

# MERCY

## Science Journal

SPRING  
2022





## Welcome to the Mercy Science Journal

We are very excited to present our first-ever edition of the Mercy Science Journal! We hope to support the STEM community at Mercy High School and encourage learning STEM with vibrant passion and joy. Enjoy all the fascinating articles, illustrations and photography in this edition of the Mercy Science Journal, Spring 2022. Happy Reading!

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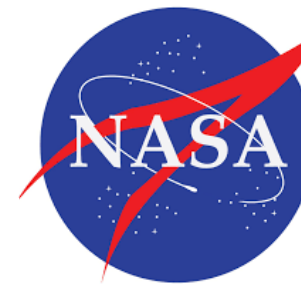
Bharathi Arivazhagan, Akiko Hokamura, Amaelia Bringas

### *Moderator:*

Ms. La Farge

## Countdown to December 22!

Do you believe that Earth has a twin somewhere out in space? Dr. Sara Seager, a planetary scientist and professor at MIT, does. She says “the odds that Earth harbors the only life in the universe are nearly impossible”, and “The greatest discovery astronomers could possibly make is that we’re not alone.” If there are  $10^{22}$  stars out there, must there be life somewhere?



Scientists (from NASA and the European Space Agency) along with researchers from 300 universities, companies and organizations from 29 states and 14 countries have worked together to build The James Webb Space Telescope. It is currently in French Guiana preparing to lift off to orbit the sun. The Webb is the world’s largest and most powerful space science telescope. It has revolutionary technology on board to allow the study of our solar system and distant galaxies and exoplanets never seen before. Webb can gaze back 13.5 billion years when the first stars and galaxies formed.

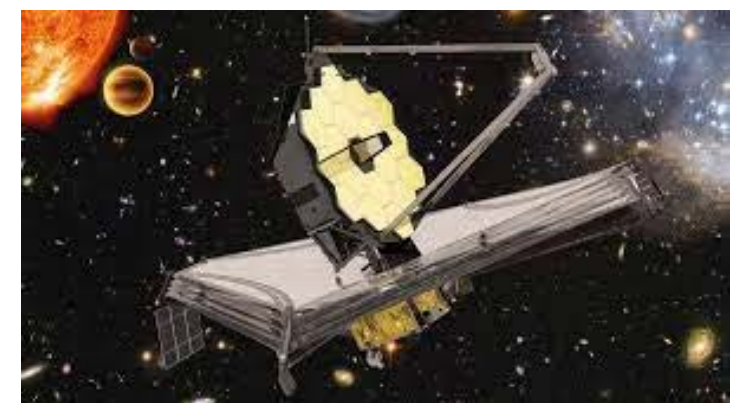
The telescope will travel 1 million miles from Earth and be in space for 6 months. It will be at a location called L2, on the other side of the sun, four times the distance of the moon. Gravitational forces of the Earth and Sun will keep the telescope’s orbit in place. It is equipped with special mirrors, a sunshield the size of a tennis court, and special cameras and sensors. Its sunshield will protect the telescope from the extreme heat and light of the Sun, Earth and Moon. The telescope will study the temperature of planets, and the chemical composition of the planets, seeing if liquid water is or was ever present. There will be three large antennas at Earth communicating with the telescope, one in Spain, one in California, and one in Australia.

If you want more information, including a link to how the telescope will unfold once it is in space, look here. You can build an origami model, sign up as a virtual guest, and view an animation of the orbit,

<https://jwst.nasa.gov/content/webbLaunch/index.html>

### **Update on the James Webb Space Telescope:**

As of February, the JWST successfully reached the spot where it will spend up to 20 years surveying the cosmos, parked between the gravity of the Earth and sun. It so far has overcome about 344 things that could have gone wrong. It will now search for clues of life on nearby exoplanets and explore the first stars and galaxies that “lit up the foggy aftermath of the Big Bang and initiated the grand crescendo of evolution that produced us...Building it required the best of humans: cooperation and devotion to knowledge, daring and humility, respect for nature and our own ignorance, and the grit to keep picking up the pieces from failure and start again. And again.” (Dennis Overbye).



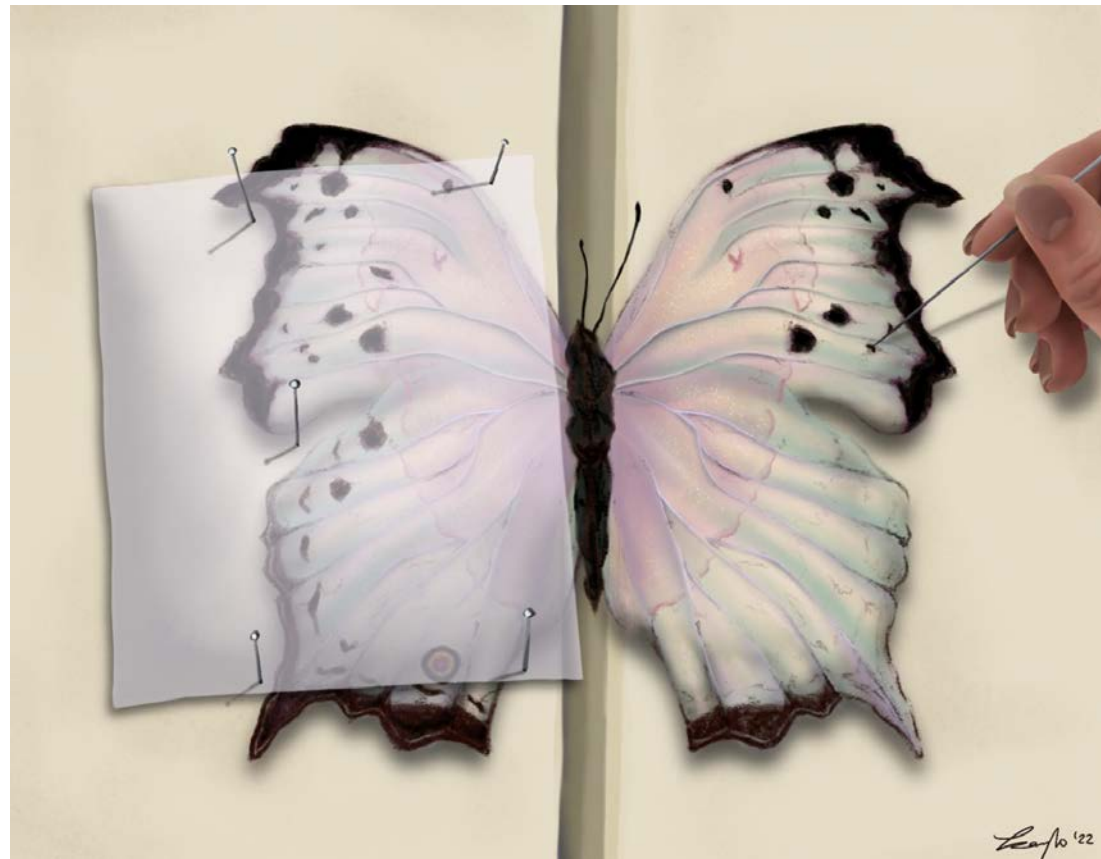
[[https://www.esa.int/Science\\_Exploration/Space\\_Science/New\\_launch\\_date\\_for\\_James\\_Webb\\_Space\\_Telescope](https://www.esa.int/Science_Exploration/Space_Science/New_launch_date_for_James_Webb_Space_Telescope)]

*Louisa La Farge, Science Teacher*

**Resources:** JWST website; The Hunt for Planet B, PBS Media



## BUTTERFLY



*Illustration by Katelyn Vo*



## A Plant-Based Vaccine - Is it possible?

Take a moment to look at the plants outside. Now imagine if these plants could be used towards the development of vaccines. This is no longer just an imaginative thought; rather, active progress is being made towards plant-based vaccines.

For 20 years, work towards making a plant-based vaccine has been made in Medicago, a company devoted to the development of such vaccines and plant-based therapeutics. Based in Quebec city and with their efficient technology, they aim to make a significant change to how vaccines are made today, especially in targeting COVID-19.

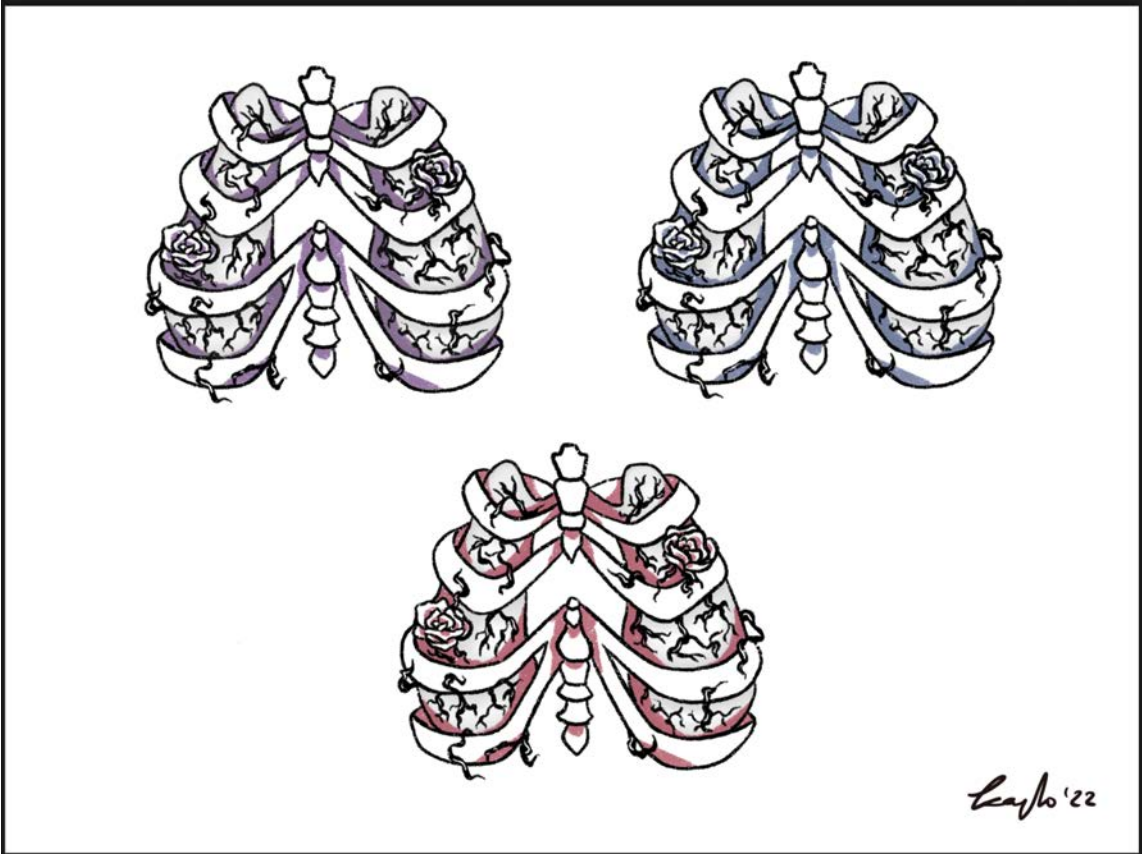
First, let us discuss how plant-based vaccines work. In typical vaccine manufacturing, a protein particle is introduced to eggs. The eggs then act as a bioreactor, to replicate more of the virus-like particles. Through so, our bodies can become accustomed to targeting the virus, in case we experience it in real life. In plant-based vaccines, instead of eggs, plants are used as bioreactors, and they too are introduced to the protein particle. With the plants' cellular processes, they can quickly and efficiently multiply the particles. Through so, one can be effectively vaccinated, and prepared.

Using N. Benthamiana Plants, Medicago is making progress towards its progression of plant based vaccines towards COVID-19. They reported a 71 percent efficacy rate in its Phase 3 trials. With such significant advancements being made today, we can ensure more understanding on the importance of scientific exploration around us.

*Bharathi Arivazhagan, Student*

**Resource:** BioPharma Reporter

HUMAN LUNGS



HUMAN SKULL



Illustrations by Katelyn Vo '22

*Disclaimer: if anyone does not feel comfortable with topics touched on death, cancer, or anything of that nature you are free to pass on to the next page.*

## The Power of Technology in Healthcare in the Midst of a Pandemic

During the past two years in the COVID pandemic, many of the hospitals, and other healthcare facilities in Japan decided to restrict the number of patients who can meet with their family. As a result many of the patients/elderly in palliative care often experienced the loneliness of not being able to meet their loved ones in their last moments. This story is about my grandmother, Mitsuko Hokamura (83) who has been battling a variety of cancers for over 6 years. Last April, my grandma was moved to hospice care as cancer had traveled all throughout her body and was told a remaining life of a month or two. In this difficult time as a family, especially with half living in the US and unable to travel to Japan, the skill of technology proved useful in the form of an iPad and the simple tool of Facetime.

My father's side of the family lives in the southern part of Japan called the Kumamoto prefecture. When my grandmother was moved to the hospice care facility in the hospital due to covid restrictions, visitors were only limited to 3 family members and were only allowed 15 minutes per session. Though my family was able to fly to Kumamoto in the summer, it was unrealistic to meet with all five of us in one room, and with the time limitation, unable to speak much. Since we would not be able to stay for long, that is when we thought of the idea of using the Facetime feature on the iPad. The idea was approved by the hospital to place an iPad stand with an iPad next to the hospital bed next to my grandma. The iPad was set up to only receive Facetime calls from specific people on the contacts and automatically answer once called and angle it so that the only thing my grandma would have to do is look to the side where the iPad is placed. This new improvement allowed all of the family members to be shown on one screen and talk to her as long as we can without worrying about the time limit or having to go to the hospital each time. As long as we looked at the time difference from Japan to the US, there would be no change in our calls from Japan or in the US. With this technology in place, we were able to check-up with her daily, see my grandmother smile while talking with us, and speak with her in her very last moments, all while being in a different country.

Today, my family's story has gone to the newspaper in the area they live in and the hospital that my grandmother was at was amazed by the idea which allowed the increase in patient to family contact, which ensured the patient was not in an isolated state. This idea increased communication and is hoped to be implemented in the hospital in the future. I truly believe that in a time where many people experience loneliness and isolation in the hospital room, especially when hearing stories of people missing the passing of their loved ones in their last moments, the power of technology can help. After how much Facetime and the simple iPad helped us to be with my grandma miles away, I hope this is spread to more families and hospitals implement this tool to their facilities, especially in the elderly care to allow families to have more freedom to talk to their loved ones without worrying about scheduling.

*Akiko Hokamura, Student '22*



## WHALE



*Photograph by Amaelia Bringas '22*



**Mercy Science Journal**

*Sparking enthusiasm in scientific exploration*