

THE MINNESOTA METEORITE MYSTERY: TWO UNRELATED VERY FLAT IRONS

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Introduction: Two iron meteorites of similar unusual shape but different composition have been found near Arlington, MN, about 90 km WSW of Minneapolis. Both are very flat, with a thickness <10% of the long dimension, but their chemical compositions are significantly different. The first of these, Arlington, was found in 1894 [1] and is a somewhat anomalous member of group IIE [2]. The second, High Island Creek, is a recent find and is described here for the first time.

High Island Creek: Another iron of similar shape was found in April 2011 in a field 3.4 km SE of the Arlington site. It was identified as a meteorite by the first author in June 2013 and named High Island Creek, after a nearby stream, to avoid confusion with Arlington. The 15 kg object was approximately 40 x 22 x 3.5 cm, and because of its unusually flat shape and the close proximity of the site was originally thought to be a second piece of Arlington. Chemical analysis however showed High Island Creek to be a member of group IIIAB.

Composition:

	Ni	Co	Ga	Ge	Ir	Au
	mg/g	mg/g	µg/g	µg/g	µg/g	µg/g
High Island Creek	78.6	5.10	21.2	<50	2.25	0.727
Arlington	83.6	4.48	21.4	64.9	7.52	1.400

Relationships: High Island Creek is clearly different from Arlington in composition, and the available interior surfaces show a less deformed Widmanstätten pattern. On the other hand, the two meteorites were found close together, and the flat shape of both is highly unusual for iron meteorites. Aside from the two meteorites described here, the only other iron meteorite with a similar shape is Tawallah Valley, a IVB iron from Australia [3].

Other than improbable coincidence, some mechanism must have been at work concentrating flat irons. Since both meteorites are somewhat weathered finds, it is unknown whether they fell at the same time. The land surface at the find sites is late Wisconsinian, ~12,000 years BP, which puts an upper limit on their terrestrial residence time. There is no obvious terrestrial mechanism to transport them to their find location, so it is likely that both fell where they were found.

Could Arlington and High Island Creek have arrived as a single bolide? This alternative is not impossible, but it does require a complex sequence of events. We are currently investigating mechanisms that could produce such an unusual breccia. It would have to come from a secondary “rubble pile” parent body on which some kind of sorting mechanism took place. Additional work is needed to assess the feasibility of this scenario.

References: [1] Winchell N.H. (1896) *Amer. Geol.* 18,267–275. [2] Scott E.R.D. et al (1973) *GCA* 37,1957–1983. [3] Buchwald V.F. (1975) *Handbook* v.3,1180–1182