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THE PIMA COUNTY (ARIZONA) METEORITE

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The name Pima County is provisionally given to a small but most unusual iron meteorite acquired by Stuart H. Perry in 1947 from Prof. Eldred G. Wilson, of the University of Arizona at Tucson. Its history is unknown except that it was brought to the university many years ago by someone who is supposed to have found it in the vicinity of Tucson, Pima County, Ariz.

The specimen, which has been given to the United States National Museum by Mr. Perry, weighed only 210 grams. It is pyramidal in shape, the base, which apparently was the evenest of the four sides, having been partly polished. Standing on that surface, the pyramid is about 1½ inches high and 1⅜ by 1¾ inches in the other two directions. Though the polished surface did not seem to have been sawed, but only partly rubbed down, this iron may have been part of a larger mass. If so, the larger mass is unknown, and the authors know of no other nickel-poor ataxite having the same microstructure.

The most striking feature of this iron is the remarkable flow structure developed on three of its pyramidal sides, consisting of deep furrows and ridges which cover the surface and curve around one of the edges between them. The fourth side is not furrowed and ridged but shows some minute droplets of melted metal. The fused metal in these flight markings shows minute pores formed by bubbles during the time the iron was molten.

The microstructure of the Pima County meteorite is that of a nickel-poor ataxite, consisting of kamacite with a profuse dispersion of minute particles of schreibersite. Generally grain boundaries are not

apparent, though in places there are faint remnant gamma boundaries along which phosphide particles are disposed.

At numerous points the phosphide particles are thickly crowded in round areas, which appear to the eye as dim lighter spots on the etched surface and at moderate magnification suggest galaxies in a photograph of the stars. At high magnification the phosphide particles appear irregular in shape, fairly uniform in size, and without orientation. In places these groups or "galaxies" of phosphide particles inclose small irregular black inclusions of unusual character—a dense aggregate of phosphide particles in a phosphide-poor groundmass. At low magnification they resemble areas of black gamma-alpha aggregate, but they are definitely proved to be phosphide.

On a thin slice cut from the base of the pyramidal mass the specific gravity was determined and a chemical analysis made, after all fused material from the outer edge of the slice had been removed. The sample was placed in a flask and covered with dilute hydrochloric acid, and the gas given off was passed through a train of lead-acetate solution to precipitate any sulphide gas as lead sulphide. There was a small residue in the flask after it had stood in contact with the acid for 20 hours. This insoluble material was filtered off and washed several times with dilute hydrochloric acid to make certain that it was free from kamacite. The residue was then taken up in aqua regia, diluted to volume, and analyzed separately from the portion soluble in hydrochloric acid.

The weight of the material soluble in hydrochloric acid and called kamacite, and that of the material insoluble in hydrochloric acid and

ANALYSIS OF PIMA COUNTY METEORITE

(E. P. HENDERSON, *Analyst*)

Element	Meteorite		Schreibersite		Kamacite	
	Percent	Ratio [1]	Percent	Ratio [1]	Percent	Ratio [1]
Fe	93.67	1.678	54.17	0.9700	93.98	1.683
Ni	5.64	0.096	28.50	0.485	5.48	0.093
Co	0.52	0.008	2.03	0.034	0.55	0.009
P	0.10		15.27	0.492	None	
S	0.003					
Insol	0.05					
Sp. G	7.695					
Mol. ratio, $\frac{Fe}{Ni+Co}$	16.13				16.5	

[1] The molecular ratios are obtained by dividing the percentage of each element found by the atomic weight of the element.

FIG. 1.—Pima County (Arizona) meteorite—a remarkable exhibition of flow structure, the result of jetting during flight. There are some globules of metal in the deeper furrows and also a few bubblelike inclusions. About twice natural size.

FIG. 2.—Sharply marked groups of phosphide particles, two inclosing dense areas composed of thickly crowded phosphide particles. Picral 40 seconds; × about 35.

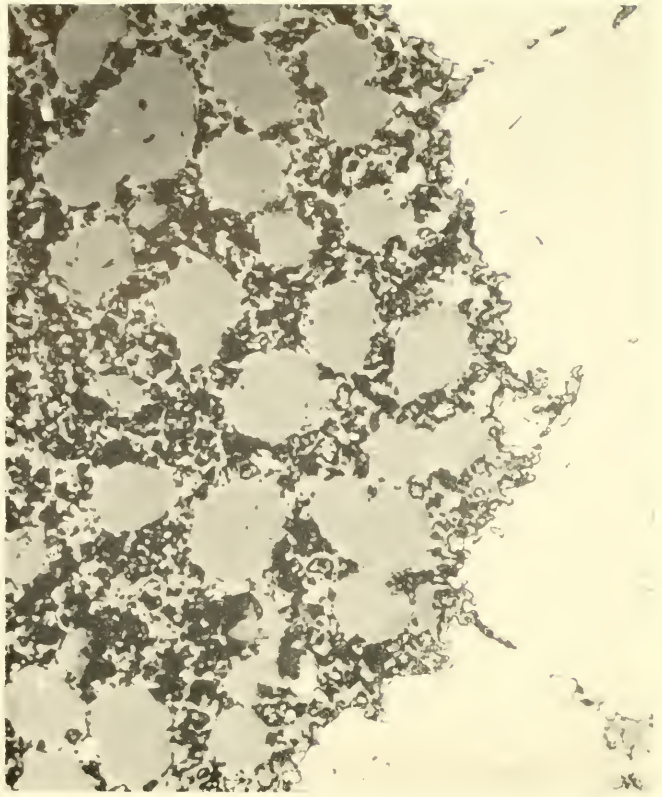

FIG. 1.—Phosphide particles, many of which contain minute inclusions of kamacite. Picral 25 seconds; × 1,000.

FIG. 2.—Part of the dark bodies shown in pl. 19, fig. 2, at higher magnification. The schreibersite grains are gray, embedded in a ground mass, the exact nature of which not determined. The ground mass is relatively phosphide-poor, and its white component is probably kamacite. Picral 20 seconds; × 500.

called schreibersite, are both unknown. The results of the determinations in both portions were used to calculate the percentage of the elements present in each portion. The analysis reported for the meteorite was obtained by combining the analyses of schreibersite and kamacite.

This schreibersite is unusually high in cobalt, considerably above any other analysis of this mineral found in the literature. Since the analysis was made by dissolving the residue, which was insoluble in hydrochloric acid, in aqua regia and dividing the solution into aliquot parts, there was no chance for any check determinations. The authors have no reason, however, to question the results. The ratio between FeNiCo and P is 3.02 to 1 and is consistent with the theoretical ratio for this mineral. The general composition of this iron is in close agreement with other nickel-poor ataxites.

The only other nickel-poor ataxite known from Arizona is the Navajo iron, which is now in the Chicago Natural History Museum. Unfortunately, that important specimen has never been studied, and the only published information as to its composition is a short note by George P. Merrill [1] in which its type was announced and a statement made that the nickel content was 5.81 percent.

The Pima County iron, though of unknown origin, will be considered a separate and distinct meteorite unless otherwise proved from later information.

[1] Amer. Journ. Sci., ser. 5, vol. 3, p. 154, 1922.

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