



# Introduction to Model Organisms

Worksheet  
Student Materials

## OVERVIEW

This activity introduces students to the concept of model organisms, what qualifies a species as a good model organism, and their importance to science research.

## KEY CONCEPTS

- Model organisms are any non-human species that are widely studied in the laboratory setting and have a very particular experimental advantage.
- Model organisms are easy to maintain and breed in a controlled environment.
- Model organisms are Domesticated for empirical studies but can also be found in the wild.

## OBJECTIVES

- Students will be able to list characteristics of model organisms.
- Students will be able to explain what qualifies a species as a model organism.
- Students will be able to justify the role of model organisms in Space Biology research.

## PART 1: What are model organisms?

Complete the right column of the table below using the links posted on the left column to have a quick overview of what model organisms are.

Table 1:

	How “model organisms” are explained from each source:
Video Source: <a href="https://www.youtube.com/watch?v=CqF8KeQU4hw">https://www.youtube.com/watch?v=CqF8KeQU4hw</a>	
Literature Source: <a href="https://www.yourgenome.org/facts/what-are-model-organisms/">https://www.yourgenome.org/facts/what-are-model-organisms/</a>	

## Part II: What makes a 'Model Organism'?

1. Click this link and watch the video while completing Table 2 with the correct information below:

<https://www.yourgenome.org/facts/what-are-model-organisms/>

2. Watch this video for Organism #4: <https://www.youtube.com/watch?v=z0KHiU2ncLw>

3. Identify the four model organisms discussed in the videos and describe their importance to scientific research:

Table 2:

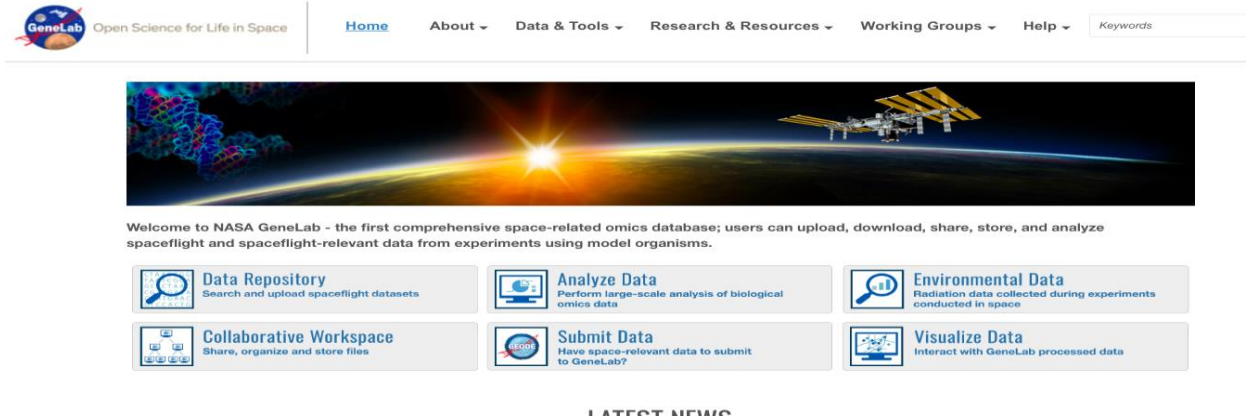
Organism # 1 _____	Organism # 2 _____	Organism # 3 _____	Organism # 4 _____
Importance to Scientific Research:	Importance to the Scientific Research:	Importance to Scientific Research:	Importance to Scientific Research:

3. In the box below, summarize/list the organisms in table 2's key features that makes them great Model Organisms:

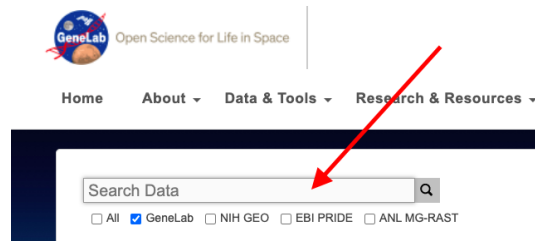
## Part III: Navigating through the GeneLab Data Repository

Now that you know what Model Organisms are, their importance, and their key features, we will look into the model organisms that you listed in Table 2 using the GeneLab Data Repository. GeneLab is an open access system that compiles - omics experiments done by scientists worldwide conducted either on a “Space Shuttle, the International Space Station and/or in ground-based simulation models” (Blaber & Gebre, 2021).

1. Click this → <https://genelab.nasa.gov/>
2. You should be able to see this page:



3. Click the **Data Repository**.
4. In the **Search Data** bar, type: Fruit Fly



5. Scroll down and look for “[Drosophila melanogaster gene expression changes after spaceflight.](#)”
6. Read the **Description** and **Protocols** then fill up Table 3 below.
7. Do steps 4 - 6 for organisms 2 and 3: (Yeast and *C. elegans*)
8. For the model organism Yeast, click this from the list: “[Genes Required for Survival in Microgravity Revealed by Genome-Wide Yeast Deletion Collections Cultured during Spaceflight](#)”
9. For the model organism *C. elegans*, click this: “[Microgravity effect on C. elegans N2/VC \(CERISE 4 days\)](#)”
10. For the model organism *A.thaliana*, click this: “[A whole-genome microarray study of Arabidopsis thaliana cell cultures exposed to microgravity for 5 days on board of Shenzhou 8](#)”

Note: You may also click the **Publications** on the left side of your screen for a more detailed discussion of the studies. They are also hyperlinked below for your convenience.

Fruit Fly (*Drosophila melanogaster*): <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0015361>

Baker’s Yeast (*Saccharomyces cerevisiae*): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4309212/>

Roundworm (*Caenorhabditis elegans*): <https://www.nature.com/articles/npjmgrav201522>

Thale cress (*Arabidopsis thaliana*): <https://www.hindawi.com/journals/bmri/2015/547495/>

Table 3:

Model Organism	Assays used in this study	Role of the genes affected by the spaceflight	Briefly describe one or two methods conducted in the studies that cannot be done to Human species
Fruit Fly ( <i>Drosophila melanogaster</i> )			
Baker's Yeast ( <i>Saccharomyces cerevisiae</i> )			
Roundworm ( <i>Caenorhabditis elegans</i> )			
Thale cress ( <i>Arabidopsis thaliana</i> )			

### Part IV: My takeaway

In the box below, explain your take on why Model Organisms are vital in Science Research specially in Space Biology studies?

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