THE IDENTIFICATION OF SULFIDE OXIDATION AS A POTENTIAL METABOLISM DRIVING PRIMARY PRODUCTION ON LATE NOACHIAN MARS

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MARS

Mars has two moons and is the last of the terrestrial planets along with Mercury, Venus, and Earth.

THE TRANSITION OF THE MARTIAN CLIMATE FROM THE WET NOACHIAN ERA TO THE DRY HESPERIAN (4.1-3.0 GYA) LIKELY RESULTED IN SALINE SURFACE WATERS THAT WERE RICH IN SULFUR SPECIES. TERRESTRIAL ANALOGUE ENVIRONMENTS THAT POSSESS A SIMILAR CHEMISTRY TO THESE PROPOSED WATERS CAN BE USED TO DEVELOP AN UNDERSTANDING OF THE DIVERSITY OF MICROORGANISMS THAT COULD HAVE PERSISTED ON MARS UNDER SUCH CONDITIONS.

HERE, WE REPORT ON THE CHEMISTRY AND MICROBIAL COMMUNITY OF THE HIGHLY REDUCING SEDIMENT OF COLOUR PEAK SPRINGS, A SULFIDIC AND SALINE SPRING SYSTEM LOCATED WITHIN THE CANADIAN HIGH ARCTIC.

DNA AND CDNA 16S RRNA GENE PROFILING DEMONSTRATED THAT THE MICROBIAL COMMUNITY WAS DOMINATED BY SULFUR OXIDISING BACTERIA, SUGGESTING THAT PRIMARY PRODUCTION IN THE SEDIMENT WAS DRIVEN BY CHEMOLITHOAUTOTROPHIC SULFUR OXIDATION. IT IS POSSIBLE THAT THE SULFUR OXIDISING BACTERIA ALSO SUPPORTED THE PERSISTENCE OF THE ADDITIONAL TAXA.

GIBBS ENERGY VALUES CALCULATED FOR THE BRINES, BASED ON THE CHEMISTRY OF GALE CRATER, SUGGESTED THAT THE OXIDATION OF REDUCED SULFUR SPECIES WAS AN ENERGETICALLY VIABLE METABOLISM FOR LIFE ON EARLY MARS

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FUN FACT: PLUTO IS NO LONGER CONSIDERED A PLANET SINCE 2006!