BIOLOGY-RELATED PARAMETERS AND POTENTIAL LIFE IDENTIFERS ON MARS. A. A. Mardon[1], G. Zhou[2], C. Mardon[3], [1]University of Alberta (116 St. and 85 Ave. Edmonton, Alberta T6G 2R3, CANADA, aamardon@yahoo.ca), [2]George Washington University (2121 I St NW, Washington, DC 20052, USA, gzhou@gwu.edu), [3]Antarctic Institute of Canada (#103 11919 82 ST NW, Edmonton AB, T5B 2W4, CANADA)

Introduction: The search for life on Mars remains one of the many pressing questions of modern time. Previous investigations, most notably but amongst others, the Viking mission Labeled Release Life Detection Experience showed results of Martian microbial metabolism [1]. However, in the last 30 years, speculations of the validity of the experience as it failed to detect presence of organic matter and the presence of hydrogen peroxide in the Martial soil has been questioned. NASA pivoted to the indirect strategy of the presence of water to address the life issue. Thermodynamic theory and experimental evidence increasingly indicate the presence of liquid water on Mars [2] [3] [4]. Supported by recent information provided by the Martian rovers, the detected Methane and formaldehyde commonly associated with metabolism, is shown to be more than what can be supported by the presumed volcanic activity on Mars.

Instrumentation: The TWEEL suite of experiences is based on carbon labelling technique of the Viking LR experience [5]. It includes assessing chirality in metabolism, circadian rhythm, photosynthesis, penetrability of soil, and surface temperature of soil to understand if conditions are met to for an environment conducive to life as we know it. Refer to Figure 1 for the instrumental breakdown.

The Solid State Spectral Imager (SSSI) is a new method employed to detect living organisms. BEST is the analytical basis of SSSI and the foundation for the biogeochemical library using wavelengths as single points in a 24-dimensional hyperspace. Refer to Figure 2 for component breakdown.

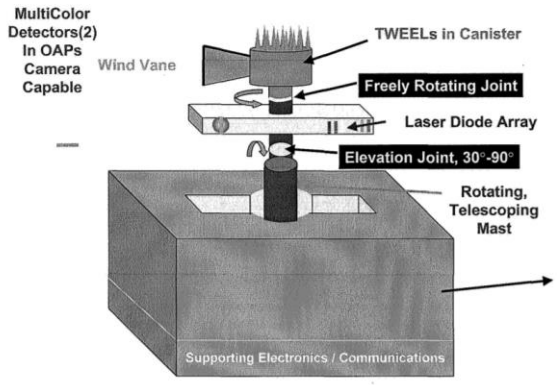

Figure 1: TWEEL and SSSI [6]

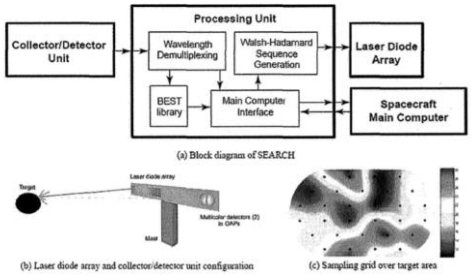

Figure 2: SSSI Composition

Results: The aforementioned use of investigating elements of chirality, photosynthesis and circadian rhythms gives TWEEL/SSSI instrument ability to differentiate between chemistry and biology to identifying Earth-like biological system and biology that might utilize sugars and amino acids [7].

The findings by Levin et. al. (2007) indicate that cryptic microorganisms in the upper layers of the Martian regolith could very well have initiated both metabolic activity and replication. Hence, the LR life detection experiment may very well have yielded valid detection of microbial life on Mars, which was erroneously attributed by many to a chemical rather than a biological phenomenon [8].

The TWEEL/SSSI results are able to provide some cursory information for the evolution and extend of Earth-like life based on photosynthesis and circadian rhythm components which we understand are fundamental aspects of terrestrial life.

References:

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