Genes in Space Student Resource Guide

By Alicia Oelfke, Science Teacher, Glenwood Middle School

Before getting started:

The competition is described on www.genesinspace.org.

- Peruse the home page briefly to get a feel for the competition.
- Read the U.S. competition page more carefully. Review the competition requirements and rewards, but focus on the requirements!
- Look at the FAQs at the bottom of the page. Read through those that seem more pertinent.
- On the Meet Us page, check out the previous winners.
- Time to start researching genetics!
    - Stated Clearly (brief, detailed videos explaining the basics of genetics and natural selection) http://statedclearly.com
    - Scitable (A resource from Nature with great explanations of biology topics written at a secondary level) http://www.nature.com/scitable/topic/genetics-5
    - BioInteractive from HHMI http://www.hhmi.org/biointeractive/genetics
    - https://geneed.nlm.nih.gov
    - https://www.dnalc.org
    - https://www.genome.gov/12511466/from-the-blueprint-to-you
    - Learn Genetics by the University of Utah http://learn.genetics.utah.edu
    - http://evolution.berkeley.edu/evolibrary/article/evo_01
    - How Stuff Works http://science.howstuffworks.com/life/genetic
    - Zymo Research (information on epigenetics and how to research it) http://www.zymoresearch.com/learning-center/epigenetics/epigenetics-research-techniques
- Now consider whether you are really ready to commit to this competition!

How to get started:

(all you will need for submission)

To submit an idea to the Genes in Space contest, you will answer just four questions online:

1. Describe the scientific problem that you propose to address. What is the question you are trying to answer? What makes it significant, relevant, or interesting? (200 words)
2. State your hypothesis. What are your objectives and possible outcomes? (200 words)
3. Explain how the unique environment aboard the International Space Station is required to test your hypothesis. What conditions of the space station are essential for your research? (200 words)
4. Outline your experimental plan. How will you use PCR to test your hypothesis? Specify for example: the samples you will analyze, controls that you will use, and the possible experimental outcomes? (200 words)

Start thinking about Genes in Space

Defining the problem

1. What is the question you are trying to answer? Be specific.
2. Why is this question relevant? Name what answering this question would allow humans to do.

Developing a hypothesis

3. What is your hypothesis?
4. Diagram your hypothesis with step-by-step justifications found during your research.

Testing your hypothesis

5. How would you design an experiment to test your hypothesis? Highlight how the PCR technique is needed for this type of research. Are other techniques necessary?
6. How does testing your hypothesis require the unique environment of the International Space Station?
7. What are the possible experimental outcomes and how would they support/refute the hypothesis?

Designing the experimental plan

8. What data would you collect?
9. What samples will be required for your experiment as inputs to the miniPCR machine?
10. Which physical variables should be considered to complete this experiment aboard the International Space Station?
11. What research or scientific principles in science can you use to explain or justify your experimental design?

Summary: How would you explain your project to a fellow student, in less than 50 words? Be specific.

What is "genetics"?

https://www.youtube.com/watch?v=aeAL6xThfL8
https://www.youtube.com/watch?v=0_b80fHmuWw
https://www.youtube.com/watch?v=vP8-5Bhd2ag

What is "epigenetics"?

Epigenetics 101
Epigenetics: Why Inheritance Is Weirder Than We Thought
What is epigenetics?
Epigenetics