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Adaptation of the black fungus *Aspergillus niger* to simulated spaceflight and Mars-like conditions

The filamentous fungus *Aspergillus niger* is one of the most common isolates of the ISS. Its surface-associated growth (or biofilm formation) can biodegrade surfaces and clog life-support systems, and its highly resistant spores can easily spread through the air and withstand extreme conditions, which facilitates colonization of habitats and infection of immunocompromised humans. Because of this, future long-term spaceflight missions going beyond low Earth orbit (to the Moon or Mars) will require an intensification of fungal research, in particular regarding assessing the resistance of fungal spores in the context of planetary protection, as well as assessing the growth of *A. niger* in spaceflight habitats. In this seminar I will present my PhD thesis, that aimed to answer three main questions: Can *A. niger* spores resist space radiation, and if yes, could they endure interplanetary travel? If brought to the surface of Mars, could *A. niger* spores survive the Martian environment? And how does simulated microgravity affect *A. niger* surface-associated growth and biofilm formation? Results highlight the extraordinary resistance of fungal spores to extraterrestrial conditions and reveal their ability to cope with spaceflight microgravity. This advocates for future research to better monitor and control fungal contaminations in space habitats, as well as to help establish filamentous fungi as valuable companions in production of valuable compounds via biotechnology in space.