THE SEARCH FOR AMINO ACIDS IN THE APOLLO 12 AND APOLLO 14 SAMPLES.
Cyril Ponnamperuma, Laboratory of Chemical Evolution, University of Maryland, College Park, Md. 20742, Charles Gehrke, Experimental Station Chemical Laboratories, University of Missouri, Columbia, Missouri 65201, Keith Kvenvolden, NASA, Ames Research Center, Moffett Field, Ca. 94035.

A cardinal tenet of the hypothesis of chemical evolution holds that molecules of importance to life could be synthesized in the abiotic milieu. The availability of samples from the lunar surface has given us an opportunity of testing this statement which is the cornerstone of our studies in exobiology.

In this report we present the results of our investigations relevant to one class of such compounds, the amino acids, which play a fundamental role in the terrestrial biosphere. Three sets of experiments were performed. The first involved the Apollo 12 sample 12023. The second used the Apollo 14 sample 14298. In the third investigation the Apollo 14 SESC sample 14240 was studied.

In the first two investigations the extraction procedures were identical. Approximately 1 gram of material was treated with water for 24 hours at 100°C. Any amino acids present in the extracts were converted to the N-trifluoro acetyl n-buty1 esters prior to gas chromatographic analysis. Compounds having retention times of glycine, alanine, serine, aspartic, and glutamic acid appeared to be present in concentrations of 3 - 4 ng/gram in the case of glycine and less than 1 ng/gram of each of the others.

In the case of the Apollo 14 SESC sample, 6 grams were extracted with water. The water extract was examined by both gas chromatography and ion exchange chromatography. Both techniques showed that compounds having the retention times of glycine, alanine, and aspartic acid, glutamic acid were present. As in the previous experiments the concentrations were 3 - 4 ng in the case of glycine and less than 1 ng of each of the others.

It must be concluded that in the absence of mass spectrometric data, these identifications appear to be inconclusive. Furthermore, the indigenous nature of these materials cannot be established until the amino acids identified can be separated into their enantiomers.