STS-101

BioTube Precursor Experiment

Payload Bay

Principal Investigator: David Cox

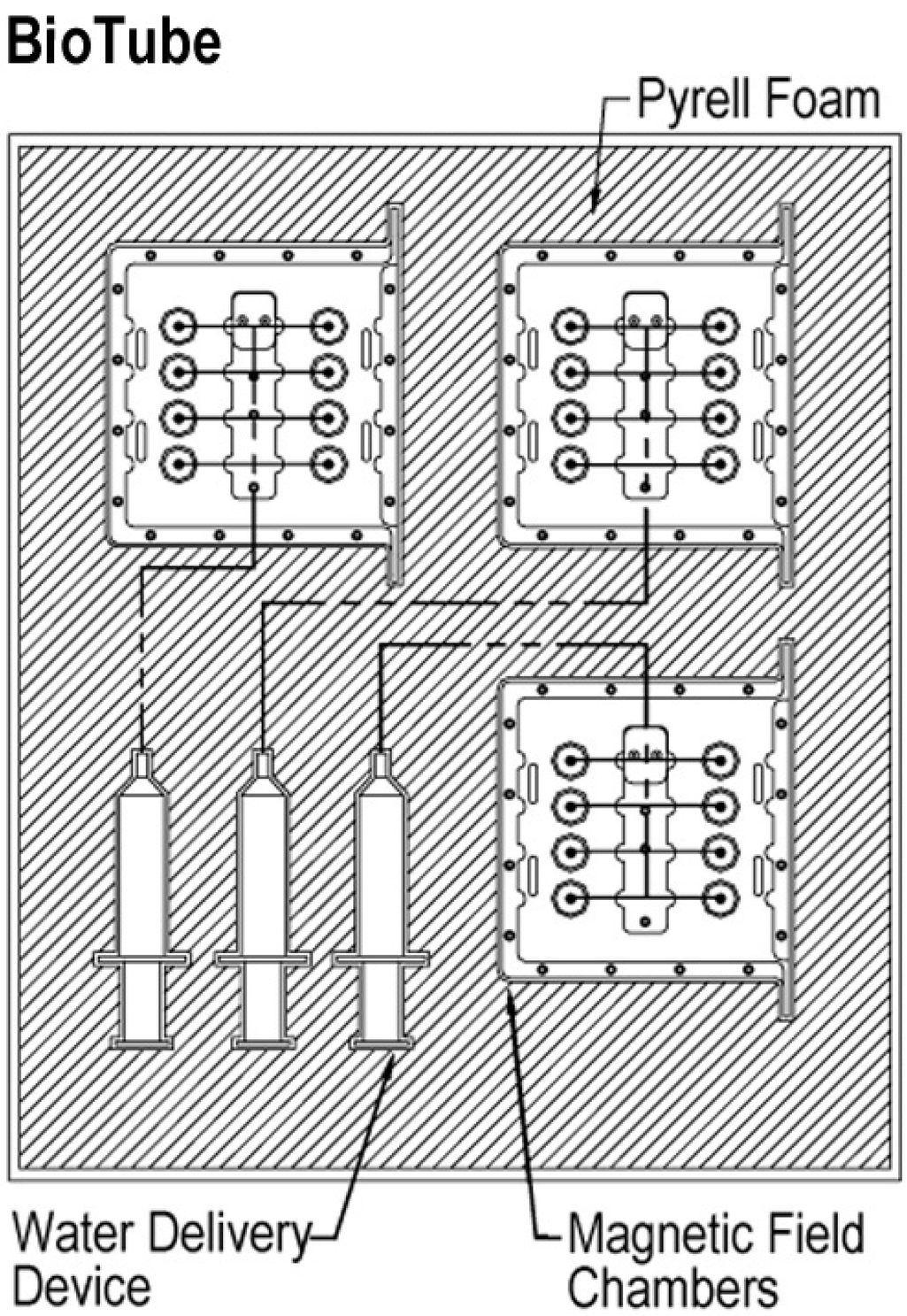
Overview

The BioTube Precursor Experiment will test newly developed technologies involved in the BioTube Magnetic Field Apparatus, a device for growing seeds in microgravity that will be flown on STS-107. This precursor experiment, which occupies half of a locker in the middeck of Atlantis, will evaluate the MFA's water delivery system and seed germination substrates.

In plant growth experiments, a wicking material, such as germination paper, is sometimes used as a liquid distributor and temporary reservoir for germinating seeds. For the precursor experiment, wicking materials other than the standard germination paper will be tested for their ability to absorb, distribute, and retain water in microgravity without pooling around the seeds.

The flight will also demonstrate seedling growth as a function of temperature in the limited volume of the sealed growth chambers.

The payload consists of 24 seed cassettes housed in three Magnetic Field Chambers (MFCs), three syringe/tube mechanisms to deliver water, and three passive temperature-recording devices. The MFCs will be used on the BioTube MFA payload to expose plant materials to a magnetic field. For the precursor flight, aluminum blanks will be flown instead of magnets, so the precursor experiment will have no magnetic field.



Twice during the flight, a crew member will turn cranks on the three syringes to deliver water to the seed cassettes. The first watering will occur 30 to 36 hours before landing, the second 12 to 20 hours before landing.

History/Background

When seeds are grown in the microgravity of space, the surface tension of water can cause excess water to pool on the surface of the seeds, which blocks oxygen transport around the seed. If the barrier forms before the seeds germinate, they will die.

Benefits

This investigation will enable researchers to develop devices for successfully growing plants in space to supply oxygen and food on long-duration space flights.