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Biology in Space (8)

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ENVIRONMENTAL RESEARCH AND GENETIC EXPRESSION IN NEW EARTH SIMILARITY
STUDY**Abstract**

To inhabit a planet we need to know its atmosphere cell tolerance to the atmosphere, currently Mars is a potential for human habitation due to Earth-likeness. Our knowledge of chemical, physical, geological geographic data is insufficient to deem an environment habitable, but it does point us in a direction where we are likely to find an area with potential for habitation. To keep cells/organisms alive through long space travel is the challenge, and we believe the solution lies in cryopreservation techniques. The process by which cells enter the hibernation state is well understood, but the reverse process, from hibernation to normal is yet to be fully understood. To date simulated Mars environment studies have been done on various organisms, mainly common terrestrial bacteria *Bacillus subtilis*. However, this hasn't as yet been done on plants or extremophiles. We have set two objectives: (1a) understanding the mechanism - how a *Ceratodon purpureus* (Moss, Kingdom: Plantae, Division: Bryophyta) an extremophile "Tardigrade", (Kingdom: Animalia, Phylum: Tardigrada) retrieves to normal from desiccation (moss),"tun"(tardigrade) in cryptobiosis; (1b) the same in combined state to form an Ecology - as moss are autotrophic tardigrade feed on moss; (2) create reference database - set of parametric standards in biological extremities, i.e. survival index to help analyze other potential habitable areas. Our study is focused to establish Earth Similarity Index (ESI) New Earth Similarity Index (NESI), for Mars, specific to moss, known for desiccation also for invertebrate tardigrade as a model. STS-134, Endeavour's last flight, concluded tardigrades were able to sustain hard vacuum of outer space with full solar UV, which is of particular interest with respect to Martian conditions. For survival in extreme environments tardigrades goes into a "tun" formation synthesize some unique proteins. Our studies ESI NESI will establish Moss Similarity Index (MSI),

New Moss Similarity Index (NMSI), Tardigrade Similarity Index (TSI), New Tardigrade Similarity Index (NTSI), Combined Moss Tardigrade Similarity Index (MTSI) New Combined Moss Tardigrade Similarity Index (NMTSI) for Mars by studying survival, hibernation, retrieval, changes in morphology, physiology, gene expressions, biochemistry. The study will be a path breaking step for future settlement of life on Mars.