Observing the Dynamic Growth Rate of Arabidopsis Under Simulated Microgravity Conditions

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OBJECTIVE

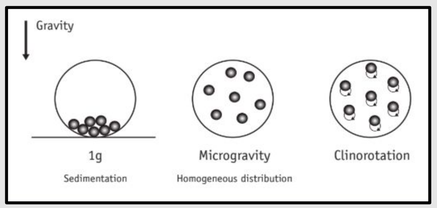
- The experiment will focus on the influence of simulated clinorotated microgravity during the germination period on the growth rate of Arabidopsis Thaliana.

BACKGROUND

- Arabidopsis is a small flowering plant of the family Brassicaceae and can be found on roadsides and disturbed land and is native in Eurasia and Africa.
- We are going to use Arabidopsis in our experiments because of the short life cycle and the sequenced genome
- The Clinostat is a device which uses rotation to negate the effects of gravitational pull on plant growth and development. Therefore it can be used to create simulated microgravity
- The clinostat we will be using for the experiment was built by Collin Topolski

HYPOTHESIS/EXPECTED RESULTS

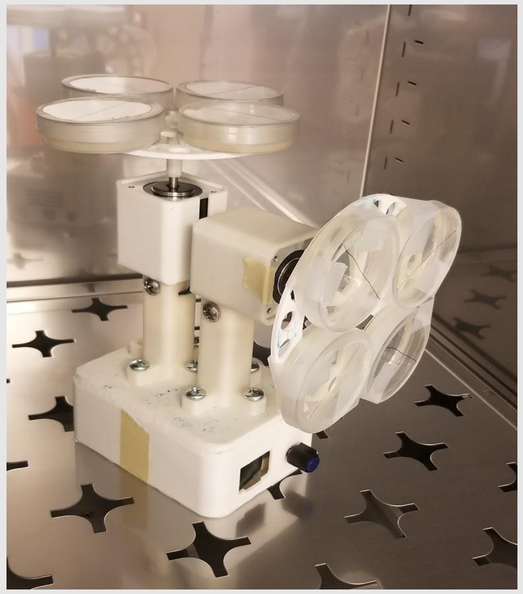
- We predict that the exposure to microgravity will cause the Arabidopsis to grow faster and healthier than our control. We also expect the shoots grown under vertical clinorotation to be distorted, not following the gravitation vector.



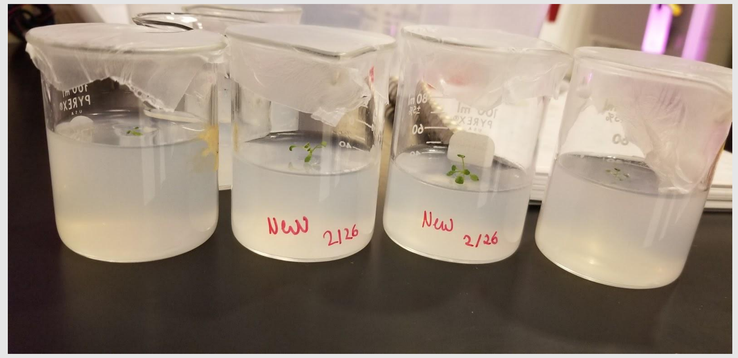
CURRENT EXPERIMENTAL SETUP

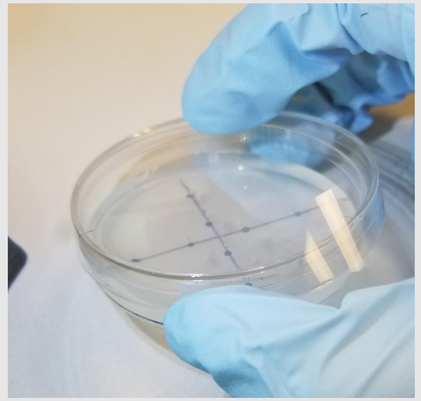
- Arabidopsis seeds are treated with bleach to sterilize
- The seeds are transferred onto 0.7% nutrient agar, on a horizontal and vertical axis spaced 12mm apart to ensure equal growth and control.
- Petri dishes are placed on clinostat and rotated with horizontal and vertical control until germination of the seets and shoot formation (25-44 hours)
- Seeds are removed from the clinostat and placed in growth chambers keeping a constant aseptic field to avoid contamination
- Growth chambers are placed in the environment box for observation and humidity and temperature are monitored using a data logger

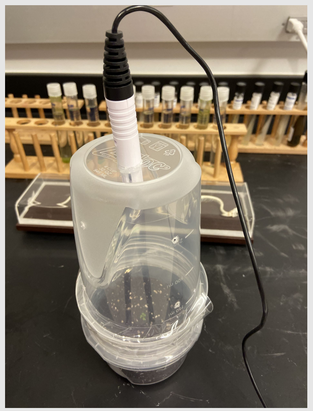
CLINOSTAT



RESEARCH PHOTOS







FUTURE WORK

- We intend to expand the experiment, with the objective to analyze DNA and RNA samples in Arabidopsis cells under simulated microgravity conditions.
- Looking at DNA and RNA samples can give insight on changes in gene expression due to the exposure to microgravity.
- A kit will be used to lyse the plant material and afterwards purify and preserve the DNA and RNA of the plant for analysis of their genome.