THE AMINO ACID COMPOSITION OF THE SUTTER'S MILL CARBONACEOUS CHONDRITE.

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Introduction: On the morning of April 22, 2012, a ~2 to 4 meter sized near-Earth asteroid fell over the Sierra Nevada mountains in California and landed over a wide area near Coloma, El Dorado County. Two days later, Dr. Peter Jenniskens of the SETI Institute and NASA Ames Research Center found a 4 g piece of the asteroid in the parking lot of Henningsen-Lotus Park and subsequently collected the meteorite sample in clean aluminum foil [1]. Several additional meteorite fragments, named Sutter's Mill, have been collected by SETI and NASA researchers with the help of many volunteers, and a Sutter's Mill meteorite analysis research consortium led by Peter Jenniskens was established. Here we report on the composition of amino acids in an HCl-hydrolyzed, hot-water extract of a 240 mg chip of the Henningsen-Lotus parking lot fragment, designated SM2. The abundance, distribution and enantiomeric compositions of the two- to six-carbon aliphatic amino acids found in SM2 were measured by ultra performance liquid chromatography fluorescence detection and time of flight mass spectrometry coupled with OPA/NAC derivatization [2]. For comparison, a similar sized sample of the Murchison CM2 carbonaceous chondrite from the Smithsonian National Museum of Natural History (USNM 5453) was processed and analyzed in parallel.

Results and Discussion: In contrast to the Murchison meteorite which had a complex distribution of amino acids with a total C_2 to C_5 amino acid abundance of ~14,000 parts-per-billion (ppb) [2], the Sutter's Mill meteorite was found to be highly depleted in amino acids. Much lower abundances (~30 to 180 ppb) of glycine, β-alanine, L-alanine and L-serine were detected in SM2 above procedural blank levels indicating that this meteorite sample experienced only minimal terrestrial amino acid contamination after its fall to Earth. Carbon isotope measurements will be necessary to establish the origin of glycine and β-alanine in SM2. Other non-protein amino acids that are rare on Earth, yet commonly found in other CM meteorites such as α-aminoisobutyric acid (α-AIB) and isovaline, were not identified in SM2. However, traces of β-AIB (~ 1 ppb) were detected in SM2 and could be extraterrestrial in origin. The low abundances of amino acids in the Sutter's Mill meteorite is consistent with mineralogical evidence that at least some parts of the Sutter's Mill meteorite parent body experienced extensive aqueous and/or thermal alteration [3-5].

References: [1] Jenniskens P. et al. 2012. *75th MetSoc* abstract, this meeting. [2] Glavin D. P. et al. 2010. *MAPS* 45:1948-1972. [3] Zolensky M. et al. 2012. *75th MetSoc.* abstract, this meeting. [4] Nagashima et al., 2012. *75th MetSoc.* abstract, this meeting. [5] Yin, Q.-Z. et al. 2012. *75th MetSoc.* abstract, this meeting.

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