

Group 5: Life Support for Long Term Space Travel and Habitation

5Y:

- Microorganism culturing (microbial, photosynthetic) in microgravity to assess viability
- Trace studies to analyze the future potential benefits of synthetic biology
- Continue developing algae as a nutrition source utilizing classical techniques
- Scaling necessary for O₂/CO₂ cycling systems for x size crew
- Micro-ecology studies on mixed populations
- Lignocellulosic degradation of human solid waste
 - Technology from Biofuels Industry

Needed: ISS or LEO sats., bioreactor platform

15y:

- Small scale semi-closed loop system with on earth incorporating waste remediation, food and fuel production
- Develop modified organisms that improve filtration, concentration and processing;
 - Low-lignin plants
 - Improved nutritional value
- Develop organisms for improved viability
 - Radiation tolerance
 - Survival in radiation
 - Mutational rates
 - microgravity
- Engineered or adapted organisms for extreme environments
- Revisit algae under a synthetic light

Needed:

30y:

- Full scale closed loop system with higher organisms (mammals)
- Synthetic biology tool set for engineered nutrition and safety
- Modular habitat that is transportable

Needed:

>30y:

- Full food production without re-supply, processing, storage.
- Waste mineralization
- Full biological CO₂ and O₂ control
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Needed: