

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Life Support and EVA Systems (6)

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PHYSIOLOGICAL RESPONSE OF SACCHAROPOLYSPORA SPINOSA AND STREPTOMYCES
SILACEUS TO SPACE FLIGHT

Abstract

Microbes can sense, adapt and respond to their environment quickly and are ideal tools to monitor the effect of space flight. *Saccharopolyspora spinosa* and *Streptomyces silaceus* strains were carried into space by a manned spaceship, 'Shenzhou IX' (Divine Vessel IX) on Jun 16, 2012. Paired space flight and ground control samples were similarly prepared using identical media and inoculum. Spinosyn and its analogs, produced by *Saccharopolyspora spinosa*, are the active ingredients in a family of insect control agents. The spinosad-producing strain, *S. spinosa* NHF132, was isolated from the sea mud sample in South China Sea. Considerable strains were unable to produce the white spores as they used to be compared to the control that did not take the flight. Further observation through electronmicroscope(EMS) showed that spore non-producing strain has a much smoother mycelium. Fermentation experiment was also carried out to test the metabolites change through HPLC analysis and we found that a spore non-producing strain NHF132-SZ024 could produce one more metabolite except spinosyn A and spinsyn D. The physiology change of *Streptomyces silaceus* SCXL-S9 which is used to produce bacterial manure has been also tested after its back from space flight, and results show that there are three main differences between the mutant strain and the ground control. As we can see that the mutant strain has a higher growth rate, better ability in pH tolerance and good antibacterial stability between generations than the control. Both of the results from *S. spinosa* and *S. silaceus* demonstrated that the space flight is a good way to study the physiological response because it could induce changes in morphology, physiology, and secondary metabolism.