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「たんぽぽ」計画における国際宇宙ステーション上での微生物曝露実験
Microbe space exposure experiments at International Space Station (ISS) in the mission "Tanpopo"

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To explain how organisms on the Earth were originated at the quite early stage of the history of Earth, Panspermia hypothesis was proposed [1, 2]. Recent findings of the Martian meteorite suggested possible existence of extraterrestrial life, and interplanetary migration of life as well. On the other hand, microbes have been collected from high altitude using balloons, aircraft and meteorological rockets since 1936, though it is not clear how could those microbes be ejected up to such high altitude [3]. Indeed, we have also collected microorganisms at high altitude by using airplanes and balloons. Spore forming fungi and Bacilli, and Deinococci have been isolated in these experiments. We also collected two novel species of the genus *Deinococcus*, one from top of troposphere (*D. aerius*) and the other from bottom of stratosphere (*D. aetherius*) [4-6]. In addition, we collected various spore-forming bacilli and their related species. Spores and Deinococci are known by their extremely high resistance against UV, gamma ray, and other radiation [4]. *D. aerius* and *D. aetherius* showed high resistance comparable with *D. radiodurans* R1 to the UV and radiation such as gamma ray. If microbes could be found present even at the higher altitude of low earth orbit (400km), the fact would endorse the possible interplanetary migration of terrestrial life.

We proposed the "Tanpopo" mission to examine possible interplanetary migration of microbes, and organic compounds on Japan Experimental Module (JEM) of the International Space Station (ISS) [7]. Tanpopo consists of six subthemes. Two of them are on the possible interplanetary migration of microbes ? capture experiment of microbes at the ISS orbit and space exposure experiment of microbes. In this paper, we focus on the space exposure experiment of microbes.

Microbes in space are assumed be exposed to the space environment with a kind of clay materials that might protect microbes from vacuum UV and cosmic rays, or exposed as the aggregates of which outer cells might protect inner cells from vacuum UV and cosmic rays. Dried vegetative cells of *D. radiodurans* and our novel deinococcal species isolated from high altitude are candidates for the exposure experiment. In addition, we are planning to perform another space exposure experiments of microbes. In this paper, we discuss current status of exposure experiment of microorganisms defined for the Tanpopo mission and others.

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