



# From Research To Researcher



## How Collaboration Forms a Scientific Mind

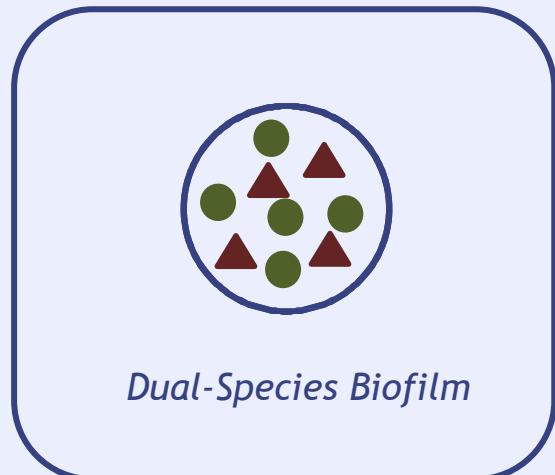
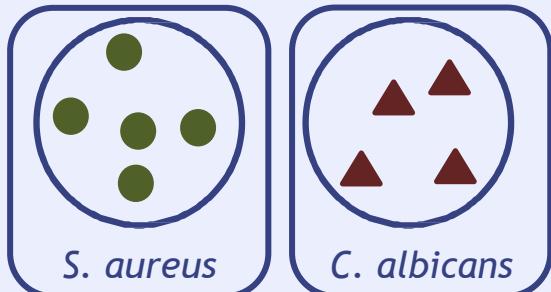
December 1st, 2024

# Freshman in College at the ZOOM Activities Fair



09-22-2020

# Columbia Space Initiative Had an Idea



Space

Earth

Space

- Increased resistance
- Higher mutation rate

(Altenburg, 2008; Rainey, 2014)

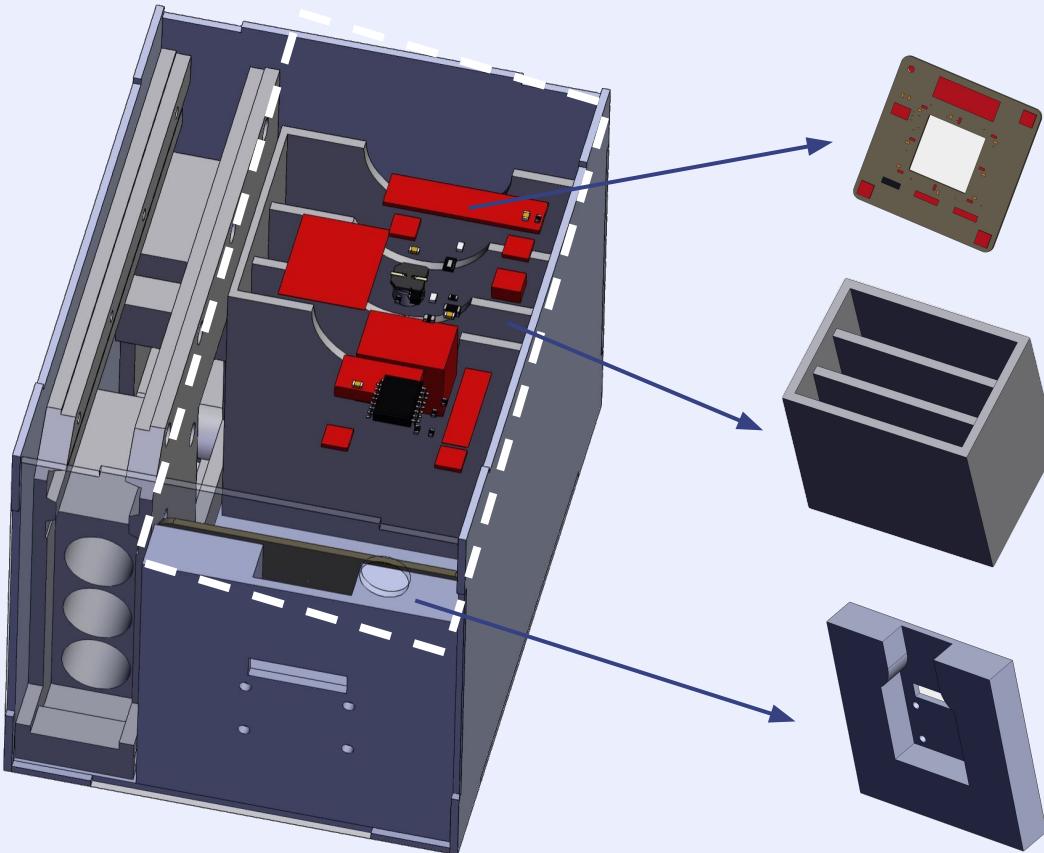
- Increased resistance
- Increased virulence

(Todd et al., 2019; Harriott & Noverr, 2009)

## Hypothesis:

**More Powerful Bacteria:**  
Greater resistance and  
mutation than ground and  
monomicrobial controls

# Columbia Space Initiative would Engineer the Payload



## Electronics

- PCBs, Sensors, Raspberry Pi
- Attached to the top face of the casing

## Petri dishes and holder

- Petri dish holder for antibiotic resistance dishes
- Top open dish for imaging

## Camera and camera mount

- Camera attached to casing through camera mount
- Keeps camera stable for imaging

# OUR TEAM

20 students

10 majors

5 faculty collaborators



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20 students

10 majors

5 faculty collaborators



## Dr. Mike Massimino

Faculty Advisor  
Former NASA Astronaut



## Dr. Raimondo Betti

Structural Systems Advisor  
Civil Engineering



## Dr. Lars Dietrich

Experimental Advisor  
Biological Sciences



## Dr. Arvind Narayanaswamy

Thermal Control Systems Advisor  
Mechanical Engineering



## Dr. David Vallancourt

Electrical Systems Advisor  
Electrical Engineering







SPOCS Launch

Alfonso, Bryan, Gaurav, Hugo...

**Kal Ganeshan**

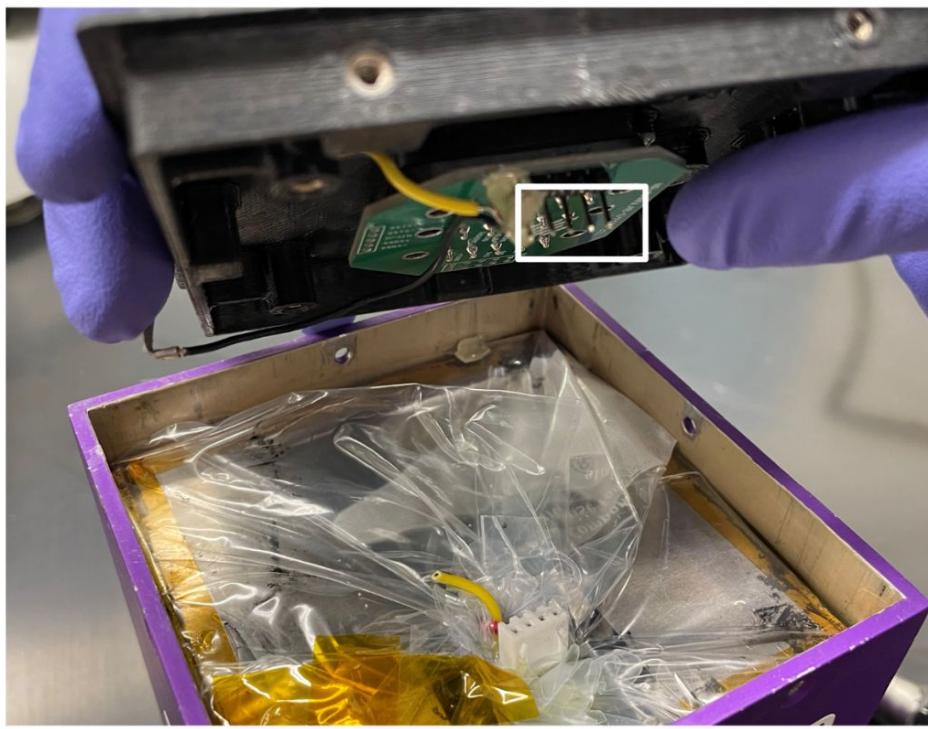
SPOCS Leadership - When2meet

[www.when2meet.com](http://www.when2meet.com)

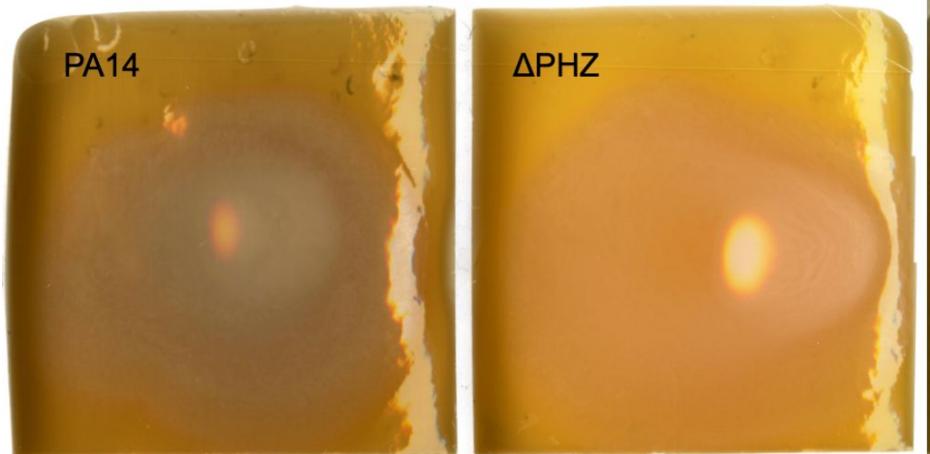
Hey everyone, yesterday afternoon, the payload was plugged in but we were unable to see any current draw, meaning the payload didn't receive any power. Since then, we have been troubleshooting with Nanoracks to try every possible option. Unfortunately, none of these steps have worked & it seems like we will be unable to run the electronics. We think the cause is continuous pressure on the connection between the payload and the nanode connector, which may have caused a connection to break.

***TLDR:***  
**The Electronics Broke**

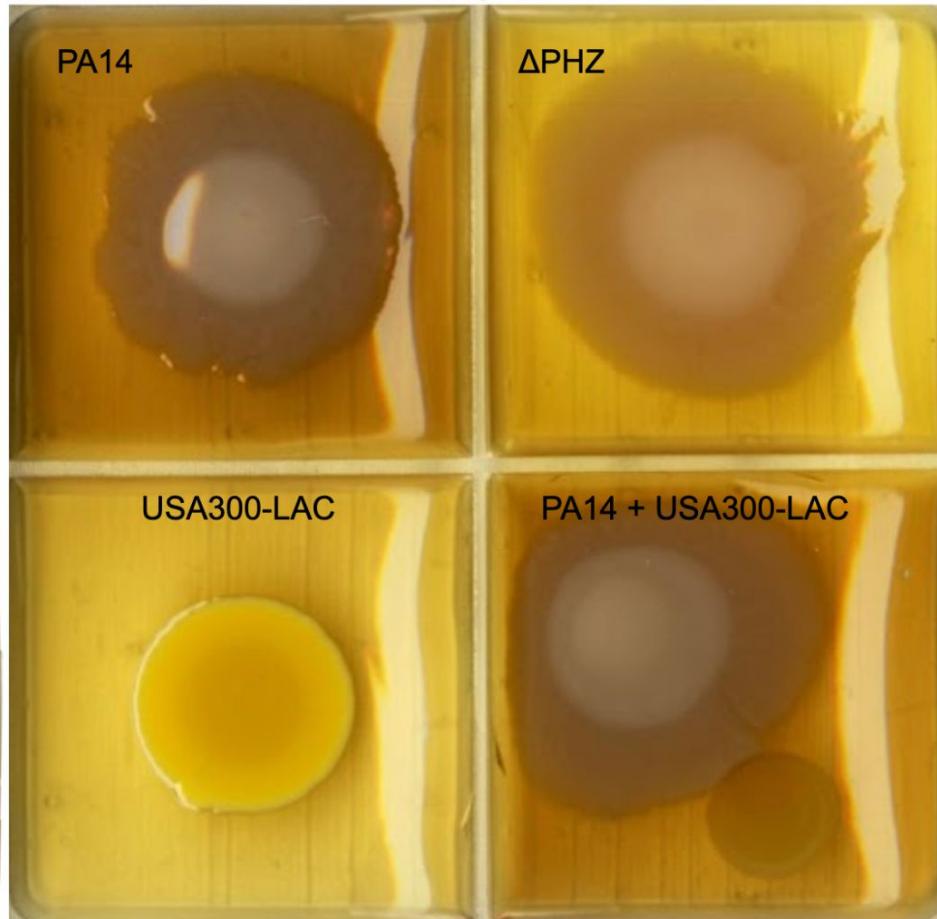




**ISS 3-day biofilms**

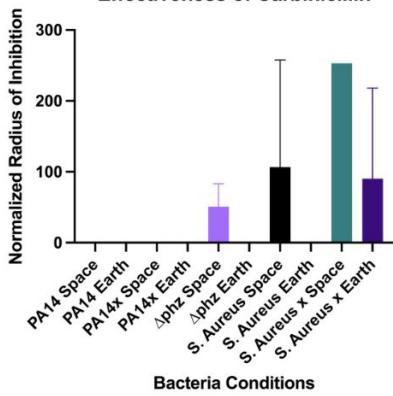


**Earth 3-day biofilms**

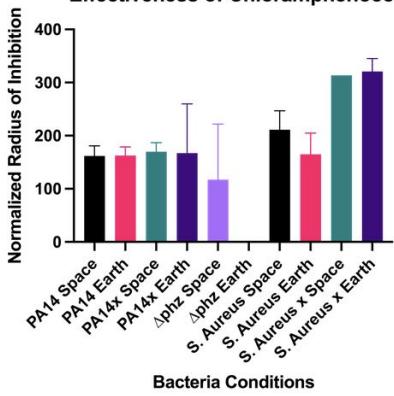


**A****B**

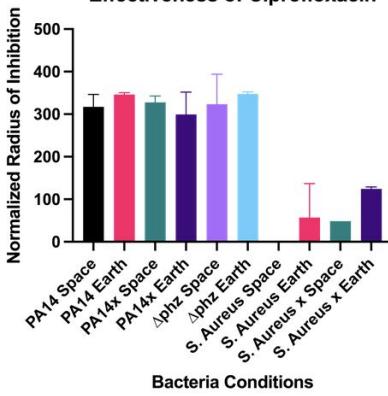
### Effectiveness of Carbinicillin

**C**

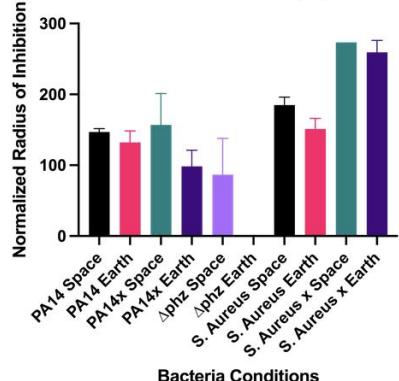
### Effectiveness of Chloramphenicol

**D**

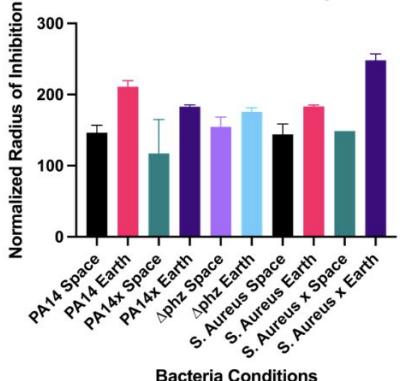
### Effectiveness of Ciprofloxacin

**E**

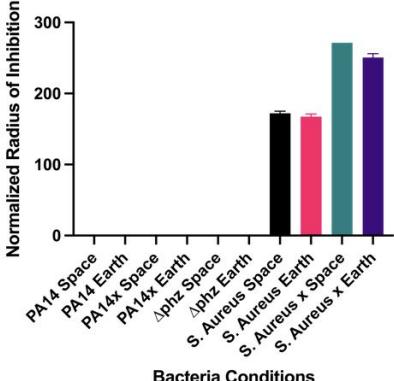
### Effectiveness of Doxycycline

**F**

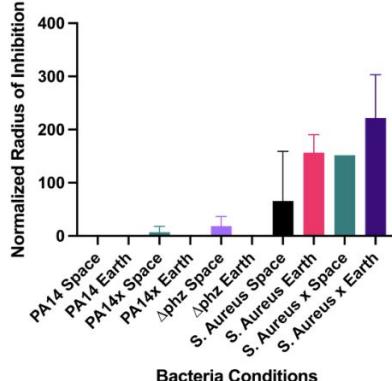
### Effectiveness of Neomycin

**G**

### Effectiveness of Vancomycin

**H**

### Effectiveness of Zeocin



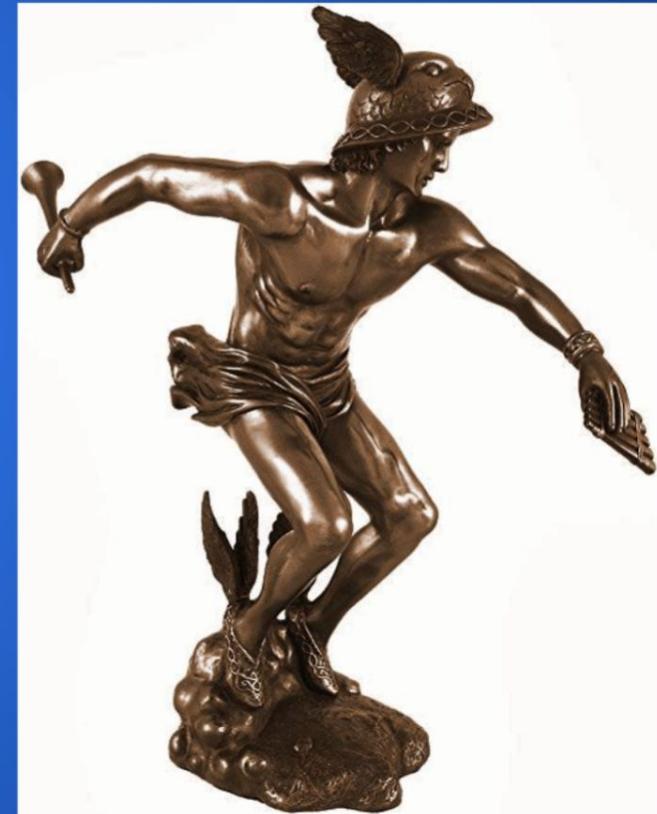
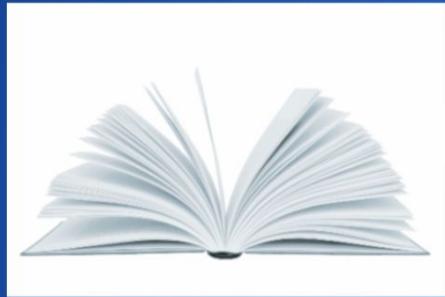
# Foundation

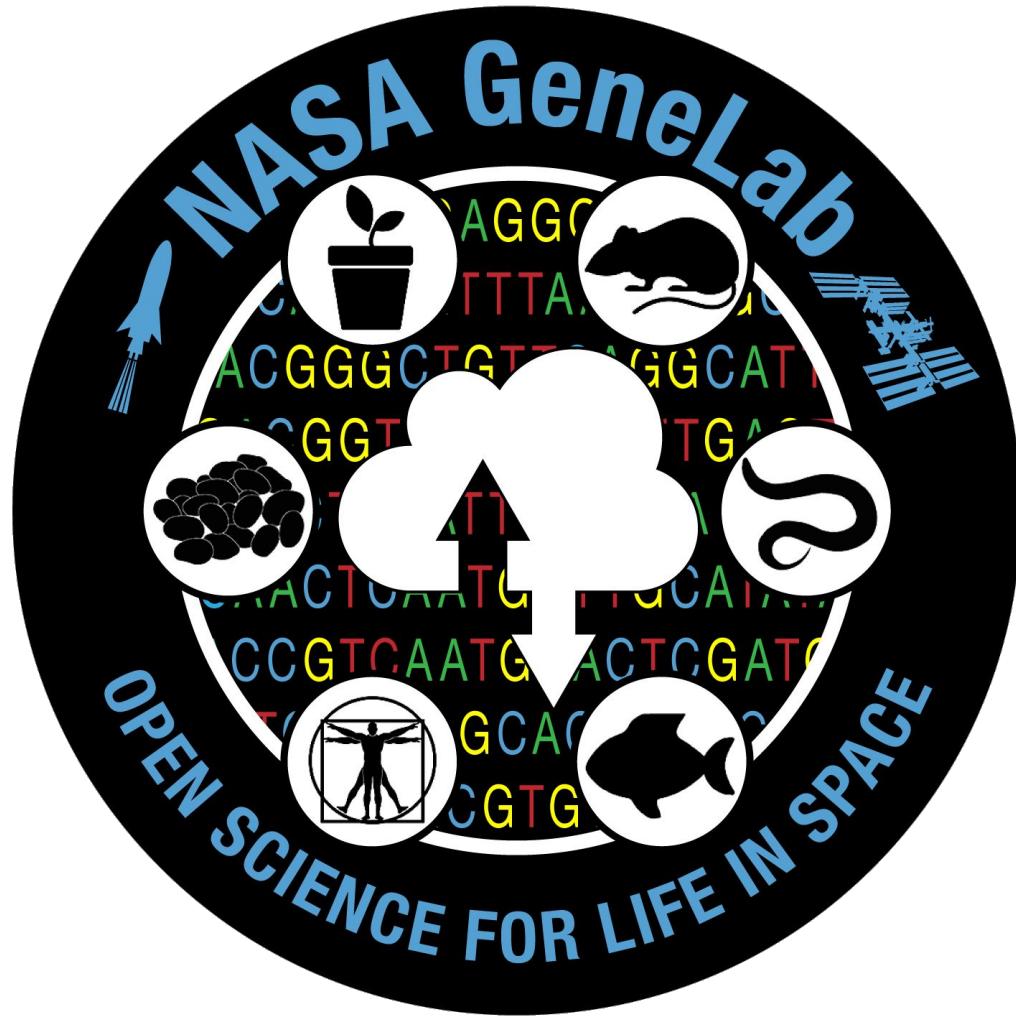
Variability

DNA

RNA

Protein

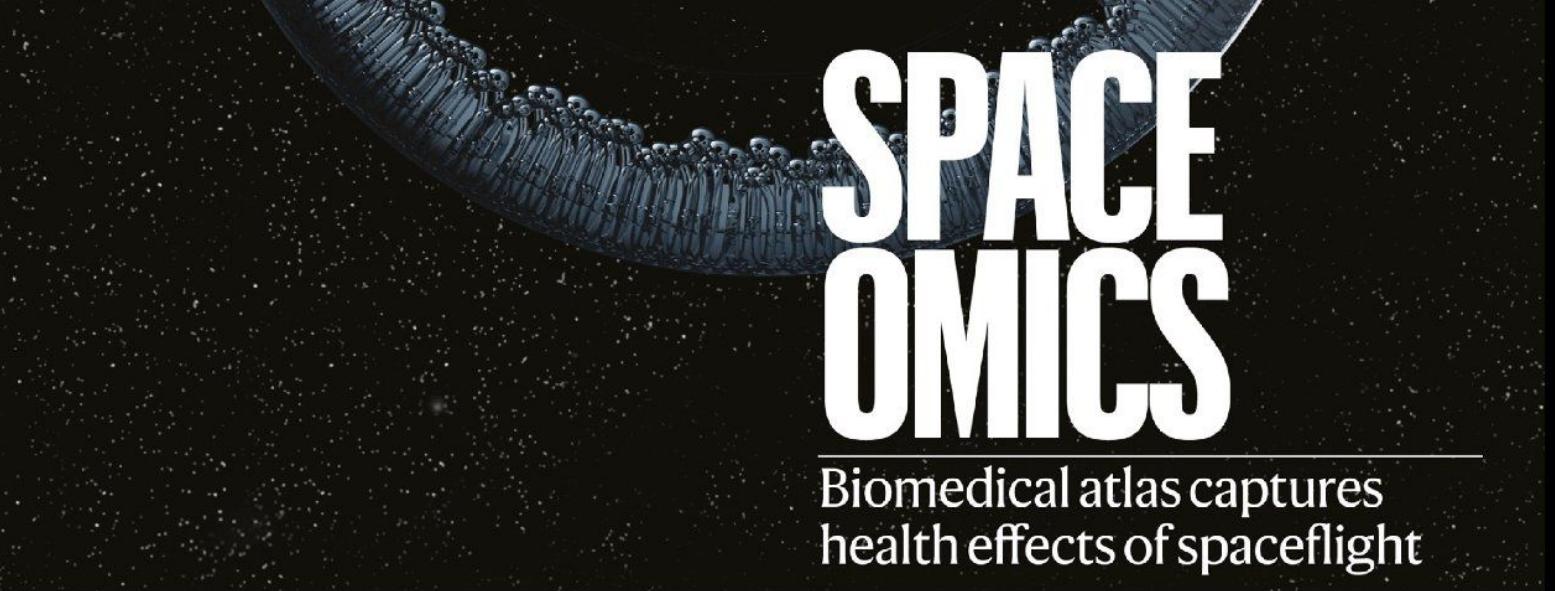




Christopher E. Mason



# Contributing to the Largest Repository of Spaceflight Biology Data Ever



The graphic features a dark, star-filled background with a prominent, glowing blue and white DNA double helix structure winding across the center. Overlaid on the right side is the word "SPACE" stacked above "OMICS" in large, bold, white, sans-serif capital letters. Below this title, a thin horizontal line separates it from the subtitle text.

**SPACE  
OMICS**

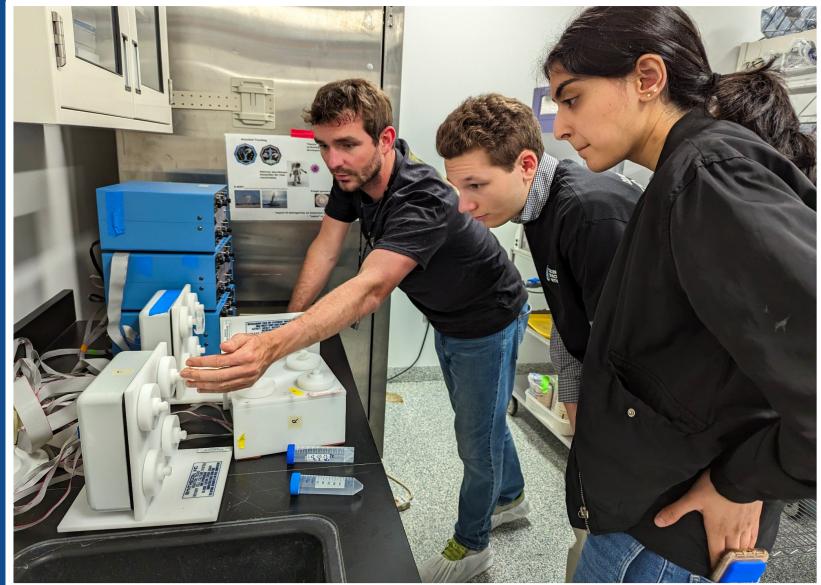
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Biomedical atlas captures  
health effects of spaceflight



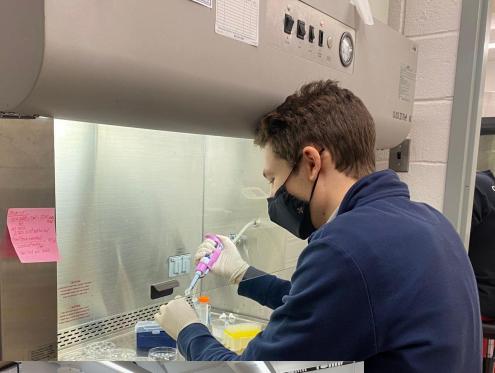
# SUMMER @ CSI:

## MICROBIO @ NASA'S JET PROPULSION LAB

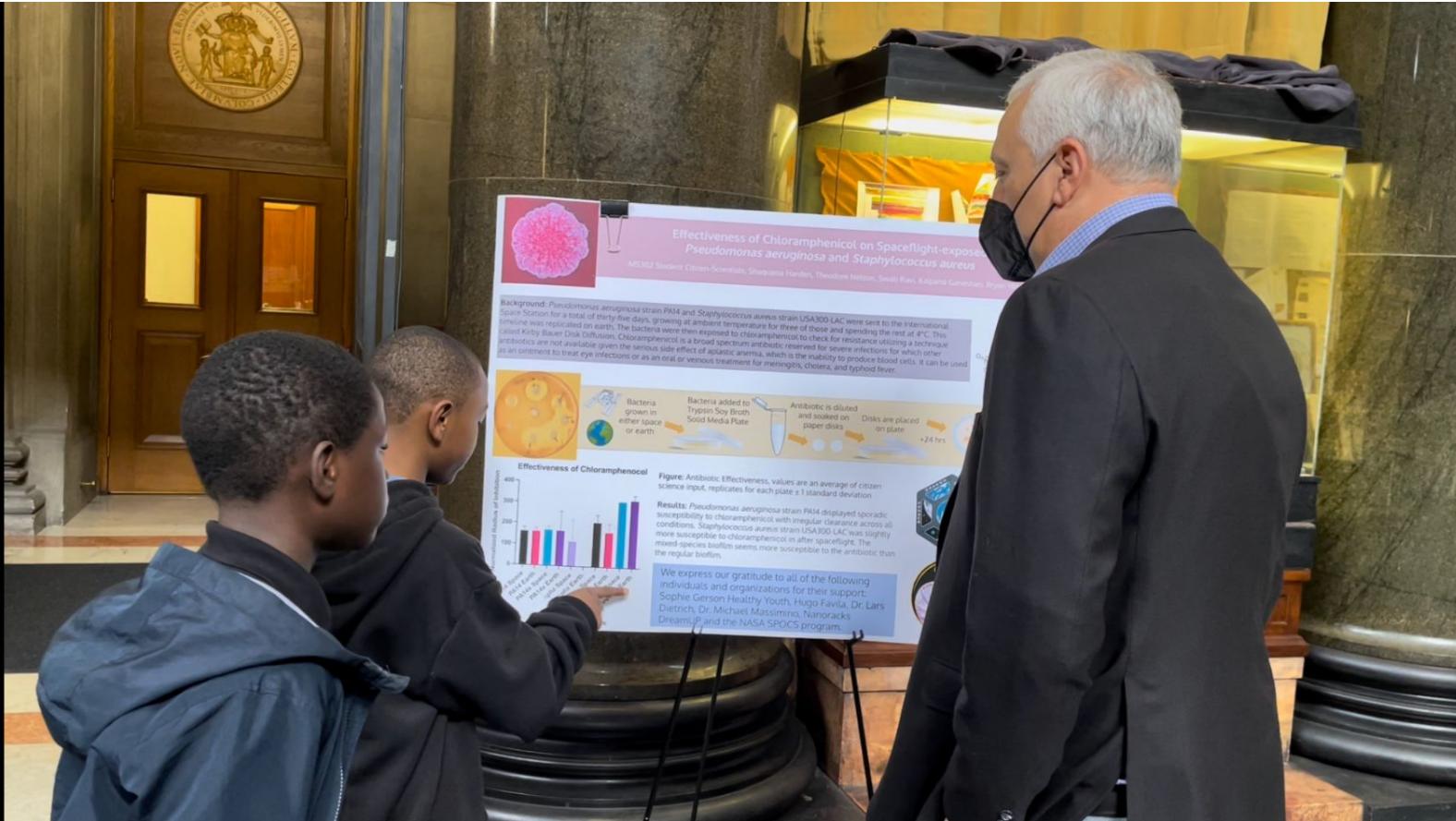


# Why?

Perseverance  
Resilience  
Experience



What we do echoes beyond ourselves



# Thank you



- + CSI SPOCs Members
- + CSI Outreach Crew
- + CSI Leadership
- + Dr. Mike Massimino
- + Dr. Lars Dietrich
- + Dr. Rajesh Soni
- + Dr. Anne-Catrin Uhlemann
- + The Carleton Laboratory at Columbia University
- + Dr. Raimondo Betti
- + Joe Viola
- + Julia Wolfenbarger
- + Lauren Milord
- + Jessica Sain
- + Krystal Winters
- + Becky Kamas

# From Research to Researcher: How Collaboration Forms a Scientific Mind

Posted on August 30, 2022 by Theodore Nelson

At the beginning of my [Columbia College journey](#), I, an eager and excited freshman, attended the virtual activities fair, filled with zoom links which would form the entirety of my university environment for what felt like an indeterminate future. In some rooms I found upperclassmen wistfully recounting the glories of olden days; in other rooms spirited organizers promised an endless parade of zoom events. In the Columbia Space Initiative room, the leadership did both, recounting the good old rockets shot 20,000 feet in the air and articulating a zoom-link heavy future. However, their zooming seemed purposeful, to pursue a one-time [student payload opportunity](#), celebrating twenty years of research on the International Space Station.



The Columbia SPOCS Team Co-Leads, Kalpana Ganeshan and Swati Ravi, Columbia SPOCS Outreach Lead Theodore Nelson, and Columbia SPOCS Mechanical Engineering Lead Alfonso Ussia hold up the spaceflight-flown Characterizing Antibiotic Resistance in Microgravity Environments (CARME) payload before unpacking at Columbia University.  
SPOCS Biology Advisor Bryan Wang is not shown.  
Photo Credit: Theo Nelson.

# Learn more



YouTube Channel



Contact Card

