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A New Stony Meteorite from Graham County, Kansas

WILLIAM F. READ

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A New Stony Meteorite from Graham County, Kansas

WILLIAM F. READ
Department of Geology, Lawrence University, Appleton, Wisconsin

Abstract

An only slightly weathered olivine-ronzite chondrite weighing approximately 25 pounds was found in 1950 seven miles southeast of the town of Densmore. Its external form and internal composition and structure are briefly described. The meteorite is cut by a thin veinlet of Ni-Fe, evidently formed by replacement. The name "Densmore (1950)" is proposed in contradistinction to "Densmore (1879)," which refers to three heavily-weathered fragments of an olivine-hypersthene chondrite found four miles to the NNW in Norton County.

The meteorite described in this paper was found in 1950 by Louis Voss while working in a field. Exact location of the discovery site is shown in Figure 1. Its coordinates are: Lat. 39° 33′ 57″ N; Long. 99° 38′ 50″ W.

In 1953 Voss loaned the meteorite to Dane G. Hansen of Logan, who left it with the Kansas Geological Survey in Lawrence for identification. A small piece was sawed off, which the Survey presumably still has. By 1967, when the writer borrowed the main mass (just under 24 and ¾ pounds) for study, Mr. Hansen had died and the Survey had no record of the name of the finder. Fortunately, Dane G. Bales, manger of the Hansen Trust, was able to supply this information. After consultation with a representative of the Survey, the writer purchased the specimen from Mr. Voss. It will be deposited, for more intensive study, in the collection of the University of California, Los Angeles.

As indicated by Figure 2, the external form of the meteorite suggests an originally angular fragment which has had its edges and corners pretty well rounded off by ablation. If fragmentation occurred in the earth's atmosphere, it must have been at a high altitude. Depressions readily recognizable as regmaglypts are lacking. Some small chips were evidently detached when, or after, the metorite hit the ground. A scar left by one such chip may be seen to the left of center in the lower photograph, Figure 2. Remnants of the original fusion crust are still discernible—suggesting a relatively recent fall.

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At Lawrence University, a slab one quarter of an inch thick was cut off parallel to the saw cut left by the Kansas Geological Survey (see lower photograph in Figure 2.) Figure 3 shows the polished surface of this slab. Particles of Ni-Fe are very abundant. Troilite is fairly abundant too, though it does not show in the photograph. Color of the silicate matrix is a uniform dark gray. A few large chondrules may be discerned with the naked eye—mainly by virtue of the fact that they are surrounded by, but do not include, particles of Ni-Fe. Cutting across the slab is a

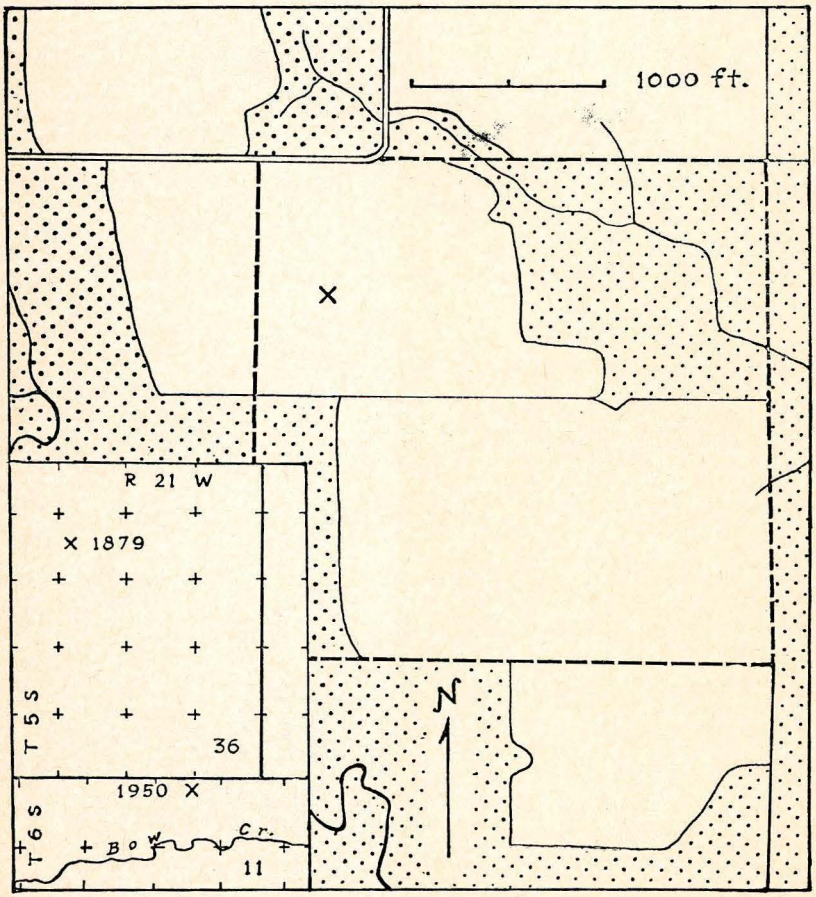

Figure 1. "X" on the main map marks the spot where Densmore (1950) was found White areas are fields; stippled areas, brush-covered. The square outlined by a heavy dashed line is NE ¼, Sec. 3, T 6 S, R 21 W. Inset map shows relative locations of discovery sites of Densmore (1950) and Densmore (1879). Boundary between T 5 S and T 6 S is the Norton County-Graham County line. For scale, see numbered sections 36 and 11, which are one mile on an edge.

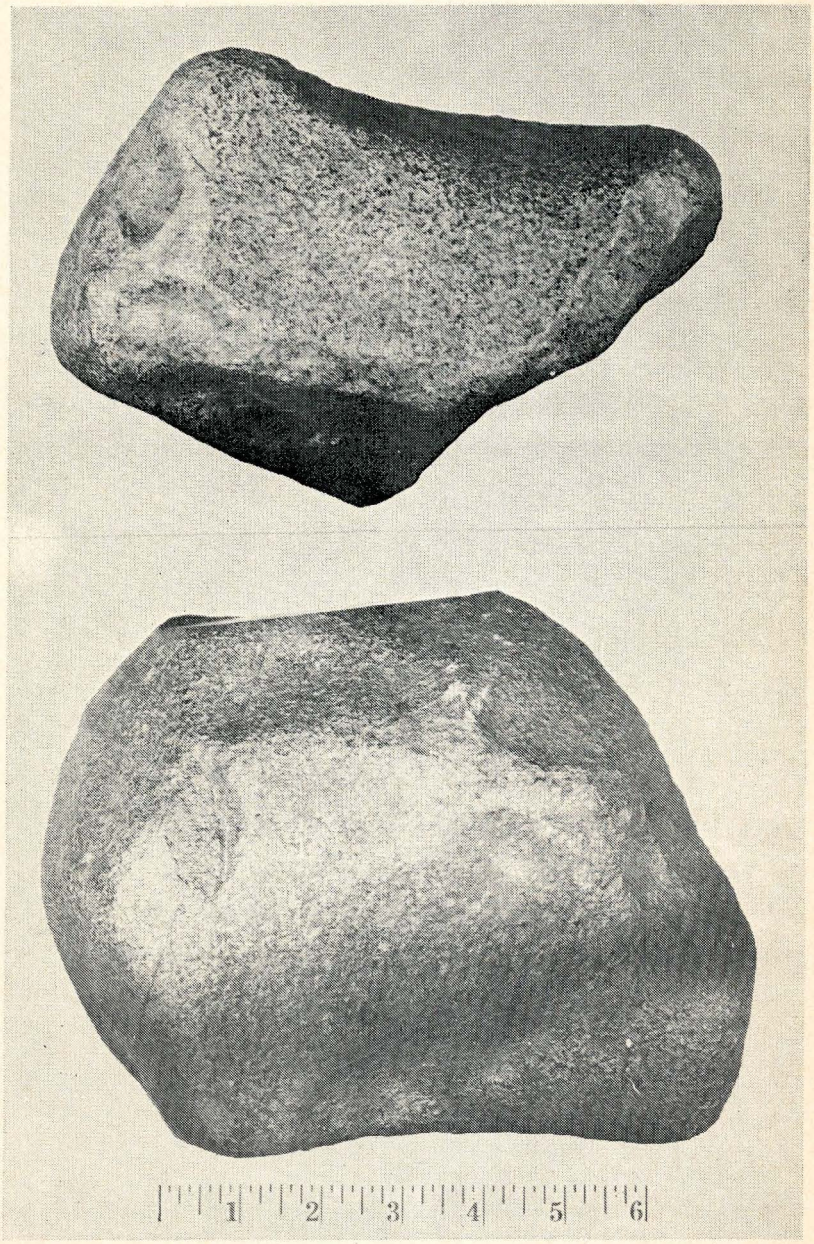

Figure 2. Exterior views of Densmore (1950). In the upper photograph, the meteorite is seen as if rolled 90° toward the top of the page from its position in the lower photograph. Flat upper edge in the lower photograph is saw cut made by the Kansas Geological Survey. Scale is in inches.

conspicuous narrow veinlet of Ni-Fe. On the exterior of the meteorite, this finds expression as a low ridge. The ridge may be seen, though not very easily, about two inches in from the upper left margin of the lower photograph, Figure 2.

In order that a thin section might be prepared, a piece about an inch long and three quarters of an inch wide was sawed out of the lower left corner of the slab as shown in Figure 3. What was left of this piece after preparation of the thin section weighs 7.1 grams. The remainder of the slab weighs 224.5 grams. Microstructure shown by the thin section resembles that of Plantersville (Lonsdale, 1937)). Olivine and bronzite are the principal silicates. This, then, is an olivine-bronzite chondrite.

Hey (1966) lists a "Densmore" meteorite from Norton County: an olivine-hypersthene chondrite found in 1879 and recognized as a meteorite in 1939. Hey says that "three fragments totalling 37.2 kg. were found by F. M. Kendrick 3 miles east and 1½ miles south of Densmore." Urey and Mayeda (1959) say that the specimen with which they worked "is badly corroded." They also report that "no metal particles have been clearly identified." Without question the meteorite listed by Hey belongs

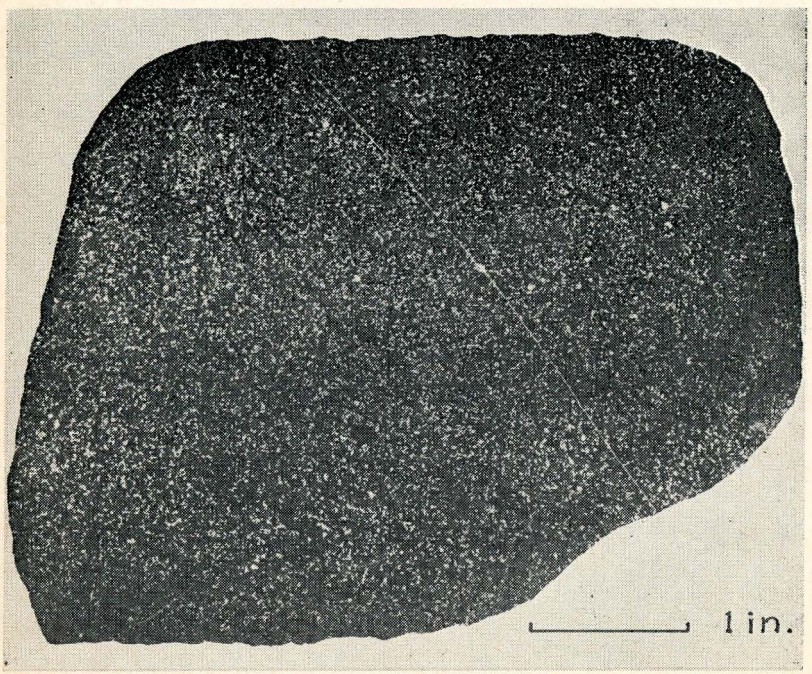

Figure 3. Polished surface of slab cut from Densmore (1950) at Lawrence University. Ni-Fe looks white. Troilite and other minerals look nearly black.

N O T E

An additional specimen of Densmore (1879), weight about 34 lbs., was found around 1950 in the section west of the one marked "X 1879" on the inset map, Figure 1. The finder, Henry Kitzke, sold it in 1965 to the American Meteorite Laboratory.

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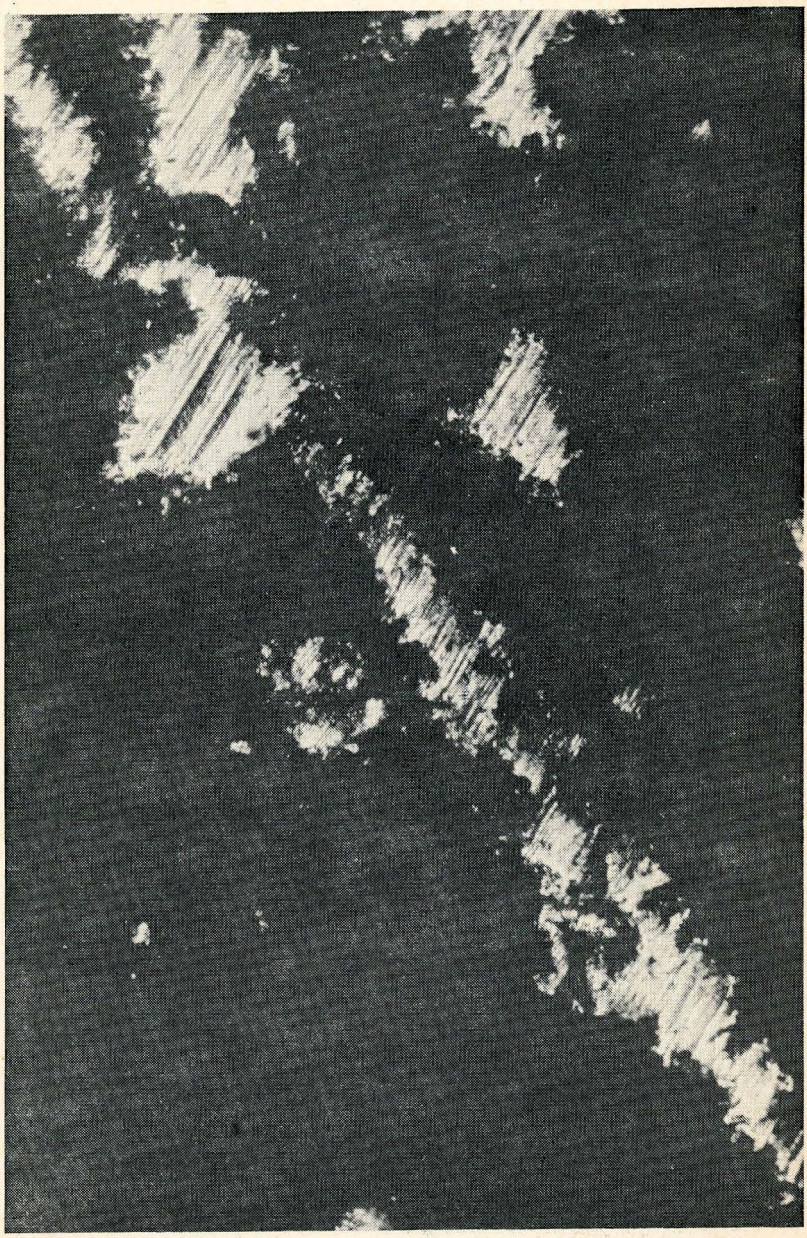

Figure 4. Photomicrograph of a portion of the veinlet shown in Figure 3. Polishing grooves are conspicuous in the Ni-Fe.

to a different (presumably older) fall than the one described in this paper. In accordance with Hey's recommendation (p. ix of the Catalogue, 1966), it is proposed that the meteorite here described be known as "Densmore (1950)" and the other one as "Densmore (1879)."

The Ni-Fe veinlet in Densmore (1950) deserves further consideration. As shown by Figure 4, this veinlet is not simply a filled crack. There has obviously been a good deal of what a geologist would call "wall rock replacement." Otherwise the sides of the vein would be more or less parallel to each other. Evidently the Ni-Fe was introduced along a crack in perviously solidified material. If one supposes that it came in as liquid metal, then there is the difficulty of explaining how the replaced wall rock was disposed of. A more logical inference would be to assume some sort of transporting fluid, analogous to the "hydrothermal solutions" of geologists. This could bring in the Ni-Fe and at the same time carry away replaced silicates. If such a mechanism did indeed operate, it raises some interesting correlative questions: for example (1) How much of the Ni-Fe outside of the vein may have been deposited by replacement? (2) Where did the silicates, etc., removed during replacement get redeposited? and (3) What was the composition of the transporting fluid? Also, there is the further question as to just how large a mass of meteoritic Ni-Fe may have been formed entirely by replacement.

Somewhat similar veinlets have been observed in other chondrites. Plantersville (Lonsdale, 1937) affords a good example.

There is always a temptation to try to correlate only slightly weathered meteorites with observed fireballs. Mr. Voss says that some time before he found the meteorite he saw "a ball of fire going across the sky with large sparks falling off of it." This was "late one afternoon."

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