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Bondoc, Philippines

# METEORITE WITH UNIQUE FEATURES

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## Meteorite with Unique Features

Abstract. *A brief account of the discovery in Luzon, Philippines, of a large meteorite that does not fit into any of the currently used classifications is presented; together with results of preliminary studies of its unprecedented structure, specific gravity, and multiple magnetic polarity. Its probable terrestrial age is also discussed.*

A 1955-lb meteorite of unique structure has been recovered from a remote location in the Bondoc peninsula on southern Luzon Island in the Philippines (Fig. 1).

The meteorite was located during our visit to Manila in 1958 through information obtained from the National Bureau of Mines in Manila. The Bureau had received a small sample, but was not interested in pursuing an investigation. The specimen, together with meager information, was then turned over to us; since that time we have been working through a local field party for its recovery.

The first sample was a badly oxidized nickel-iron nodule weighing 684.1 grams with a specific gravity of 7 plus. Later samples from the field ranged from 3.26 to 6.35 in specific gravity with an average of 3.94. All local geologists and mining men called them "low-grade iron ore" and not meteoritic. It was felt that this was a very unusual meteorite and efforts to recover it were intensified. These were successful, and the meteorite arrived in Sedona, Arizona, on 10 August 1962 (Fig. 2).

A section measuring 71.2 by 43.8 cm was cut from near the small end of the generally oval-shaped mass. This cut

Fig. 1. Polished section through a fragment of the Bondoc meteorite which shows one large and one small nickel-iron, chondrule-like nodule.

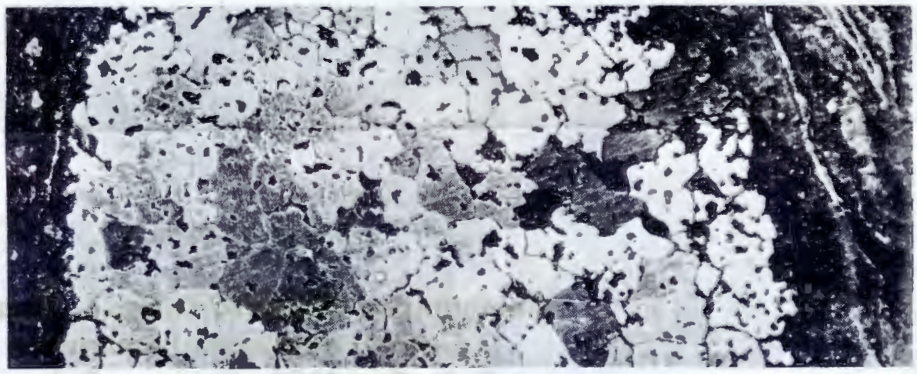

Fig. 2. Enlarged polished section of nickel-iron nodule.

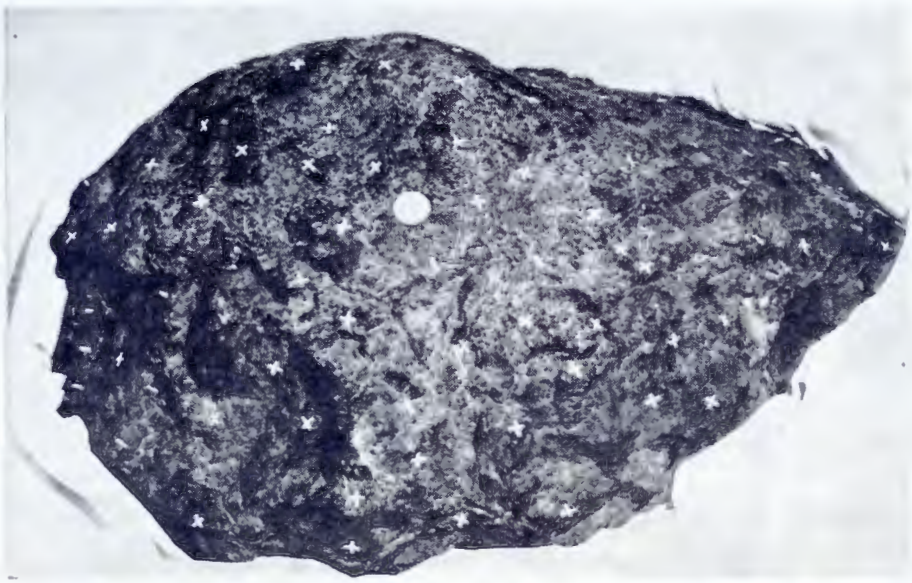

Fig. 3. North and south poles of magnetic fields are marked with crosses and bars, respectively.

showed 15 large nickel-iron chondrule-like nodules similar to those described by Brezina in the mesosiderite from Mincy, Mo. (1895). The Luzon specimen, however, is an aerolite, most of which is free of metallics. Those present are all located in an outer zone surrounding a roughly rectangular block of what appears to be pure crystalline enstatite measuring 22 by 15 cm, within which Carleton Moore and I could find no trace of metal. The zone surrounding the metallic chondrules, of which the largest measures 7 by 4 cm, seems on casual inspection, to be a mineralogical complex of enstatite, olivine, and other unidentified minerals.

A remarkable feature of this meteorite is its multiple magnetic polarity. More than 90 each of positive and negative poles have been located without investigating the under surface of the stone (Fig. 3). Each pole exercises the compass needle much more energetically than the two poles found on the many meteorites that I have previously tested.

A sample from the surface of the stone was submitted to Edward Anders of the Enrico Fermi Institute of the University of Chicago for an estimate of terrestrial aging. His report is as follows:

"The $Al^{26}$ content of Bondoc, as measured by $\gamma$-$\gamma$ coincidence spectrometry, is 5.0 $\pm$ 1.7 disintegrations per minute per kilogram, compared to about 54 dpm/kg for an average chondrite. This low activity may be due to any of the following three causes, acting singly or in combination.

"1) Short cosmic-ray exposure age. If the pre-atmospheric mass of the meteorite was not much greater than its present mass, the low $Al^{26}$ content may indicate an exposure age as short as 100,000 to 40,000 years.

"2) Long terrestrial age. Assuming negligible shielding and a long exposure age (greater than a few million years), the low $Al^{26}$ content may be attributed to decay since the time of fall. The meteorite must then have fallen 2.5 $\pm$ 0.3 million years ago.

"3) Shielding. Assuming a long exposure age and a short terrestrial age, one can attribute the low $Al^{26}$ content to shielding. If the recovered mass of Bondoc came from the center of the meteoroid, the pre-atmospheric mass must have been at least as great as 6 tons, and may have been greater if Bondoc was located closer to the surface."

A mineralogical analysis of the meteorite is now being made by C. Moore, curator of the Nininger Meteorite Collection at Arizona State University. It appears that this specimen must be classified in a new subclass of the aerolite group.

The meteorite will bear the name Bondoc, a station on the Bondoc peninsula that appears on the latest map of Luzon Island.

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**Photographs Courtesy Glenn I. Huss**
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