NOTES AND NEWS

THE SOPER, OKLAHOMA METEORITE[1]

F. C. WOOD[2] AND C. A. MERRITT[3]

On March 14, 1938, Mr. T. J. Stockton of Soper, Oklahoma, forwarded a specimen to the Oklahoma Geological Survey with the request that it be identified. He had picked up this peculiar material while working on a farm about six miles northwest of Hugo, Oklahoma. The exact location of the find was NE¼ sec. 4, T. 6 S., R. 16 E., Choctaw County, Oklahoma.

This specimen proved to be a meteorite and it has been given the locality name: Soper, Oklahoma meteorite, by the authors.

FIG. 1. Illustrating the general shape of the meteorite.

The meteorite is irregular in shape though somewhat pointed at one end, figure 1. A noticeable feature is the sharp ridges formed by the intersections of the various surfaces with one another. Its maximum dimensions, as found, were: length, 6½ inches; width, 5½ inches; thickness, 3 inches. The original weight was 3700 grams. The specimen is pitted with shallow to deep oval-shaped depressions, which approximate a man's thumb in size.

To date no additional fragments of meteorites have been found in this vicinity and there is no evidence as to whether or not this material was a portion of a larger meteorite.

[1] Published with the permission of the Director of the Oklahoma Geological Survey.

[2] Oklahoma Geological Survey.

[3] University of Oklahoma, and associate member, Oklahoma Geological Survey.

The specimen has been slightly weathered and a thin crust of oxidized material, one millimeter thick, coats the outside. This altered surface has a dull luster and is dark gray to black in color, with a few spots of reddish or yellowish material. The unweathered inner portion of the meteorite is bright, shiny and steel-gray in color. A freshly polished surface developed a few small reddish spots of oxidized material after exposure to the atmosphere for a period of one month. The slight amount of weathering of the specimen as found, probably indicates that the fall was rather recent.

A chemical analysis of the bright unoxidized material gave the following results:*

Insoluble residue**	0.07%
Fe	90.89%
Ni	6.21%
P	2.23%
Co	0.70%
C	0.02%
S	0.03%
Al	0.10%
Cl	trace
Cu	—
Ti	—
Mn	—
Total	100.25%
Specific Gravity	7.387

* Analysis by S. G. English, Chemist of the Oklahoma Geological Survey.

** Insoluble residue—after treatment with concentrated HCl, H_2SO_4, and HNO_3 acids.

The iron, nickel and cobalt contents of this specimen are quite similar to those of many of the iron-nickel meteorites reported in the literature. The percentages of carbon and sulfur likewise are typical. The amount of phosphorus, 2.23%, however, is exceptionally high. In the analyses of the iron-nickel meteorites listed by Merrill,[4] the phosphorus ranges between 0.03 and 0.365%. This element is present in meteorites as a constituent of schreibersite. This mineral has the theoretical formula $(Fe, Ni, Co)_3P$, but admittedly its chemical character varies considerably in different specimens. The meteorite described in this paper appears to be unusually high in this phosphide mineral.

A polished specimen of the meteorite reveals a fine granular structure with the grains irregular in shape and varying somewhat in color from steel gray to dark gray, figure 2. Many of the grains appear to be schreibersite. The outer portion of the material is finer grained than the inner.

[4] Merrill, G. P., Composition and Structure of Meteorites: *Smithsonian Institute, United States National Museum*, Bull. **149**, p. 9.

On cutting the meteorite with a milling machine, a decided difference in hardness was encountered in the different parts of the section. The outer edge was difficult to cut while the inner material was softer. Even the latter portion, however, was not uniform, there being areas of harder material unevenly distributed throughout the entire section. This variation in hardness may be due to an unequal distribution of the different iron-nickel alloys in the various parts of the specimen, though no confirmation of this could be obtained by a microscopic examination of the polished and etched surface.

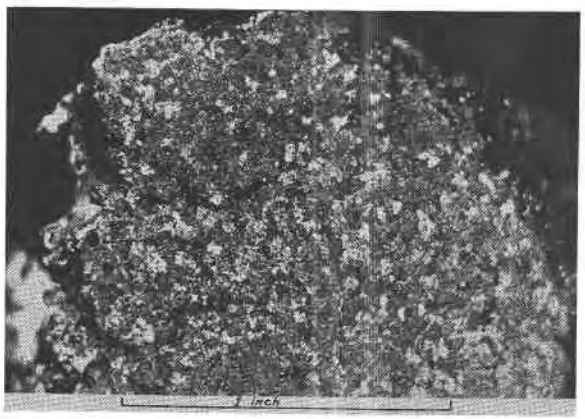

FIG. 2. A polished and etched specimen.

The polished specimen was etched with 7% nitric acid and an examination was made of the etched surface at intervals of one minute during the acid treatment. This process was continued for fifteen minutes and at the end of that time the surface was deeply attacked. At no time during the examination was there any indications of octahedral or Neumann lines, nor of octahedral or cubic cleavage. This lack of structure places the meteorite in the *ataxite* class. Apparently the Soper meteorite is an ataxite with an unusually high schreibersite content.

A portion of the meteorite was sent to W. F. Foshag, Curator of the Smithsonian Institution for confirmation of the identification. In his reply he mentioned that it was quite similar to the Locust Grove, Georgia meteorite and also to the Willemette, Oregon meteorite, though the latter has a coarser texture.

The Soper, Oklahoma meteorite has been divided into two main portions. One piece (1632 grams), is in the Museum of Geology, University of Oklahoma. The other part (1317 grams), is in the meteorite collection of the Smithsonian Institution, United States National Museum. A small piece is in the Nininger collection, Denver, Colorado.