

Earth and Planetary Materials Science Seminar (No. 1858)

日時 : 2015 年 1 月 22 日

Date & Time : Jan. 22nd 2015 13:10~15:30

場所 : 地学生物共通講義室

Room : Earth Science & Biology Lecture Room

-----**ABSTRACT**-----

Presenter: Prof. J. L. Kirschvink

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Title: Mars vs. Earth: Planetary constraints on the Origin of Life

The discovery over 10 years ago that rocks can travel from the surface of Mars to the surface of Earth without being heated above 40°C makes plausible the process of interplanetary panspermia. Further discoveries from NASA'S Martian rovers (Spirit, Opportunity, and Curiosity) and numerous orbiters have demonstrated that Mars once had liquid water flowing on the surface, possibly in large lakes or even in a North Polar Ocean. I will argue that the essential components for an RNA world plausibly arose first on Mars, on the flanks of the Tharsis supervolcano, in a Death-Valley like series of crater lakes. This environment can provide the Ca-Borate minerals needed for the Benner synthesis of ribose, as well as the prebiotic organic synthesis via the classic Miller-Urey spark-gap reactions. Volcanic gasses from Tharsis should have equilibrated with the iron-wustite buffer of the deep Martian mantle (yielding reducing gasses), that would have been hit by lightning during eruption to form organic compounds. Tharsis is also high enough to extend up into the Martian ozone layer, providing a source for oxidized Mo needed in the ribose synthesis, and providing an exceptionally wide range of electrochemical intermediates needed to for the evolution of primitive metabolism. If this life was transferred to Earth via meteorites, we would not simply be "Martians", we would be "Tharsians".

Keywords: