Earthworm or Spaceworm?

The Effects of Microgravity on the Growth of the Red Wiggler Earthworm

Investigators: Ashlyn Johns, Sohan Islam, Carolyne Harvey, Heston Irons, and Sara Gutierrez Cortazar

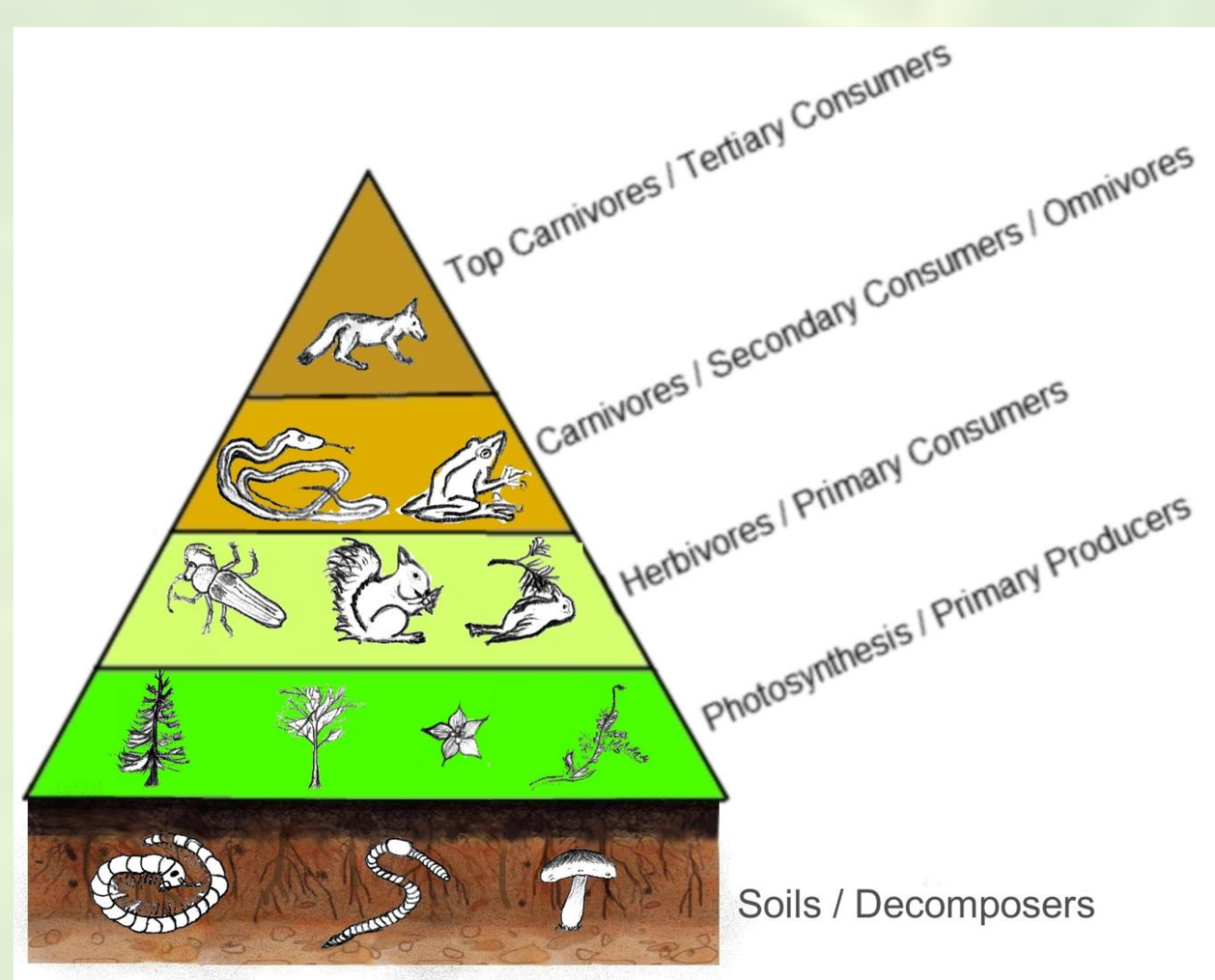
Teacher Facilitator: Alyssa Sanchez

Experiment Importance

Why is this experiment important for humankind?

This experiment can help further space exploration to understand the effects of the microgravity on the growth of Earthworms.

Ecosystems rely on decomposers as a building block to break down nutrients for plants. Earthworms play a role in in an ecosystem to constantly recycle broken down organic matter.



The Reason

We are proposing to study the effects of microgravity on decomposers because if we are to explore other planets we are hopeful that decomposers can grow and live to bring the benefits.

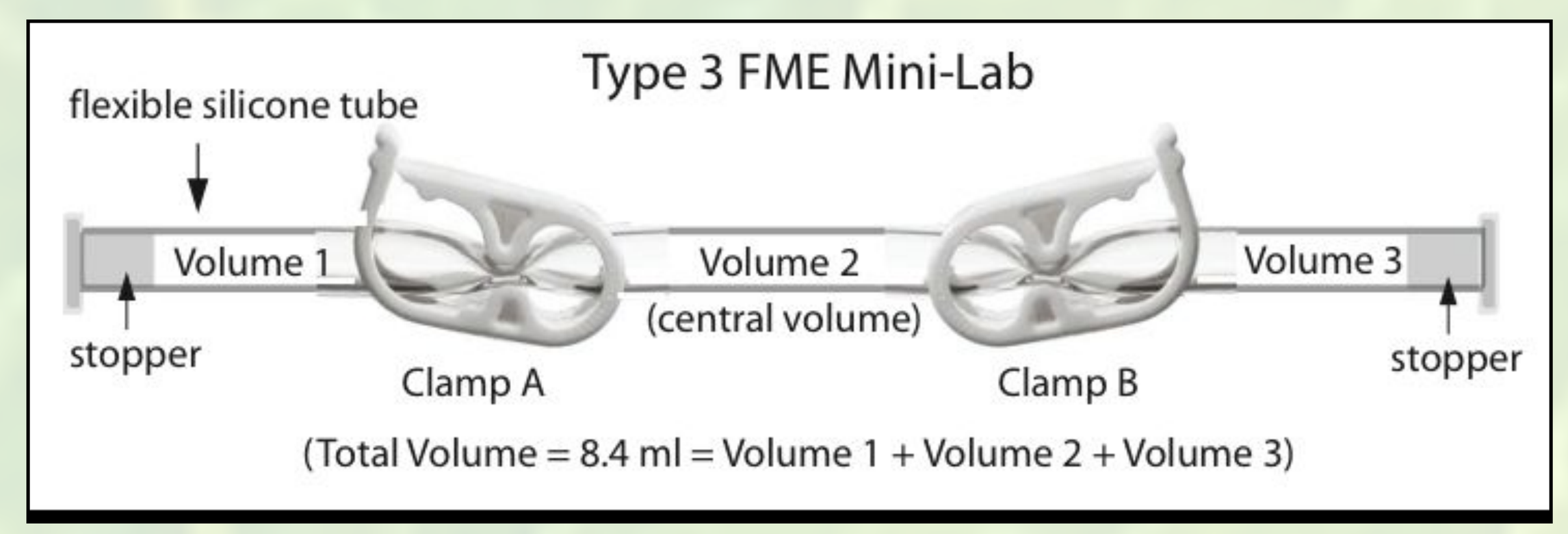
With the experiment, we will gain more information about the growth of an Earthworm in microgravity.

Proposal Summary

Earthworms are crucial to the colonization of a planet due to being a decomposer. They improve nutrients of the soil and they remove the dead roots, grass, and biotic factors and break them down. The process of breaking down organic matter to improve the fertility of the soil and create air pockets. These air pockets are another benefit to the soil because it allows air flow for the fertility of the soil.

If you find out what could happen to the growth of the earthworm this could possibly help gain information in the process of colonizing other planets. We will learn how a living organism reacts when it is growing and changing in microgravity.

We are going to compare the size of the earthworms grown in microgravity to the earthworm grown in Earth's gravity. The growth size is a determining factor if earthworms are able to further space exploration and assist with the colonization of planets as decomposers are a critical part of an ecosystem.

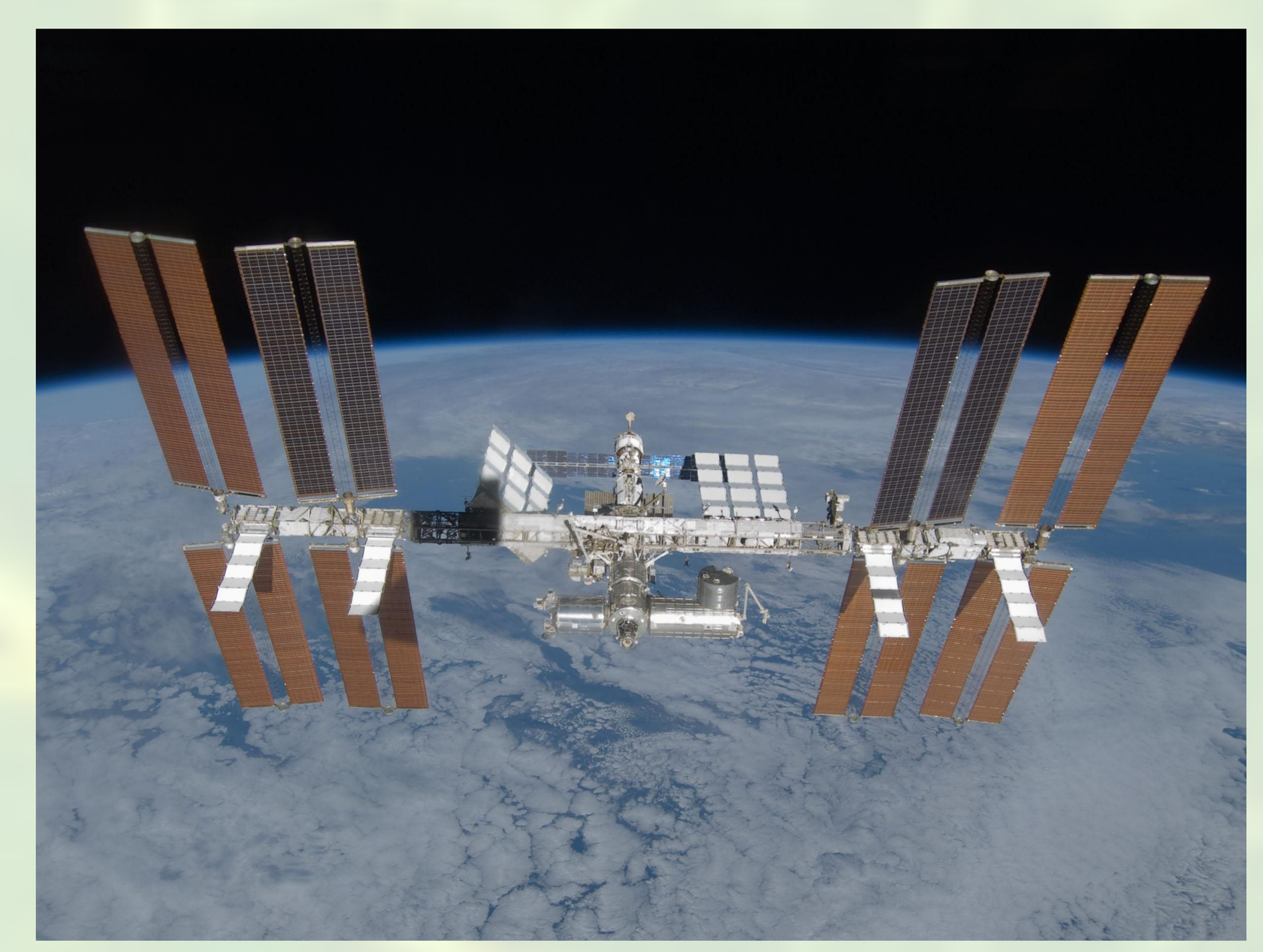


What is the FME tube? An FME tube is a experiment housing that is airtight and can have three variations. It can have no clips, one clip, or two clips. Our experiment requires a Type 3, which has two clips.

Special Handling Requirements During Transportation

FME will be refrigerated from Burleson TX. to NASA with a temperature of at least 40℉ to match the experimental test on the ISS. It will also need to be refrigerated on its return to Burleson TX from NASA. We will follow the same experimental process with the control test on Earth.

Travel	Location and destination	Refrigeration	Ambient Condition
PRE-FLIGHT	Shipping from your Community to NanoRacks in Houston	X	
	At NanoRacks until Handover to NASA	X	
FLIGHT	Handover to NASA Until Arrival at ISS	**X (required)**	
	Onboard ISS		**X (required)**
POST-FLIGHT	From ISS until Arrival at NanoRacks		**X (required)**
	At NanoRacks through Return Shipping to Community	X	



Proposed Results

In our earthbound test of refrigerated Earthworm cocoons, we noticed that the growth of the earthworms is delayed. The unrefrigerated cocoons hatched from their cocoons a few weeks ahead of the refrigerated. We hypothesize the the same will happen in a microgravity environment. The refrigeration will most likely act like a hibernation period until they reach ambient temperature aboard the ISS. We feel that the growth of the Earthworms from the cocoon stage will match

We hypothesize the the same growth rate will happen in a microgravity environment. The earthworms grown in gravity and microgravity will be similar.

References

Clark, Josh. "How Earthworms Work." *HowStuffWorks*, HowStuffWorks, 16 Dec. 2011,

animals.howstuffworks.com/animal-facts/earthworm4.htm

"How Do Earthworms Eat and Poop - and Other Surprising Facts." *The Washington Post*, WP Company, www.washingtonpost.com/national/health-science/how-do-night-crawlers-eat-and-poop--and-other-surprising-facts/2017/04/21/ebe2a8ac-13ee-11e7-ada0-1489b735b3a3_story.html?utm_term=.e7b3ef277d83

Sartore, Joel. "Common Earthworm." *Earthworm | National Geographic*, 21 Sept. 2018, www.nationalgeographic.com/animals/invertebrates/c/common-earthworm/

Brainard, Jean. "Scientific Measuring Devices." *CK-12 Foundation*, CK-12 Foundation, 13 Sept. 2016, www.ck12.org/c/physical-science/scientific-measuring-devices/lesson/Scientific-Measuring-Devices-MS-PS/.