AMINO ACIDS IN THE ALH84001 MARTIAN METEORITE. J. L. Bada[1], D. P. Glavin[1], G. D. McDonald[2] and L. Becker[3]. [1]Scripps Institution of Oceanography, UCSD, La Jolla, CA 92093-0212.; jbada@ucsd.edu. [2]Jet Propulsion Laboratory MS 183-301, 4800 Oak Grove Drive, Pasadena, CA 91109. [3]Hawaii Institute of Geophysics and Planetology, University of Hawaii at Manoa, Honolulu, HI 96822

In any investigation of organic compounds possibly derived from life on Mars, it is important to focus on compounds that play an essential role in biochemistry as we know it and which have properties such as chirality (handedness) which can be used to distinguish between biotic versus abiotic origins. Amino acids are one of the few compound classes that fulfill these requirements. Amino acids are the building blocks of the proteins and enzymes which are integral components of terrestrial biology and only L amino acids (the L enantiomers) are incorporated into proteins during biosynthesis. Because there are no apparent biochemical reasons why L amino acids should be selected over D amino acids, it is generally assumed that life elsewhere could be based on either L or D amino acids, but not both. The presence of only D amino acids in martian meteorites would be indicative of unique martian life. Even if life on Mars was based on L amino acids as on Earth, racemization of these amino acids on Mars before ejection of the meteorite would generate significant levels of D amino acids. Thus the finding of both D and L amino acids in unequal quantities in a martian meteorite would thus also be suggestive of life on Mars.

We have investigated the abundances of amino acids, as well as their enantiomeric composition, in ALH84001 using high performance liquid chromatography (HPLC) with fluorescent detection. Trace amounts of glycine, serine and alanine were detected in the carbonate component of the martian meteorite ALH84001 using high performance liquid chromatography. The detected amino acids were not uniformly distributed in the carbonate component and range in concentration from 0.1 to 7 parts-per-million (ppm). Although the detected alanine consists primarily of the L enantiomer, very low levels (<0.1 ppm) of endogenous D alanine may be present in the ALH84001 carbonates. The amino acids present in this sample of ALH84001 appear to be terrestrial in origin and similar to those in Allan Hills ice. Our analyses indicate that there is no compelling evidence that the ALH84001 contains detectable amounts of endogenous amino acids, one of the important classes of compounds associated with life as we know it.