Issue 4. March/April 2025

Event Horizon

The magazine of STARFLEET Sciences



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Celebrate Earth Day
Warp drive theory
Foraging for food and fun
Meet the SRTs
Changeable Betelgeuse
The science of snow

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Event Horizon is edited by CAPT Pam Kingsley.
Deputy editor COL Patrick Litton.

Submissions are welcomed - please send them to **sfsci-eheditor@sfi.org**

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Cover image: Edited AI image.

"Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less."

Marie Curie

From the Director's Office

Greetings,

In 1962, Rachel Carson published her groundbreaking book "Silent Spring", which documented the environmental harm of the widespread use of the pesticide DDT. In April of 1970, U.S. Senator Gaylord Nelson created Earth Day to bring awareness to environmental issues. It worked. After millions of citizens raised their voices, the U.S. Environmental Protection Agency was created just months later. Earth Day quickly became recognized internationally and is still celebrated around the world today.

Those who have seen Earth from above have gained a perspective of just how special it is. In 2021, William Shatner (Captain Kirk) made his first trip to sub-orbital space on the Blue Origin at the age of 90. He returned with an unexpected emotion - overwhelming sadness. Said Shatner, "My trip to space made me realize we have only one Earth - it must live long and prosper." If you see him speak nowadays, he makes sure you know.

In celebration of our home planet Earth, we are excited to announce our version of Earth Day, STARFLEET Project Earth! It will be held online on Saturday April 26th and is a collaboration between SFI Sciences, Petfleet, Medical, and Tactical. We will be bringing you an exciting mini-summit full of information, trivia, and guest speakers. Be sure to mark it on your calendar!

To the stars!

Fleet Captain Barb Barton

Director of STARFLEET Sciences

From the Editor's Desk

Welcome to the first *Event Horizon* of 2025!

In this bumper edition we have a great variety of articles, from the history of arsenic poisoning to warp drive theory, via some space race history and a quick forage for fun and food! Of course, there are also our regular series' on astrophotography and electronics for you to enjoy.



We have focussed some spotlights on what some of you have been doing in Scietific Research Teams (SRTs) and on away missions, recommendations of places to go and things to do from members, and the introduction of two new ventures for SFSCI - Project Earth, a celebration of Earth Day, and the First Contact programme which aims to build relationships between chapters across the globe.

Stamets, our mascot, has been exploring the UK and Ireland, including the famous Cavern Club in Liverpool, and his adventures are chronicled on pages 49 and 50. Younger members (or non-members!) should also check out the following pages, which have some puzzles for you to solve.

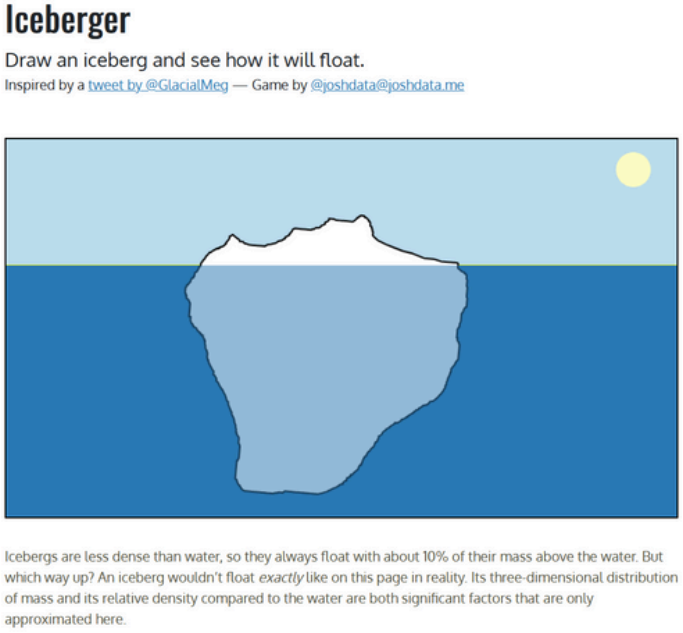
I hope you enjoy reading this issue, and, as always, if you have any comments, feedback, suggestions or content you would like to contribute, please send it to **sfsci-eheditor@sfi.org**

Captain Pam Kingsley

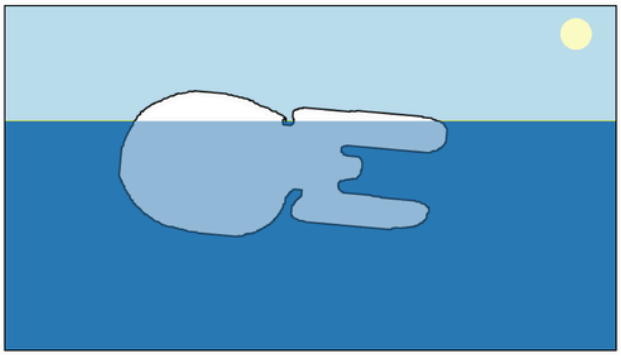
Deputy Director of STARFLEET Sciences & *Event Horizon* editor

SFSCI recommends...

Each issue members of STARFLEET Sciences will share some of their favourite science-themed websites, books, equipment, places, podcasts, etc. from the past quarter.



Something that has entertained me far more than I expected is **this iceberg simulator.** You can draw any shape and see what its stable orientation (how it would float) is. Challenge yourself to draw something in its perfect orientation... or you could try some different shapes...





The Americas

Produced by the team behind some of David Attenborough's best-known series, narrated by Tom Hanks and with a score from Hans Zimmer, The Americas is a stunning view into the animals live throughout North and South America.

From the frozen north to tropical beaches, mountain peaks to arid plains – this varied, breathtaking land is a place the most unexpected creatures call home.

Watch on NBC/Peacock in the US or on the BBC/iPlayer.



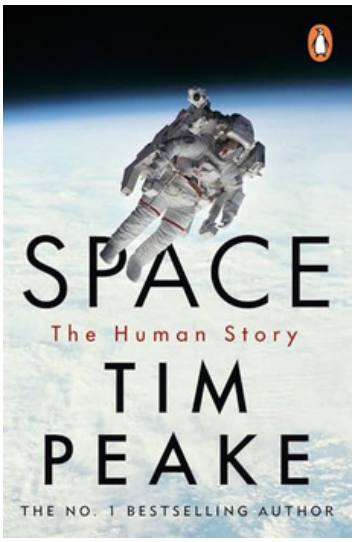
James Cameron - Challenging the Deep exhibition, Queensland Museum Tropics, Queensland, Australia

Whether you enjoyed the film *Titanic* or not, there's no denying filmmaker James Cameron's passion for deep ocean science, technology and exploration. The exhibition includes material on his record-breaking dive to the bottom of the planet in the Deepsea Challenger, the submersible he co-designed and co-engineered to withstand water pressure of 110,000 kPa.

For film buffs, there are displays on underwater recording, lighting, diving and communication used by Cameron in both in his exploration and in his filmmaking.

More information:

https://www.museum.qld.gov.au/tropics/whats-on/james-cameron



***Space: The Human Story* by Tim Peake**

Part history book and part recollections of Major Peake's own experiences, *Space* tells the story of human spaceflight from Yuri Gagarin up to the Artemis missions. He infuses the stories of the men involved in early spaceflight with some insight into what the astronaut mentality is like, and draws parallels with his own training . A fascinating read.

Attention, STARFLEET personnel!

A special transmission is incoming...



On Stardate 2025.112 (Saturday, April 26, 2025), STARFLEET Auxiliaries will host a Project Earth event to celebrate Earth Day (April 22, 2025). Join us as we honour Terra (Sol III), the cradle of the Federation and home to many of our fleet's finest beings—both humanoid and non-humanoid alike!

This virtual mission will include special transmissions, interactive activities, and surprises from STARFLEET Science, Medical, Tactical and Petfleet Auxiliaries. You might even encounter some historical records involving humpback whales...

To ensure all crew across the quadrant can participate, we'll run events in two time slots. See the next page for our timetable. To find the time for your time zone use **this website**.

Stand by for further orders. Until then, may your environmental impact be minimal and your curiosity boundless!

STARFLEET Auxiliaries Command

Timetable for Project Earth

The programme will run through twice - you are free to attend any session you like at whichever time suits you best.

SESSION 1	**SESSION 2**	
5.45am ET / 9.45am UTC	12.45pm ET / 4.45pm UTC	Auxiliary Introduction Videos
6am ET / 10am UTC	2pm ET / 5pm UTC	Nature-themed games streamed by SF Tactical!
7am ET / 11am UTC	2pm ET / 6pm UTC	Project Earth Mission – Save the Planet
8.15am ET / 12.15pm UTC	3.15pm ET / 6pm UTC	Kahoot Trivia Game
9.30am ET / 1.30pm UTC	4.30pm ET / 8.30pm UTC	Project Earth Greetings
10am ET / 2pm UTC	5pm ET / 9pm UTC	Sol Speaker Series – speaker TBA
11.15am ET /3.15pm UTC	6.15pm ET / 10.15pm UTC	Eco Dystopian Games streamed by SF Tactical

STARFLEET: Project Earth – Wilderness/Park Cleanup

A Call to Action for STARFLEET Members

Our planet is a beautiful and precious place, teeming with life and wonder, and it's our responsibility to protect it for future generations. As members of STARFLEET, we are united by a vision of exploration, discovery, and the betterment of all life—both in the stars and here on planet Earth. This year, we invite you to be part of something truly impactful: STARFLEET Project Earth – Wilderness/Park Cleanup. Join forces with fellow crew members, family, and friends to restore and rejuvenate local parks, nature reserves, wilderness areas and shorelines by removing litter and debris. Together, we can make our world a cleaner, healthier place for all.

This initiative runs between Tuesday, April 22 (Earth Day), and Sunday, May 11 and aligns with our commitment to environmental stewardship. Whether it's a city park, a hiking trail, or a beachside cleanup, every action counts. Let's make a difference—one bag of trash at a time!



CDT4 Chloe Kingsley (R20) on a beach litterpick

Who Can Participate?

This event is organized by STARFLEET members, but friends, family, and local volunteers are welcome to join in!

Where Can You Host It?

Chapters and regions are encouraged to choose local parks, wilderness areas, or nature reserves that need cleanup. Groups should contact their local park authorities or municipalities to coordinate and ensure a smooth event.

When Does It Take Place?

Cleanup efforts can take place on any day(s) between April 22 and May 11, 2025.

How Do You Organize It?

Each chapter/region will plan their own local cleanup event. Below is a guide to help you set up and execute your cleanup effectively.

Guide for Organizers

Organizing a successful STARFLEET Project Earth Wilderness/Park Cleanup takes planning, teamwork, and coordination. Whether this is your first time leading an event like this or you're a seasoned organizer, this guide will help ensure that your cleanup is well-structured and impactful. Below are seven key steps to setting up and executing your event smoothly. By following these steps, you will create a positive experience for participants and leave a lasting impact on your local environment. As an organizer if you have questions, please **reach out to the STARFLEET Project Earth team**, we are here to help.

1) Announce your event and get volunteers
2) Select your cleanup location and contact any relevant authorities, eg. local council/park authorities
3) Gather supplies and equipment - bags, gloves, litter pickers, etc.
4) Map out cleanup zones
5) Make sure volunteers have safety information and sign any waivers
6) Partner with local businesses and sponsors
7) Track and report your success - before and after photos, weight of filled bags, etc.

For more information and resources visit **https://sciences.sfi.org/project-earth/**

Scientific Research Teams

Greetings Fellow and Future Researchers!
Since the launch of the Scientific Research Teams (SRTs) at the end of 2024, we've seen a lot of folks jumping on board. We presently have 8 SRTs across 6 Regions. Here is our current list:

SRT-36010
Nickname: Apollo's Acolytes
Motto: Blinding You With Science!
Chapter: ISS Olympus
Lead Researcher: Aaron Morphew
Assistant Lead Researcher: Michael Malotte

SRT-73817
Nickname: The Signallers of Science
Motto: Quark to Quasar and everything in-between.
Chapter: USS Vimy Ridge
Lead Researcher: Amanda Dunklin-Goodman
Assistant Lead Researcher: Kevin Kirk

SRT-1676D
Nickname: Archer's Pathfinders
Motto: Uncovering the Temporarily Hidden .
Chapter: USS Challenger
Lead Researcher: Vince Ceraso

SRT-4321
Nickname: The Lab Rabbits
Motto: *Explorare Omnia, Confido Scientiam*.
Chapter: ISS Kidd
Lead Researcher: Janet Livingston
Assistant Lead Researcher: Kelly Hays

SRT-71803
Nickname: The Darwin
Motto: Man is not above nature, but in nature.
Chapter: USS Virginia
Lead Researcher: Clinton Harris
Assistant Lead Researcher: Elizabeth Harris

SRT-72296
Nickname: Nuclear Nerds
Motto: Well, that was unexpected.
Chapter: USS Matrix
Lead Researcher: Eric Johannson

SRT-2121
Nickname: Jet Streams
Motto: Going with the Flow.
Chapter: USS New Jersey
Lead Researcher: Monika Reinholz

SRT-39852
Nickname: Sark Labs
Motto: Defying Limits, Igniting Discovery.
Chapter: USS Cutty Sark
Lead Researcher: Jennifer Lord

These folks have got a lot going on, including focusing on the botanical sciences (edible weeds, anyone?), stargazing (seven planets in one night!), researching exoplanets, even preparing for Space Camp! Future activities include plenty of space research, museum visits, and – most importantly – sharing the love of science with everyone. Want to get involved? Starting an SRT is easy!

First off, what is an SRT? The Scientific Research Team (SRT) is the smallest unit in the STARFLEET Sciences Auxiliary. They are chapter-based, and size can vary, consisting of a single member or dozens. The member in charge of overseeing the SRT is referred to as the Lead Researcher (LR) and their second in command is usually termed the Lead Research Assistant (LRA). The chapter CO must give permission for an SRT to be established.

The primary purpose of the SRT is to serve as an informational and communications resource for the chapter in all things science. Its secondary mission is to share this information and communication with other like-minded individuals through the STARFLEET Sciences Auxiliary via the Region Science Liaisons. Its third mission is to foster participation in science-related activities.

To be an official member of the chapter's SRT requires three things: STARFLEET membership; affiliation with the STARFLEET Sciences Auxiliary in the database; and signing up for membership with the STARFLEET Sciences Auxiliary at the following website - **https://sciences.sfi.org/join-us/**

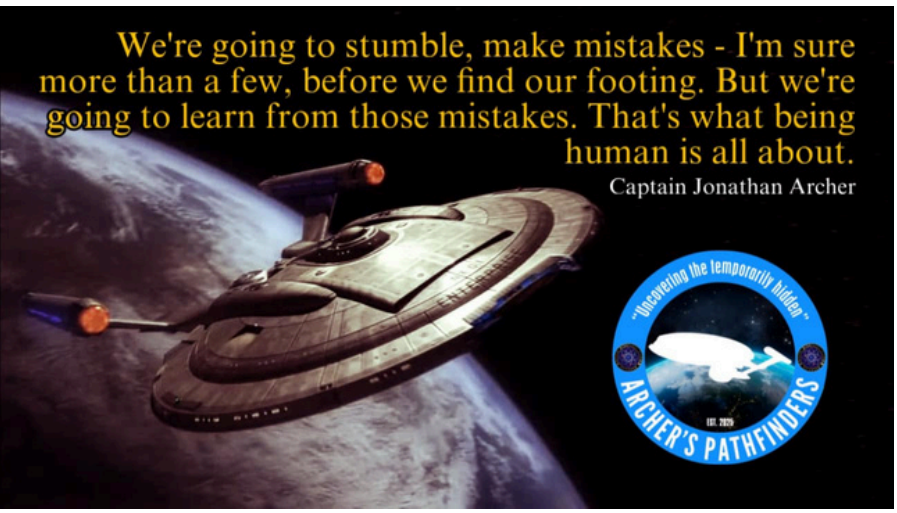
FTADM Michael Malotte, SRT Coordinator
sfsci-srtcoord@sfi.org

Hello! I'm **Ensign Vince Ceraso**, a Science Officer on the *USS Challenger* (NCC-1676D), the flagship of the 7th Fleet. I'm a member of the Science division, as well as a member of the Communique writing staff.

I'm the Lead Researcher of Archer's Pathfinders (aka The Pathfinders), the Challenger's Science Research Team (SRT) spearheaded by myself. The goal is to share planetary data from my NASA volunteer work at Exoplanet Watch.



I'm looking forward to teaching Starfleet officers all about exoplanets. I'm still getting the ball rolling as we were only commissioned a month ago.



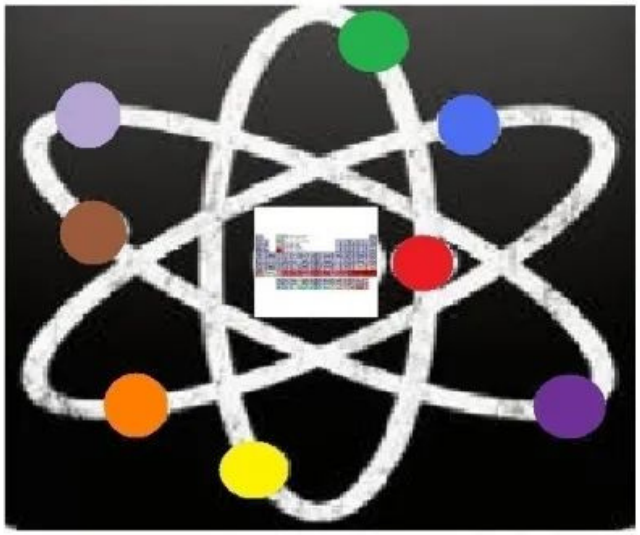
Driven by determination to unravel the mysteries of our galaxy, Archer's Pathfinders is a Starfleet Science Research Team (SRT) founded for the purpose of sharing information about, and encouraging participation in, exoplanet observations and research. We will also act as an accessible educational vehicle about space exploration.

Honoring the exploratory legacy of Captain Jonathan Archer, we seek to know what lies over the horizon, beyond our own shores. The frontier is waiting. Let's explore together.

R3's ISS Kidd now has a Scientific Research Team (SRT-4321), The Lab Rabbits! Our current projects are Vasquez Rocks, exploring geology, fossils and lapidary arts of planets, and Botany YAY!, examining all things botanical.

The Lab Rabbits are thankful to Christina Sievers at the CoE for designing our amazing logo.

Scientific Research Team SRT-72296, headed by Lead Researcher Eric Johannson, are the Nuclear Nerds, whose motto is "Well, that was unexpected".





Introducing First Contact



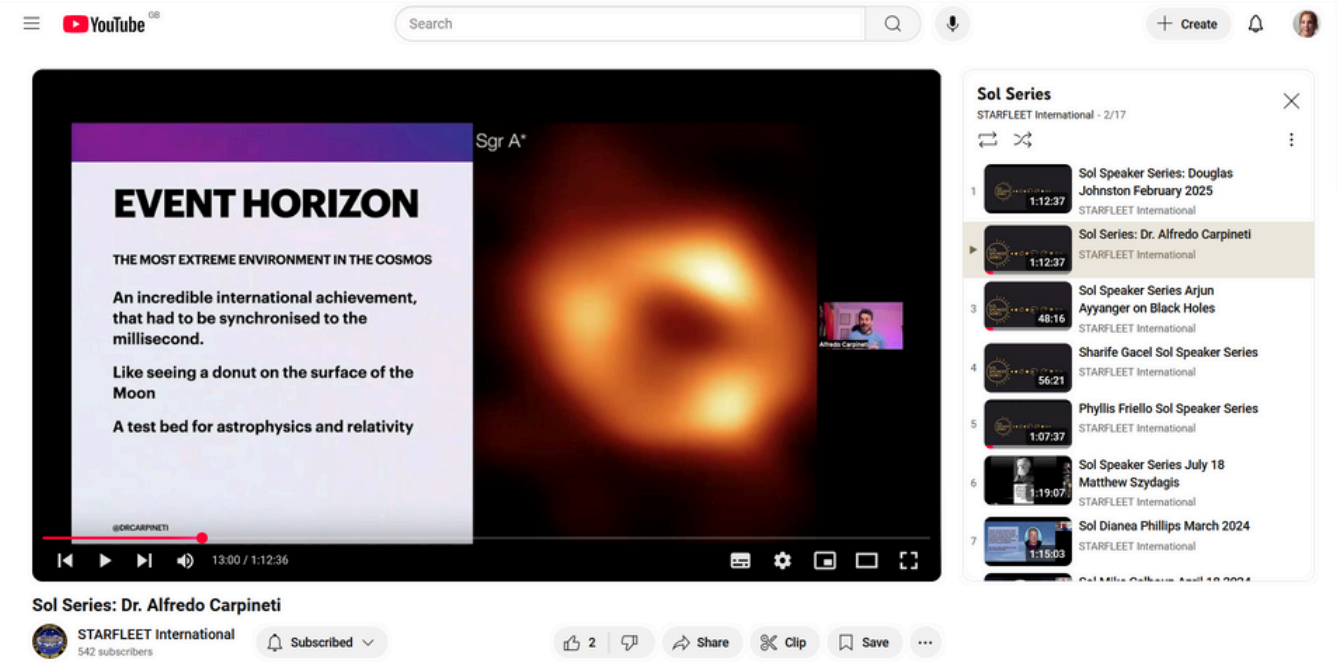
STARFLEET International has over 5000 members from around the globe, so what an opportunity to learn about our different cultures and share the love of *Star Trek* and Science with chapters from other countries! Introducing Science's newest program, First Contact!

The idea for a First Contact program was inspired by the Sister Cities program, which informally started in the 9th century! A sister city or a twin town relationship is a form of agreement between two geographically and politically distinct localities for the purpose of promoting cultural and commercial ties. As we follow the principles of IDIC (Infinite Diversity in Infinite Combinations), creating First Contact with a chapter from another country on Planet Earth and building up those relationships enriches our lives and broadens our horizons. It also gives us opportunities to learn about what is going on in the Sciences in other parts of the world, share information with each other about the lands and waters where we live, ecology and conservation work, space programs, cool places for away missions, and whatever else your curiosity comes up with.

Talk to your chapters and see if they would like to join the program. If you decide you are ready to make First Contact, the Commanding Officer of the chapter just needs to go to **our website** and complete the form. We will confirm your application and help you make First Contact once we have enough chapters signed up. If you have any questions please contact Fleet Captain Barb Barton, Sciences Director, at **sfsci-director@sfi.org**

The Sol Speaker Series lectures are 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. To participate or watch live, you need to get the link by registering **here**.

All previous talks are available at the **STARFLEET International YouTube channel.**

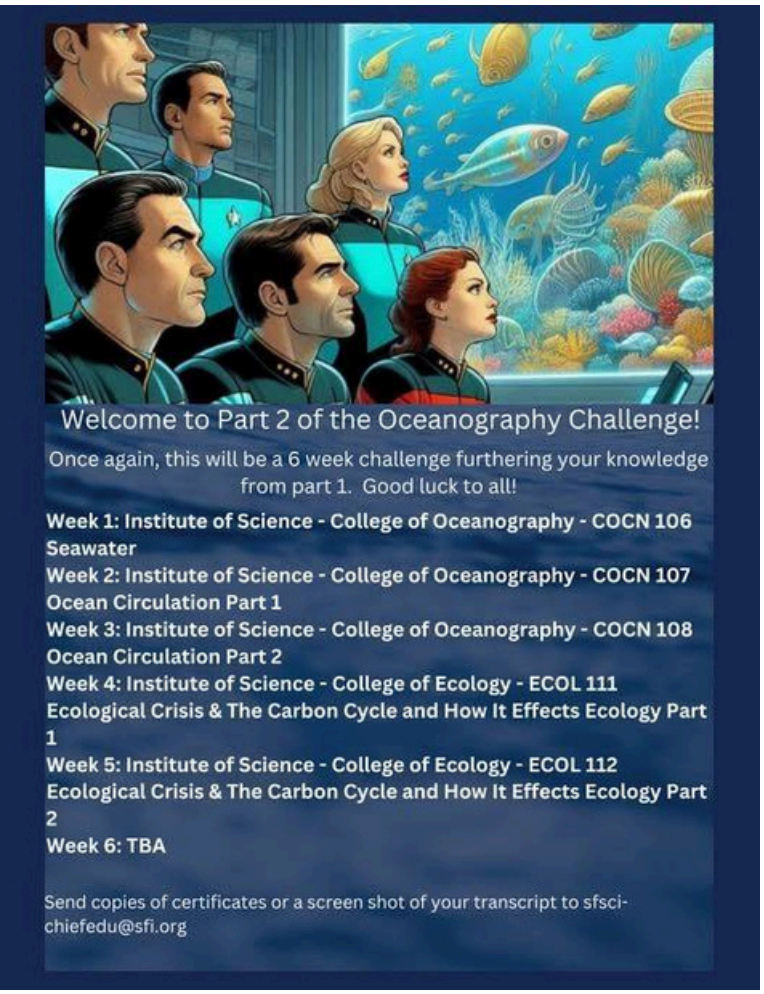


If you have any suggestions for topics or speakers for future talks, email **sfsci-director@sfi.org** If you miss a live event, recordings are posted on SFI's YouTube Channel here.

Spring News from our Liaisons

ENS Monica Butt, R20 Science Liaison, Asst. Science Liaison Coordinator, Deputy Chief SFI Science Education

The spring season has been bustling, and as the new year unfolds, more activities are ramping up here at the Science Auxiliary!



Can you believe that we've gone and created even MORE events? Only just announced is an exciting LIVE, ONLINE conference to celebrate Earth Day and all things STARFLEET. (See pp 7-10 - ed.)

The Sol Science Lectures have been fantastic this Spring! This exceptional series offers attendees a unique chance to explore various scientific topics presented by field experts. And we've enjoyed diving deep into our February and March Oceanography Challenges Parts 1 and 2.

What's in store for April?? Think to the farthest reaches of the galaxies as well as the smallest micro-organisms yet to be truly defined....beam over in April to find out more at **https://sciences.sfi.org/challenges-events/** and watch for posts on our Facebook pages announcing each new week of the challenge. You will earn a certificate upon completion that you can show off at your next Ten Forward talent event!

Does becoming a certified STARFLEET Specialist in your chosen scientific field interest you? Are you looking to pad out your STARFLEET Science career CV? With this certification, you can look forward to being the go-to person called on during that next away-mission, or perhaps even have that missing kernel of scientific know how to successfully complete your mission.



Excitingly, new science specializations will be introduced every month, allowing you to continually expand your expertise. Current offerings include: Anthropologist, Astronomer, Astrobiologist, Astrocartographer, Biologist, Botanist, Entomologist Forensic Scientist, Mechanical , Engineer, with more being released each month! Completion of all introduction courses is a prerequisite before any specialty studies can be commenced. For more information on how to get involved, please visit **https://sciences.sfi.org/specialist-training/**

The Science Auxiliary is always seeking innovative ways to grow and exceed the expectations of its dedicated members. We encourage you to explore all the available resources and programs for participation. If you're not a member yet, we warmly invite you to join us at **https://sciences.sfi.org/join-us/**

Additionally, don’t forget to follow our Facebook page **STARFLEET Sciences Division**.

Moreover, our Monthly Live Science Quizzes will kick off for it's second round this April. This is your chance to flaunt your knowledge and quiz-solving prowess while having a blast at live, online quiz events.

We are committed to making the Science Auxiliary the best it can be, so we welcome your feedback on what you'd like to see more of. Your thoughts and suggestions are invaluable to us, and we encourage you to reach out with any questions or suggestions you may have.

The universe is not merely a backdrop for our endeavors; it is a dynamic tapestry brimming with wonder, filled with enigmas waiting to be deciphered, and abundant with infinite potential. When we unite as a community dedicated to fostering positive change, we create an environment where collaboration and innovation flourish. In such a setting, there are truly no limits to the impact we can have on the world around us and the society we inhabit.

The collaborative spirit within all of the Starfleet Science Auxiliary not only drives our scientific inquiries, but also cultivates a sense of joy and excitement in sharing the world of science with our members. As we chart our course through the stars, we do so with the knowledge that we are part of something much larger than ourselves. Until next time, I remain your intrepid R20 Science Liaison, eager to share in the adventures that await us and to witness the incredible discoveries that lie just beyond the horizon!

Live long and prosper!
ENS Monica Butt
sfsci-r20liaison@sfi.org

Spotlight on our Scientists

As your Assistant Science Liaison Coordinator, I want to celebrate and share all the amazing research, study and activity our Chapters are engaging in! I am now accepting monthly submissions to be shared in each issue of the Event Horizon. Let me know what you're getting up to and inspire your Region and the Fleet to get involved and join in the fun.

Themes are open to any science you are currently researching, science-based events or places your planning for away-missions or even an article based on your own current research and activity within the scientific field. Share your findings and enthusiasm with your Region!

ENS Vince Ceraso, USS Challenger, R7

I'm a member of the Science division, as well as a member of the Communique writing staff. I'm looking forward to teaching Starfleet officers all about exoplanets. I'm still getting the ball rolling as we were only commissioned a month ago. I'm currently working on my astrocartography and astronomer specialist certifications. Archer's Pathfinders (aka me) are planning either an in-person demonstration at a local meeting or making a video (or both!) on how to be involved with Exoplanet Watch, how to create light curves to submit to NASA.

You can read Ens Ceraso's article Exploring Strange New Worlds: What I Do for NASA *in January's* Event Horizon*, available* ***on the Sciences website.***

LTjg Raven Cochran, USS Blackstone, R12

Engineering is high on the list for chapter activities, but science activities are being planned, including tree planting for Arbor Day and an away-mission to the Mid America Science Museum.



CMDR David Roberts, USS Merlin, R20

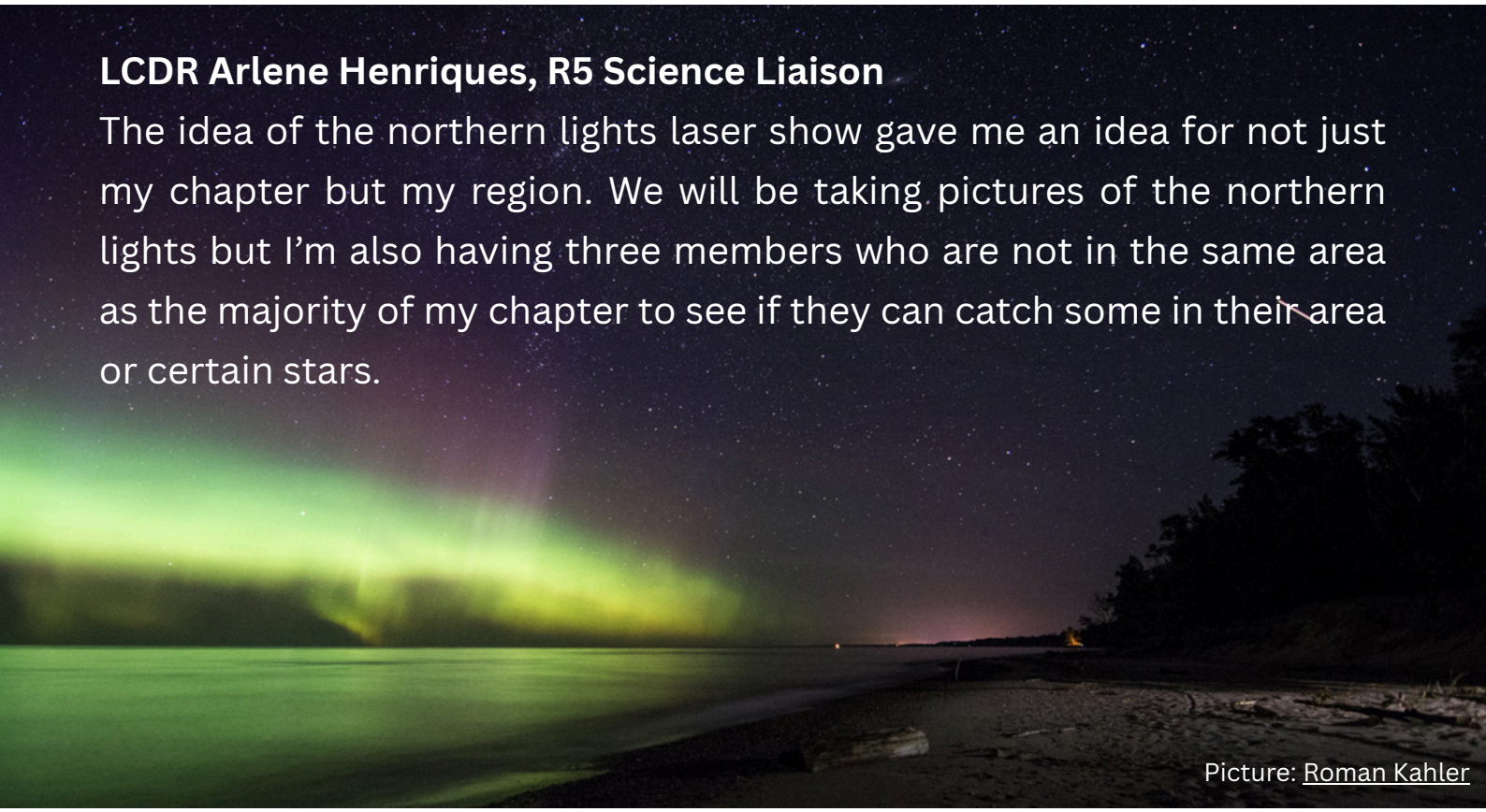
In the planning stages is an Away Mission to the Natural History Museum in London.

CAPT Claire Meade, USS Essex, R20

Members of our Chapter are going to Lightroom, 12 Lewis Cubitt Square,, London to enjoy this event in April: *The Moonwalkers* with Tom Hanks

LCDR Arlene Henriques, R5 Science Liaison

The idea of the northern lights laser show gave me an idea for not just my chapter but my region. We will be taking pictures of the northern lights but I'm also having three members who are not in the same area as the majority of my chapter to see if they can catch some in their area or certain stars.



Picture: Roman Kahler

LT JL Livingston, R3 Science Liaison

The Lab Rabbits SRT are going to Dinosaur World in Glen Rose TX USA in March. I've issued a challenge just for R3 to watch at least one Sol Series Speaker, live or from the archives. This could be a watch party or as an individual. The challenge ends 31 Mar. I'm planning on quarterly science challenges for R3.

My February FB post series, Wednesday's Weed of the Weed, is a way to keep our SRT visible and showing activity. You don't know who will find inspiration in your post, and you may never know. I find that thought opens a universe of possibilities of what might be. Cheers!

You can read Lt Livingston's article Foraging for Food and Fun *on p30.*

The State of Warp Drive Theory in 2024



By Ens Craig Walsh, USS Mercia, R20

Children often get asked what they want to be when they grow up. When I was asked this many (many!) years ago, my answer would always be "I want to work in space". The inevitable response "then you need to work hard in maths and science", or some variation, seemed at the time to be a thinly veiled substitute for "NASA doesn't hire geeks like you". But it's not quite what I meant. I pictured myself operating an LCARS interface to manage a highly efficient warp core, not bouncing around the moon in a space suit five sizes too big for me.

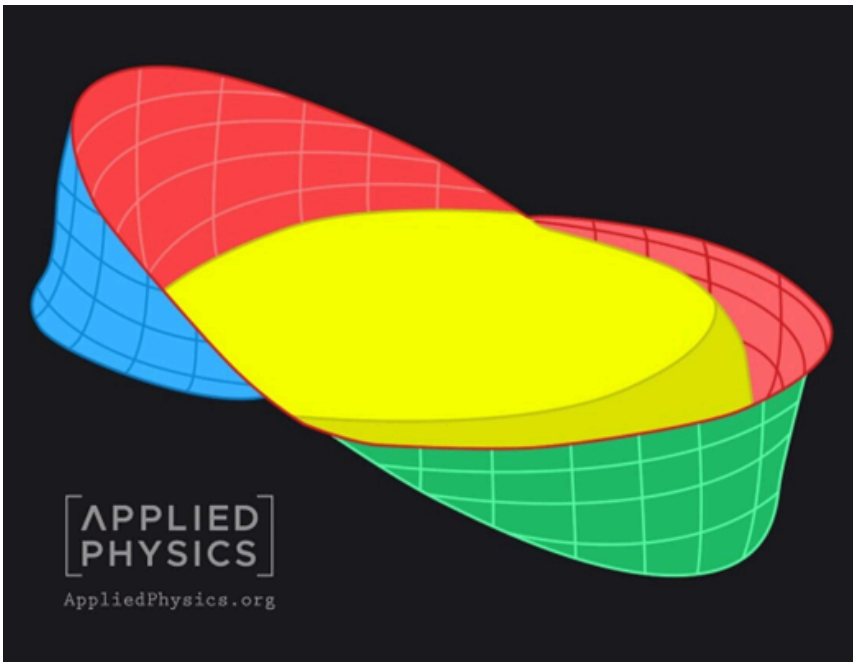
I haven't lost that dream of working in space, but it's not likely to happen in my lifetime. If the human race is to colonise the solar system, there are a few engineering problems we need to solve first, and warp drive is one of those problems, or rather challenges, we're well on the way to figuring out.

In 1994 the Mexican theoretical physicist Miguel Alcubierre wrote a paper called "**The Warp Drive: Hyper-fast travel within general relativity**" that caused quite a stir, and I know what you are going to say. "But Craig, Einstein states in his theory of general relativity that it's

impossible for an object with non-zero mass to travel faster than light", and you'd be right, but Alcubierre's theory has taken that into consideration.

Imagine you're on a beach and there is a surfing competition taking place. When the surfer sees a wave, they position themselves such that the water in front of them is contracting and the water behind is expanding, pushing them along at speed. All the surfer has to do is sit in that sweet spot for as long as possible, they don't even have to paddle.

Alcubierre's theory uses the same principal to propel an object, such as a space ship, through space and time by generating a gravitational wave. Like water, space-time is bendy and, in theory, can be manipulated to form a wave by contracting the space in front and expanding the space behind. A space ship caught in the middle of the wave, known as the "warp bubble", would be able to ride the wave and move away at speeds that exceed the speed of light.

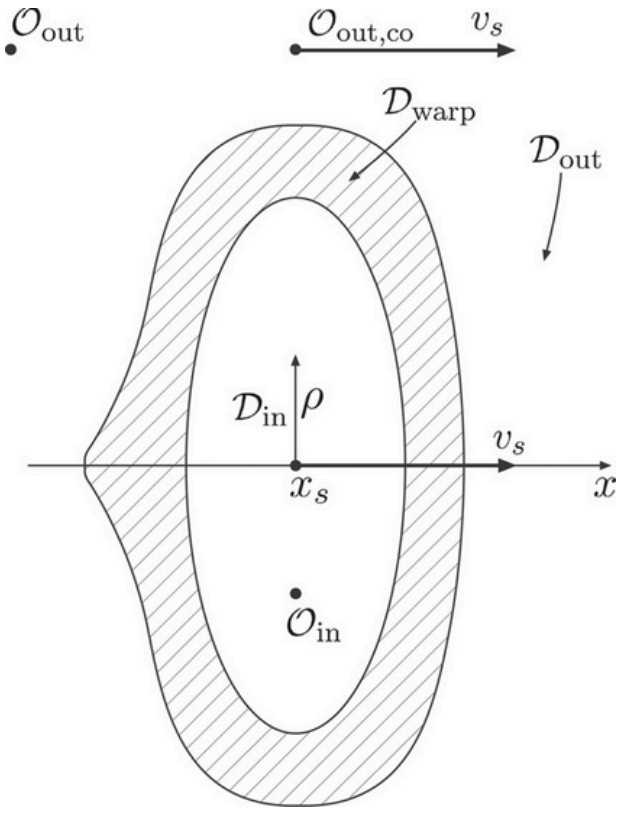


Since the ship is not moving within the bubble, conventional relativistic effects (or wibbly-wobbly, timey-wimey... stuff) such as time dilation would not apply. Hence, the rules of relativity would not be violated.

This all sounds well and good, but there is a problem. The energy required to power the drive, sometimes called negative energy, is more than the observable universe has available. We don't even know if negative energy exists.

Oh, and there is also no known way to stop once you've reached your destination. Like I said, these are just engineering challenges, that are still being worked on by some very clever people, including NASA.

In 2021 a new paper was published called "Introducing Physical Warp Drives". This paper has been "blessed" by Alcubierre and proposes warping space-time to generate a bubble that encompasses a space ship, rather than using a wave. It still requires a massive amount of energy, about the mass of a planet, and we don't know what the bubble that protects passenger from time dilation will be made of, but this theory provides a better mathematical framework for a real world application.



The biggest hurdle to overcome with both theories is that we don't know how, and probably can't, accelerate to faster than light speeds.

Gianni Martire, one of the authors of the second paper once said: "While we still can’t break the speed of light, we don’t need to in order to become an interstellar species. Our warp drive research has the potential to unite us all." and I couldn't agree more.

Having tried to read both papers myself, the echos of those wise advisers from my childhood haunt me. I should have paid more attention in maths and science. Maybe then I could understand the equations in these white papers and make a meaningful contribution.

Betelgeuse: The Changeable Giant on Orion's Shoulder

Comm Michael Lewis, Chief Science Officer, USS Potomac, R1

Comm Lewis is a member of The American Association of Variable Star Observers (AAVSO), a non-profit worldwide scientific and educational organization of amateur and professional astronomers who are interested in stars that change in brightness—variable stars.
In this article he explains more about one of the most well-known variable stars in the sky—Betelgeuse.



One variable star you can see this month is Betelgeuse, normally the brightest star in the constellation of Orion, "The Hunter." It is easily seen in the eastern shoulder of The Hunter, even from within a city.

Betelgeuse is amongst a class of stars known as "red supergiants." As its name implies, Betelgeuse is so large that, if it were placed at the location of our Sun, its outer atmosphere would extend out beyond Jupiter! It is a relatively nearby star, roughly 420 light years away. A "light year" is the distance that light travels in one year—almost six trillion miles!

Betelgeuse may one day explode as a supernova, but it is far enough away that it will not present a hazard to Earth. However, the explosion will be bright enough that we will see it in the daytime and astronomers will have an opportunity to easily study the explosion.

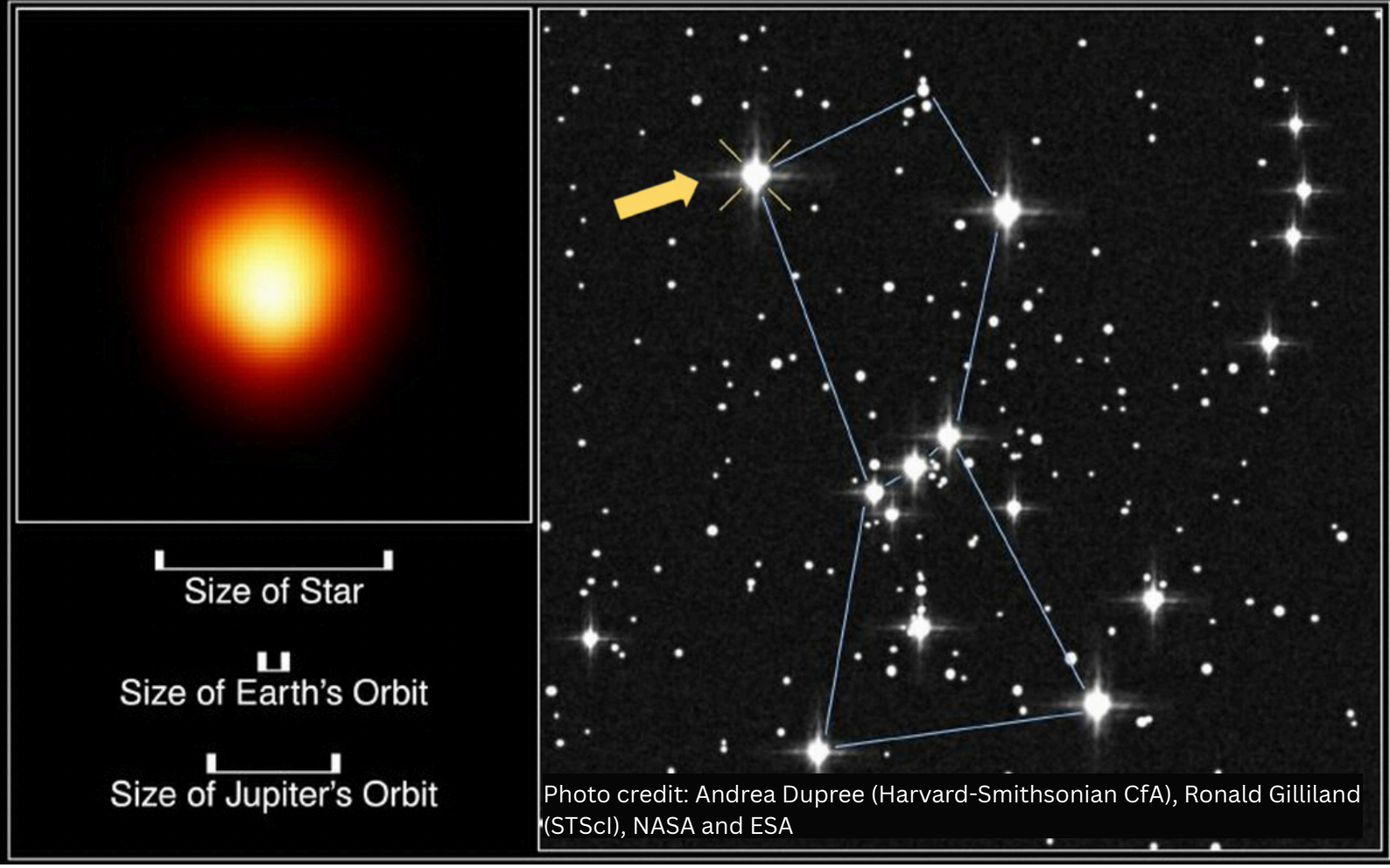


Photo credit: Andrea Dupree (Harvard-Smithsonian CfA), Ronald Gilliland (STScI), NASA and ESA

While awaiting the possible supernova explosion, we can watch Betelgeuse pulsate on an 11-month timescale, first determined in 1836 by John Herschel — son of the astronomer William Herschel, who discovered Uranus. As it pulsates, it can change in brightness, becoming three times brighter!

You can compare it to Rigel, also known as Beta Orionis, which is diagonally opposite Betelgeuse in Orion; Bellatrix, a.k.a. Gamma Orionis (in Orion's other shoulder); or Aldebaran, the bright eye of Taurus the Bull. In late 2019 and early 2020, Betelgeuse dipped to the brightness of Bellatrix, its faintest on record. With a little practice, you should be able to detect these changes, even from all the way here on Earth.

To read more of Comm Lewis's articles on variable stars visit the ***AAVSO website.***

The Basics of Electrical Engineering: Engineering Notation

By Lt Col Michael Stelzer, USS Oklahoma, R12

Engineering notation is a version of scientific notation in which the exponent of ten must be a power of three. In this way, very large or small numbers may be expressed much more efficiently.

To convert a number to its engineering equivalent, merely divide the number by its base ten equivalent and add the appropriate suffix.

Examples:
6,000,000,000 = 6,000,000,000/1,000,000,000 = 6G,
3,300,000 = 3,300,000/1,000,000 = 3.3M,
3,500 = 3,500/1,000 = 3.5K,
0.018 = 0.018/0/001 = 18m,
0.00005 = 0.00005/0.000001 = 50 µ, etc.



Table 1: Common Engineering Prefixes

Name	Symbol	Base 10	Value
Giga	G	109	1,000,000,000
Mega	M	106	1,000,000
Kilo	K	103	1,000
100		1	
milli	m	10-3	0.001
micro	µ	10-6	0.000 001
nano	n	10-9	0.000000001
pico	p	10-12	0.000 000 000 001

Combining Art and Science

R3 Science Liaison LT JL Livingston describes her husband and ISS Kidd photographer PO David Livingston's photographic hobby.

He worked a full time job to support his family, but on the weekends he'd grab his camera and take off to the motorcycle races. He would often shoot several rolls of film, but that was just the beginning. He would develop the film himself. He had a darkroom in his home where he used an enlarger and large trays of chemicals to make prints. He would sell those at the next race.



To capture a great shot like this one you'll go through a lot of film. David is now digitizing tens of thousands of his motorcycle racing negatives, cleaning them up with Photoshop, and sharing them with racing fans on social media.

Photography is a wonderful combination of art and science.

Picture: **What goes up must come down. Gravity!**
Camera Mamiya Sekor 500DTL, 1/ 250 SEC
Vivitar 135mm 3.5 preset lens
Kodak TRI-X film, ASA 400 film developed in Microdol-X
1974 Mosier Valley (TX, USA)
Motocross Rider: Jeff Kring

Foraging for Food and Fun

By LT Janet 'Hopper' Livingston, SFMD, CMO, ME, ISS Kidd, R3

This article is intended for entertainment purposes only. I have eaten each of these plants and suffered no ill effects. This doesn't mean you will have the same results!



Cleavers (*Galium aparine*) also known as goose grass or “sticky weed”

The ISS Kidd's SRT, known as the Lab Rabbits, has an on-going project of plant research called Botany, YAY! This article is submitted based on recent findings.

The six plants listed here are what humans commonly call weeds, or in some cases wildflowers. They all seem to grow well in North Texas, and some are quite vigorous. The suggested harvest dates are based on my location (Mirror Universe, Wise County, Texas, USA).

Common Dandelion (*Taraxacum officinale*)
edible parts: leaves, flowers. Harvest almost all year.
Common Chickweed (*Stellaria media*)
edible parts: leaves, stems, flowers. Begin harvesting in late February.
Henbit (*Lamium amplexicaule*)
edible parts: leaves, stems, flowers. Begin harvesting in late February.
Cleavers (*Galium aparine*)
edible parts: leaves, stems, flowers. Begin harvesting in late February.
Stonecrop (*Sedum Purpureum*)
edible parts: leaves. Begin harvesting in March.
Dewberry (*Rubus trivialis*)
edible parts: fruit. Harvest in May.



Henbit © Greg Peterson

Common Chickweed, Henbit and Cleavers all have long, weak stems allowing them to trail along the ground. This lets you pull or trim the stalks with little effort. The stems and leaves of Cleavers are covered with small hook-like hairs. These tiny hooks will grasp anything that brushes against them. Take a walk through a field at the right time of year and your clothes will likely be covered in Cleavers!

Dandelions have a place of honor in my flower beds. The leaves and flowers are a fan favorite of my house rabbits.

Dewberries, also known as American blackberries, are very challenging to harvest. They are a low, trailing shrub with very small fruit, which are protected by stems covered in thorns, even the leaves have barbs. The berries begin to ripen in May, so you may wish to harvest the berries early in the day before it gets too hot outside.

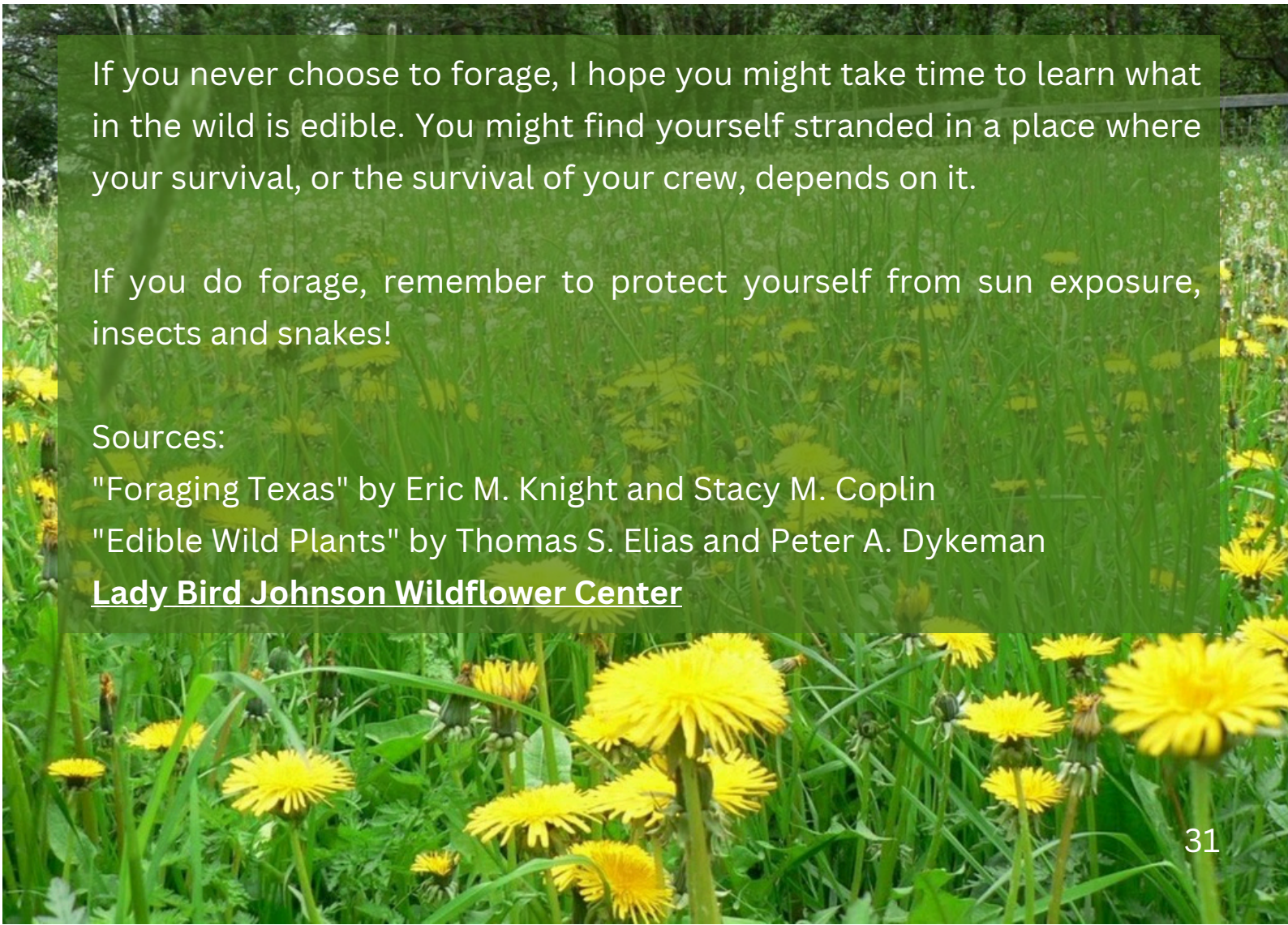




I have seen all of these plants growing wild with the exception of Stonecrop. My mom gave me a pot of this years ago. I have it growing in some very unforgiving containers and they suffer all the adverse weather North Texas can muster, yet they pop up each year, ready for another round.

Foraging can be time consuming, as it may look like you've harvested a lot until you cook it down into a tiny pile of greens. However, you can add those greens to soups or stews, and the raw greens can be mixed with salad or blended with other items into a smoothie. There's a wide variety of ways to use what you've harvested, so think creatively!

The next time you are out for a walk, take a look at what's growing. I enjoy discovering fascinating plants, often digging them up to plant closer to the house or watching until they go to seed and collect the seeds for future plantings. I believe if that plant can grow on the side of the road without any care it ought to grow just fine in my flower bed! I do have to take care when harvesting that I have a safe place to park not far from my target plants, and because I take in way too much true crime (tv shows and books about murder) I make sure to be on the lookout for suspicious people!



If you never choose to forage, I hope you might take time to learn what in the wild is edible. You might find yourself stranded in a place where your survival, or the survival of your crew, depends on it.

If you do forage, remember to protect yourself from sun exposure, insects and snakes!

Sources:

"Foraging Texas" by Eric M. Knight and Stacy M. Coplin
"Edible Wild Plants" by Thomas S. Elias and Peter A. Dykeman
Lady Bird Johnson Wildflower Center

A Brief History of Arsenic Poisoning

By LT Janet 'Hopper' Livingston, SFMD, CMO, ME, ISS Kidd, R3

Bridget Heos explores the fascinating history of modern forensic science in her 2016 book "Blood, Bullets, and Bones: the Story of Forensic Science from Sherlock Holmes to DNA." She uses true life cases to explain fingerprinting, firearm and blood spatter analysis, DNA evidence, criminal profiling, forensic anthropology and other resources used to solve crime. I found chapter 1, "A Whiff of Garlic: The First Poison Tests," to be fascinating.

Before scientific tests were created to detect poison in a murder victim, arsenic poisoning was a popular method used to eliminate inconvenient people. It was used to speed up inheritances, get rid of an unwanted spouse or for revenge.

In the 1700s, there were plenty of daily health risks due to lack of sanitation, and a person suffering from a stomach ailment might not immediately think of being intentionally poisoned.

However, one still needed to be prudent when administering poison to an unsuspecting target. A careless woman in the mid-1700s left enough evidence to implicate herself.



A doctor was called in to examine the sick man after the servants found suspicious chemicals in the home. The doctor knew arsenic, when heated, smelled like garlic. The chemicals were placed on a hot iron and confirmed by scent they were arsenic.

The man soon died and his murderous daughter was sentenced to hang. Her final request to the hangman was that he not hang her too high. She didn't want the onlookers to see up her skirt.



In 1806, a test for arsenic was developed that didn't require a sample of the substance. The stomach of the suspected victim was removed from the corpse, cut up into pieces, and liquified by boiling.

This liquid was filtered and treated with nitric acid. The arsenic was converted to arsenious oxide, which had a known test. (I am certain the medical professional who perfected this was from the mirror universe - JL)

With this new testing method, a German serial killer was convicted. She was suspected of killing 4 people (one was a baby) and of poisoning 4 other people. This was another careless killer. Police found arsenic in the salt box and packets of the poison in the killer's possession. This killer was beheaded in 1811.

Arsenic would continue to be the most popular poison throughout the nineteenth century. The Arsenic Act was enacted in England in 1851 in an attempt to thwart would-be poisoners. Druggists would now have to require a prescription before selling arsenic. Unfortunately, the law left a large loophole, the druggist could also sell arsenic to persons they personally knew. There were poison registers for the arsenic sales to be recorded in, and arsenic was tinted with soot or blue indigo so it wouldn't be mistaken for sugar or flour.

Determined poisoner Mary Ann Cotton managed to acquire enough arsenic to poison up to 21 people by 1871. The suspected victims included three husbands, 10 children, five stepchildren, her mother, her sister-in-law, and a lover. Most of these people died while under the care of Cotton. She was able to obtain arsenic by sending a neighbor to make the purchase when her previous attempt of sending a child was unsuccessful.

Cotton made a careless comment to a government official about her stepson. The official became suspicious when the seemingly healthy boy died less than a week later. He reported this to police, and at first the death was ruled to be from natural causes. The doctor who performed the autopsy wisely kept the boy's stomach, and when he saw newspaper reports that Cotton was a poisoner, he tested the saved stomach and discovered the presence of arsenic. The jury deliberated only one hour before finding Cotton guilty of murdering her stepson (this was the strongest case against her, and the one brought to trial). She was hanged in 1873.

By the twentieth century poison fell out of favor as a popular method of murder. The sale of poisonous products became strictly regulated and medical examiners had better tools and training to detect poisons.

The Science of Snow

Lt David Lyons, Chief Science Officer, USS Ronald E. McNair, R1

I researched the science of meteorology following the recent winter storms that brought massive amounts of snow over several states. People have noted that oddly enough, there was a great amount of snow that melted quickly despite the fact that temperatures stayed at or below freezing throughout the day.

The answer lies in the strength of the sun during this time of year, which in February is just as strong as it is in October. The sun is weakest in December, when it is lowest in the sky which is also when the days are shortest. The sun is strongest in June, when the days are longest.

A question was asked on social media why the sun is equally strong in April as it is in August, yet October is so much hotter in ambient temperature than April. A local meteorologist explained that the oceans play a big part in this, as in April the waters are still cold since it takes a while to warm them. Colder oceans influence the weather patterns just as warmer ocean waters do in the opposite way.



M42 the Orion Nebula by FCapt Barb Barton

Astrophotography Part 3 – The Workflow

By Fleet Captain Barb Barton, Sciences Director

We are continuing our journey into the world of astrophotography by understanding the workflow of an imaging session. There are many ways to do the same thing, and in this article, I am sharing what works best for me. You may find a different way suits you better and that is great. Astrophotography is certainly a journey, and one that is very rewarding if you stick with it.

Watching YouTube videos and reading books and magazine articles will help you immensely. But for me the best and fastest way is to find a mentor and spend time with them. You will learn so many things that online learning just can't provide.

Setting up your workflow for imaging is very important. If you don't, you will likely wander around not knowing what to do next and get confused. Nothing can turn you off from astrophotography more than frustration (and cloudy nights). Think of your workflow as a tool, a procedure manual for a smooth evening of shooting. I am going to present to you my workflow in an outline form, feel free to copy and tailor to your needs.

WORKFLOW FOR PLANNING AN IMAGING SESSION – ASTROPHOTOGRAPHY



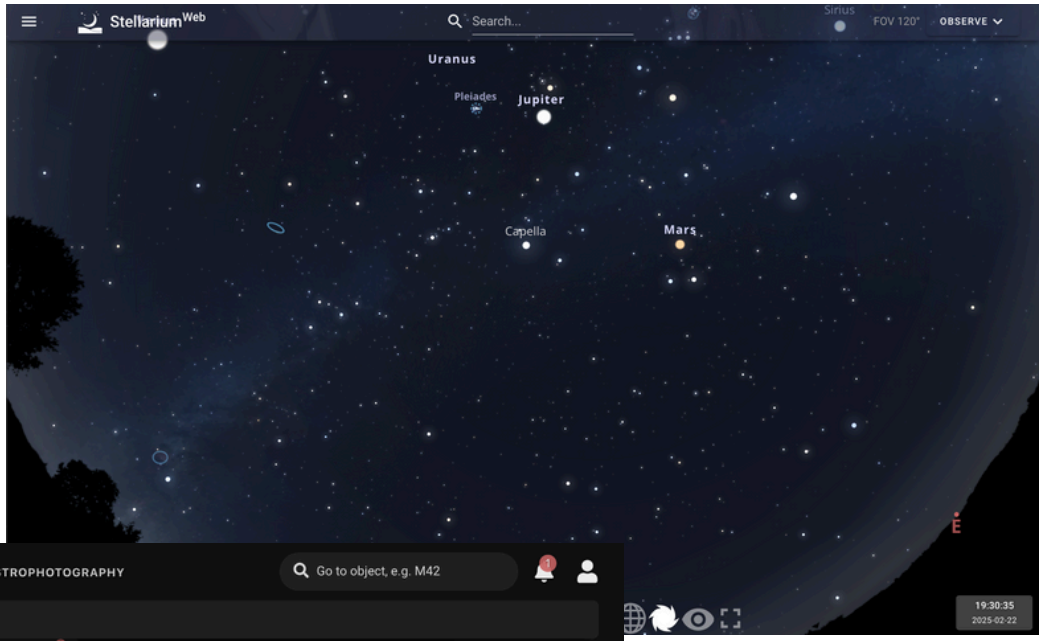
1. SITE SELECTION – find the darkest skies you can in your area. You can take images in the city, but the darker the better. Use **https://www.lightpollutionmap.info** online or download the app.
a. The more open the area the better. Some deep sky objects are low on the horizon.

2. CHECK WEATHER – I use an app called Astrospheric to find out the forecast.

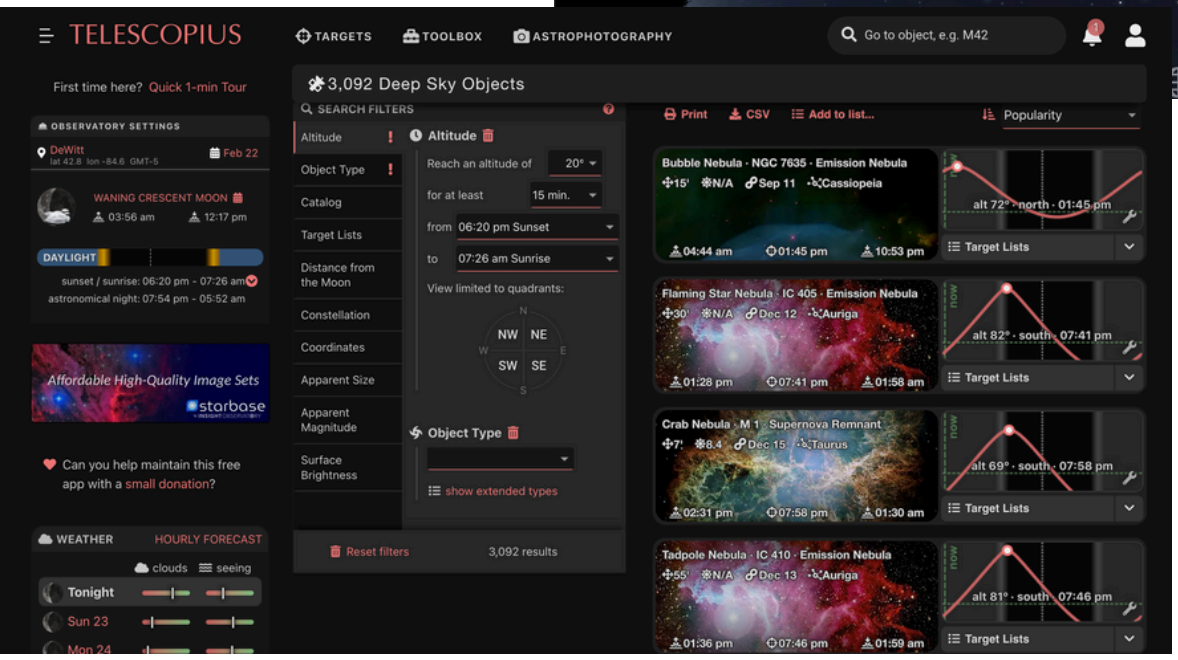
a. Other apps for astronomy weather – Clear Outside, Good to Stargaze.

3. RESEARCH YOUR TARGET – Before you head out it is very important to select several targets for imaging. Deep sky objects move through the sky over a year, so you need to know when they are up and at what time of the evening. Selecting several targets will give you options if clouds move in over part of the sky and block your first choice, or if an objects dips below the horizon and you need to shoot a different one. You can see what is in the night sky using several apps/online sources;

a. Stellarium – both app and **online**



b. Telescopius (my favorite) – both app and **online**



c. SkySafari – both app and **online**
d. Skyview – app
e. Aurora Pro – app that will alert you when the Aurora borealis is viewable in your area

4. DO YOU NEED TO USE FILTERS?
a. If you are imaging nebula or certain galaxies, using filters can greatly enhance your image.
b. Search on sites such as Astrobin www.app.astrobin.com and look for images you like there and see what filters, if any, were used. Read up on the use of filters in astrophotography so you know what to use. It depends on your target.

5. MAKE A RECORD OF YOUR SESSION
a. I use a small black notebook to record the date, location, which telescope I used, target name and catalog number, which filters I used, how many images I took (lights, flats, dark flats), and how long the exposure times were for each image. This is important information for when you process your images. It is also important if you want to shoot the same image on another day. Knowing which filter you used is critical when you process your images.

6. CREATE A CHECKLIST OF GEAR
a. When you first start out, you may be overwhelmed with everything you need to take on an imaging session. You don't want to forget the battery cable or any other cable that must be there. Set up your rig at home and create a checklist for yourself of every item in your rig, all the extras like spare batteries, extra cables, table, chair, repair kit, food and drink, etc...make sure EVERYTHING is fully charged. It is a good idea to have a spare battery pack or two especially in very cold weather.

C2023-A3 Tsuchinshan–ATLAS comet by FCapt Barb Barton

7. LET SOMEONE KNOW WHERE YOU WILL BE AND WHEN YOU WILL RETURN

a. Many astrophotographers go out alone. For safety reasons, it is good practice to let someone know where you are going and when you expect to return. Using a locator app like Life360 is great because your friend/family member can see where you are.

It may seem like a lot of work getting ready for a night of shooting. It gets easier the more familiar you become with your gear and your workflow. But it is one of the most important things you can do - if you miss a step, it can ruin your night, and you won't know it until you are in the middle of setting up.

In our next issue of the Event Horizon, we will talk about the workflow of the actual imaging session. Wishing you clear skies!



M33 Triangulum Galaxy by FCapt Barb Barton

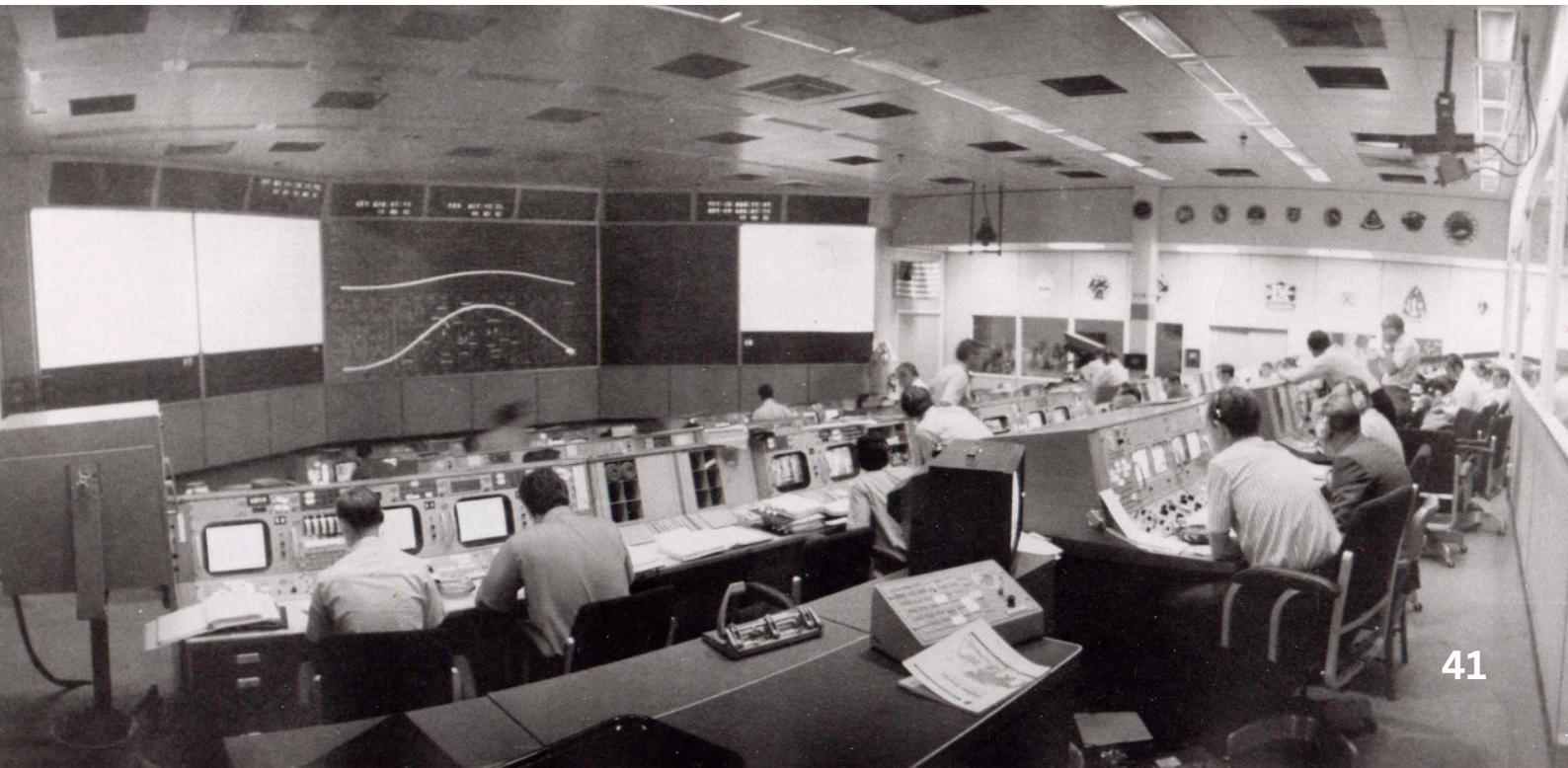
How Ford helped put man on the Moon

Lt David Lyons, Chief Science Officer, USS Ronald E. McNair, R1

Did you know that the same company that put the world on wheels, also helped put man on the moon? In the early '60s, there was a cutting-edge technology company called Philco. They had developed some of the best transistors ever made which would ultimately pave the way for the modern-day computer.

The problem was, they were so cutting edge that they were headed for bankruptcy. In 1965, Ford Motor Company purchased Philco, and the company became known as Philco-Ford.

As the Apollo program was developing, Mission Control was being built in Houston, and that meant having the ability to monitor and control thousands of inputs with crafts in space. Philco-Ford bid for the job to build Mission Control, going against AT&T, Hughes Aircraft, and IBM. Philco was considered the underdog, but won the contract.



Building Mission Control required laying 60,000 miles of wiring, and at completion the facility had the largest single location of television switching equipment in the world. Mission Control could simultaneously monitor 1,500 different types of telemetry data, including the astronauts' vital signs.

Enabling communication with space was the next 'giant leap' as Philco-Ford had to also develop the technology for communication with the spacecraft. Philco's experience with cutting edge transistors helped make this happen as well, building technology that allowed for radio broadcasts to reach the moon, ultimately allowing that iconic sentence from Armstrong to happen as the Eagle landed at Tranquility Base.



The company later updated its name to Ford Aerospace and Communications Corporation. It remained committed to the Aerospace industry until Ford decided to sell it to the Loral Corporation in 1990.

Unveiling the Mystery: A STARFLEET Away Mission to Space Lates at the London Science Museum

By Ens Monica Butt, R20 Liaison

As the stars shone in the evening sky, three remarkable Starfleet ships began a unique away mission. This time, they weren't heading to a distant planet but to an iconic location on Earth: the London Science Museum. Their destination was the exciting "Space Lates" event, an inspiring evening focused on expanding our understanding of space.

This fascination with the cosmos has intrigued people for centuries. The Space Lates event offered an exceptional chance to explore this interest further. With a variety of engaging workshops, and pioneering demonstrations, the event aimed to connect space research with the public's curiosity about our universe.



Starfleet officers from diverse backgrounds and diverse groups—scientists, engineers, and historians—gathered together to share their enthusiasm for the adventure ahead. The journey to London was not solely about reaching a destination and deepening our understanding and experience of the history and future of space exploration; it was also about the interactions and social connections that we formed

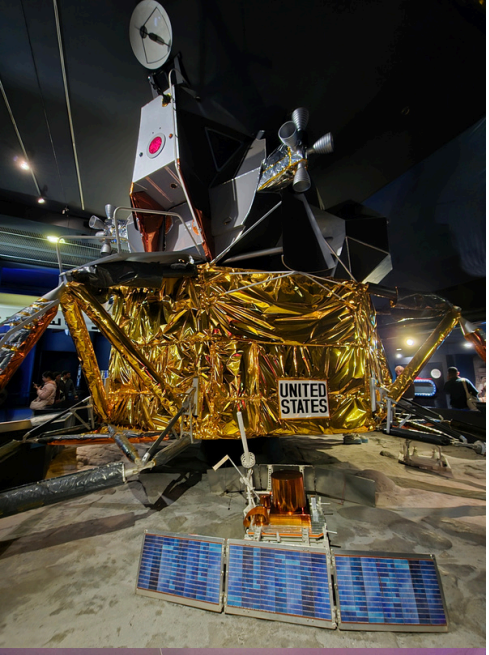




along the way. This was not a simple multi-crew expedition, but a diplomatic away mission! We met new non-fleet friends and even members of the public as first-contact representatives of what STARFLEET International is all about.

For many on board, this night represented a rare opportunity to celebrate scientific progress. Each member of the USS CuChulain, USS Mercia, and USS Stargazer may have had distinct objectives, yet their shared mission reflected Starfleet's values: spreading knowledge and inspiration to look skyward.

The event was rich with hands-on workshops that allowed attendees to engage directly with experts. The Space Lates event showcased talks that highlighted groundbreaking space technologies. Experts discussed advancements and gave participants the ability to interact and ask questions. The innovative technician team from Clearspace was on hand to offer the opportunity to see up close their pioneering robotic capture technology designed to remove space debris from Earth orbit. UK Space Agency’s Will Gater revealed the science behind the magic of the auroras, exploring the science behind this stunning celestial









show that has captivated humans and inspired folk stories throughout time.

Robin George Andrew was on hand to speak on the real science of planetary defence from his new book, How to Kill an Asteroid, the incredible true story of how a maverick team of scientists and engineers plan to prevent a future asteroid impact.

Marcus Chown gathered crowds for a talk on his latest book, A Crack in Everything, the story of how black holes came in from the cold and took cosmic centre stage. "Once upon a time black holes were considered so ridiculous as to not even be the preserve of science fiction. Now we know they play a crucial role in the universe."

The list of ways to interact didn't stop there. Workshops and installations invited further exploration. Cosmic Drift allowed you to experience floating through the solar system in a spacesuit thanks to a fun AR filter and at Chopstix Rockets, participants were able to launch a two-stage rocket and attempt to recover the first stage by guiding it back to the launch tower. This interactive, hands-on workshop explored the engineering behind spaceflight and booster landings and demonstrated real-world rocket dynamics.

This wasn't just an event highlighting breathtaking displays, it was an interactive exploration inviting all the attendees to dance through the stars - figuratively, and literally! Three of the standout attractions were the famous silent disco, a Space Concert event and even an opportunity to experience the naturally created Solar Symphony.

Within the playful atmosphere of the Silent Disco, attendees danced with headphones on beneath a ceiling of twinkling stars, giving off an ambience of floating through space, creating lasting memories, joyful celebrating and embodying the event's theme of exploration and discovery. At the Space Concert, participants were invited to channel their inner Holst by composing their own cosmic melodies. This immersive sound installation was inspired by astronomical magnitude data— the information relating to the brightness of stars. The Stages of Chaos was just as illuminating as we were greeted by a stunning installation that revealed how stars emerge from collapsing nebulae of gas and dust.







The Space Lates event wasn't just about technological advancements; it was a call to engage with a passion for knowledge and exploration and as the evening drew to a close, we reflected on our experiences.

Exploration is a collective human endeavor built on curiosity, collaboration, and a shared zeal for discovery, echoing Starfleet's mission: to explore strange new worlds and seek out new knowledge—both in far-off galaxies and in scientific understanding on Earth.

The journey to the London Science Museum for the Space Lates event not only illustrated the limitless potential of gazing toward the stars but also what we can do when we join in service towards creating a better world, where diversity is seen for the treasure it is.



Each of us coming together to create a community where every voice and talent is valued. As we all left to board our awaiting transports, we stopped for a moment to reflect on our community, and what we had experienced together and to gaze at the solar display happening right before our eyes as the alignment of the planets Mercury, Venus, Jupiter and Mars was still on bright display.

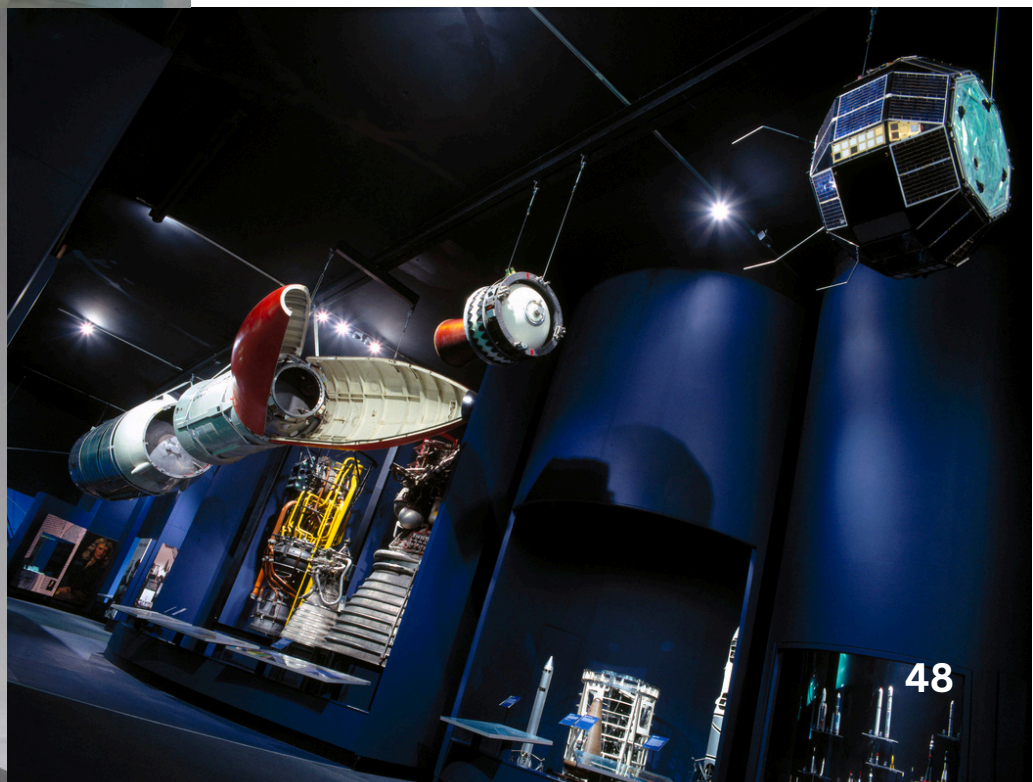




With minds expanded and spirits lifted, the crews of the USS CuChulain, USS Mercia, and USS Stargazer, returned to their ships, not only as officers but as ambassadors of creating a place where everyone is invited to participate in exploration, community and fun!

We carried with us not only the knowledge of current innovations but also a renewed determination to inspire and serve. We each boldly ventured into an evening of discovery, joy, and cosmic wonder, carrying with us a spark of the legacy that would fuel humanity's quest for knowledge amidst the stars.





The Adventures of Stamets: UK to Ireland trip





After a read to settle him to sleep, Stamets woke up fresh as a mycelia and headed off to Oswestry train station to begin Leg 1 of his journey to Ireland.

Unfortunately at Chester the train driver, who was Welsh, did not like Stamets saying that rugby isn't his favourite sport so was drop kicked off the train!!!!

Stamets being a resilient creature, stole aboard another train and left Chester heading to Liverpool.













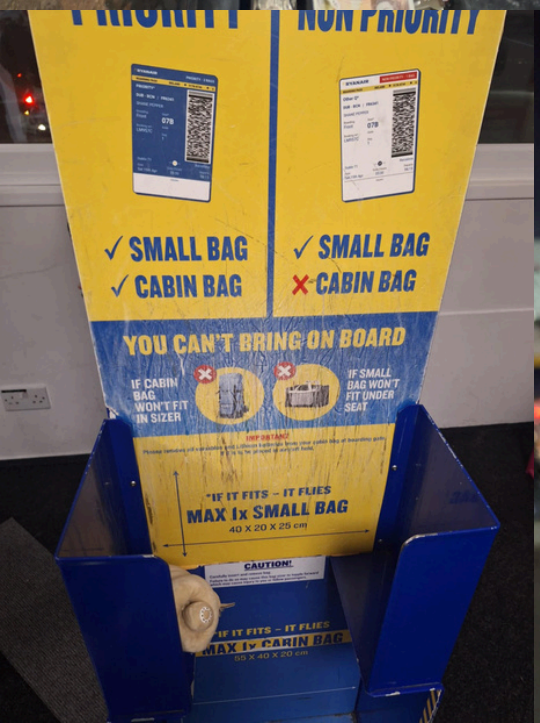


Of course Stamets had to explore a bit before going to the airport.

He decided to explore the area that made the Beatles famous. Meeting Cilla Black was lovely but he didn't like being thrown up like that!

Stamets and his travel companion Phyllis went to a local pub and made friends with lots of the locals there. Unfortunately Stamets was a bit naughty...

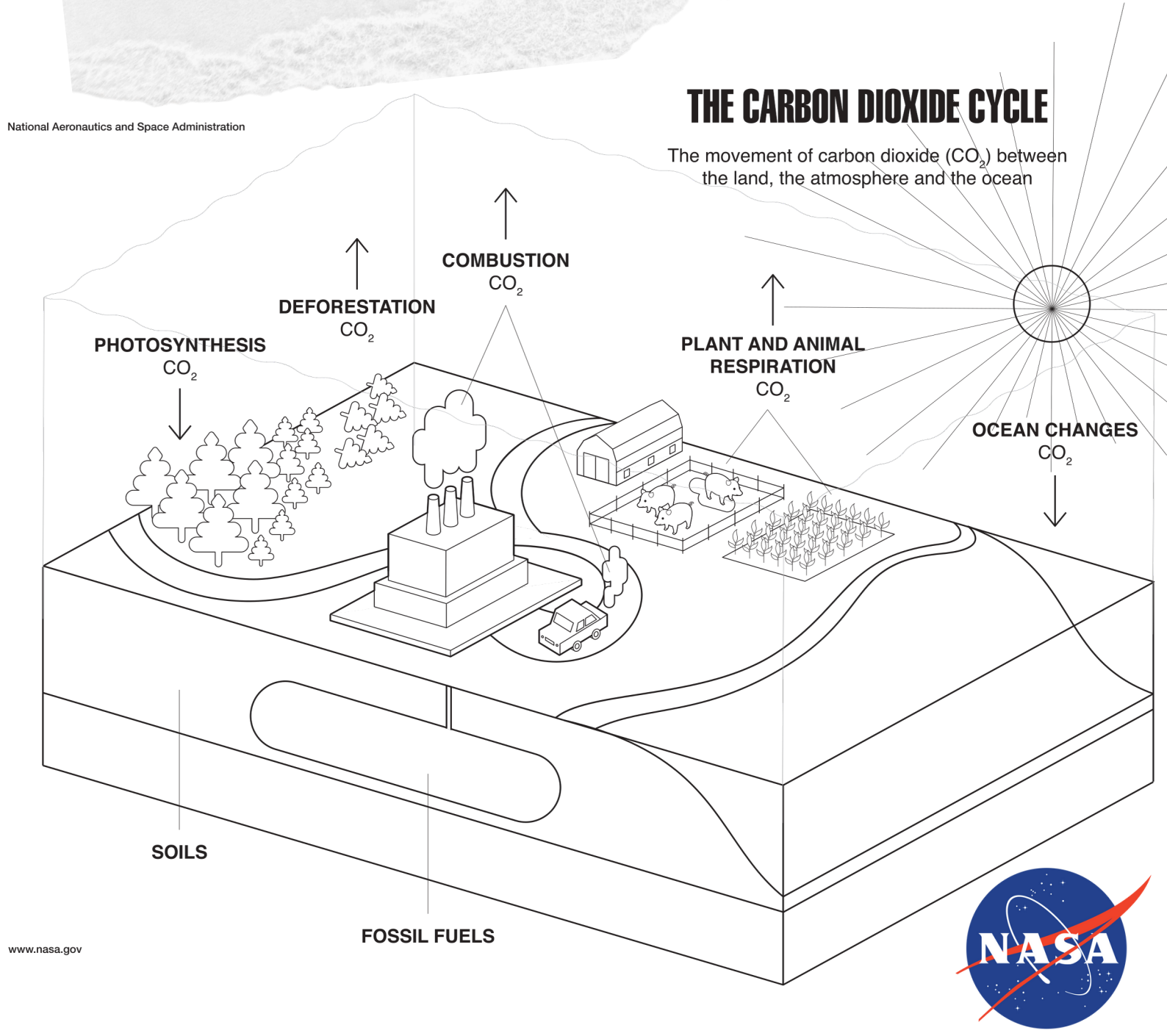
John Lennon Airport was explored thoroughly and Stamets was careful to have his documents ready for boarding.







CADETS ONLY PAST THIS POINT!



Plant detective

Keiko needs help identifying a delivery of plants - the answers are somewhere in this issue of the Event Horizon!









Dewberries

Cleavers (sticky weed)

Henbit

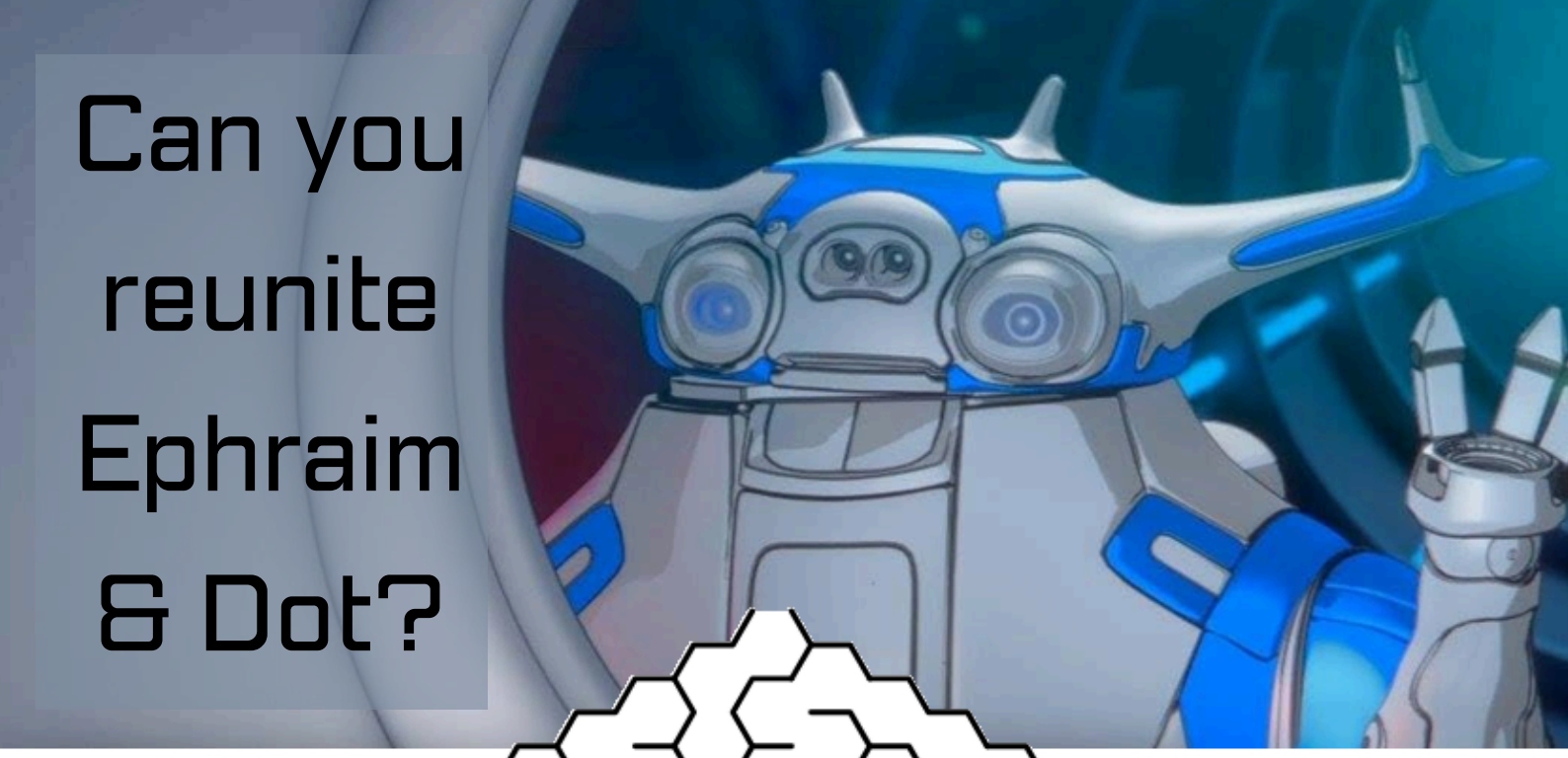
Stonecrop

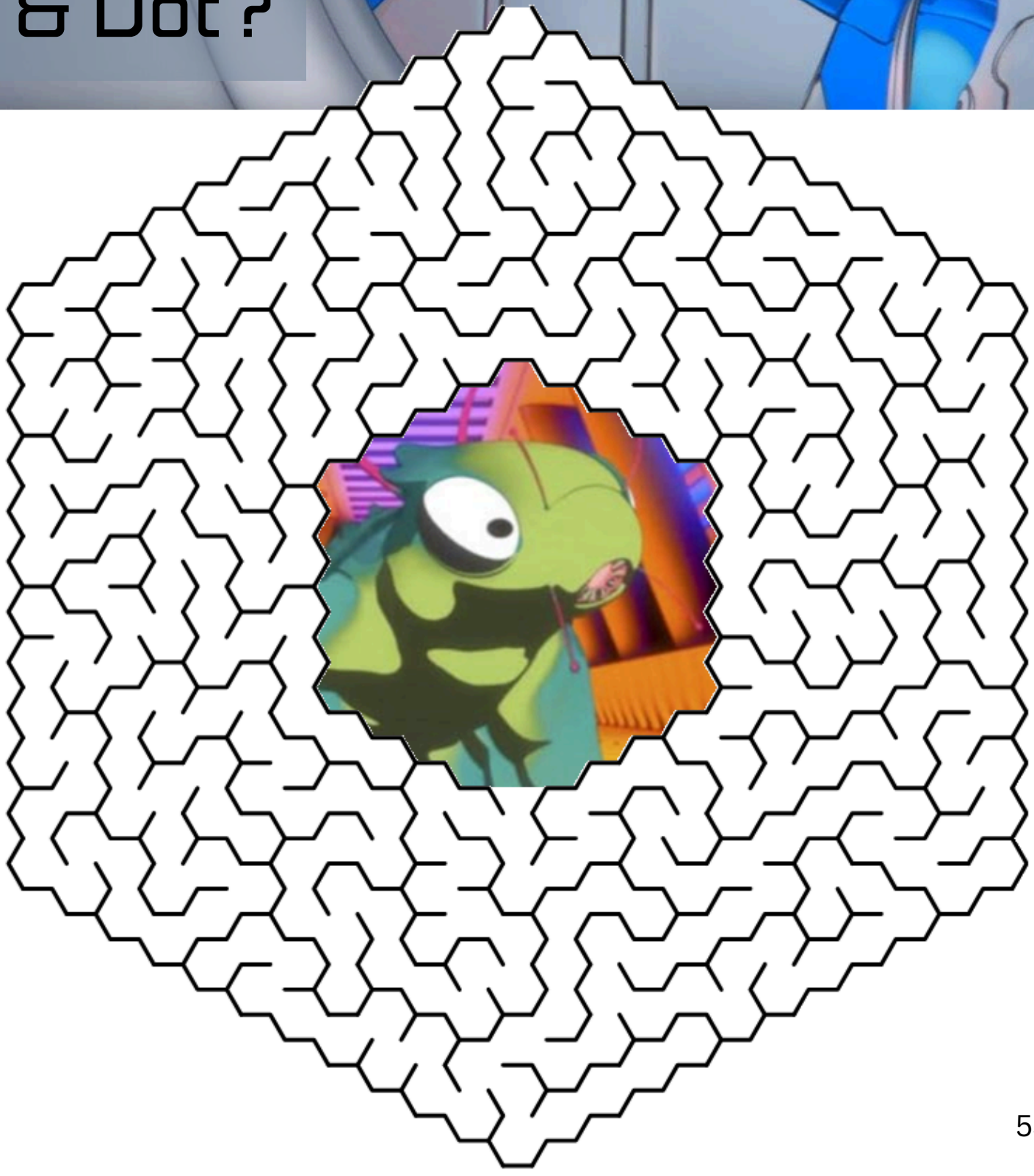
Dandelions





Can you reunite Ephraim & Dot?





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