Synthesis of Prebiotic Organic Compounds within the Tagish Lake Meteorite

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The Tagish Lake meteorite consists of several different lithologies that exhibit varying degrees of parent body hydrothermal alteration. Through leeching regimens with polar and weakly polar solvents, and by employing GC-MS techniques, we found within the extracts several different classes of soluble organic compounds, ranging from highly polar monocarboxylic acids, amino acids and phenols, to essentially non-polar aliphatic and aromatic hydrocarbons. The differences in both the concentrations and the classes of soluble polar organic species across the four lithologies studied are likely the result of varying degrees of oxidative hydrothermal alteration of primordial insoluble organic matter (IOM). The amino acids found in the water extracts, by contrast, are probably derived from small precursor molecules, such as aldehydes and ketones, via aqueous-based reactions within the parent body, as per the Strecker-cyanohydrin synthesis, [e.g., 1]. Monocarboxylic acids, which are present in relatively high abundances in our Tagish lake specimens, could have served as the construction material for pre-cellular membranes on the early earth, while amino acids, via polymerization,could have produced the essential proteins needed to generate primitive celluar machinery .

[1] Botta, O., and Batta, J.L. 2002. *Surveys in Geophysics*, **23**, 411-467