

To the Nomenclature Committee of the Meteoritical Bulletin

Petition to revise the designation “martian (basaltic breccia)” for the paired meteorites of Northwest Africa (NWA) 7034 (NWA 7475, NWA 7906, NWA 7907, NWA 8114, NWA 8171, NWA 8674, NWA 10922, NWA 11220, NWA 11522, NWA 11896, NWA 11921, NWA 7533 [currently “achondrite-ung” but unambiguously paired with NWA 7034, e.g., Humayun et al. 2013; Wittmann et al. 2015;], Rabt Sbayta 003 [currently “Martian” according to the “Classification” write-up: “Martian (polymict regolith breccia),. Paired with NWA 7034, NWA 7475, NWA 7533, NWA 10922 and others from the same area.”], Rabt Sbayta 010, as of October 3, 2018) to “**martian polymict breccia**”.

The reason for this suggestion is to avoid further confusion especially to non-specialists and correct the presently incorrect petrographic designation for these stones.

According to the Meteoritical Bulletin, the currently recommended classification “martian (basaltic breccia)” for NWA 7034 and paired stones means:

"A martian meteorite that is a breccia dominantly composed of basaltic clasts; this martian meteorite is not assigned to the shergottite, nakhlite, or chassignite types."

This nomenclature term had been devised after the initial publication on NWA 7034 (Agee et al. 2013), which erroneously interpreted the stone as a “monomict brecciated porphyritic basalt”.

The reasons why “basaltic breccia” is misleading are:

(1) the term “basaltic” carries a connotation for a volcanic lithology, which has not been demonstrated conclusively for these meteorites; on the contrary, these rocks are polymict and include high proportions of impact melts (the dominant clast component in some of these stones, Wittmann et al. 2015), impactor components (Humayun et al. 2013; Udry et al. 2014; Hewins et al. 2016; Goderis et al. 2016), sediment rock clasts (Wittmann et al. 2015; McCubbin et al. 2016), clasts of slowly cooled, low-Ca pyroxene-bearing clasts (Hewins et al. 2016), and diverse clasts that have been identified as noritic, monzonitic, trachyandesitic, basaltic andesitic, etc. (e.g., Humayun et al., 2013; Wittmann et al. 2015; Santos et al. 2015) .

(2) it is not clear whether these meteorites contain any basalt clasts at all, because the fine-to-medium grained clasts with basaltic compositions were shown to include high concentrations of siderophile elements, which suggests they very likely are fragments of impact melt rocks (cf., Humayun et al. 2013; Udry et al., 2014; Wittmann et al. 2015; Hewins et al., 2016).

(3) basaltic composition (e.g., from its bulk rock SiO₂ and alkali concentrations) is ambiguous and arbitrarily uses a chemical classification scheme for terrestrial volcanic rocks that glosses over the complexity of this new suite of martian meteorites.

Numerous publications since corrected this interpretation and the consensus is that these stones are **regolith breccias** (Humayun et al. 2013; McSween 2013; Cartwright et al. 2014; Muttik et al. 2014; Nemchin et al. 2014; Beck et al. 2015; Bellucci et al. 2015; Lorand et al. 2015; Wittmann et al. 2015; Leroux et al. 2016; Sautter et al. 2016; McCubbin et al. 2016; cf., Stöffler and Grieve (2007)).

Although **regolith breccia** is the most precise description for these stones that have been shown to include high proportions of impactor components in melt particles that were emplaced contemporaneously with the lithification of the breccia, including cm-size melt spherules that are characteristic regolith components (Humayun et al. 2013; Udry et al. 2014; Wittmann et al. 2015; Goderis et al. 2016; McCubbin et al. 2016; Hewins et al. 2016), this term may carry too much genetic interpretation than is desired by the Nomenclature Committee. Therefore, we suggest that “**martian polymict breccia**” (cf., Santos et al. 2015; Nyquist et al. 2016; Gattacceca et al. 2016) is more suitable as a nomenclature term for NWA 7034 and paired stones, especially because “polymict breccia” is an established nomenclature term for eucrites.

We hope that the Nomenclature Committee will consider our request to revise the classification term for NWA 7034 and paired stones, including NWA 7533, to “**martian polymict breccia**”, which we think is better than the current term for the reasons stated above.

Sincerely,

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