Journal of the Tennessee Academy of Science
Volume 39, Number 4, October, 1964

TWO MORE FINDS AT THE SMITHVILLE METEORITE LOCALITY

William F. Read
Department of Geology, Lawrence College
Appleton, Wisconsin

Introduction

An article (Read, 1963) in an earlier issue of the Journal of the Tennessee Academy of Science announces the finding of a new meteorite specimen at the Smithville locality, where six other specimens had been found between 1839 and 1892. This new discovery was made in January, 1962, by means of an electronic metal detector, a photograph of which has since been published in the Wisconsin Academy Review (Read, 1962).

The writer visited the locality again in the winter of 1962-63 and spent 5 days working over additional ground with the same metal detector. With reference to the map printed in the previous article, the 1962-63 search covered (1) most of the old Beckwith property south of Highway 26 and west of the site of the previous find, (2) a considerable tract of the adjoining Whaley property south of Falls Creek, and (3) a small area on the old Cantrell property immediately to the north of Falls Creek.

Two additional specimens were found, both buried at a depth of about 8 inches. The first, weighing 4415.2 g, was located 325 feet from the site of the previous find in a direction S 37° W. The second, weighing 1303.1 g, was located 950 feet from the site of the previous find in a direction S 22° W.

The Larger Meteorite

The larger specimen, found December 30, 1962, has the general shape of a small round loaf of bread. The maximum diameter in the plane of flattening is about 6 inches, as shown in Fig. 1, and the minimum about 5 inches. The maximum thickness, as shown in Fig. 2, is about 2¾ inches. The surface shows irregular protuberances and depressions apparently shaped more by oxidation than by ablation or fracture. No shell of detached oxidation flakes was found in the ground around the specimen. Presumably, the specimen had been moved about by plowing.

Fig. 2 is a tracing of a photograph of an etched surface. The structure of the kamacite in general resembles that of the writer's previous find. The bands are relatively broad, making this a "coarse" octahedrite, but decidedly irregular. Locally, the structure is more granular than octahedral. Taenite lamellae are thin and discontinuous. A few small areas of plessite are present.

Special interest attaches to the schreibersite. In the previous find (which will be referred to as No. 7 since it was the seventh specimen reported from this locality), schreibersite is very abundant and occurs mainly in elongate strips within and parallel to the kamacite bands. In this specimen (No. 8), schreibersite is relatively scarce and occurs in irregular small patches showing no distinct relationship to the band structure. Some of the larger masses of schreibersite in No. 7 show an inner core of heavily fractured material surrounded by an apparently finer grained unfractured

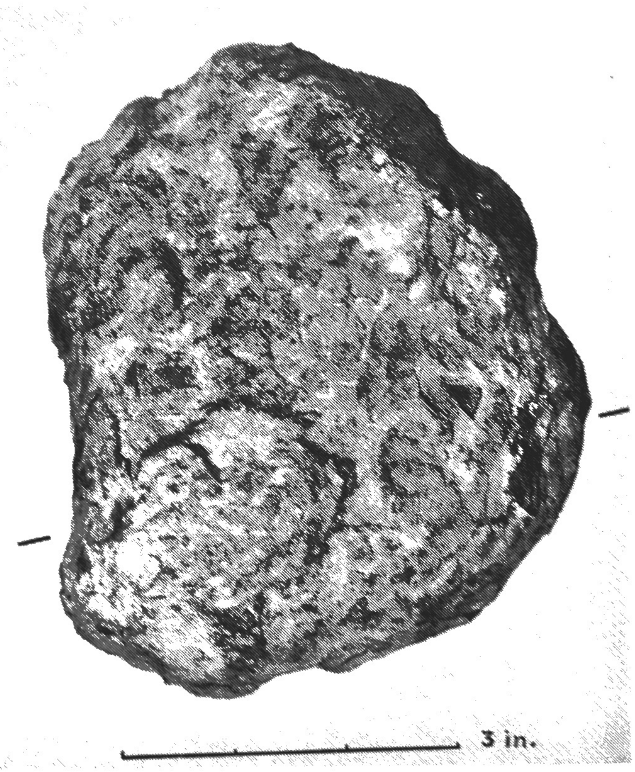

Fig. 1. Exterior view of the larger meteorite. Short lines indicate position of section shown in Fig. 2.

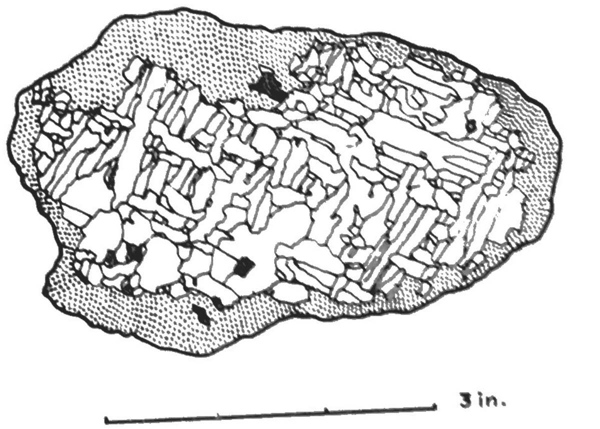

Fig. 2. Tracing of photograph of etched surface of the larger meteorite. Relation to Fig. 2 is as if slice cut off were rolled forward down the page. Oxidized material stippled; schreibersite, black; troilite, black with white center.

border. This is true of all the schreibersite patches observed in No. 8, but the borders are very narrow and in some places discontinuous.

The occurrence of one small patch of troilite (upper right in Fig. 2) is noteworthy. This mineral was not observed in No. 7.

The Smaller Meteorite

The smaller specimen (found January 1, 1963) has the general shape of a very blunt stone axe-head. The length and breadth, as shown in Fig. 3, are about 4½ and 3 inches respectively. The maximum thickness, as shown in Fig. 4, is about 1½ inches. The shape of this specimen is in contrast to the rounded forms characteristic of other Smithville specimens (Read, 1963). It suggests an explosion splinter not greatly modified by subsequent ablation. The surface, as in No. 8, has been roughened by oxidation and preserves no ablational detail.

Fig. 4 shows the internal structure of this specimen. The kamacite is arranged in about the same manner as in No. 8. Most of it lacks Neumann lines—possibly an effect of atmospheric heating (Perry, 1944), but secondary thermal granulation is not conspicuous, at least under low magnification. Plessite fields are granulated, however, and their taenite seems to have migrated into cracks between the granules. It may be that this meteorite, because of its small volume, suffered greater internal heating than Nos. 7 and 8.

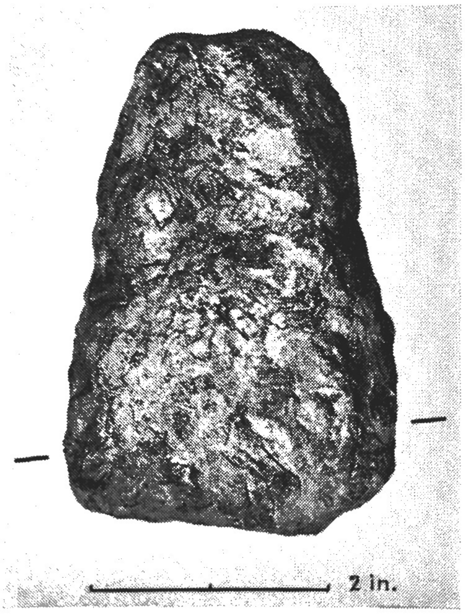

Fig. 3. Exterior view of the smaller meteorite. Short lines indicate position of section shown in Fig. 4.

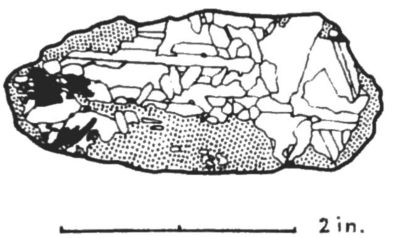

Fig. 4. Tracing of etched surface of the smaller meteorite. Relation to Fig. 3 is as if slice cut off were rolled forward down the page. Oxidized material stippled; schreibersite, black.

All the schreibersite is concentrated at one end of the etched surface. As in No. 8, it shows no tendency to occupy the centers of kamacite bands. Cores of fractured material are present within unfractured borders, but the borders are much broader than they are in No. 8.

Conclusion

Like No. 7, both specimens described in this paper lack the graphite-troilite nodules which are a conspicuous feature of the earlier finds (Huntington, 1894). The occurence of schreibersite in Nos. 8 and 9 is strikingly different, as has been noted, from its occurrence in No. 7. Inasmuch as all the Smithville specimens are presumably fragments from a single parent mass(it is rather surprising that so much variation should occur. This lack of homogeneity within relatively small volumes of meteoritic material is a condition that needs to be accounted for in theories of meteorite origin.

Cut surfaces of No. 7 were subject to very rapid rusting due to the presence of abundant lawrencite. The rusting continued during and after prolonged soaking in alcohol, a treatment recommended by Nininger (1952) as a means of extracting the chloride. Nos. 8 and 9 were placed, after cutting, in air tight containers with small cans of silica gel. Virtually no rusting was observed over a period of several months. It may or may not be true that Nos. 8 and 9 contain less lawrencite than No. 7.

Specimen 7 has already been turned over to the U.S. National Museum. It is likely that the two specimens described in this paper will go to the same repository.

LITERATURE CITED

Huntington, O. W. 1894. The Smithville meteoric iron. *Proc. Amer. Acad. Arts and Sci.* 29:251-260.

Nininger, H. H. 1952. *Out of the sky*. Dover Publications, Inc., New York, 1-336.

Perry, S. H. 1944. The metallography of meteoric iron. *U.S. Nat. Mus. Bull.* 184:1-206.

Read, W. F. 1962. Wisconsin meteorite investigations. *Wis. Acad. Review* 9:152-155.

———————. 1963. A new find at the Smithville meteorite locality. *Jour. Tenn. Acad. Sci.* 38:22-25.

JOINT MEETING OF FIVE BIOLOGICAL SCIENTIFIC ORGANIZATIONS

University of Tennessee

Knoxville, Tennessee

December 27-30, 1964

See inside back cover for additional information.