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Two New Meteoritic Irons from New Mexico: The Grant Meteorite and the Santa Fe Meteorite*

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Within the past three years the National Museum has acquired through the Roebling Fund two iron meteorites from New Mexico. Comparison with other falls and finds from the neighboring regions fails to establish their identity with any of the known meteorites, and the following notes have been prepared in order to place them on record.

1. THE GRANT METEORITE

The Grant meteorite was first brought to the attention of the United States National Museum in January, 1929, by Mr. Harold E. Elliott of Fort Sumner, New Mexico. Mr. Elliott acted as agent for the owners, Mr. Charles E. Herring and a Mexican whose name was not given. Neither the date of fall nor that of discovery is known, but the specimen was found apparently only a short time before it was offered for sale. Mr. Herring advises that the meteorite was unearthed in the Zuni Mountains, about 45 miles south of Grant, Valencia County, New Mexico, for which place it is named. According to his description, the meteorite was embedded about two feet under the top soil, two feet being the approximate thickness of the soil at this point.

The meteorite is a rather symmetrically shaped conical mass of iron weighing 1060 pounds. It is 21⅞ inches from the lowest point on its naturally shaped base to the apex, and the base measures 29⅜ inches in one direction and 22⅜ inches on a right-angle cross-line. The iron is only slightly altered, and in many places the bright metal shows through the thin film of rust. The surface is smoothly rounded, but near the base on one side is an area about 17 inches long and 5 inches in its widest part, which has a ragged surface, appearing to be a recent break.

A great many circular cavities appear on the surface and these are rather uniform, most of them being between one and two inches in diameter. The bottoms of these crater-like holes are gently rounded and several are between one-half and three-fourths of an inch deep. The apex is roughly flattened out into a rather lobed triangular surface, this being in all probability the *Brustseite.*

The polished face after etching, shows a moderately fine octahedral structure. The kamacite bands are slightly swollen in the center, constricting toward the ends. The angular areas between intersecting kamacite bands (plessite) have borders which are concave toward the kamacite. Between the kamacite and the plessite is a thin but persistent rim of tænite. In a number of the plessite areas there are thin parallel bands of tænite of uniform thickness, the apparently enlarged pointed edges being due to the coalescence of two of the tænite bands.

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Two circular masses of troilite are shown on the polished face, the larger having a maximum diameter of 2.3 cm. Immediately surrounding the troilite inclusion, the octahedral structure has to some extent been modified, and the plessite nearest to the troilite shows a concave curvature, which, in almost every case, conforms to the shape of the troilite. The rim of kamacite surrounding the troilite varies between one and two mm. in width.

The rod-like and also the angular inclusions are schreibersite, and these apparently affect the immediately adjoining structure in the same manner as the troilite. The Wallapai meteorite* has numerous angular inclusions of schreiber-

FIGURE 1. THE CONE-SHAPED GRANT METEORITE.
This view shows the ragged surface which represents a recent break.

site, and there is a decided absence of any structure in the iron immediately surrounding these inclusions.

Shortly after the acquisition of the Wallapai iron, a visiting chemist began an analysis of this meteorite under the direction of the late Dr. George P. Merrill, who intended to describe it. In the course of this analysis Dr. W. F. Foshag noticed minute velvety black prismatic crystals in the insoluble residue, only one of which had faces sufficiently well developed to be measured. This was found after measuring to be a distorted isometric crystal, an elongated octahedron and a dodecahedron. A few minute velvety black octahedrons were associated with these elongated crystals and it is probable that both are chromite.

From a sample weighing 46.45 grams, sawed from the original mass of the Grant iron, the following analysis was made after the rust had been carefully removed. The entire piece was dissolved in *aqua regia,* and several additional

*Merrill, G. P.: *Proc. U. S. Nat. Mus.*, **72**, §22, pp. 1-4, pls. 1-3, 1927.

quantities of nitric acid were added to insure complete oxidation of both the sulphur and the phosphorus. At least six such treatments were made, and then the excess acid was evaporated off and the nitric acid expelled by repeated evaporations with concentrated hydrochloric acid. The hydrochloric solution was diluted and the various determinations were made upon aliquot portions.

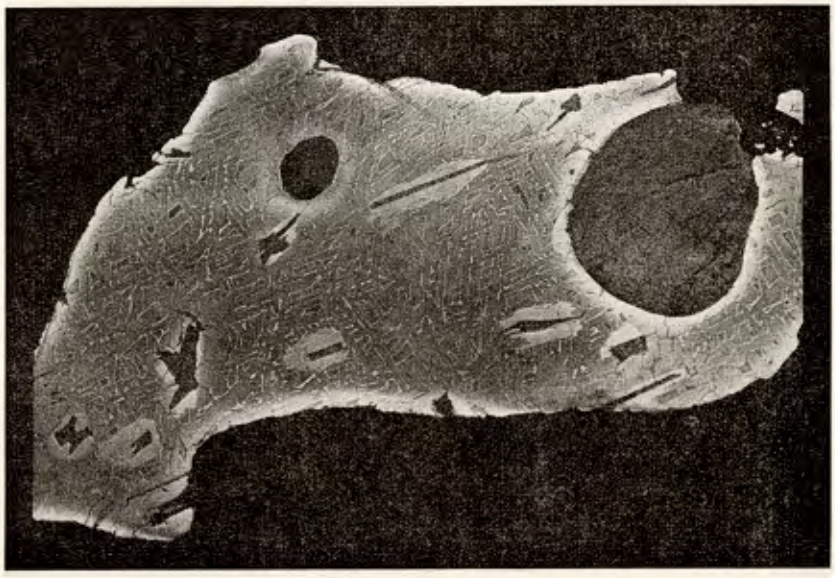

FIGURE 2. AN ETCHED SLICE OF THE GRANT METEORITE.
(The inclusions were protected from etching; hence the "halo" around each inclusion.)

ANALYSIS OF THE GRANT METEORITE
E. P. Henderson, Analyst

	%
Insol.:	0.046
C:	0.002
Fe:	89.45
Ni:	8.58
Co:	0.011
P:	1.15
S:	0.02
Cu:	trace
Pt:	none
Total:	99%.25

2. THE SANTA FE METEORITE

In October, 1930, a fragment of iron was received at the National Museum for determination as to its possible meteoritic nature. It was found to be unquestionably a fragment of a meteorite, and the entire mass was subsequently purchased from Mr. La Rue Paytiamo of Glorieta, New Mexico.

According to Mr. Paytiamo, this meteorite was found about 14 miles east of Santa Fe, New Mexico, on the Las Vegas highway. It will therefore be called the Santa Fe meteorite. The discoverer was a Mexican whose name does

not appear in the records, and we have no information as to the date of either fall or discovery.

The meteorite, which is somewhat club-shaped, weighs 23 pounds, and measures 18¾ inches in its greatest length, 4⅜ inches in maximum width, and

FIGURE 3. THE SANTA FE METEORITE
viewed from two directions at right angles to each other.

2⅜ inches at right angles to the latter dimension. One end is smaller in every dimension, and the size increases, rather gradually, reaching a maximum near the opposite end. There are four rather prominent ridges which continue almost

FIGURE 4. AN ETCHED SLICE OF THE SANTA FE METEORITE.

the entire length of the meteorite. These ridges occur in such a manner about the long axis of the iron that a cross-section, cut at right angles to the long axis and near the thickest portion, would have a rhombic outline.

The surface is uniformly pitted, but none of the pits is deep, and since the polished section does not show any troilite, it is not likely that these pits are the result of the weathering or burning out of troilite masses. There is only a slight coat of weathered iron on the surface, and the cross section does not show any

veinlets of rusty material extending into the iron.

The structure is a fine octahedrite, but a few prominent bands of kamacite are much coarser than others. Between the kamacite and plessite areas there are thin bands of tænite, and some of the kamacite bands are streaked with thin parallel stringers of tænite. There is a total absence of troilite and schreibersite inclusions.

The chemical analysis was made upon a small piece weighing 14.341 grams after it had been polished free from all oxidized matter. This sample was dissolved in mixed nitric and hydrochloric acid and the analysis was made in the usual manner.

ANALYSIS OF THE SANTA FE METEORITE
E. P. Henderson, Analyst

	%
Insol.:	0.001
Fe:	94.75
Ni:	4.64
P:	0.23
S:	0.04
Co:	0.32
Cu:	trace
Total:	99%.981

United States National Museum, Washington, D. C.