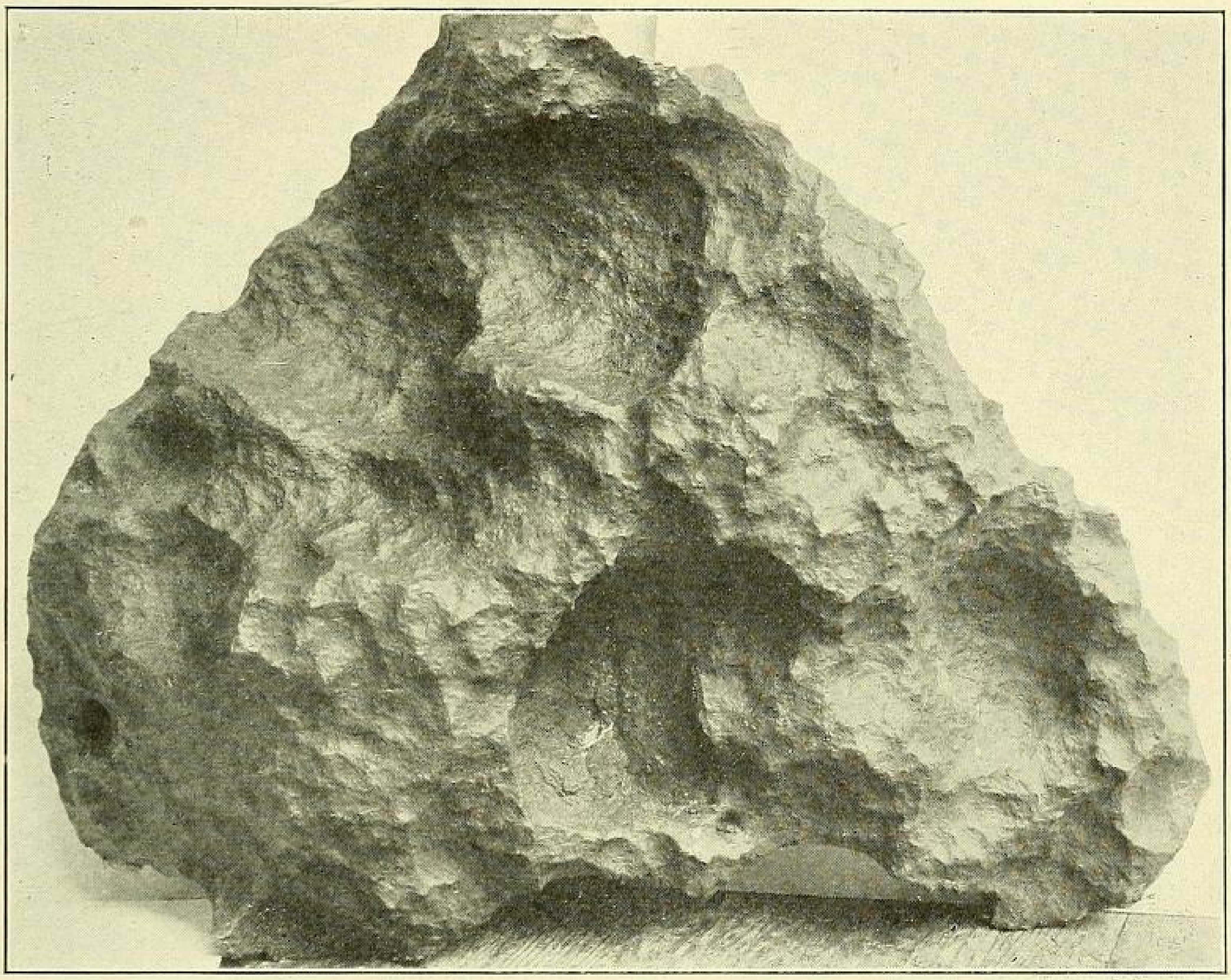

Fig. 1. Deeply pitted side. × 1/6 diameter.

states that it was met with in the country schist, buried in an upright position; about five inches of the thinnest edge showed above the surface. The locality is near Mount Edith, which is situated in 116° 10′ E. and 22° 30′ S., being well within the tropic of Capricorn. About 80 miles to the northwest is the post town of Onslow and about 160 miles to the northeast is another coast town, Roebourne. There is no record of other meteoric finds nearer than that of the Roebourne iron 100 miles distant. For the foregoing data I am indebted to Mr. Harry P. Woodward of Perth, W. A. The mass was recently acquired by the Foote Mineral Co. of Philadelphia. It is proposed to designate the fall as "*Mount Edith.*"

The meteorite weighed complete, 161 kilograms or 355 pounds avoirdupois. Its average dimensions are about 45×40×12^{cm} (18×16×5 in.) and its overall dimensions 62×55×20^{cm} (25×22×8 in.). It has an irregularly triangular flat

FIG. 2.

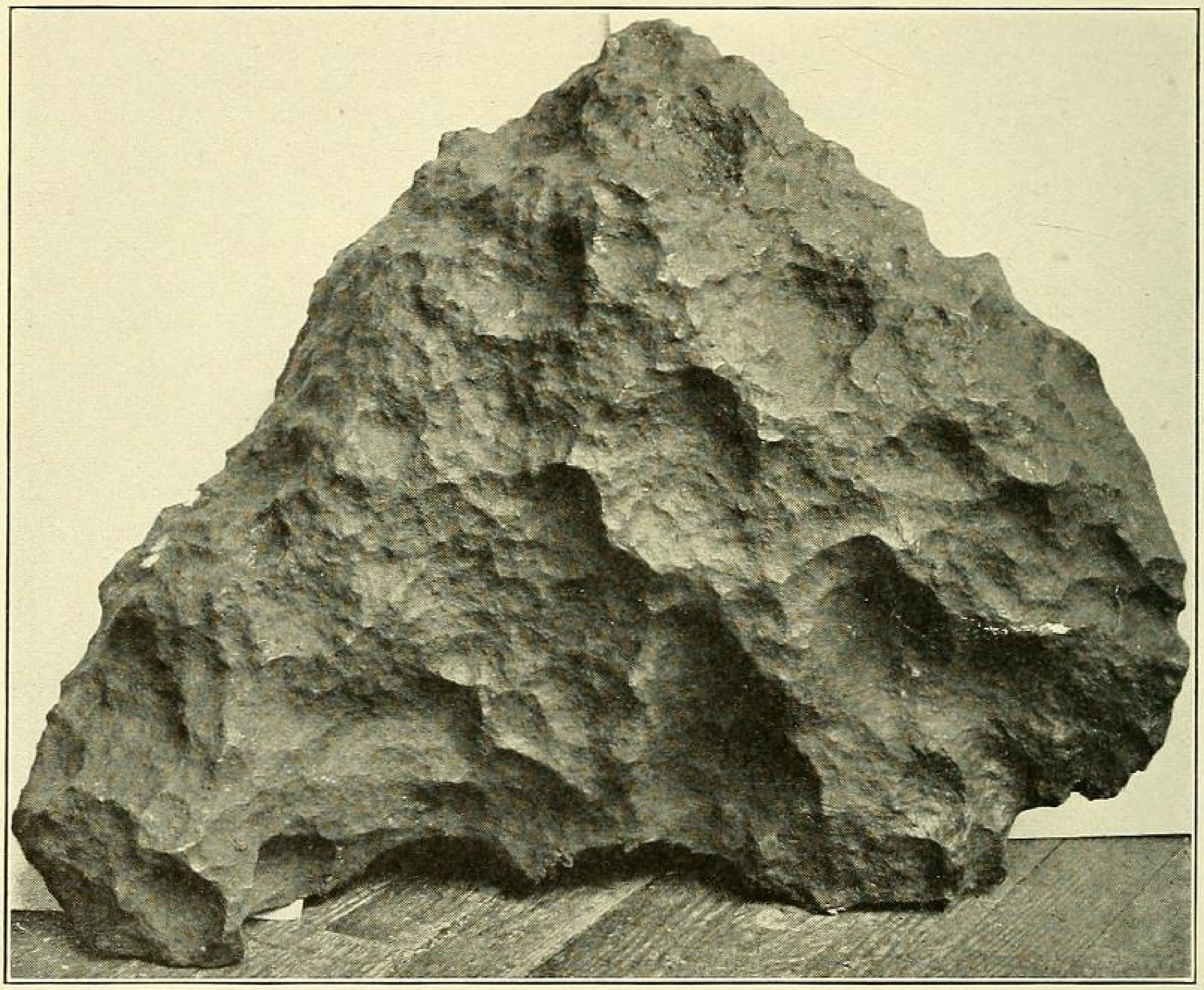

FIG. 2. Broadly pitted reverse side. × 1/6 diameter.

shape, suggesting a broad Indian arrow-head. In figs. 1, 2, 3, the blunt point of the arrow-head is at the top, the thin rear edge at the bottom. The center of gravity being nearer the thickest point, and this being deeply imbedded in the rocky ground, was probably the front in flight. The long thin edge would thus form the rear in flight. Such an orientation may be further confirmed by the fact that with a fairly uniform distribution of hard schreibersite and troilite throughout the mass, the iron is very much harder in the front than in the middle or rear. It requires three to four times as long to saw through a square inch in the former area as in the latter. One explanation of this variation is that the front, being subjected to greater heat during the atmospheric passage, was tempered to a slight depth below the surface.

One of the two broad sides (fig. 1) is marked by four nearly hemispherical pits about 12 to 15^{cm} across and 7 to 8^{cm} deep,

FIG. 3.

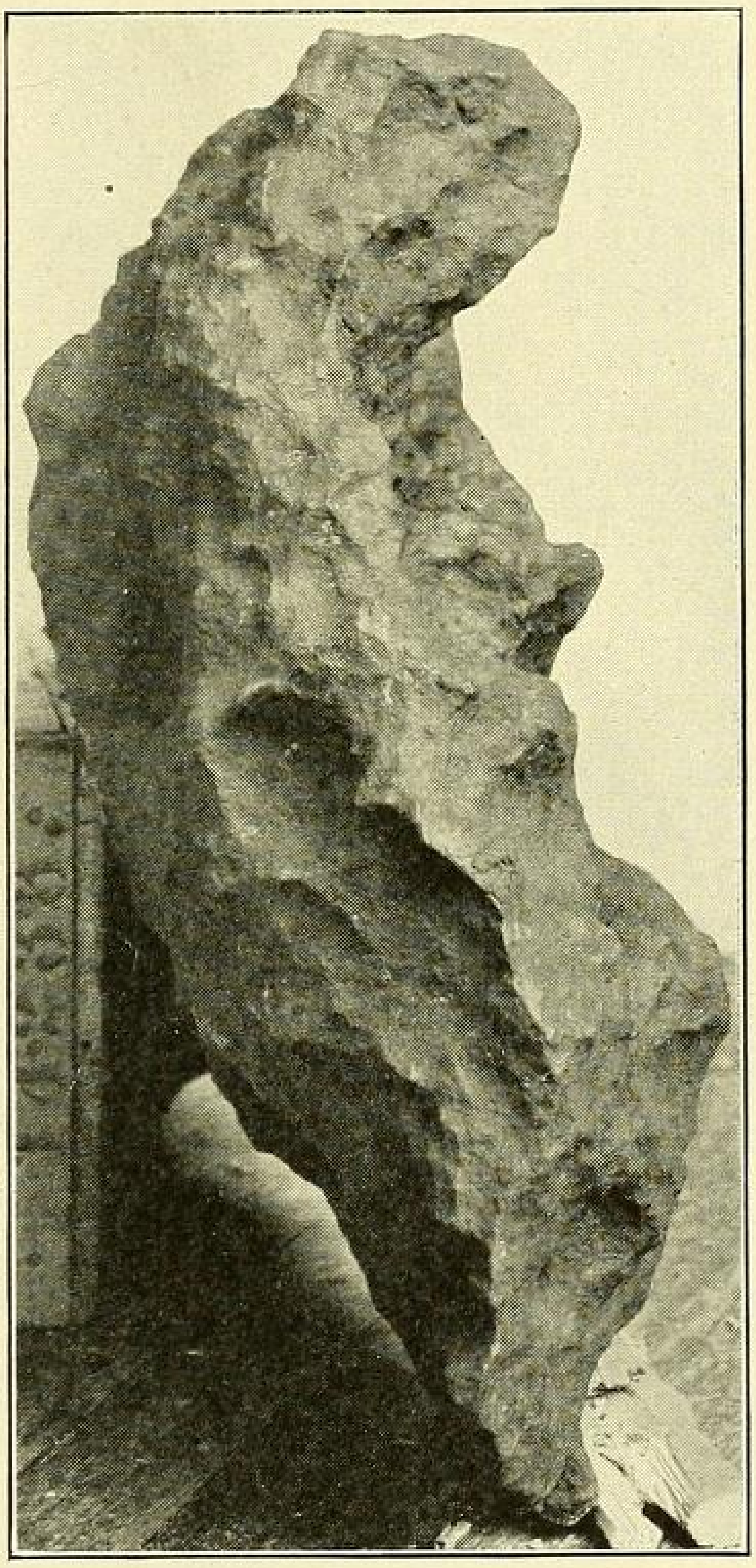

FIG. 3. View outlining pits. × 1/6 diameter.

the central one at the rear almost perforating the mass. At the bottom of this bowl-shaped "pot-hole," the oxidized crust due to terrestrial rusting is over 1^{cm} thick. In general, however, the reddish-brown crust is only 1 or 2 millimeters in thickness. There is no evidence whatever of any surface flowing or melting of the iron. The remainder of the surface, including the reverse broad side, is quite covered by shallow depressions and low prominences. These lesser pits are 2 to

10^{cm} across and less than one-half as deep as their lateral radius. On the thick edge of the iron shown in the extreme left corner of fig. 1 is a pit about 2^{cm} broad and 2^{cm} deep, due to the aerial burning out or terrestrial oxidation of a surface nodule. The heavy oxidation in the large deep pit indicates that the meteorite did not fall recently.

After making casts, the mass was sawed at Philadelphia in a direction that would outline the deeper pits in cross section (fig. 4). The iron is exceptionally hard, due in part to the presence of occasional patches and thin leaves of schreibersite. On the etched surface these appear as long needles, one measuring 76^{mm} long and only 1 to 2^{mm} broad. This mineral also encases some of the nodules of troilite (fig. 5) which are frequent and range up to $3{\cdot}5^{cm}$ in length; some at the surface are exposed on sawing. The largest so far uncovered (fig. 5) includes small rods and nodules of olivine about 2 to 3^{mm} across. The olivine appears to be opaque brownish-black, but under the microscope shows a yellowish-brown translucency and internal reflections. Another inclusion shows as dark capillary lines about 2^{cm} long, separating two parallel bands of kamacite. These minute fissure-like plates lie on edge, sometimes in parallel series and again without regular arrangement. When etched or broken, the iron is light gray. Polishing and etching with dilute nitric acid brings out the structure of a medium octahedrite, the kamacite bands mostly ranging between 0·5 and $1{\cdot}5^{mm}$ broad. These are strongly outlined by the brighter taenite, the two making up the greater part of the mass. The predominance of kamacite bands and the relative scarcity of plessite groundmass tends to slightly confuse the otherwise very striking Widmanstätten figures. Two full size photographs of the same slab illustrate a common feature of meteoric irons. Fig. 5 shows the soft-toned kamacite and plessite which are prominent in most lights. Fig. 6 shows the same subject held at an oblique angle to catch the fullest reflections of the more brilliant taenite and schreibersite, thus obscuring, in part, the main constituents. The taenite is uniformly distributed throughout the mass. Its variation in fig. 6 is due to the etched surface not being perfectly level. Even the condensation of moisture from breathing on a polished surface momentarily develops well-marked figures of kamacite and plessite.

On comparing the Mount Edith iron with over two hundred meteorites, a close resemblance to the Bella Roca (Mexico) iron was observed. This likeness extends to all of the crystalline features, except the dark capillary lines before referred to. Bella Roca, however, according to Whitfield, contains 1·53 per cent less nickel and 1·98 per cent more iron than Mount Edith.

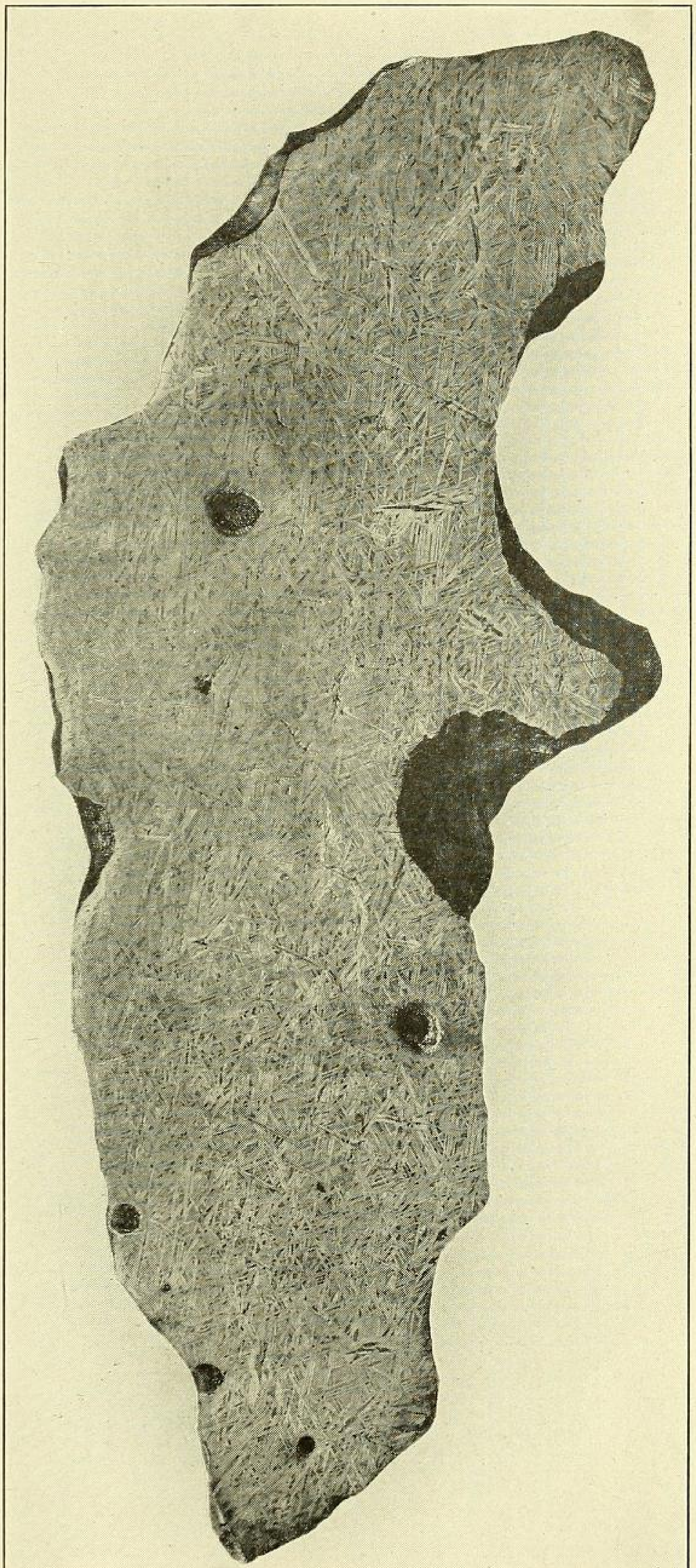

FIG. 4. Slice partly outlining deep pits. × 1/3 diameter.

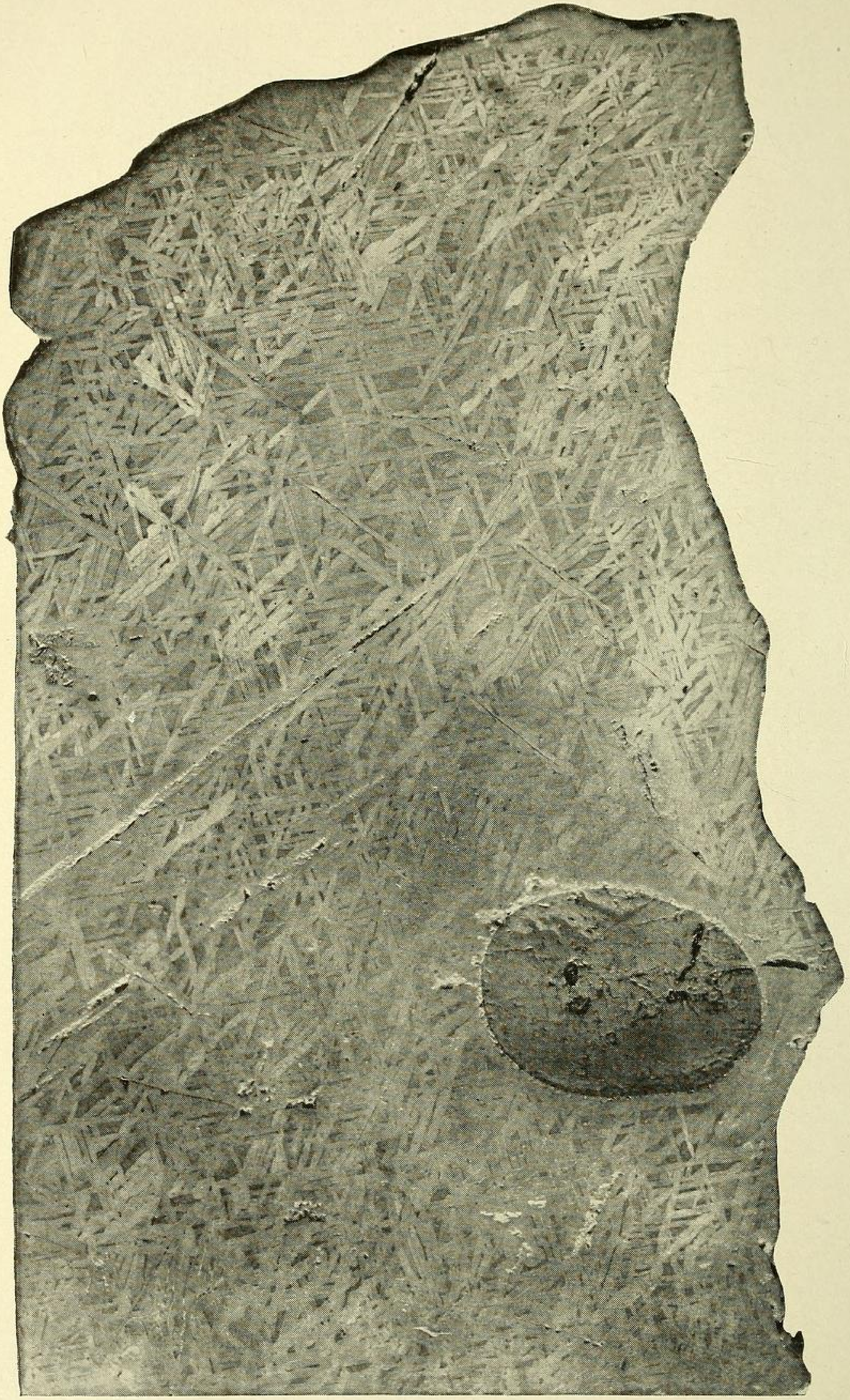

FIG. 5. Showing kamacite and plessite. ×1 diameter.

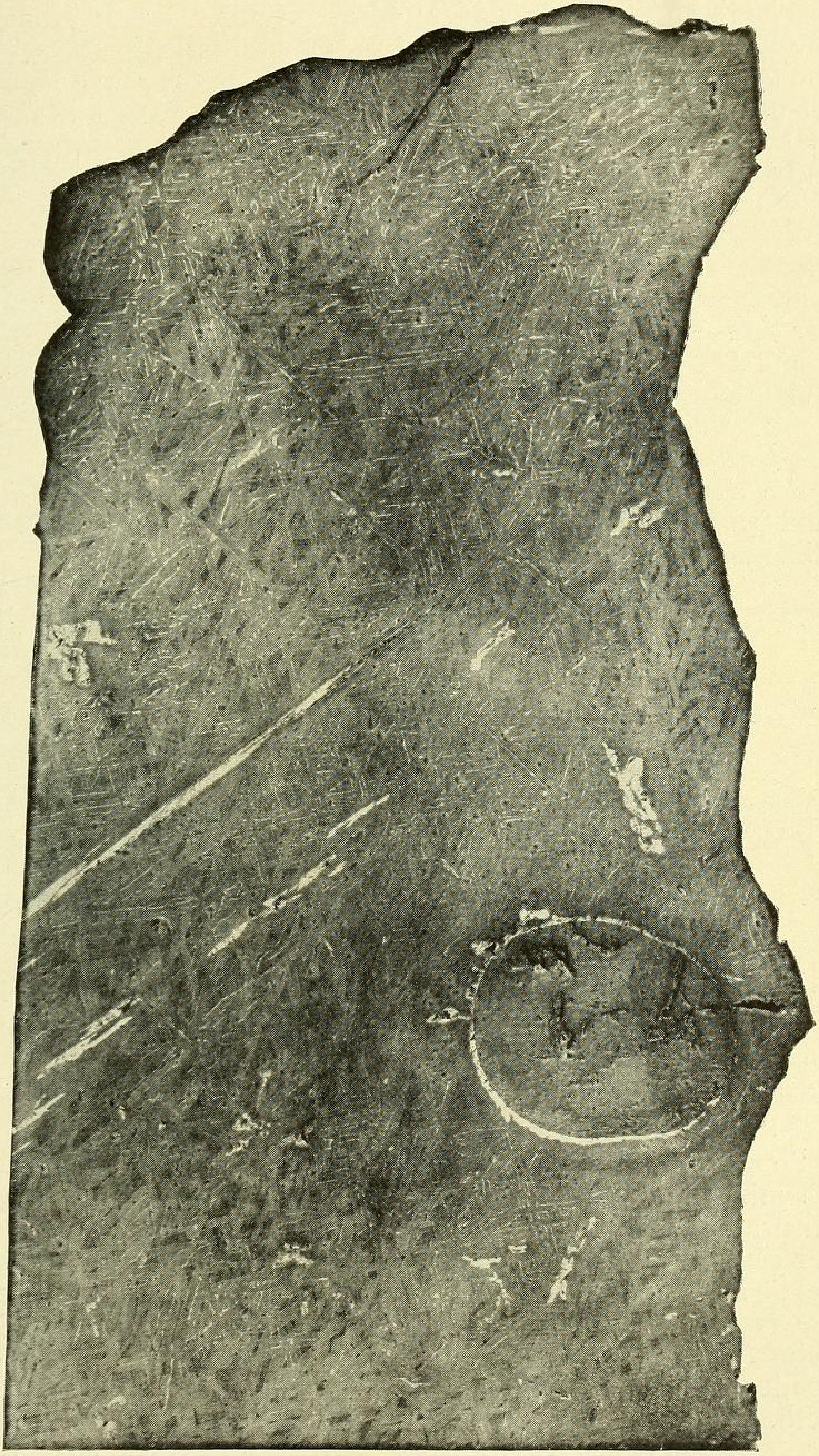

Fig. 6. Same slice at an oblique angle, reflecting taenite and schreibersite.

The nearest known geographical neighbor among irons is the Roebourne, found in 1894 two hundred miles southeast of the town of Roebourne and twenty miles from the Hammersley Range, 118° E., 22° 20′ S. This place is about 100 miles east of Mount Edith. Their points of difference are numerous and fully differentiate the two falls. While a medium octahedrite, Roebourne's figures are much dimmed by a schiller-like or flaky structure. It contains few troilite nodules and these are smaller than in Mount Edith. Roebourne contains little schreibersite and also carries 1·12 per cent less nickel and 1·414 per cent more iron than Mount Edith. The Ballinoo iron, found 300 miles to the south, has only 0·6 per cent less nickel and 0·4 per cent more iron than Mount Edith, but is totally unlike the latter in other respects. Ballinoo is one of the finest octahedrites, the figures being barely visible.

An analysis of the Mount Edith iron was made by Mr. J. Edward Whitfield of the firm of Booth, Garrett & Blair, Philadelphia. Their report follows:

Iron (direct)	89 500%
Nickel	9·450
Cobalt	0·625
Phosphorus	0·316
Carbon	0·017
Copper	0·013
Silicon	0·005
Sulphur	0·005
Manganese	none
	99·931

Included minerals were avoided as much as possible, and only clean drillings of the iron used for analysis. The material insoluble in hydrochloric acid amounts to 1·115 per cent. Considering the entire content of phosphorus as composing schreibersite, this would indicate that 2·10 per cent of this mineral was present in the iron. The specific gravity is 7·86.

Some six months previously, Mr. Edward I. Simpson, Chemist in the Laboratory of the Geological Survey of West Australia, reported the Mount Edith iron as containing 9·45 per cent nickel. This complete agreement with Mr. Whitfield's later analysis tends to show the uniform constitution of the mass throughout, as the sampling was done at different points. Such perfect concordance in the results of independent workers affords a pleasing commentary on the skill of both.