Identification of Novel Desiccation-Tolerant *S. cerevisiae* Strains for Deep Space BioSensors

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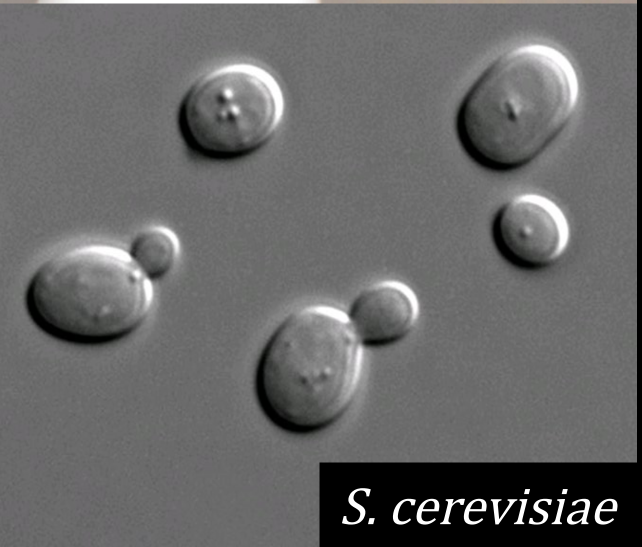
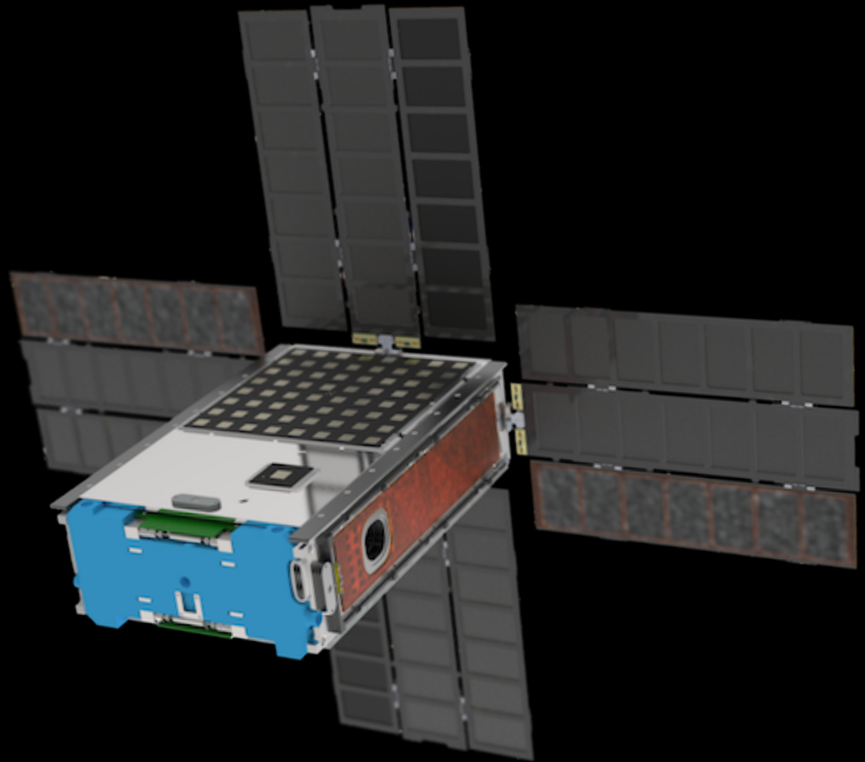
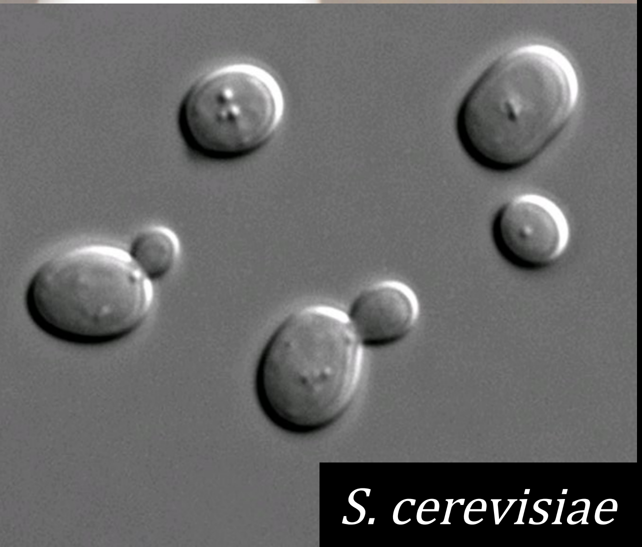
The BioSentinel Mission





Primary Objective: Develop a biosensor with autonomous life support technology to study and compare the biological effects of space radiation in different orbital environments.



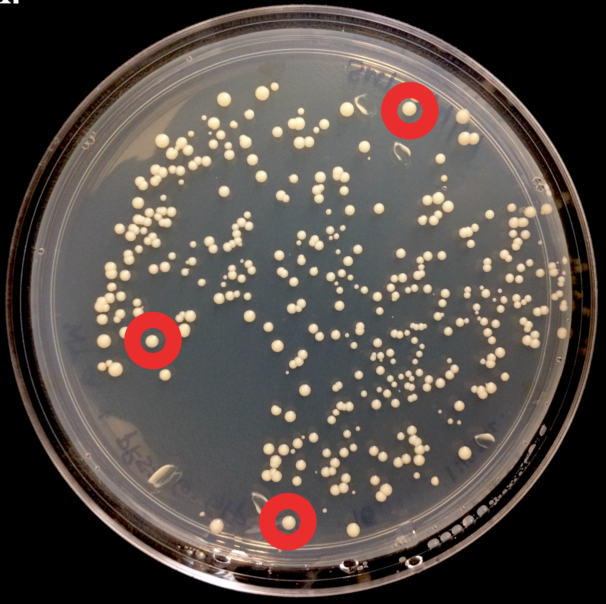
The BioSentinel Mission

Pre-Launch SLS-Integration at KSC 6-9 mo. → Heliocentric Orbit Insertion 2-4 wk. → Science Operations 6-12 mo.

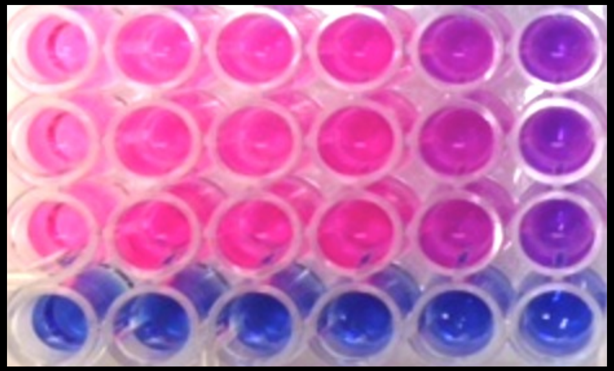
Mission Risk: Viable cell loss following long term desiccation and acute rehydration stress.

Desiccation-Tolerance Screen Methodology

A.



B.



Methods:

1. *rad51* yeast samples (previously in a desiccated state for three years) rehydrated and grown along with wild type and *rad51* controls and desiccation-tolerant *rad51* clones (A).

2. Largest colonies selected (A), cultured, and desiccated by air drying in 10% trehalose for 7 days.

3. Strains rehydrated at various time points over several months. Viability measured with viable cell counts. Growth, metabolism and radiation sensitivity assessed with an alamarBlue dye reduction assay (B)

Desiccation-Tolerance Screen Results

Results:

- Decrease in % cell survival for all strains following the initial seven-day air-drying process
- DRY1 and DRY2 have similar desiccation-tolerance compared to the previously undesiccated control, YBS29-1 (*rad51*)
- Following 10 weeks of desiccation, L10 exhibits greater viability than YBS29-1 (*rad51*), indicating superior desiccation-tolerance

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