EL BURRO, COAHUILA, MEXICO, METEORITE

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ABSTRACT

A new meteorite from northern Coahuila, Mexico, is described and its chemical composition compared to an iron-nickel equilibrium diagram. Reasons are given why El Burro is classified as a coarse octahedrite and also why brecciated hexahedrites are likely to be very coarse octahedrites.

The El Burro meteorite was found in northern Coahuila, Mexico, in April of 1939, but it is not a new fall. The place of discovery is best located by giving the latitude 29°20′N. and longitude 101°50′W. as the area has few settlements and hence it is impossible to assign a geographical name of any nearby town. According to our informant this meteorite was found close to some hills known as El Burro, and hence the reason why this name was selected.

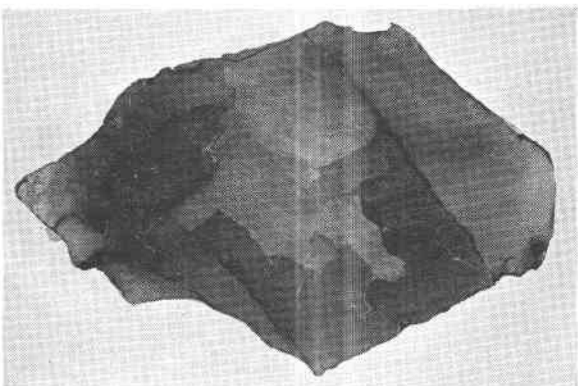

FIG. 1. Polished cross-section of El Burro, Coahuila, Mexico, meteorite. The kamacite area at the left is 8.5 cm. long and 3 cm. wide when measured in its greatest dimensions, and is separated from the adjoining area by a continuous film of brown iron oxide.

When received at the National Museum the 79 pound meteorite showed a jagged surface on one portion of it suggesting a rather recent break, and the remaining area is weathered. None of the flight features was preserved on this meteorite.

Sections of this iron were made in our laboratory and all show large and irregular areas of kamacite. All the kamacite areas appear to be separated by thin zones of a brown material assumed to be secondary iron oxide. Some schreibersite is present in these oxide veins and in a few places the kamacite areas are separated by a filling of schreibersite.

Taenite, usually found between kamacite areas, is almost non-existent; in fact, a careful search had to be made of the kamacite individuals which

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were broken off from the main mass before any taenite was found. A few thin, scale-like pieces were found but it is definitely not an abundant constituent.

The absence of any easily detectable quantities of taenite, on the one hand, and the finding of large, irregular areas of kamacite would suggest that perhaps this meteorite was a brecciated hexahedrite. This is a term which has been used many times to describe similar structures, but to this author it never seemed an entirely satisfactory usage. Having been interested in the composition of hexahedrites, this meteorite afforded an excellent opportunity to determine if the nickel content would agree with the iron-nickel diagram of Owens and Sulley,[1] which apparently holds for hexahedrites. Since El Burro has a very coarse kamacite structure, and also contains such a very small quantity of taenite, it is important to know if its nickel content would lie in the α-iron or $\alpha+\gamma$ iron field of Owens and Sulley's diagram.

To classify a meteorite as belonging to the octahedral group, it is necessary not only for the kamacite to have an octahedral arrangement, but also some taenite should be present. That is, it should consist of two phases. If El Burro is a hexahedrite, or single phase meteorite, with a brecciated structure then its nickel content should lie in the range of composition of the α-iron.

Analysis of El Burro
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Fe	93.10%
Ni	6.02
Co	.34
P	.32
S	trace
Insol.	.01
Total	99.79%

The El Burro meteorite contains 6.02% nickel which is just within the $\alpha+\gamma$ iron field as shown by Owen and Sulley.[2] It is also definitely above the average nickel content for hexahedrites which was found to be between 5.52% and 5.6%.[3]

Therefore, the El Burro is classified as a very coarse octahedrite. A good probability exists that some of the so-called brecciated hexahedrites should be more properly classified in this group of octahedrites rather than as brecciated hexahedrites.

[1] Owens, E. A., and Sulley, A. H., Equilibrium diagram of iron-nickel alloys: *Phil. Mag. and Jour. Sci.*, **27**, no. 184, p. 633, May (1939).

[2] Owen, E. A., and Sulley, A. H., *Idem.*

[3] Henderson, E. P., Chilean hexahedrites and the composition of all hexadedrites: *Am. Mineral.*, **26**, 546–550 (1941).