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Survivability of Microorganisms and Organics in Interplanetary Space of the Solar System

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Panspermia is one of the hypotheses of the origin of life, where seeds of life were traveled from one planet to the other planet. Not the organisms but organic compounds could have been delivered to the primitive Earth before the generation of life. It can be referred as "chemo-panspermia". For panspermia and chemo-panspermia, organisms and/or organic compounds must survive in interplanetary space during their migration. It is estimated that interplanetary dusts carried much more organic carbon than comets and meteorites. In order to evaluate the survivability of organics and organisms in interplanetary dust, we irradiated some microorganisms and organic compounds with high-energy heavy ions or ultraviolet light.

Some microorganisms like *D. Radiodurans* and some spore-forming microorganisms showed stronger resistance than ordinary microorganisms. Complex amino acid precursors that were synthesized from possible interstellar media by high-energy particles irradiation were much more stable than free amino acids. It is of important to estimate UV and radiation environments of the solar system of 4 Ga, since panspermia or chemo-panspermia might have occurred then. Collaboration between chemists, microbiologists and solar physicists are essential in these studies.

Keywords: cosmic rays, ultraviolet light, microorganisms, organic compounds, origins of life, panspermia