Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

PPS05-06 Room:A03 Time:May 28 09:45-10:00

Life search plan on Mars surface and the significance

YAMAGISHI, Akihiko[1*] ; SATOH, Takehiko[2] ; MIYAKAWA, Atsuo[1] ; YOSHIMURA, Yoshitaka[3] ; HONDA, Hajime[4] ; SASAKI, Satoshi[5] ; IMAI, Eiichi[4] ; USUI, Tomohiro[6] ; MIYAMOTO, Hideaki[7] ; FUJITA, Kazuhisa[8]

[1]Tokyo Univ. Pharm. Life Scie., Dep. Applied Life Scie., [2]ISAS/JAXA, [3]Tamagawa Univ., [4]Nagaoka Inst. Tech., [5]Tokyo Univ. Tech., [6]Tokyo Inst.Tech., [7]The Univ. Tokyo, [8]JAXA

The view of active Mars has been emerged based on the recent findings of the exploration and high-resolution imaging of Mars. The finding includes the Recurring Slope Linear (RSL), where the presence of liquid water is most provable. We are planning to test the view of Mars still active and the presence of current life at the most promising place on the Mars surface.

Thought the 1970's Viking mission reported the detection of catalytic reaction that could be attributed to life (Levin and Straat 1977), negative conclusion was made based on the level of organic compound lower than the detection limit. In 2000's, the results of Viking mission was reevaluated(Glavin, et al.2001; Navarro-Gonzalez, 2006), and found that the detection limit of organic compound, 10^6-10^7 cells/g soil, is not sufficient to detect the microbes with lowest microbe density (i.e. deep see water, Atacama desert, Antarctic desert soil) 10^4cells on Earth.

SAM (Sample Analysis at Mars) onboard the NASA's Rover MSL (Mars Scientific Laboratory) Curiosity has detected organic compound in the Gale Crater, though its origin is not clear. SAM detected chlorinated methane 4 micro gram/g Martian soil (Ming et al. 2014). If we assume the amount corresponds to the total organic carbon and the ratio of total organic carbon and microbes similar to those at Atacama Desert (Connon et al. 2007), the 4 x 10^4 cells/g soil is expected for the Gale Crater. We developed the fluorescence microscope system to detect the microbe. We are targeting the most provable place with liquid water. We will use fluorescence microscope and fluorescence pigment that can detect organic compounds and can differentiate it from organic compounds surrounded by membrane, the latter being most provably "cells". We named the system Life Detection Microscope, LDM.

If we were to find life on Mars surface, life will be examined, and totally new knowledge of life extending the knowledge of terrestrial life will be obtained, transforming the Biology to New and so to speak Real Biology.

In the next stage of exploration, genetic material DNA and amino acid will be analyzed. If the Martian life uses genetic material different from DNA or the DNA different from ACGT, it is life emerged independently. If the life on Mars turned out to possess the same DNA (ACGT) as terrestrial life, phylogenetic analysis of Martian life will be conducted. The Martian life may be unrelated to terrestrial life, if there is no homology between genes of the two life forms. If there is homology between genes, phylogenetic tree will tell us whether the life emerged only on Earth and transported to Mars, or the life emerged only on Mars and transported to Earth. In the last case, life may have emerged on the third celestial body and transported to Earth and Mars.

If the life could not be found by LDM, the current scheme on origin of life has to be reconsidered. A. If life emerged both on Mars and Earth, what is the condition supported life only on Earth. B. If life emerged only on Earth, what is the critical factor that prevented the emergence of life on Mars. C. If life emerged only on Mars, why it is extinct on Mars. D. If the life emerged on the third celestial body, what prevented the settling of life on Mars. Prebiotic conditions on Mars and Earth have to be reevaluated.

References

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Keywords: Fluorescence microscope, Fluorescence pigment, Origin of life, Phylogenetic tree