THE CASE AGAINST MERCURY AS THE ANGRITE PARENT BODY (APB).

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Introduction: Angrites are not plausibly from Mercury based on their high FeO contents and ancient ages (e.g., [1]). Rather, the early crystallization ages of angrites argues for a small asteroidal-sized parent body for these meteorites (e.g., [2]). Despite this, recently it has been proposed that Mercury is the APB [3, 4, 5, 6]. Preserved corona and symplectite textures and the presence of 120° triple junctions in NWA 2999 have been cited as requiring a planetary origin [3, 4], with the symplectites in NWA 2999 resulting from rapid decompression during uplift via thrust faults on Mercury [4], and the coronas during subsequent cooling at low pressure. Glasses along grain boundaries and exsolution lamellae possibly indicative of rapid melting and cooling in NWA 4950 are cited as evidence of rapid decompression [6]. To explain the discrepancy between spectral observations of the Mercurian surface and the high FeO contents in angrites, an early (~4.5 Ga), collisionally-stripped FeO-rich basaltic surface has been suggested for Mercury [5, 6].

Discussion: There is no compelling evidence that angrites are derived from a planet-sized parent body. The observed corona and symplectite textures in NWA 2999 are not consistent with the metamorphic reactions described [4], but rather with cooling during crystallization from an angrite-like melt [7]. 120° triple junctions do not require a large parent body as they have been observed in brachinites, acapulcoites, lodaranites, ureilites, and winonaites (e.g., [2, 8]). It is implausible that Mercury ever had an early FeO-rich basaltic crust and mantle. With this model, Mercury would have had to differentiate under reducing conditions to produce the observed planet, after early differentiation under oxidizing conditions to produce the FeO-rich angrites, for which there is no evidence or apparent mechanism. Additionally, there is no viable mechanism for rapid uplift of ancient Mercurian crust over the depths required. The lobate scarps on Mercury formed relatively late (e.g., [9]), not early as required.

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