FURTHER NOTES ON THE PLAINVIEW, TEXAS, METEORITE.

By George P. Merrill.

Head Curator, Department of Geology, United States National Museum.

In my paper descriptive of this find,[1] I called attention to an apparent brecciated structure, the certainty of which could be determined, if at all, only when one of the larger masses could be cut in halves and give opportunity for study of unweathered portions. Since that writing, through the liberality of Mr. C. S. Bement, of Philadelphia, the Museum has come into possession of two more of these stones. (Nos. 2 and 3 of pl. 35 of my paper.) This generous gift has enabled me to sacrifice one of the larger individuals already in our possession, No. 4 of the same plate, to the extent of slicing it through the center in a plane parallel to the face there shown. The results of the studies on this and further thin sections are in every way corroborative of the first, which are reviewed below, and the new data likewise presented.

As descriptive of the appearance of a cut and polished surface, I can not do better than quote the following from the addendum of the first paper:

> When the possibility of brecciation was realized, the smallest (870-gram) fragment of the first find was cut in halves and polished. The resultant surfaces showed a ground of about equal parts light gray, mainly oxidized to reddish, and darker gray more or less angular areas. Both portions are equally injected with small, but abundant points of metallic iron and iron sulphide. There are also occasional light-gray fragments, some 2 to 4 mm. in length, which are evidently pyroxenic. To the unaided eye both portions are chondritic, though this structure is much more pronounced in the dark areas. It was at first thought that this difference might be merely apparent and due to the obscuring of the structure in the lighter portions through oxidation. Further investigation has, however, shown that this conclusion will not hold. Under the microscope the lighter portion is chondritic and consists wholly of olivine and enstatite with the metallic iron and iron sulphide. None of the twin pyroxenes so characteristic of the dark portion, which was the material described in the first part of this paper, are present. Further than that, the

[1] Proc. U. S. Nat. Mus., vol. 52, 1917, pp. 419–422.

chondrules in the light portion are almost wholly very light gray and nearly white, while those in the dark portions are in part of a dark-gray color, although there are white chondrules here also. By reflected light the polished surface shows a structure distinctly brecciated, and in one or two cases it is possible to trace the outlines of a fragment of the darker rock inclosed in the lighter gray, but in the majority of cases this is impossible, and the darker material is so commingled with the lighter that for a long time considerable uncertainty existed in the mind of the writer as to the true nature of the stone.

* * * * * * *

The strongest argument in favor of the brecciated nature of the stone seems to lie in the presence of the polysynthetically twinned pyroxenes in the dark-gray chondrules and their absence in the lighter portions. In one instance the line of demarkation between the light and dark portions could be plainly traced in thin section, and the metallic sulphides were found elongated along this line to indicate that it had been an open cleft at the time of their deposition.[1]

It remains to be stated that in the newly cut stone the dark portions are plainly not entirely a result of oxidation through weathering, as they are distributed regardless of surface contours and are as abundant in the center as about the periphery. By holding the stone so that the polished surface catches the light, lines of demarkation between the lighter and darker portions can in many instances be very readily made out. But, again, there are places where it would seem most certain that the darker portion is but an oxidized zone about a fragment of the lighter. In short, it does not seem possible to decide the question of brecciation, if one must rely on examination of a polished surface alone. Thin sections were therefore prepared of two portions affording structural differences even to the unaided eye, from which the photomicrographs reproduced in plate 79 were made, figure 1 being of the dark portion and figure 2 of the light. It is scarcely necessary to call attention to the marked difference in structure, which is all that was suggested in the first paper. To further illustrate the difference, sections were prepared showing the contact between the two portions, a photomicrograph of one of which with the same degree of enlargement is shown in figure 1, plate 80.

To assure myself that the apparent greater abundance of chondrules in the dark portion was not due to their being thrown out in relief by the deposition of interstitial iron oxides, a second like section was prepared, which, without cover, was then placed section side down over a narrow-mouthed vessel containing a few cubic centimeters of strong nitric acid, where it was allowed to remain for 36 hours, when it was carefully washed and remounted. There was effected an almost complete leaching out of the iron oxide, and of course a portion of the metal and sulphide; the olivine was also somewhat attacked but not enough so to vitiate the wished-for results.

[1] Proc. U. S. Nat. Mus., vol. 52, 1917, p. 422.

A photomicrograph from this is shown in figure 2 on plate 80, figure 1 being of the same magnification as those on plate 79 and figure 2 more highly magnified.

The above-mentioned facts, together with the presence of abundant chondrules of polysynthetic pyroxene in the dark portion and their absence in the light, lead me to the conclusion that the stone is a true breccia composed of fragments of a spherical chondrite and a veined intermediate chondrite like that of Dhurmsala. The confused, obscure character of the brecciation may have been due to the friable, sandy nature of one of the stones and the compression to which the mass has been subjected. If not a true breccia, the stone certainly shows, in its different parts, greater structural and mineralogical variations that are usually expected in one and the same mass.

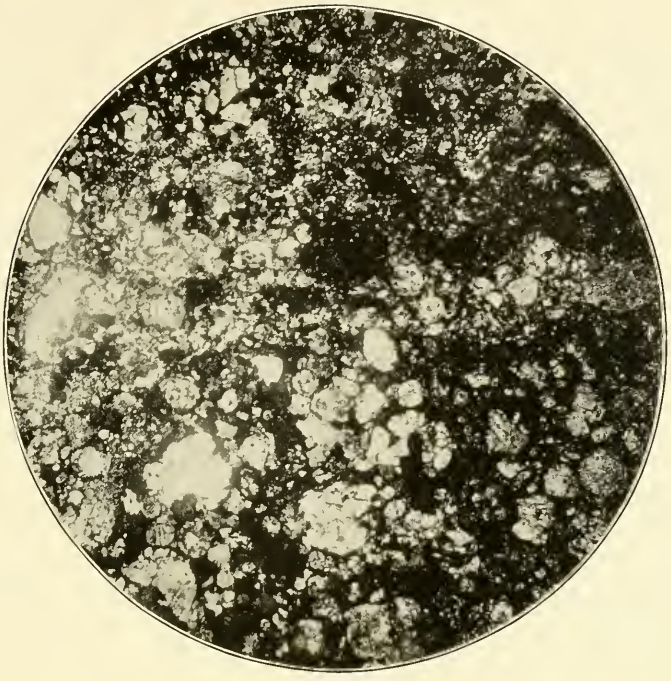
It may be mentioned incidentally that Mr. Lazard Cahn writes me he has three individuals of a chondritic stone, weighing altogether about 15 pounds, from the Plainview locality, and which doubtless belong to the same fall. This being the case, the total weight given in my previous paper must be increased to "about" 31 kilograms.

1

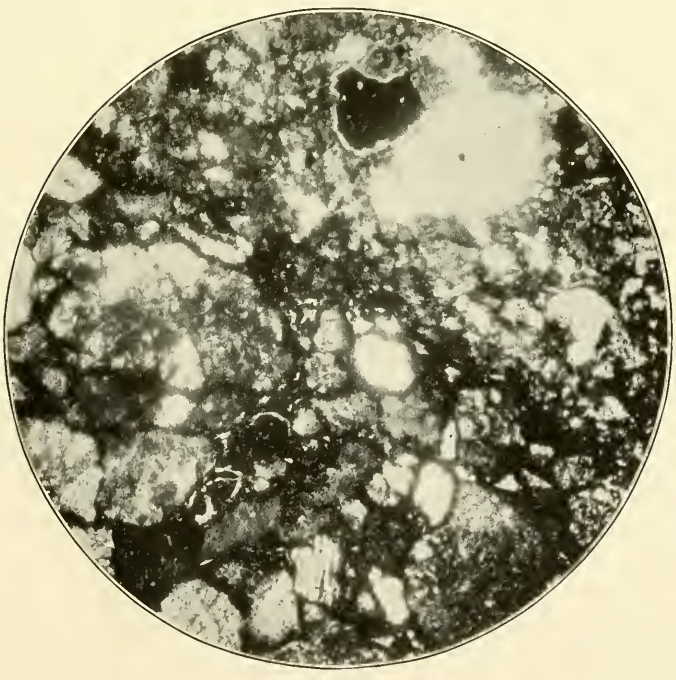
2

MICRO-STRUCTURE OF THE PLAINVIEW, TEXAS, METEORITE

FOR EXPLANATION OF PLATE SEE PAGE 504



1



2

MICRO-STRUCTURE OF THE PLAINVIEW, TEXAS, METEORITE

FOR EXPLANATION OF PLATE SEE PAGE 504