CONTROL ID: 2253637

TITLE: Organic Molecules in Meteorites

ABSTRACT BODY:

Abstract Body: Carbonaceous meteorites are primitive samples from the asteroid belt, containing 3-5wt% organic carbon. The exogenous delivery of organic matter by carbonaceous meteorites may have contributed to the organic inventory of the early Earth. The majority (>70%) of the meteoritic organic material consist of insoluble organic matter (IOM) [1]. The remaining meteoritic organic material (<30%) consists of a rich organic inventory of soluble organic compounds, including key compounds important in terrestrial biochemistry [2-4]. Different carbonaceous meteorites contain soluble organic molecules with different abundances and distributions, which may reflect the extension of aqueous alteration or thermal metamorphism on the meteorite parent bodies. Extensive aqueous alteration on the meteorite parent body may result on 1) the decomposition of α-amino acids [5, 6]; 2) synthesis of β- and γ-amino acids [2, 6-9]; 3) higher relative abundances of alkylated polycyclic aromatic hydrocarbons (PAHs) [6, 10]; and 4) higher L-enantiomer excess (Lee) value of isovaline [6, 11, 12].

The soluble organic content of carbonaceous meteorites may also have a contribution from Fischer-Tropsch/Haber-Bosch type gas-grain reactions after the meteorite parent body cooled to lower temperatures [13, 14].

The analysis of the abundances and distribution of the organic molecules present in meteorites helps to determine the physical and chemical conditions of the early solar system, and the prebiotic organic compounds available on the early Earth.

[1] Cody and Alexander (2005) *GCA* 69, 1085. [2] Cronin and Chang (1993) in: The Chemistry of Life's Origin. pp. 209–258. [3] Martins and Sephton (2009) in: Amino acids, peptides and proteins in organic chemistry. pp. 1-42. [4] Martins (2011) *Elements* 7, 35. [5] Botta et al. (2007) *MAPS* 42, 81. [6] Martins et al. (2015) *MAPS,* in press. [7] Cooper and Cronin (1995) *GCA* 59, 1003. [8] Glavin et al. (2006) *MAPS.* 41, 889. [9] Glavin et al. (2011) *MAPS* 45, 1948. [10] Elsila et al. (2005) *GCA* 5, 1349. [11] Glavin and Dworkin (2009) *PNAS* 106, 5487. [12] Pizzarello et al. (2003) *GCA* 67, 1589. [13] Chan et al. (2012) *MAPS.* 47, 1502. [14] Burton et al. (2011) *MAPS* 46, 1703.

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PRESENTATION TYPE: Oral