ABUNDANCE AND MEANING OF REGOLITH BRECCIAS AMONG METEORITES.

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Introduction: The study of meteoritic breccias contributes significantly to our understanding of early solar system processes of accretion, differentiation, and surface (regolith) evolution, and also provides unique information about the primordial, chemical and mineralogical characteristics of the accreted components themselves.

Discussion: Breccia-producing impacts took place prior to, simultaneously with, and after accretion and early differentiation of the parent bodies; impact metamorphism is an ongoing process producing not only gas-containing regolith, but also gas-poor fragmental breccias. Considering mineralogy and texture of breccias of various meteorite groups and the presence of incorporated solar particles (e.g., solar gases; Tab. 1), it may be possible to decide, if breccias result from cratering processes on a parent body without total destruction (à la moon), or from complete destruction of precursor parent bodies and formation of a new (second generation) body from which the meteorites derive.

Table 1: Percentage of solar gas containing meteorites. It is uncertain that some CV chondrites are true solar gas-rich regolith breccias (); some uncertainties also exist for the primitive achondrites; (a) No. of meteorites considered; (b) No. of meteorites with solar gases.

Chon.	(a)	(b)	%	Achon.	(a)	(b)	%
CI	6	6	100 %	Acap	12	0	0 %
CM	19	19	100 %	Win	2	0	0 %
CR	5	5	100 %	Lod	9	0	0 %
CO	21	0	0 %	Brach	7	0	0 %
CV	29	(5)	17.2 %	Aub	20	6	30.0 %
CK	21	0	0 %	How	21	8	38.1 %
CH	7	5	71.4 %	Euc	73	0	0 %
H	626	96	15.3 %	Dio	30	0	0 %
L	405	12	3.0 %	Ure	25	3	12.0 %
LL	110	6	5.5 %				
R	23	11	47.8 %				
E	73	7	9.6 %				

Often meteoritic breccias appear to result from impact cratering and mixing on a parent body without total destruction. This is probably the case for most ordinary, R-, and E-chondrite (regolith) breccias and achondritic breccias. Many of these breccias usually consist of a mixture of cognate clasts. For regolith breccias of most carbonaceous chondrites (CC) the situation is different. It is suggested that many breccias (e.g., from CM, CH, perhaps CI, CR) result from mixing of fragments after total destruction of (a) precursor parent bod(y)ies. Dark inclusions in CR and CH chondrites are excellent witnesses to document formation of the final parent body by secondary accretion. It is also suggested that most solar gases were incorporated into rock components prior to secondary accretion (exception: CM-chondrites). Main irradiation of CC components may have occurred (a) prior to primary accretion or (b) mineral or lithic fragments of destroyed bodies were irradiated prior to formation of the final parent body.