

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Life and Physical Sciences under reduced Gravity (7)

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CAMBRIAN EXECUTIVE SUBORBITAL FLIGHT: MICROGRAVITY RESEARCH ONBOARD DLR
SOUNDING ROCKET, LAUNCHED BY SWEDISH SPACE CORPORATION, TO INVESTIGATE
MORPHOLOGICAL CHANGES OF ESCHERICHIA COLI K12, SACCHAROMYCES BOULARDII,
SACCHAROMYCES CEREVISIAE

Abstract

Cambrian Executive Suborbital Flight: Microgravity Research Onboard DLR German Aerospace New Red Kite Motor Sounding Rocket, Launched by Swedish Space Corporation, to Investigate Morphological Changes of Bacteria Culture Escherichia Coli K12, and Single Cell Fungi Saccharomyces Boulardii, Saccharomyces Cerevisiae in Microgravity

This paper investigates the impact of microgravity on cell cultures launched into microgravity on board a suborbital flight and shared experimental payload contained on a newly enhanced DLR German Aerospace sounding rocket, launched by the Swedish Space Corporation from Esrange base, in the Arctic Circle Sweden. This paper further describes the experimental design, implementation, results, and the next steps in biological microgravity research design, based on the cell cultures morphological behaviour investigated in suborbital flight. Saccharomyces boulardii has been utilised in human health as a probiotic, anti-inflammatory, anti-pathogenic, immune modulating, that works rapidly to restore healthy intestinal microbiota and displays possible anti-radiation properties. Saccharomyces cerevisiae, as a yeast has space heritage and was launched again to investigate if previous morphological behaviour could be replicated. The paper further outlines the effect of cell division, die off and reproduction of Escherichia coli to better understand genetic variances in microgravity. The design lessons, telemetry data and microbial analysis is a first step in understanding the nature of microbiological behaviour of the trio of cell cultures and will inform the next phase of microgravity experiments. Particularly anti-radiation capabilities of probiotics, GIT health and the possible impact of probiotics in long term space travel. It will also inform the next phase of engineering a orbital and sub orbital payload design, including the cuvette holder, slides, cube satellite capability, data capture, time release, camera and longer duration exposure to microgravity in sub orbital and orbital flights 2024/25.