

Perspectives of biotechnologies based on dormancy phenomenon for space researches

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Long term space missions will require a renewable source of food and an efficient method to recycle oxygen. Plants especially aquatic micro algae provide an obvious solution to these problems. However, long duration plant growth and reproduction in space that is necessary for transportation of a control ecological life support system (CELSS) from Earth to other planets are problematic. The introduction of heterotrophs in space CELSS is a more formidable problem as the absence of gravity creates additional difficulties for their life. Dormancy phenomenon protected a great many animals and plants in harsh environmental conditions within a special resting phases of life cycle lasting from months up to hundred years. This phenomenon can be quite perspective as a tool to overcome difficulties with CELSS transportation in space missions. Cryptobiotic stages of microbes, fungi, unicellular algae and protists can survive in open space conditions that is important for interplanetary quarantine and biological security inside spacecraft. Searching for life outside the Earth at such planet like Mars with extremely variable environment should be oriented on dormancy as crucial phases of a life cycle in such organisms. Five major research programs aimed on study dormancy phenomenon for exobiology purposes and creation of new biotechnologies are discussed. List of species, candidate components of CELSS with dormancy in their life cycle used in space experiments at the Russian segment of International Space Station now includes 26 species from bacteria to fish. The first results on study of the resting stages of aquatic animals after exposing in space station conditions are presented.

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