**Slide order:**

1. Sophia
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10. Brady
11. Jameson
12. Mazelie
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**Roles:**

Sophia - Lab Coordinator

Lizzy - Payload Leader

Jerry and Ethan - Vehicle Construction

Emma - Painting Leader

Brady - Maze Man

Jameson and Mazelie - Launch Crew

It is strongly encouraged for presenters to write down word for word what they are going to say

30 seconds is the allocated time for each slide

Smile a lot, speak clearly, confidently, make sure you understand your content, come prepared.

**Do not undermine team!** If someone answers question incorrectly, try and add on without correcting too much. Never criticize or downplay your project during public presentation.

If you are not happy with your or your team mate’s presentation, don’t say anything and make no facial reactions (it won’t help). Don’t rough up your teammates for poor performance - they certainly did not set out to do that. This is your time to learn, cut yourself and others some slack.

Share your narrative with [pinkasp@gmail.com](mailto:pinkasp@gmail.com)

There's 12 slides in the presentation and 8 of you. A small number of slides per person and count on having one minute to deliver your slides (I think you’re time limit is between 5-10 mins but 7 mins is a good time to start with).

* Presentation Attire: club polo, khaki/black dress pants or skirt, dress shoes.

# **Sophia**

## ***Slide 1) Title 21.4s***

Good afternoon! We are Madison West Rocket club. My name is Sophia, and now I'm going to introduce the rest of team. I am the lab coordinator. This is Lizzy, our payload leader, Jerry and Ethan, our Vehicle construction specialists. Emma, our Design leader. Brady is our Maze Engineer, and Jameson and Mazelie are our launch crew. We're excited to present our experiment: “Hypergravity Induced Behavioral Changes in *Physarum polycephalum* slime mold”

***Slide 2) Missision Patch, mythology (~28 seconds)***

Our project name, Ariadne, comes from the Greek myth of the labyrinth. At center of the mission patch is the constellation Corona Borealis, also known as Ariadne’s crown. It symbolizes the vast reaches of space and the universe itself. The left side of the patch shows a slime mold and the right side shows an electrical circuit. Together, they represent biocomputing and the ability for the slime mold to act **like a computer algorithm.**

## ***Slide 3) Motivation***

For several years our club has studied how organisms respond to spaceflight conditions. High power rockets provide an excellent opportunity to generate intense gravitational force, similar to conditions during a spaceflight takeoff.

Our previous projects focused on two other biological systems; project Jarilo studied Arabidopsis plants, and project Populus fungi studied a symbiotic system between fungus and poplar trees. The results showed that hypergravity triggered the organisms’ preservation instinct: Arabidopsis flowered early, and the symbiotic fungus turned parasitic and attacked the trees. The onset of self-preservation behavior in response to stressful conditions is a major concern for future spaceflight and should be studied in great detail.

# Lizzy

## ***4) Introducing Slime Molds***

We have chosen to study Physarum Polycephalum, a species of plasmodial slime mold. Plasmodial slime molds are single celled protists and one of three distinct groups of slime molds. Our research focuses on 2 specific sections of their life cycle: plasmodium (where the slime mold is a large, gelatinous mass of veins) and young sporangium (the beginning of reproduction, called sporulation). In nature, slime molds reside in shady, damp places and they decompose dead organisms, organic matter, and various fungal spores. Slime molds are extremely sensitive to light, but light also can provide them enough energy to trigger sporulation.

***5) Behavioral Stages of Slime Mold***

Slime molds have three behavioral phases that we’re focusing on in our experiment. The first phase is explorative, where slime mold veins reach out to their surroundings in search of a food source, and attempt to maximize total area searched. The second phase is utilizing, where connections that found food are reinforced, and connections that did not reach a food source die off. The slime mold is a plasmodium at both of these phases. Lastly, when slime molds have enough energy, and believe they are about to die, they begin sporulation, in hopes of starting a new generation in a more prosperous environment.

# Jerry

## ***6) Biocomputing***

## Slime mold is an interesting research subject because of its brainless intelligence and ability to perform certain biocomputing tasks . It can search its surroundings in an efficient manner (similar to computer algorithms) and find efficient solutions. For example, if food is placed on a map where cities are, the slime mold will create a network that closely follows major highways on the map. Slime mold can also find a shortest path through a maze if the food is placed at the entrance and the exit from the maze.

# Ethan

## ***7) Video***

## Now we will show a video showing the slime mold searching for food. As you will see, slime mold starts in the center of the Petri dish and spreads in all directions to find food. Once it finds the food the slime mold will reinforce the successful branches and consumes all food.

# Emma

***8) Experiment Scheme***

## We will start with two identical samples of slime mold, baseline sample and stress sample. We will fly the stress sample in our rocket, while the baseline sample will stay on the ground. We will also create a third hybrid sample, by mixing equal portions of the baseline sample and the stress sample, after the flight. The three samples will each go through five specific maze runs to see how the stresses of rocket flight changed the behavior of teach sample.

***9) Hypothesis***

## We are hypothesizing that the stress group will react strongly to flight stresses and sporulate to preserve its own species. We hypothesize that the hybrid group will be inclined to reinforce plasmodium before it sporulates to ensure its own preservation.

# Brady

## ***10) Maze Design***

We have created five different types of maze, each presenting the slime mold with a different problem to solve. For instance, Maze #4 tests to see if the slime mold will take a longer, simpler route or a shorter, more complex route to the center. Maze #3 has no solution and it will test how quickly the slime mold responds to a no-food situation.

We will present each of the five mazes to a slime mold that has undergone stresses of a rocket flight and compare its performance in maze solving with a slime mold that has not been through the rocket flight. We will be looking for behavioral changes in slime mold caused by its exposure to flight stresses.

# Jameson

***11) Data Collection and Analysis***

Let me summarize our experiment and data that we will be collecting: We will be comparing changes in slime mold behavior in a response to the stresses of rocket flight. We will use three groups of slime mold: baseline, stress (the group that will fly in a rocket) and the hybrid (the group made by mixing baseline and stress groups after the flight).

We will be looking for changes in slime mold’s ability to solve mazes and possible onset of sporulation, which is the slime mold’s strongest defense mechanism. We will use time-lapse imaging to record slime mold’s behavior over the period of several days.

# Mazelie

## ***12) What we have learned***

We learned a lot during this project. Before we started, our research taught us how complex slime mold is and the effects of stress on organisms. In the lab we learned how to prepare agar for and handle slime mold, as well as aseptic technique and time-lapse imaging. During rocket construction we determined how to use OpenRocket software, CAD modeling, and 3D printing. We also applied high power rocketry construction techniques, painting, and surface finishing on the rocket.

## ***13) Acknowledgements and questions***

We would like to thank Hyun-seok Chang, Matilda Carne, Mr. Brent Lillesand, Ms. Christine Hager, and especially Dr. Richard Barker and Ms. Marie Trest from the Gilroy Lab. Now we will gladly answer any questions you may have.