

IN THIS ISSUE

Project Earth cleanup reports

Planet hunting with PEP-3

Science reports from around the Fleet

Issue 9. July 2026

Event Horizon

The magazine of STARFLEET Sciences

2024 STARFLEET Newsletter of the Year

Contents

3. Welcome from the Director's Office
4. From the Acting Director's Desk
5. Sol Speaker Series
7. Scientific activity around the Fleet
10. Fungi - a special report
13. Jodrell Bank away mission
16. Project Earth Cleanup
18. Expedition Report: PEP-3 (Kepler)
26. PEP-4 Atlas Expedition
27. The science of Entomology
30. Viewing yellow supergiant R Scuti
31. Is terraforming possible? Part 2
36. International Observe the Moon Night
37. Wordsearch

Event Horizon is edited by CAPT Pam Kingsley.

Submissions are welcomed - please send them to **captpamkingsley@gmail.com**

Star Trek image rights belong to CBS, etc and are used here in a not-for-profit capacity. Other images are the property of their owners and are used with permission. Some images may be created using AI - these will be clearly captioned.

Cover image: The crew of the USS Mercia (R20) at the Lovell telescope, Jodrell Bank © Pam Kingsley

"The only way of discovering the limits of the possible is to venture a little way past them into the impossible."

— Arthur C. Clarke

From the Director's Office

Greetings!

This will be my last letter to you, as of June 14th I have resigned as Director of Sciences. I have thoroughly enjoyed my time helping to build our Auxiliary, meeting STARFLEET Sciences members from all over the world, booking inspiring and interesting Sol Speakers, and most of all - working with such an incredible staff. This is bittersweet for me, I LOVE Sciences. But I need some time away from the Director role and my Deputy Captain Pam Kingsley will do a fantastic job as your new Acting Director. I will stay on our staff leading the Sol Speaker Series, First Contact, and Astrometrics programs so you will still see me around.

I wish Captain Kingsley and her Acting Deputy Director Lieutenant Janet Livingston the best in their new roles leading our fantastic Auxiliary! Please give them your support.

Live long and prosper!

Barb Barton



From the Acting Director's Desk

Welcome to the latest issue of the *Event Horizon*!



Before going any further I would like to extend a huge THANK YOU to FCAPT Barb Barton for all her hard work over the past three years in bringing Sciences to this stage. Many of the activities and events we enjoy in the auxiliary were Barb's idea, and I am delighted that she will be staying on staff to help guide our Sol speaker events and First Contact programme and to bring her expertise to the Astrometrics group on Facebook.

Going forwards I hope to be able to build on what we already have going on. Speaking of which, you can read about science activities from around the Fleet in the pages of this magazine! This issue really does run the gamut of the wide range of activities that science encompasses, from botany and birds to radio astronomy and exoplanets.

This month also sees the launch of our PEP-4 expedition (details on p26) during which you can join other members in observing objects in the sky and tracking any changes you see.

If you have any comments, feedback or suggestions for a future issue, or for Sciences in general, please send it to **captpamkingsley@gmail.com**

Captain Pam Kingsley

Acting Director of STARFLEET Sciences & *Event Horizon* editor

SOL SPEAKER SERIES

The Sol Speaker Series lectures is a monthly online event free to SFI members bringing interesting and inspiring presentations on a variety of science topics - with the opportunity to ask questions at the end of the talks.

Next talk: July 18th, 11am EDT/3pm GMT
“101 Ways to Die in Space”
Speaker: Pam Kingsley, STARFLEET Sciences



“Space is disease and danger, wrapped in darkness and silence.”

- Dr McCoy, Star Trek (2009)

Dr McCoy’s warning to anyone wanting to explore the final frontier sounds ominous, but how accurate is it really? Join Sciences Acting Director Captain Pam Kingsley as we explore the many ways you might die in space - and some ways that you won’t!

Pam Kingsley is a lifelong Trekkie with a particular interest in real-world science featured in or inspired by Star Trek. As Director of Sciences in STARFLEET International, the largest and longest-running Star Trek fan club, she champions the cause of real science, encouraging Trekkies to discover more about the universe around them and to never stop asking questions.

Coming soon: August 15 11am EDT/3pm GMT
“Wild & Wonderful Pluto!”
Speaker: Dr. Caitlin Ahrens, NASA Goddard Space Flight Center

Ice isn’t just a cold mineral, it’s weird! We’re going to dive into the many varieties of cryogeology at Pluto as discovered by the New Horizons mission in 2015 and we’ll see what makes ice so interesting to research, and how cryogeology differs between rocky and icy surfaces. From cryo-volcanoes to glaciers and weird spiky towers of doom, Pluto offers a bizarre menagerie of icy features!



Dr. Caitlin Ahrens received her B.S. in Astrophysics and Geology from West Virginia University in 2015, and a Ph.D. in Space and Planetary Science at the University of Arkansas in 2020. Dr. Ahrens is currently an assistant research scientist from the University of Maryland working at NASA Goddard Space Flight Center, and a science member of the Lunar Reconnaissance Orbiter.

Her research involves remote sensing of icy surfaces and volatile interactions, including ice at the lunar poles and cryovolcanism in the outer solar system. Dr. Ahrens also works on several planetary volcanism projects, including Mars, Ceres, Titan, and Pluto!

To participate or watch live, you need to get the link by registering **here**.

Previous talks are available at the **STARFLEET International YouTube channel.** If you have any suggestions for topics or speakers for future talks, email **sfsci-director@sfi.org**

Would you be interested in having Sol talks available another language? If so, please let us know what language you require.

Scientific activity around the Fleet

Report by LT Janet 'Hopper' Livingston
SRT Coordinator, STARFLEET Sciences

COMM Michael Lewis, reporting for Region 1's SRT-2151, as the SRT's Lead Researcher

SRT-2151's projects are smart agriculture, ham radio, and viewing variable stars.



The smart agriculture project involves growing a few corn, bean, and pumpkin plants in a container of organic soil. I currently make decisions on irrigation, position of the container, and fertilizer applications with data from a soil sensor that gives readings for moisture, pH, and lighting

Wireless soil sensors will be added to send data to farm management software. The data will be used in decisions regarding irrigation, location of the container, and fertilizer applications.

I am viewing variable stars that are bright enough. I am viewing in areas where a sky quality meter usually gives a reading of about 18.0 magnitudes per square arcsecond.

COMM Lewis encourages anyone interested in the science of farming and agriculture to check out the Gathering for Open Agriculture Technology (GOAT).

LT Janet Livingston, reporting for R3's SRT-4321, The Lab Rabbits, as the SRT's Lead Researcher



Project Flying Circus:
PO3 David Livingston and I met Kang, the Black Vulture in February. He's been in our area for a couple of years, entirely on foot as a badly healed wing injury prevents him from flying. He was bold enough to get on our deck, just a few feet from our door. He quickly learned where and when David would be providing food to our outdoor/feral cats. I conducted research on the Black Vulture and shared my findings with SFSCI and Petfleet. Kang strolled on after a couple of days exploring our property and eating cat food, likely in search of carrion. We still see him once in a while, trotting about in nearby pastures.

Copper Breaks State Park in Quanah, TX, USA, has become a camping destination for excellent stargazing.

CAPT Arlene Henriques, reporting for Region 5's SRT-75030, The Marmots, as a member of the SRT

In March, the USS Antares Away Mission took the crew of 12 to Kennewick, Washington, for the Premiere Night of Project Hail Mary.
CAPT Henriques describes the film: "Project Hail Mary is a Science, Science Fiction and Adventure film about a Sun-destroying spore and how NASA and the world's leading scientists work the problem on Earth, then go into space to solve it, and a surprising alliance formed by our intrepid amnesiac astronaut."

LTCOL Tiffany Cushman, reporting for Region 5's SRT-1032, as the SRT's Lead Researcher

The USS Candor's Citizen Science Project is a xenobotany experiment with 12 laboratories registered. The experiment states "participants will receive seeds to cultivate in their quarters using innovative, non-traditional methods. The goal is to document novel growing techniques and share results with the fleet."

CMDR Kendra Chemaly, reporting for Region 8

The USS Dauntless' Anthropology Project is "Where we discuss anything relating to the study of humanoids and their culture. May or may not be relevant to Anthropology movie night away missions, which are generally also hosted by the Science Department. These movie nights are largely pop culture/Science Fiction films," as explained by CMDR Chemaly.

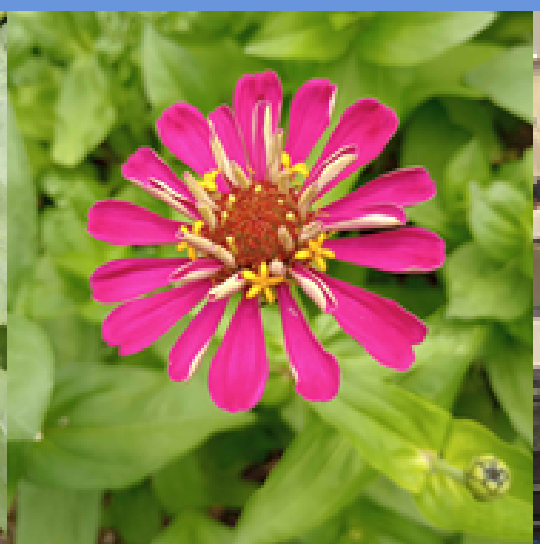
Lt. Tracy O'Quinn, CSO of Station Shelby, R1

May: Attended the Exotic Pet Expo in Southaven, MS, with PO1 Didi Wash, as a fun little zoology outing! *(Below right)*

June: PO2 Kat Gilliand posted 2 pics *(below left & centre)* of her first flowers this year for her on-going botany/horticulture endeavors; I believe they were grown from seed.

Spring/Summer Ongoing Zoology/Ethology project--I am observing by video Sparrows, Mourning Doves, and Cardinals interact at 2 feeders in my backyard daily.







A Special Report from The Lab Rabbits, SRT-4321

Project: Botany YAY!

By LT Janet 'Hopper' Livingston, SFMD
Chief of Communications & SRT Coordinator, SFSCI
SRT-4321 Lead Researcher, The Lab Rabbits, ISS Kidd
2025 Science Chapter of the Year

While we haven't discovered the interdimensional *Prototaxities stellaviatori* fungus yet, there are plenty of fascinating fungi on Sol III.

The largest organism on our planet covers almost four square miles/ten square kilometers of land! Discovered in the Blue Mountains of Oregon, USA, it's believed to be at least 2,400 years old. This giant *Armillaria ostoyae* is aptly nicknamed the humongous fungus!

An entire secret world exists just below us. Trees use this mycorrhizal network to share water, sugar, and nutrients. Some trees can recognize their relatives, and will provide for them first.

However, like the Ferengi, the mycorrhizal network doesn't work for free; it takes its cut of the sugar the trees produce. This allows the network to collect and transfer nutrients back to the trees. German forester Peter Wohllenben coined the term 'woodwide web' for this remarkable network.



Chido Govera, the ‘fungal evangelist’

She grew up an orphan in Zimbabwe, experiencing many hardships. At age 11, with the help of mentors, she began perfecting the art and science of mushroom farming, allowing her to provide food to other orphans. She learned agricultural waste left over at the end of the farming season could be used to grow mushrooms.

Determined to help orphans, as well as other marginalized and vulnerable members of society, Chido created the Future of Hope Foundation in 2013. Mushrooms are an important part of the Foundation’s work. They can be sustainable grown, sold for additional income, and the Foundation is working on a project to make bricks out of mycelium!

Dr. Harris Wang, fungus in construction

This Columbia University synthetic biologist created fungus-based bio-bricks that could be a sustainable alternative to traditional building materials.

These mycelium bricks could be a practical solution for building in remote settings or when natural disasters create an urgent need for temporary structures. These lightweight bricks are easy to produce, insulating, and biodegradable.



Professor Harris Wang holds a living brick that has come into contact with water and sprouted a bumpy layer of fungus. Photo: Kim Martineau

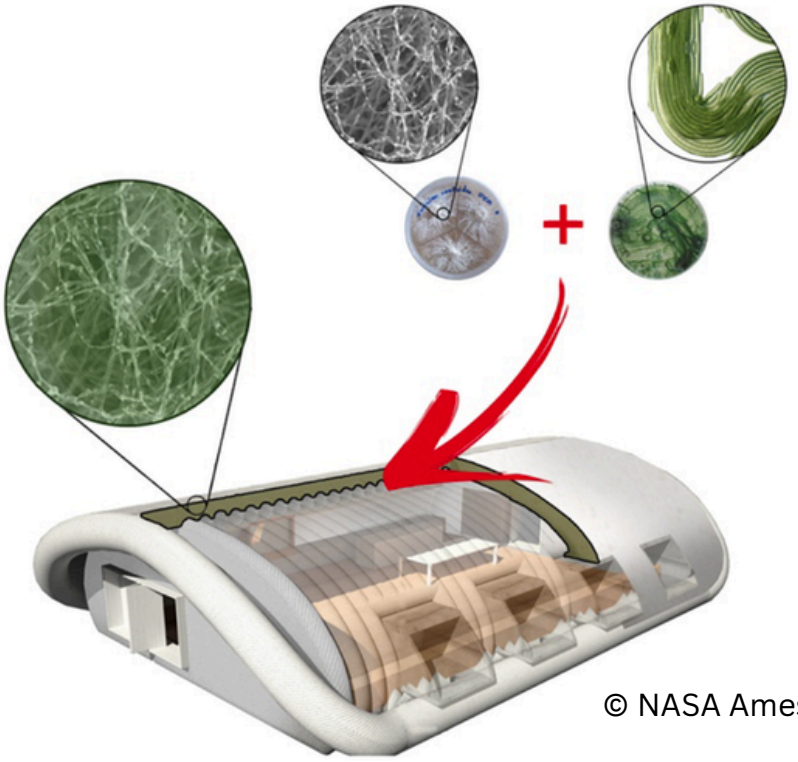


MycoWorks, fungus in fashion

Mycelium is soft, strong, and dense, making it an environmentally friendly option for the fashion industry. In South Carolina, this biotechnology company is focused on the future of mycotextiles. Requiring little energy to produce, these mycotextiles can be crafted into supple leather-like accessories, garments, and shoes.

NASA, fungus in space

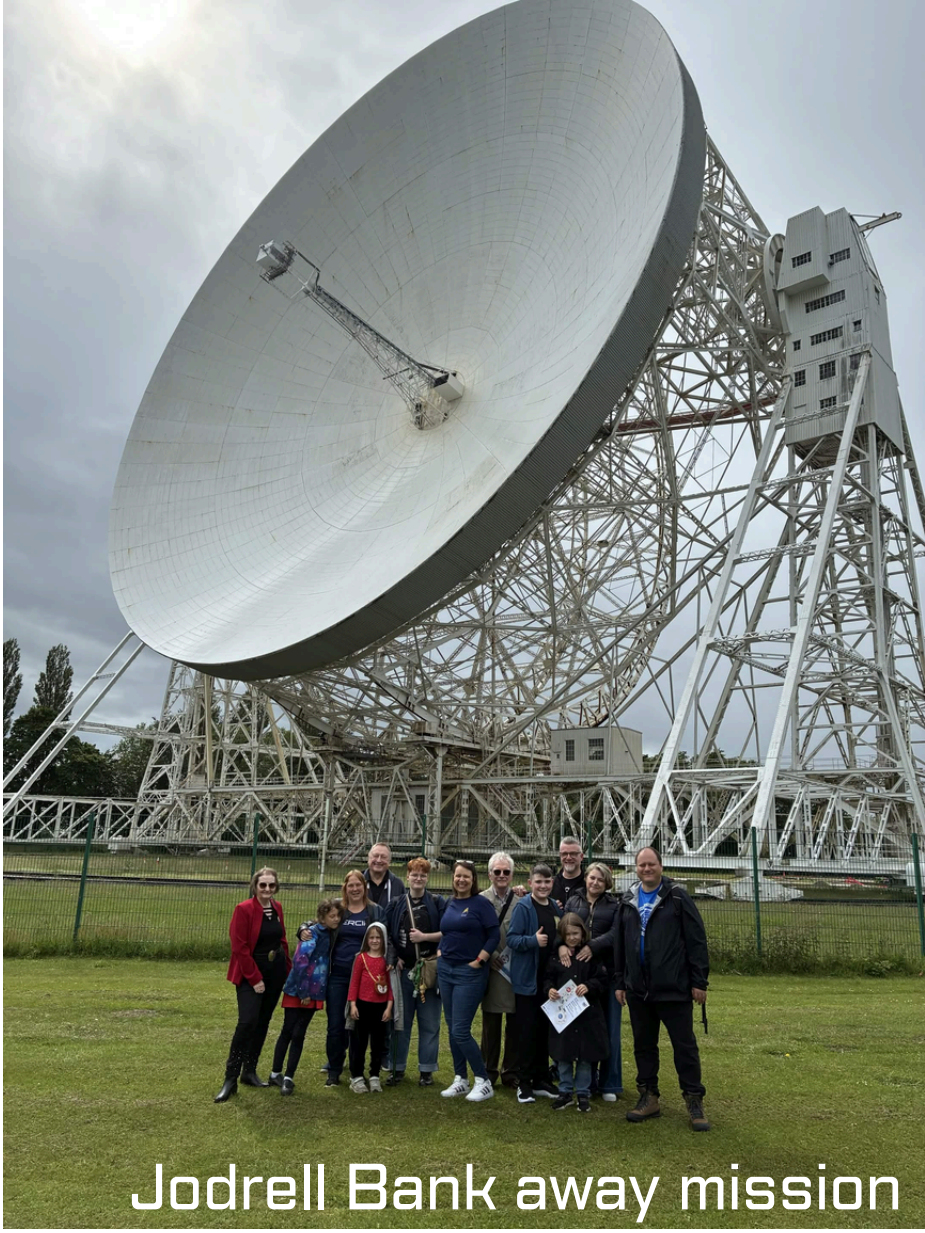
A myco-architecture project at NASA's Ames Research Center in California will allow humans to grow the building materials required to construct habitats on the Moon (or beyond) once they arrive. Using this low energy option, dormant fungi are revived with water once the final destination is reached. They grow on a lightweight frame to become a human habitat.



© NASA Ames

What might be next in the future of fungus?

Sources:
National Geographic magazine, April 2026
https://www.nationalgeographic.com/environment/article/fungi-fast-fashion-mycotextiles
https://www.thefutureofhope.org
https://magazine.columbia.edu/article/magic-building-mushrooms
https://www.nasa.gov/centers-and-facilities/ames/could-future-homes-on-the-moon-and-mars-be-made-of-fungi/
https://www.nationalforests.org/article/underground-mycorrhizal-network/
https://www.scientificamerican.com/article/strange-but-true-largest-organism-is-fungus/



Jodrell Bank away mission

By Capt Pam Kingsley, USS Mercia, R20

The huge dish of the Lovell Telescope at Jodrell Bank is visible from high points across several counties, and being in the *USS Mercia*'s back yard, the crew paid a visit to find out more about it.

The site itself is hidden away down narrow country lanes, with the first view of the Lovell dish coming between hedges.

As the telescope is a radio observatory, mobile phones can interfere with the signals they receive, so all mobile phones have to be switched to airplane mode on arrival, and no Bluetooth devices are permitted to be used.

There are four telescopes at the site - The Lovell, Mark II, 42ft, and 7m - all in use 24 hours a day. The highlight for most of us was getting to see the enormous Lovell dish, which at 76.2 metres (250 feet) across is the third-largest steerable dish radio telescope in the world, up close. We even got to see it move - very slowly - as it tracked the movement of whatever it was studying across the sky.

The telescopes are joined by three exhibition halls, an auditorium, and a trail leading through constellation-themed play areas and hands-on science experiments for visitors to try out. We watched a science presentation about the history of space travel, including flaming ethanol gas!

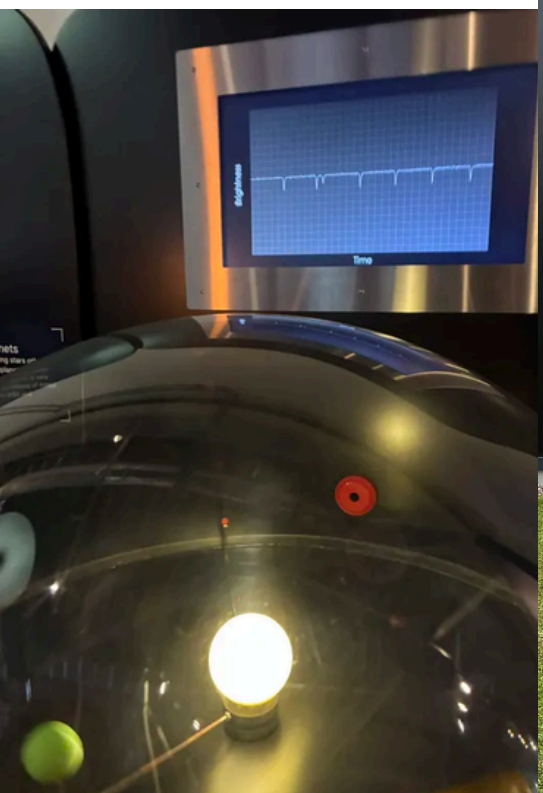
The history of the telescope is fascinating. Bernard Lovell, who conceived the project in 1945, started with equipment left over from World War II. He

had originally planned to work in Manchester, but the city's trams created electrical interference in the readings, so he moved out of the city into the countryside at Jodrell Bank. He began by observing radio emissions from meteor showers, then, when that proved successful, decided to build a bigger 66m (218ft) telescope. The Lovell Telescope was constructed a decade later and quickly began making unique observations of the universe. It was turned on just in time for the launch of Sputnik-1 and was the only telescope able to track the satellite's rocket by radar!

The site also has a tenuous *Trek* connection - on 31st August 2013, it hosted a concert performed by the Hallé Orchestra to commemorate what would have been Lovell's 100th birthday. Among the pieces played were themes from *Star Trek*.

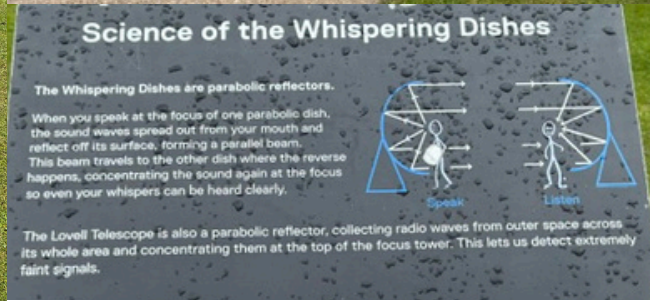
The *Mercians* spent a lot of time in the exhibition halls, finding out more about the Bernard Lovell and the site's story, and trying experiments which explained more about what the telescopes study. The cadets enjoyed testing the outdoor experiments, with the 'whispering dish' being a favourite.

Left: an experiment demonstrating the transit method of detecting exoplanets or eclipsing binary stars.
Centre: A statue of Nicolaus Copernicus.
Right: The 'whisper dish' and explanation of how it works.

















A UNESCO World Heritage Site*

Jodrell Bank is part of a small group of sites across the globe recognised by UNESCO's international community as sites of Outstanding Universal Value. The World Heritage Site inscription was made in 2019 and acknowledges the site's scientific endeavours and its role in achieving a transformational understanding of the Universe.

*Planet Earth Division







In North Carolina, the ***USS Kitty Hawk*** held a highway cleanup. *(Above and right)*
You can see more pictures on a video they produced here.

In April, SFSCI encouraged chapters to get outside and clean up their local area as part of Project Earth, STARFLEET's auxiliaries' celebration of Earth Day.
Here are reports from some of the activities that took place across the Fleet.

Station Shelby, R1 *(Pictures below)*
Lt Tracy O'Quinn reports, "Our Science department and chapter members volunteered for a clean-up on the Epping Road portion of Wolf River Greenway in Memphis, Tennessee, to participate in the Earth Day Science Auxiliary event on April 25th, 2026. It was a great day and we all enjoyed doing our part!"









The ***USS Antares*** took time to clean up this natural park in Pasco, WA. The winner for biggest/craziest item was found by Landan Hicks, half of a car tire!

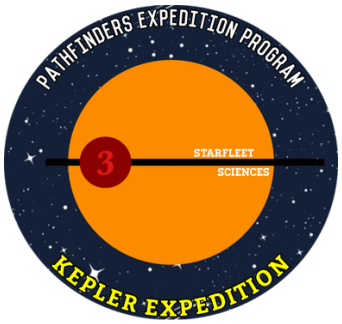




Participants were Lea Morgan, Dave Morgan, Arlene Henriques, Hector Gutierrez jr, Tina Conkey, Bob Conkey, Landan Hicks, Mary Demiter, Wesley Demiter, Mike Sandbeck, and Tom King.







Expedition Report: PEP-3 (Kepler)



In 2017, ABC (Australia) hosted a televised event for *Stargazing Live*, a show hosted by Brian Cox and Julia Zemiro. During this three-night event, amateur astronomers were called upon to hunt for exoplanets among data provided by NASA on Planet Hunters, a citizen science project on Zooniverse. The method with which the viewers would try and find exoplanets was identifying light curves.

As a planet moves or transits in front of a star, some of the star's brightness dips, creating a curve (often U- or V-shaped) in telescope data.

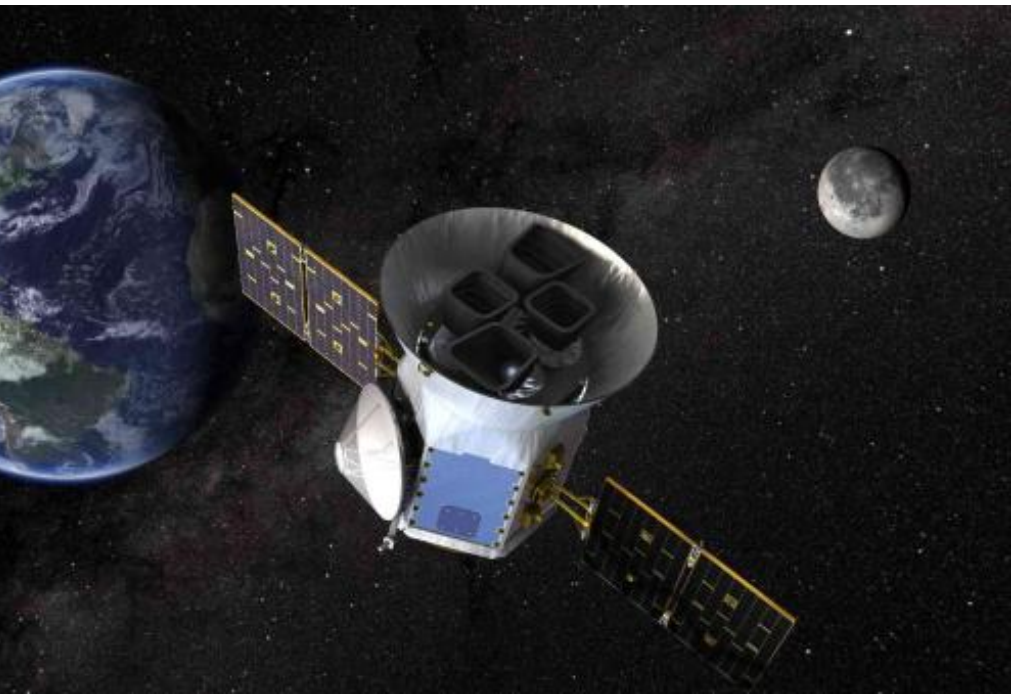
Stargazing Live had more than 7,000 volunteers analyzing mountains of data, resulting in the discovery of 90 new planets. One of those 7,000 volunteers was 26-year-old Andrew Grey from Darwin, Australia. By day, Andrew is a mechanic tending to common problems with automobiles. By night, an explorer seeking to uncover the temporarily hidden among billions of stars. On the first night of Stargazing Live, Andrew waded through more than a thousand pieces of telescope data, carefully analyzing any possible light curve.

With the help of other users, Andrew co-discovered a star system 600 light-years from Sol with four planets. One of them was a "super earth" planet; slightly bigger than Earth, but smaller in mass than ice giants like Neptune. Super earths are usually rocky or water planets.

This discovery by Andrew and others was called the most significant discovery of the event, and one of the most significant planetary discoveries in years. This milestone was thanks to the tireless work of curious citizens, some of whom don't even have a STEM background.

PEP-3, the Kepler Expedition, was the third mission of STARFLEET Sciences' Pathfinders Expedition Program (PEP). This time, Mission Specialists went on a hunt for planets in the same manner as the many volunteers from Stargazing Live.

A newer version of the Zooniverse project that uses data from NASA's Transiting Exoplanet Survey Satellite, Planet Hunters TESS, allows users to sift through mountains of telescope data to identify light curves from images taken of distant stars.



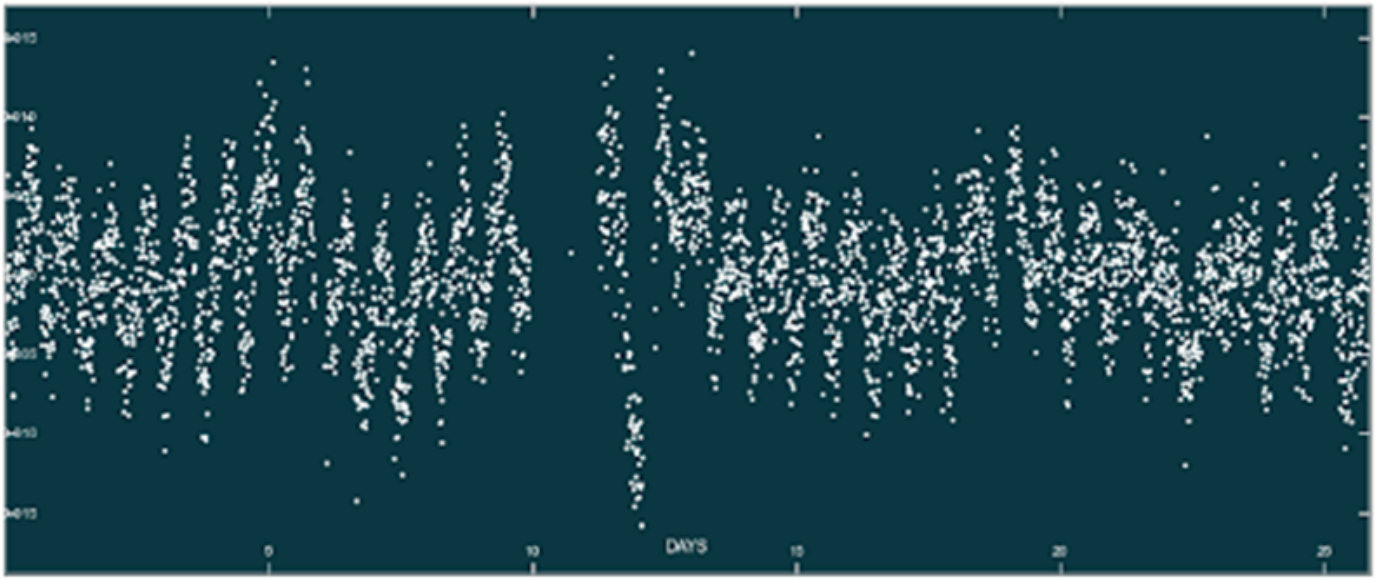
For thirty days, PEP-3 Mission Specialists dove into the data pile and began classifying potential planetary transits.

Left: The Transiting Exoplanet Survey Satellite (TESS)
© NASA Goddard Space Flight Center

Our first stellar observer, Commander Cosmo Bauer-Zierfuss, registered an account on Zooniverse. Although doing so was not a requirement for PEP-3, doing so helps users keep track of their classifications not just on Planet Hunters TESS, but any Zooniverse project.

On stardate 202602.17, the Region 9 science officer and Diplomatic Corps staff member combed through a number of images.

Here in Subject 116715298, below, we see an example of an eclipsing binary (EB). This is when two stars in a binary system orbit one another, resulting in a mishmash of brightness fluctuations, making it look like there's dozens of large objects in the vicinity of a star. It can be tricky to find potential planetary transits among this madness.

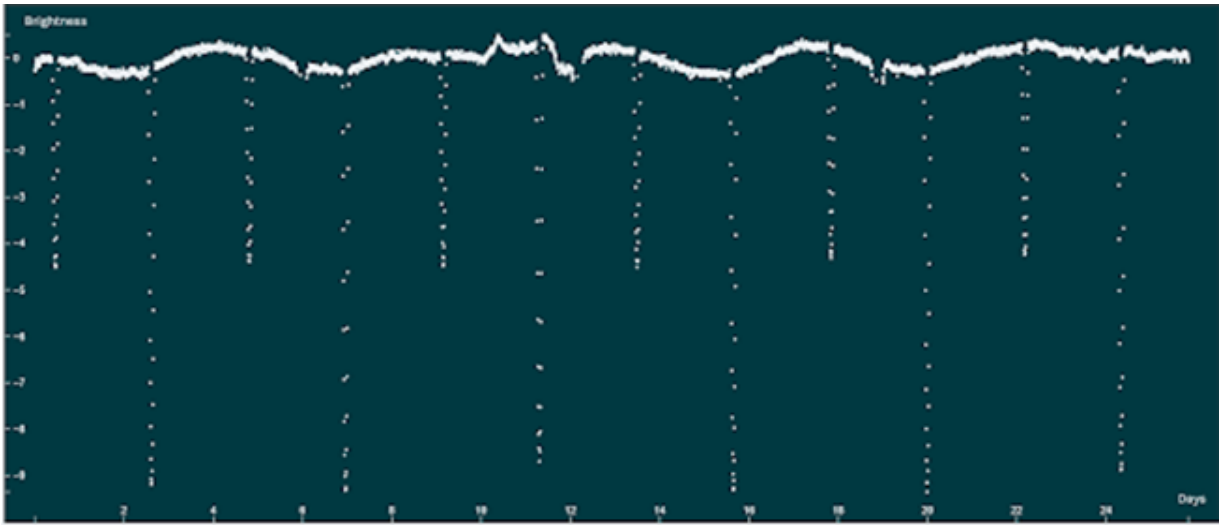


According to the field guide provided by PH TESS, 'Transits due to eclipsing binaries tend to be more V-shapes, whereas transits due to planets are more U-shaped.'

Subject 116726626 was a little messier than the previous. This subject demonstrates a pulsating variable star, in which a star's brightness pulsates. The extreme brightness can block out visible movement of other objects, including potential planets.

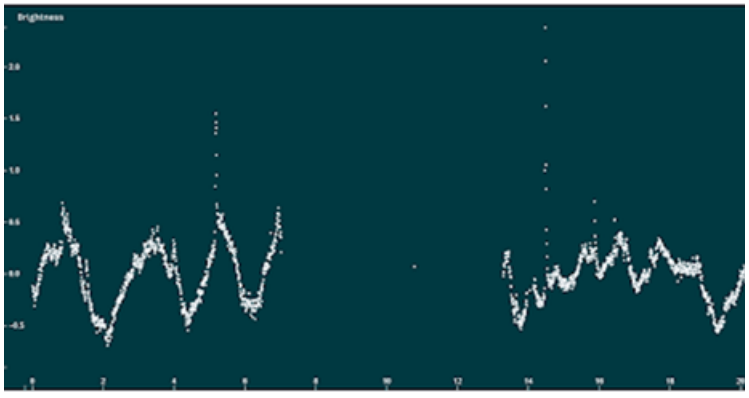
“This appears to be something of note,” were the words written by Mission Specialist Vice Admiral Eric Johannson in his expedition log, who came across what Planet Hunters TESS describes in their virtual field guide as a planetary transit that is “quite obvious”.

VADM Johannson’s screenshot shows Subject 116748551; however, a deeper dive into this subject revealed that it was ‘observed 43 times by TESS’ and concluded as an ‘EB (eclipsing binary) with … no planets’. This is the not-so-great thing about eclipsing binaries—they’re the most common kind of data on PH TESS. It can also be easy to mistake an EB for data showing a multi-planet system, i.e., dips with differing depths like Subject 116748551.

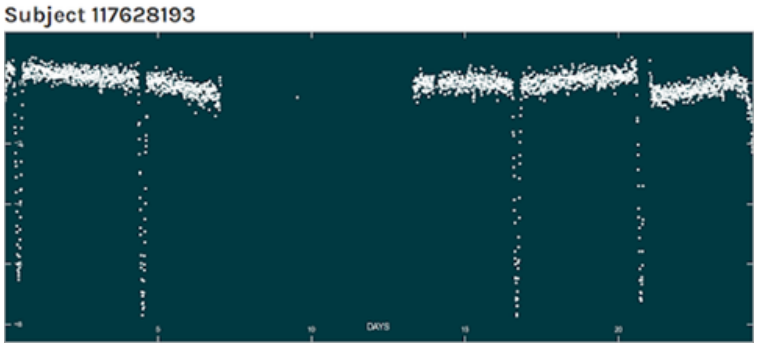


An issue that the Vice Admiral ran into with some data were images showing ‘missing chunks’ - gaps where there should be data. The explanation for this anomaly is due to the technical constraints of telescopes like Kepler and TESS. It happens if a telescope or satellite is unable to observe a star continuously.

“If they DO have a transit hidden in there somewhere, it is well hidden,” noted VA Johansson.

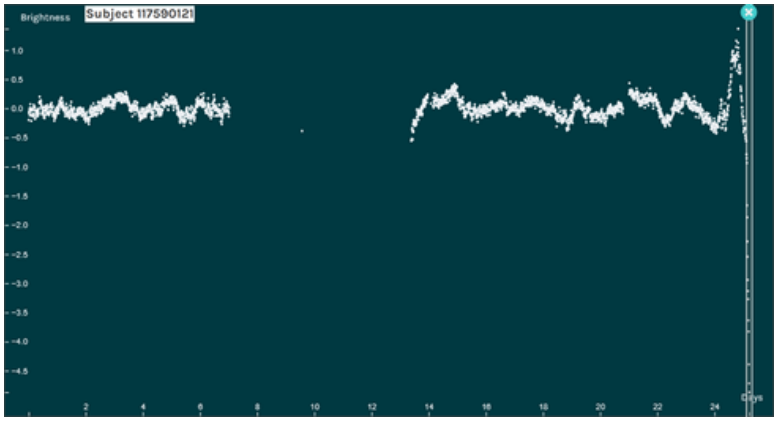


From aboard the *USS Atlantis*, SFMC officer MGSGT Timothy Barrington kept busy with PH TESS observations. One of his finds was Subject 117628193, a set of data with similar results as one of VADM Johannson's. A look at the *Atlantis* explorer's data shows four large dips indicating a possible planetary transit. As well, there was a bit of data unaccounted for.



"Not a test image, so no feedback," noted MGSGT Barrington in his personal expedition log.

In my many countless hours spent on PH TESS, I've come to find that the more dips there are in an eclipsing binary, the less likely there is for a planet to be found. Although the data is still inconclusive (it has yet to be formally researched by the general community), MGSGT Barrington's find is quite promising.



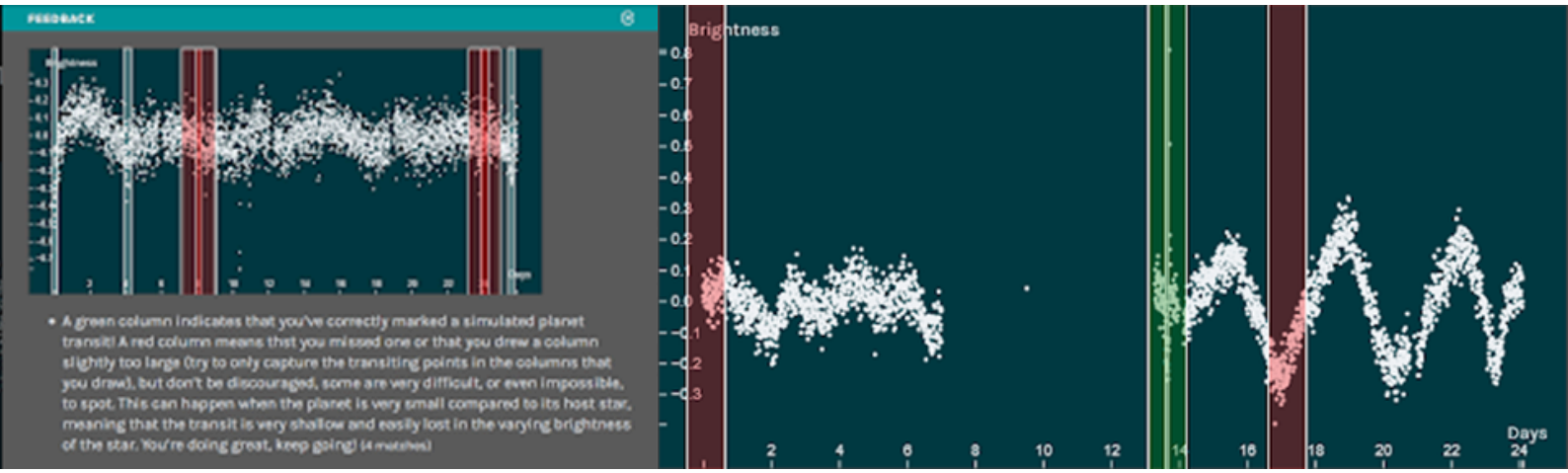
It was awesome to see Expedition participants remaining vigilant and observing and pointing out dips in data that may have been overlooked by other users.

"Subject 117590121, looks like a single dip at the end at around 25 days," the Region 10 mission specialist noted, which also has not yet been looked at by the Zooniverse community.

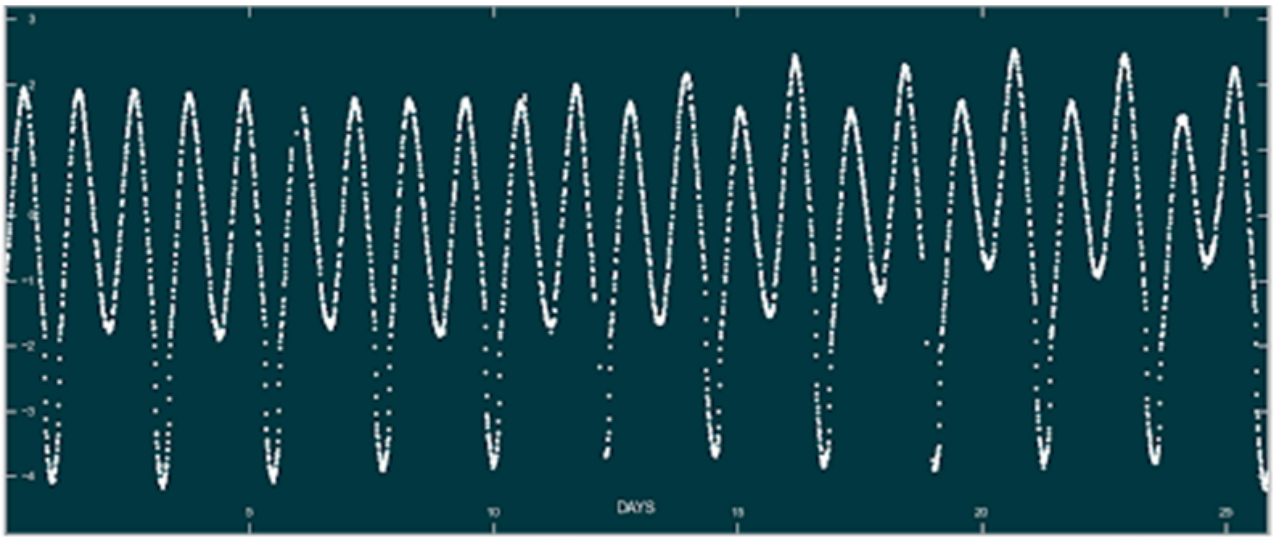
Another, rather unfortunate, issue everyone came across was “fake data”. For new users or people without Zooniverse accounts, PH TESS will sometimes generate sets of fake data to show you what you highlighted correctly, and what you may have missed or incorrectly highlighted.

While this is done for “educational purposes” for newcomers, it’s frustrating that users aren’t told exactly what they did wrong and how to correct for the future. Fortunately, there’s a digital field guide to help users understand what they’re looking out for.

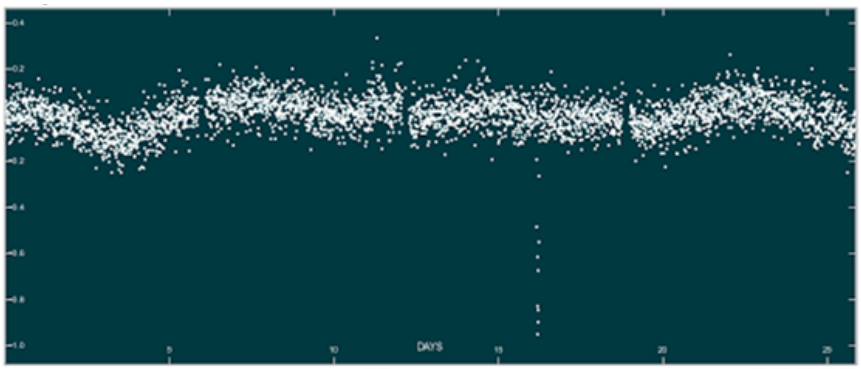
Here are a couple of examples of fake data:



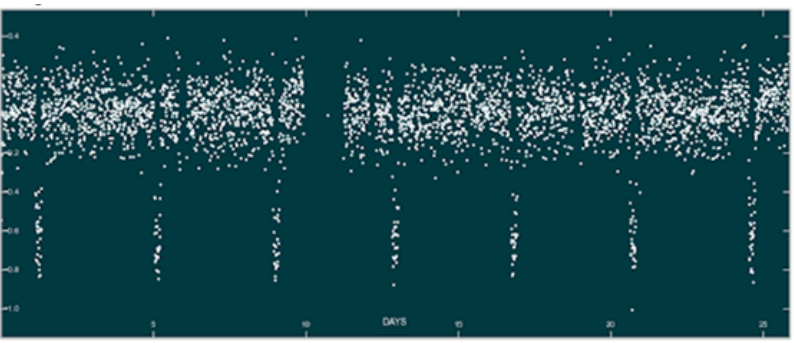
Moving on to the 9th Fleet, Fleet Captain Valerie Pollet from the *USS Versailles* was busy searching for possible transits. FCAPT Pollet’s first run-in with telescope data was Subject 116719722, an eclipsing binary variable. The whacky waves you see in the data shows two stars varying in brightness.



While there doesn't seem to be a transiting planet in this data—stars are typically V-shaped while planets are U-shaped—it's nevertheless a great example of activity from not one but two bright and healthy stars somewhere far, far away. This eclipsing binary has been studied by astronomers and astrophysicists on Planet Hunters TESS. As with all other data, only time will tell if there are celestial bodies hidden among the data.



In the case of Subject 116716694, the Starship Versailles officer found possible planetary activity. Notably, this subject can be found in MIT's TESS Input Catalog (TIC). As of this Expedition Report, it has yet to be determined whether or not Subject 116716694 is a legitimate transit or false positive.

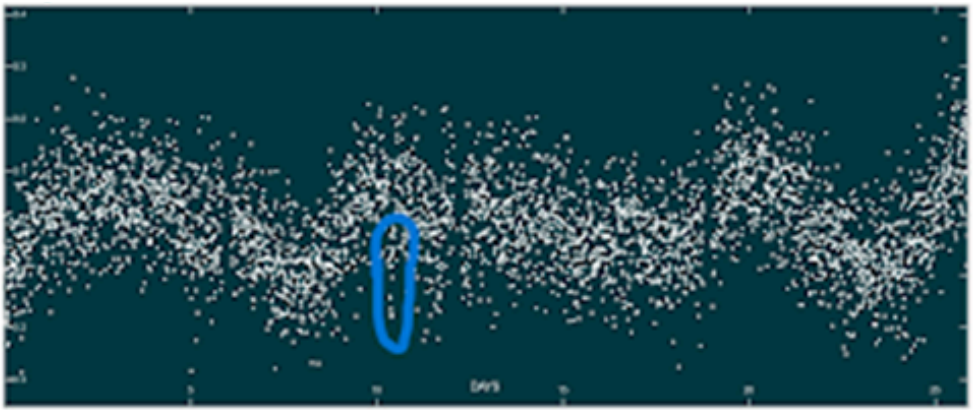


Sometime later in the expedition, FCAPT Pollet shared the following data of Subject 116717106, which turned out to be a previously-discovered planet: WASP-176 b!

Discovered in 2020, WASP-176 b is a gas giant that orbits a G-type star 1900 light-years from Earth. The planet takes 3.9 days to orbit its star. This much is corroborated by the dips in the data every four days at a time, with a missing chunk of data around 10 days in.

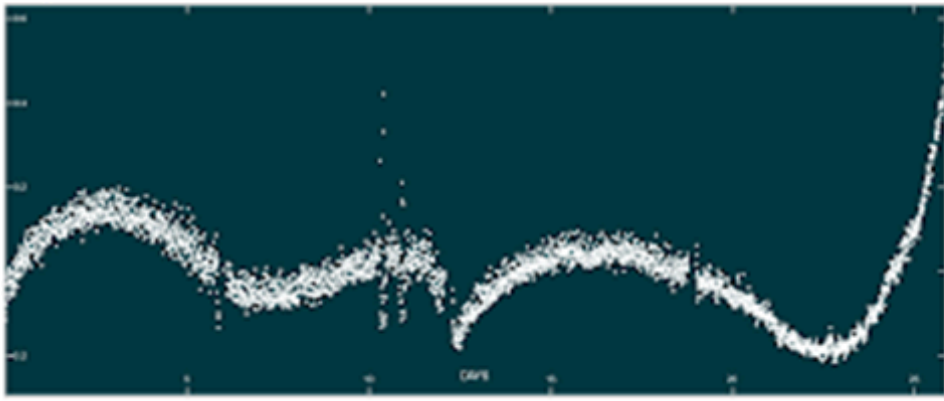
As for myself, Lieutenant-Junior Grade Vince Ceraso, I took some time to explore with fellow STARFLEET officers as expedition commander. PEP-3 ran alongside Project Astraeus, an ongoing research project by Archer's Pathfinders SRT-1676-D to help the public find new exoplanets. My vehicle for research has been Planet Hunters TESS.

On stardate 202602.17, I found what might be a planetary transit in Subject 116727049. After a quick check on the Talk board, it appears this data hasn't been looked at by anyone else in the community at the time of this writing. In a mess of scrambled dots among the data, there was something that caught my eye. I surmised the highlighted section in my screenshot was a potential transit due to the consistency of the dip.



Of course, it is entirely possible I could be wrong. Hopefully we'll see what "it" turns out to be as results from recent data start slowly rolling in.

A much better example is Subject 116730535, featuring three dips, indicating a potential planetary transit in front of a star.



The Kepler Expedition concluded on stardate 202603.17, St. Patrick's Day. Looking back, there were some hiccups in the road, primarily the fake data confusing mission specialists. However, real contributions to space exploration were made. My only hope is that one day our findings will be confirmed as real exoplanets.

As always, I am very happy to see eager participation from members in the Pathfinders Expedition Program. The Kepler Expedition (PEP-3) was special in that it was the first of many missions of the program to utilize real data from a citizen science project.

Future expeditions will make use of other popular citizen science projects and platforms—NASA's Exoplanet Watch, where I got my start as a citizen scientist, might just be one of them.

Thank you to everyone who participated and contributed to the success of PEP-3!

LTJG Vince Ceraso
Coordinator – Pathfinders Expedition Program (PEP)
USS Challenger NCC-1676-D



No experience is necessary. To join in, sign up here by July 15.





The science of Entomology



By Comm. Michael Lewis, USS Potomac, R1





Entomology is the scientific branch of zoology dedicated to the study of insects and their relationship to humans, the environment, and other organisms. Zoology is a branch of biology. Biology is one discipline that I use in an interdisciplinary approach to problem-solving in smart agriculture.

There are insects that eat parts of plants. I have leaves on my pole bean plants, also known as green beans, that have missing parts or are yellow (top left). That is where entomology comes in.

Science tells me what certain insects do to parts of plants. Observation and deductive reasoning are the way of matching the available evidence with the usual suspects.

I use the iNaturalist app to identify plants, animals, and insects. It gave me this result for an image (bottom left) of an insect on the underside of one pole bean leaf; the topical leafhopper of the *Cicadellidae* family. They suck the sap out of leaves. The leaves lose chlorophyll and turn yellow. The older leaves may turn yellow anyway.

This does not explain the missing parts of leaves. So I need more observations of the leaves, as replies from Virginia Homegrown (a television program exploring the delights and challenges of gardening and growing in Virginia, US) and a entomologist Douglas Tallamy suggest.

Thanks for sending your question to Virginia Home Grown. Here is Peggy's advice:

“Michael, I see your are growing the 3 sisters in one container, until the corn grows taller I suggest you set up some poles for the beans adjacent to the corn. Leaf curling and compromised leaf margins could be from the fluctuating temperatures such as those experienced during the past few months, over watering which is easy to do in a container or either aphids or leafhoppers. Really study the plants to determine if the damage is on the old growth or new growth. I also take pictures of the undersides of leaves and at the points of new growth then expand them in my phone to look for aphids or leafhoppers.

To learn more about these insects use this link: https://extension.illinois.edu/blogs/flowers-fruits-and-frass/2015-08-07-aphids-leaf-hoppers-and-lacebugs These tools should help you discern what the issue is, or was.

Happy Gardening! Peggy”

Hi Michael,
Many insects only eat at night. My guess is that one of the scarab June beetles are nibbling when you're not looking.
- Doug



Applications use artificial intelligence (AI) for many things. iNaturalist uses generative AI (GenAI) to identify species of life forms. iNaturalist gave me an answer of "tropical leafhopper" (above) from an image of an insect on the underside of a pole bean leaf. This may or may not be correct. So more consultation with an expert is my next step.

Plants get energy from photosynthesis to form carbohydrates that fuel their metabolism. [1] If I lose too many leaves rapidly, then this is an issue. Improving the growth rates of crops and increasing crop yields are goals. [2]

References

1. Understanding how plants use sunlight. Main. https://energy.mit.edu/news/understanding-how-plants-use-sunlight/

2. Estimating Yield Goal for Crops | Cooperative Extension | University of Delaware. 2025. Udeledu. https://www.udel.edu/academics/colleges/canr/cooperative-extension/fact-sheets/estimating-yield-goal-crops/

Did you know...

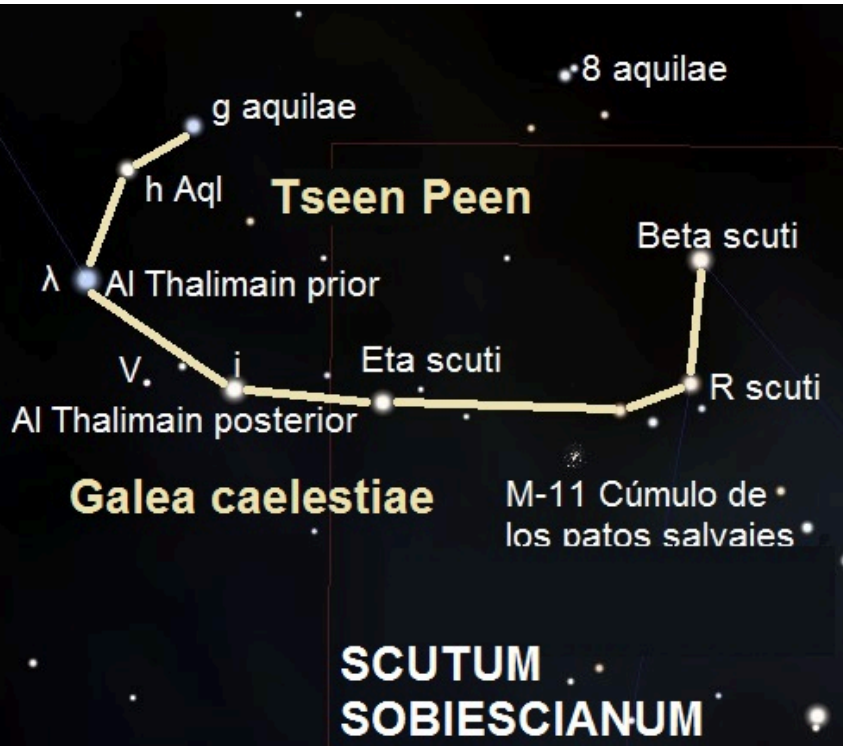


- Over half of the two million living species described in the world are insects.
- Insects have been around for over 350 million years and have evolved solutions to many physical and chemical problems. Engineers are increasingly looking to insects for solutions in material science and chemistry.
- Insects are found on all seven continents, even Antarctica.
- Insects are excellent models for physiological and population processes. For example, the common fruit fly, Drosophila melanogaster, has been used as a model species in genetic studies for over 100 years. Its short generation time, small size and the ease with which it can be reared in the laboratory makes it an ideal organism for such studies.
- More species of insect have had their genome sequenced than any other group of multicellular organisms.
- Insects are everywhere. No matter where you live in the world or what language you speak, you will come into contact with insects.

Source: Royal Entomological Society

Viewing yellow supergiant R Scuti

One variable star that you can see in July is R Scuti in the constellation Scutum the Shield. When the English observer E. Piggot discovered it in 1795, it was one of only a few variable stars known. At its brightest, it is an easy star to see. Even at its dimmest, some 50 times dimmer, you can still see it in binoculars. It is easy to find since it lies just a degree (about 2 diameters of the full Moon) northwest of a cluster of stars called the "Wild Duck Cluster," so named because the bright stars in the cluster form a "V" - like a flock of flying ducks.



R Scuti is the brightest of a class of variable stars called RV Tauri stars, after the prototype, or first star, to be determined of the class. Such stars are a small group of yellow supergiant stars that are thought to be near the end of their life. They may provide us with information about the evolution of stars as they transition to white dwarfs.

Visually, they are characterized by alternating patterns of deep and shallow minima--periods of minimum brightnesses. R Scuti has a period of about 144 days between deep minima. For example, every fourth or fifth minimum is exceptionally faint for reasons that are not well understood. The star seems to be pulsating in at least two superimposed periods, possibly due to shock waves within the star itself or their interaction with a surrounding cloud of gas and dust.

Is Terraforming possible - and is it a good idea?

By COL Jordan Reinleib, USS Britannic, R7

This is the second part of an article started in the last issue looking at the possibilities and difficulties regarding terraforming planets and moons in our solar system.

Gaseous planets

The gas giants are comprised of a core and a dense body of gases. They have no solid surface and are subject to formidable and relentless winds. Unmanned probes have endeavored to penetrate their atmospheres with varying but futile gradations of success, only to be crushed in the upper layers of the clouds.

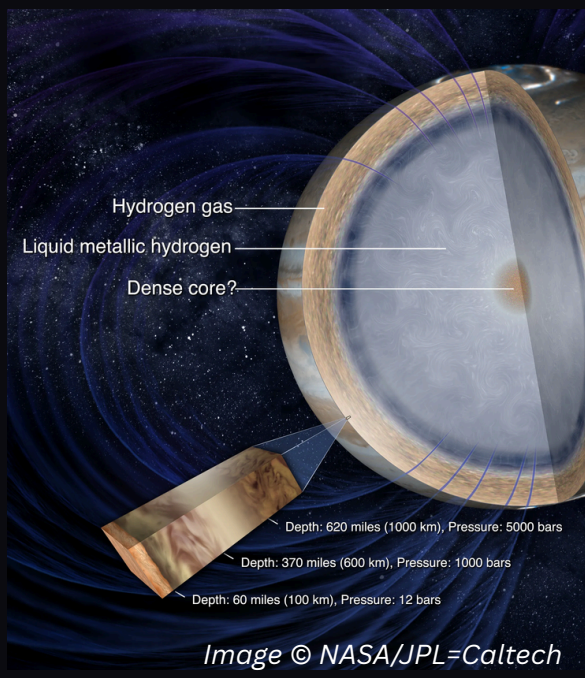


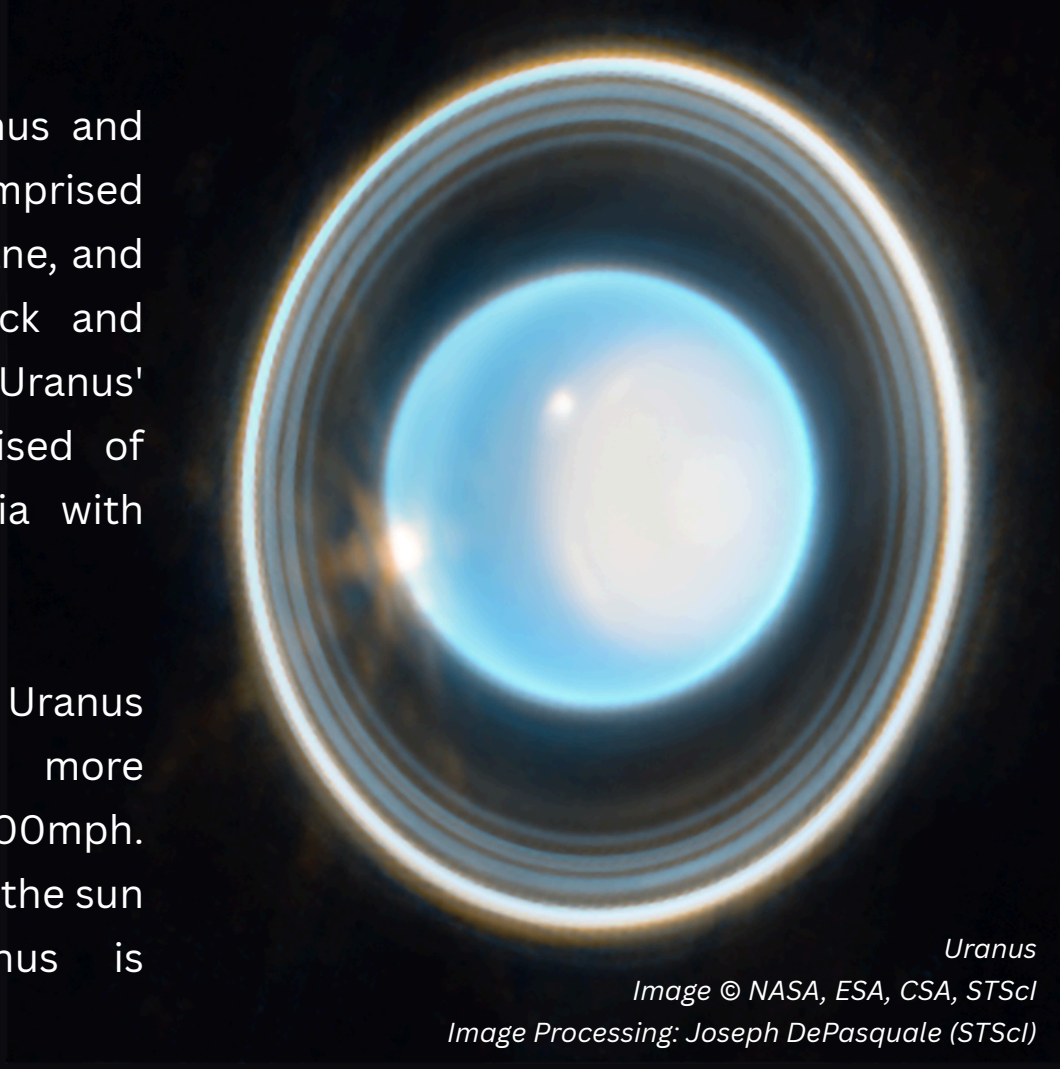
Image © NASA/JPL=Caltech

Jupiter is the largest planet in our solar system at 317 times more massive than Earth. Jupiter is multi-colored with one of its intriguing features being its Great Red Spot which is a haven for turbulent and unrelenting winds. The Great Red Spot is approximately 10,000 miles in diameter, and is comprised of ammonia, ammonium hydrosulfide and other compounds. Beneath Jupiters clouds lie an ocean of liquid metallic, and it is believed that beneath that is a core of rock, metal and hydrogen compounds.

Saturn is a multi-colored world encircled by rings comprised of ice. Saturn interestingly also possesses a hexagon - a six-sided storm situated at the planet's north pole.

The ice giants of Uranus and have atmospheres comprised of ammonia and methane, and are notorious for thick and unrelenting storms. Uranus' atmosphere is comprised of methane and ammonia with winds up to 560mph.

Neptune is similar to Uranus but its winds are more ferocious, reaching 1,200mph. Despite being closer to the sun than Neptune, Uranus is colder.



Uranus
Image © NASA, ESA, CSA, STScI
Image Processing: Joseph DePasquale (STScI)

Terraforming these worlds would prove a formidable challenge to say the least. We could use hydrogen-helium fusion to siphon off septillions of tons of gases Jupiter and Saturn, and helium-ammonium fusion to to do the same on Uranus and Neptune.

If we can clear these hurdles we can take hydrogen, carbon, oxygen and carbon dioxide from each respective world's core and affix artificial surfaces to each, followed by enveloping each surface (natural and artificial) with Earth-type atmospheres.

The technology required to bring this to fruition is centuries, if not millenia, away from being available. Needless to say, there is no possibility of terraforming a planet which has no solid surface currently. However, there may be possibilities on the moons.



Titan’s surface as seen by the Huygens lander.

Image © ESA/NASA/JPL/University of Arizona)

Saturn’s largest moon Titan is the only moon in our solar system with a formidable atmosphere. Titan is orange, its atmosphere is rich in nitrogen, and its surface is comprised of methane seas, rivers, and lakes.

We successfully sent the Huygens probe to Titan, which transmitted an image of its surface, although it’s difficult to assess if the rocks on its surface are rocks, ice or both.

Terraforming Titan would require hydrocarbon reserves several hundred times greater than Earth’s total complement. However, it has been postulated that positioning mirrors in orbit above Titan to divest focused sunlight on its surface would warm the planetoid up, melting its ice and oxygenated its atmosphere. This would envelop Titan with water and, as it already possesses the building blocks for life, we'd have a head start on terraforming.

We currently possess the technology to venture to some alien worlds. In 2006 Japan announced plans to establish a base on the Moon by 2030, and Russia in 2007 announced plans to follow suit by erecting a base there from 2027-2032. In 2028 The Dragonfly is slated to embark on an excursion to Titan ETA December 2034.

If we manage to not destroy ourselves and sojourn into space the true test and testament of our legacy will be if we encounter alien life. Our legacy has unfortunately entailed trying to change what we don't understand.



As Jean Luc Picard said to Beverly Crusher in *Symbosis*, "History has proved again and again that whenever mankind interferes with a less-developed civilisation, no matter how well intentioned that interference may be, the results are invariably disastrous."

If we manage to not destroy ourselves and sojourn into space the true test and testament of our legacy will be if we encounter alien life. Our legacy has unfortunately entailed trying to change what we don't understand. As Jean Luc Picard said to Beverly Crusher in *Symbosis*, "History has proved again and again that whenever mankind interferes with a less-developed civilisation, no matter how well intentioned that interference may be, the results are invariably disastrous."

I'm not emphatically opposed to us colonizing alien worlds. I am emphatically opposed to us undermining and potentially usurping the sanctity and unique features of these worlds. If we colonize alien worlds, then we should first and foremost ensure we don't transfer any innocuous, contagious, deleterious or even lethal germs dormant and/or active that could prove fatal to indigenous life.

If we clear these hurdles, then we should build underground centers and bases replete with special materials designed to withstand radiation as such. This way we respect the sanctity of these worlds, alien life, and can colonize. It’s a win-win.

If we choose to terraform nothing may ensue, but the uniqueness of each world would not only be lost, but, by definition, no longer be extraterrestrial.

We could displace or even inadvertently murder or even render extinct whatever indigenous life could exist there. This would be reprehensible and, as Spock said in The Devil in The Dark, "A crime against science."



Star Trek has always served as a haven for whatever contemporary dilemmas are prevalent on Earth at the time. Take the Genesis concept in The Wrath of Khan. This showcased the Genesis device which on the surface seemed laudable (changing a barren world bereft of life and terraforming it).

As the Federation president said in the Undiscovered Country "just because we can do a thing does not necessarily mean we must do it."

Taking everything into account if push comes to shove I hope we err on the side of caution.



Join STARFLEET Sciences for International Observe the Moon Night September 19th 2026 Stay tuned for more details

---



© Achiri Bitamsimli

Who were the first intrepid explorers who gazed at the night sky, and learned to use the stars to navigate their world? The answer might surprise you!

Sweden's Lund University researchers Marie Dacke, Eric Warrant and Emily Baird published their findings on dung beetles' ability to use starlight as a navigational tool. They earned the 2013 Ig Nobel Prize for this study!

Exoplanet Travel Bureau

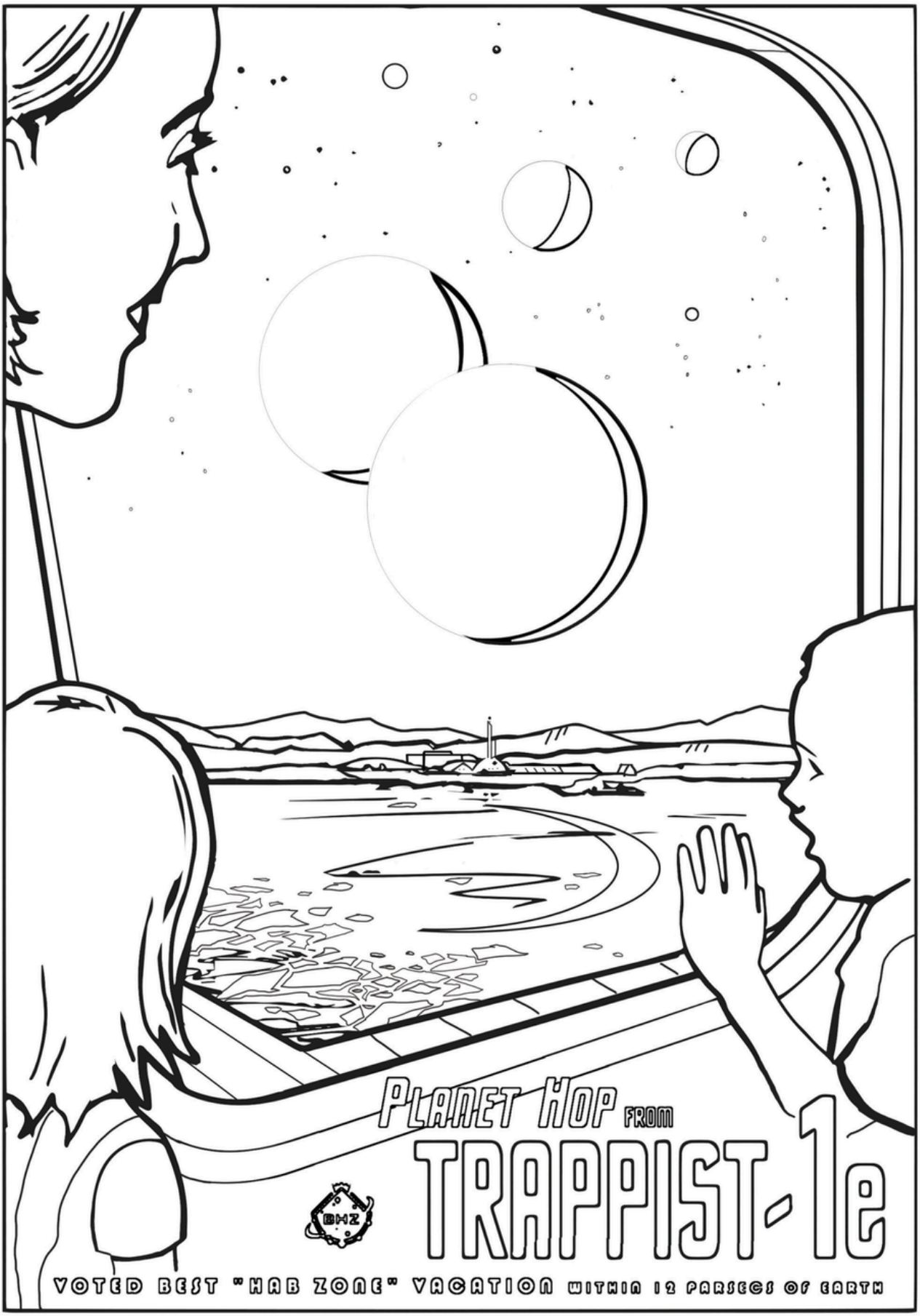


Kepler-186f is the first Earth-size planet discovered in the habitable zone of another star – where liquid water could exist on the surface. If plant life did exist on Kepler-186f, leaves might be shades of red to generate energy from its cool, red star – very different than Earth's palette of greens under our yellow Sun.

What tones will you pick to color Kepler-186f?

NASA's Exoplanet Exploration Program. Jet Propulsion Laboratory, Pasadena, CA.

Exoplanet Travel Bureau



About 40 light-years from Earth, seven planets orbit a small, dim, red sun. TRAPPIST-1e, the fourth planet from the star, is in the habitable zone, meaning liquid water could exist on its surface. The six other Earth-size planets are so close that they would loom like moons in its red-tinged sky.

Imagine what the other planets would look like from TRAPPIST-1e!

NASA's Exoplanet Exploration Program. Jet Propulsion Laboratory, Pasadena, CA.



If you have received this newsletter and you're not a part of STARFLEET Sciences but would like to be, visit **https://sciences.sfi.org/join-us/** to sign up.

To contact SFSCI email the Director at **sfsci-director@sfi.org**
Join the main SFSCI Facebook Group: **https://www.facebook.com/groups/sfsciences** - ask your regional liaison for region-specific groups.
Join the discussion on Discord: **https://discord.gg/3nW8wXhPTF**