Of Bobtails and Bacteria: Intro to Experimentation and the GeneLab Data Repository

Worksheet
Student Materials

OVERVIEW

This activity presents the symbiosis of the bobtail squid and its microbes, and provides an introduction to accessing the GeneLab data repository. Students will make observations using video clips and should have familiarity with the vocabulary of independent and dependent variables in a scientific experiment.

KEY CONCEPTS

- Symbiosis describes the physical interaction between two or more different living organisms.
- Biotic factors affect the survival of organisms.
- Data is derived from experiments and experimental studies and can be publically shared.

OBJECTIVES

- Students will be able to state objective observations without anthropomorphizing the organism.
- Students will be able to identify at least one example of a symbiotic relationship.
- Students will be able to describe relationships between variables using real, publically available data.

CASE STUDY: Symbiosis

PART 1. Getting to know your Bobtail Squid

1. Write **five observations** about the image below. Try to include an estimate of the size of the organism using the scale provided and the hand included in the photo.

Image used with permission from M.J. McFall-Ngai, University of Hawaii at Manoa

2a. Watch the video clip: https://www.youtube.com/watch?v=p91OZVo_1a0

2b. Describe what you saw in the video clip.

3b. What organism has a symbiosis with the squid that causes the squid to light up?

4a. Watch this video clip: https://www.youtube.com/watch?v=3OGEXs27kRs

4b. What is the scientific term for the light that is emitted by living things?

4c. Describe the relationship between the bobtail squid and the *Vibrio fisheri*.

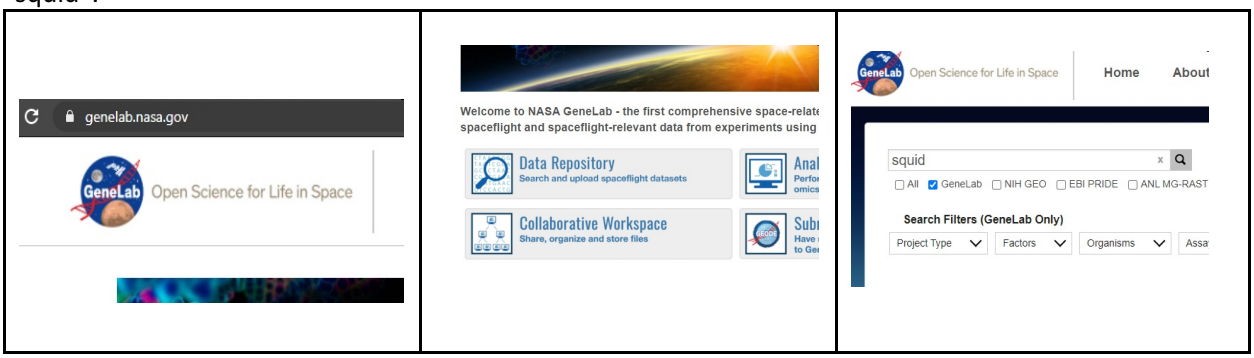
5. Write a testable, scientific question regarding the squid and its symbiosis with *Vibrio fisheri*.

5. List dependent and independent variables that would be addressed by your question in the previous step.

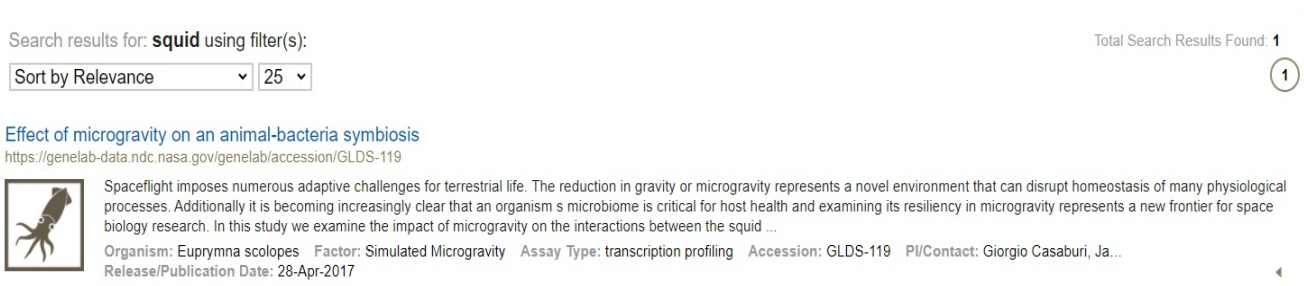
PART II. Accessing Squid Research

These squid have been an organism of interest to interest to many researchers, including Dr. Jamie Foster who is at the University of Florida and works with NASA Ames Research Center for space biosciences.

1. Navigate to the website: genelab.nasa.gov >> Click on **Data Repository** >> and in the search bar, type "squid".



You should see the following study listed:



Click on the hyperlink title in your browser or click on this: "Effect of microgravity on an animal-bacteria symbiosis".

2. Look in the **Protocols** tab, specifically in **sample collection**. In what temperature and lighting conditions were these squid kept? How long is the developmental cycle of the squid?

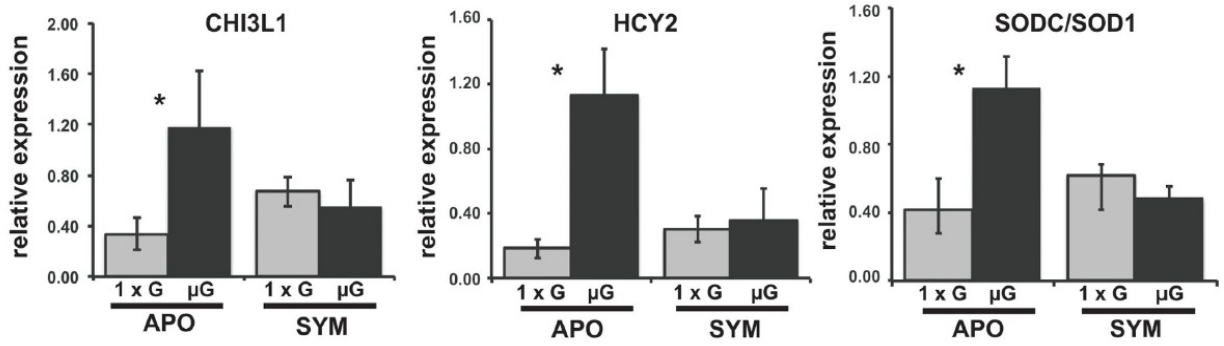
8. Two groups of squid were created: **aposymbiotic** and **symbiotic**. What is being compared between these two groups?

9. What platform was used for the **nucleic acid sequencing**?

10. Look in the **Samples** tab. How many samples were taken? (You might need to scroll through in order to count.)

PART III. Extending Meaning to Squid Research

Examine these graphs that were retrieved from the published squid study:



1. Describe objectively what you see in these graphs, such as axis labeling, abbreviations, etc.

2. Describe what the contents of the graph mean, specifically interpreting what you described in the previous step.

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