

Title: The Effect of Microgravity Over Time on the Circadian Clock in *Arabidopsis thaliana*

For future spaceflight, it is important to understand plant growth and response to altered gravity. In microgravity fluid dynamics is disrupted and biochemical processes that depend on diffusion may be disrupted. The circadian clock regulates the plant's biochemical and molecular activities, so they are coordinated with the 24h daily cycle. The circadian clock is a tightly connected molecular network dependent on precise diffusion and kinetics for its function. Therefore, we wanted to ask the question: does reduced gravity affect the circadian clock.

To examine the effect of microgravity on circadian clock, we used a random positioning machine (RPM) to simulate microgravity. Plants were harvested from the RPM every 2 hours for 48 hours to observe the genetic response of core clock genes to simulated microgravity. Two complete replicates were harvested.

RNA isolated from the shoot tissue at each time point for transcriptional analysis to observe the effect of microgravity on the core circadian clock genes and downstream clock-regulated targets. This time-course will be a comprehensive observation of plant response to the abiotic stress of microgravity over time, and will be useful for understanding these responses for future longterm space travel.