

Activity 3: Metadata Analysis Using GLDS-38

Curricular Unit
Student Materials

Instructions: Navigate a web browser to [NASA GeneLab: Open Science for Life in Space](https://www.nasa.gov/genelab)

Welcome to NASA GeneLab - the first comprehensive space-related omics database; users can upload, download, share, store, and analyze spaceflight and spaceflight-relevant data from experiments using model organisms.

- Data Repository**: Search and upload spaceflight datasets
- Analyze Data**: Perform large-scale analysis of biological omics data
- Environmental Data**: Radiation data collected during experiments conducted in space
- Collaborative Workspace**: Share, organize and store files
- Submit Data**: Have space-relevant data to submit to GeneLab?
- Visualize Data**: Interact with GeneLab processed data

Once on the site, click on **Data Repository** and search for **GLDS-38**.

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Studies Per Page: 25

Transcriptional profiling of livers from mice flown on Rodent Research Reference Mission-1 (RRRM-1)

Organisms	Factors	Assay Types	Release Date	Description
Mus musculus	Spaceflight Age Duration Euthanasia Location Dissection Condition	transcription profiling	26-May-2021	In the Rodent Research Reference Mission (RRRM-1), forty female BALB/cAnNTac mice were flown on the International Space Station. To assess differences in outcomes due to age, twenty 10-12 week-old and...

Transcriptional profiling of roots and shoots from Brachypodium distachyon seedlings flown on the ISS

Organisms	Factors	Assay Types	Release Date	Description
	Spaceflight Accession Organism Part	transcription profiling	20-May-2021	Most major cereal grain crops are monocots. Yet, most investigations of plant adaptation to the spaceflight environment have been carried out on the dicotyledonous model plant, Arabidopsis thaliana. I...

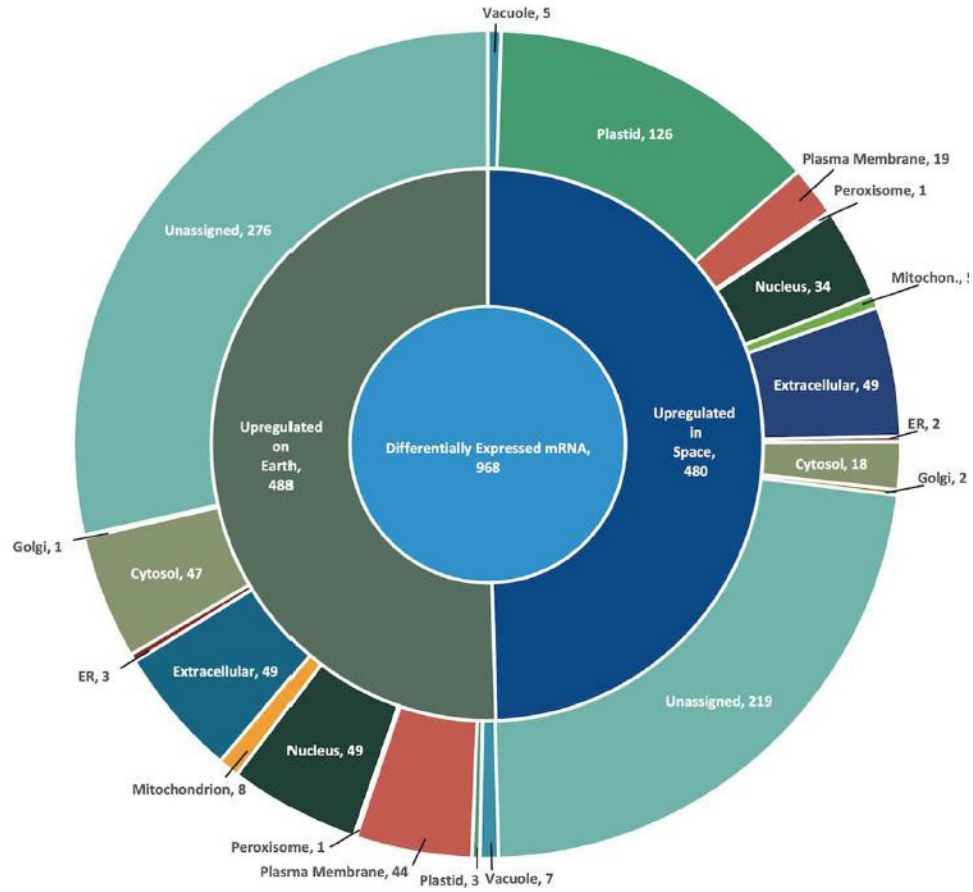
This will bring you to the study that we will be analyzing in this curricular unit, [Proteomics and Transcriptomics analysis of Arabidopsis Seedlings in Microgravity](#).

The screenshot shows the GeneLab search interface. At the top, there are logos for GeneLab and NASA, and navigation links: Home, About, Data & Tools, Research & Resources, Working Groups, and Help. The search bar contains 'GLDS-38'. Below the search bar, there are checkboxes for 'All', 'GeneLab', 'NIH GEO', 'EBI PRIDE', and 'ANL MG-RAST'. The 'GeneLab' checkbox is checked. Under 'Search Filters (GeneLab Only)', there are dropdown menus for 'Project Type', 'Factors', 'Organisms', and 'Assay Type', along with a 'Clear' button. A 'Show Only' section has a checkbox for 'Studies With Visualizations'. The search results section shows 'Search results for: GLDS-38 using filter(s):' and 'Total Search Results Found: 1'. A dropdown menu for 'Sort by Relevance' is set to '25'. The first result is 'Proteomics and Transcriptomics analysis of Arabidopsis Seedlings in Microgravity' with the URL 'https://genelab-data.nsl.nasa.gov/genelab/accession/GLDS-38'. Below the title is a small icon of a plant in a pot and a text description: 'On Earth plants are constantly exposed to a gravitational field of 1G. Gravity affects a plant in every step of its development. Germinating seedlings orient their radicle and hypocotyl and growing plants position organs at a specific Gravitropic Set-point Angle dictated by the asymmetric distribution of auxin depending on the gravity vector. Hence gravitropism is one of the fundamental growth responses in plants. For any experiment studying the effects of gravity on plants the ultimate control ... Organism: Arabidopsis thaliana Factor: Spaceflight Preservat... Assay Type: protein expression pr... Accession: GLDS-38 PI/Contact: Sarah Wyatt Release/Publication Date: 01-Nov-2015'.

Click on the hyperlink that corresponds to the study “[Proteomics and Transcriptomics analysis of Arabidopsis Seedlings in Microgravity](#)”.

1. According to the **Study Description**, what is one of the fundamental growth responses in plants? What is the ultimate control for any experiment studying the effects of gravity in space?
2. What is the model organism for this study?
3. In the **Samples** section under **Factor Value**, what two groups are being compared in the study? What is being compared?
4. Under the **Protocol** section, how was nucleic acid extracted? What platform was used to sequence it?

5. Look at the figure below.



The figure shows an overview of transcripts differentially expressed during spaceflight. How do the upregulated in space compare to those on earth?

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