Volume 2, Issue 1

April 2023

STARSociety

South Texas Astronomical Society

Editorial

"Two possibilities exist: either we are alone in the universe or we are not. Both are equally terrifying." - Arthur C. Clarke

We listen at the helms of our radio telescopes, we stand with our heads toward the stars, watching and waiting, searching for our place in the universe. Are we alone? This question has boggled my mind since I can remember. Staring at the stars since I was a child, I wondered if anybody else out there was staring back, thinking the same thing as me. The fact that we can see phenomenal structures like galactic walls and supermassive black holes so unimaginably far away, yet so powerful and beautiful, that I cannot help but wonder why we are here for such a short time, relatively speaking. My part as an astronomer is to peer out into the frontier, attempt to decipher some truth, and bring it back to the civilization. Some of the scientific fields for discovering life out there are in exoplanet atmospheres, planetary science (moons and asteroids), and detecting signals across a variety of wavelengths and channels. I've seen some interesting ideas proposed, like hearing gravitational waves from a previous universe and searching for God in the cosmic microwave background. I've also wondered if we should be sending signals out there to say 'hello'. We might be surprised to hear something back, and I can only imagine what contents the reply contains.

In this first issue of our second volume, we feature seasonal sky treasures; a special interview with our beloved founder; the search for extraterrestrial intelligence and our findings so far; a cosmic conspiracy in the middle of the desert; a history and overview of the science of astrobiology; an exciting two-part series of an adventure tale and special news bulletin; cosmic coordinates for the spring; a summary of programs and initiatives in our growing organization. Thanks to readers like you, we can continue to grow and serve the community, bringing the science of the stars closer to home.

Wishing you clear skies,

Richard Camuccio
Editor-in-Chief

Content

Featured Art

Carol's Corner of the Cosmos: Seasonal Sky Treasures

Carol Lutsinger

March: Although spring is officially a few weeks away as I write this, it has arrived already in our Rio Grande Valley with trees budding out everywhere, wildflowers slowly spreading color across the ranchland fields, and green row crops marching in straight columns along dark Valley earth. That means Leo the Lion is strolling up from the eastern horizon by 8:00 PM. This handsome member of the feline family is easy to find in a dark sky. The head is a large backward question mark. At the base of the head there is a large blue-white star known as Regulus. The star marking Leo's heart is bright, although not nearly as bright as Sirius in Canis Major.

Another indicator is in the early morning sky. Spring IS coming - the stars are sharing a secret advance announcement when these two stinger stars in Scorpius are in the predawn sky. Shaula and Lesath are located at the back of Scorpion's tail. Pawnee prairie people knew it as the Swimming Ducks. When the Swimming Ducks appeared before dawn in winter, the Pawnee knew spring was near and would begin planting ceremonies. The constellations may have been called different names, but many of the same stars were connected in different dot-to-dot conformations to entrance children and inform cultures even today. What might you name the shape of the Scorpion?

In a predator/prey relationship Leo the Lion is following along after Orion, sneaking up behind him, daring to hunt the top predator. Those Greek and Roman myths that surround the constellations we still see today are both bloodthirsty and strange. If you are interested in the backstory of the constellations, the internet and our library will have a variety of books on the subject. Just be sure to check out age-appropriate ones. There are some versions for children that are geared to young minds instead of the adult versions. Parents, please be aware of this.

Any time we do have the pleasure of clear skies this week, you will notice the winter constellations are observably farther west than the last time we were able to see them. Orion is strolling toward the western horizon in pursuit of Taurus the Bull, followed by his two faithful canine friends, Canis Major and Canis Minor. Lepus the Hare, or jackrabbit to every self-respecting Texan, is still hiding at Orion's feet, out of sight of the hunter and his hounds.

April: Have you ever wondered why the date to observe Easter is different each year? Both the Christian Easter and the Jewish Passover are historical cultural observances based on the lunar phases. The standard rule for selecting Easter is "the first Sunday after the first full Moon on or after the Vernal Equinox". Passover is a set date based on the Jewish calendar that dates from the time of Hillel II (359 CE, AM4119) and which is the official calendar of the State of Israel. It is a calendar based on computations rather than visual observations (visual observations of the young crescent Moon were used in ancient times). Passover begins on the same liturgical date, Nisan 15, each year. Easter can occur any Sunday between March 22 and April 25.

Shhh. Don't tell anyone; if you do, it will be cloudy and rainy and you won't get to see any. Lyrid meteors, I mean. April 16 is the beginning of this year's event, with the peak night on the 22nd after midnight (23rd) when our spaceship Earth carries us through the debris left by the passing of Comet Thatcher 1861. One of the oldest recorded meteor showers, dating back more than 2600 years, this meteor shower appears to radiate from the constellation Lyra the Harp as it rises from the east. Sky watchers predict 10-20 meteors per hour possible with a slender waxing crescent Moon that

will only be 6% illuminated. In order to see them you need a dark, safe observing site as far as possible from sky glow from all the public lighting.

If skies are clear, then we will be able to explore constellations as they appear above the eastern horizon and sink into the west. Or as those in the north do, rotate counterclockwise about the North Star Polaris. It is easy to know the directions of east and west because of the location of sunrise and sunset. If you stand facing east, then your left shoulder will be toward north. You may be able to watch a definite change in the location of the Sun along the horizon at sunrise and sunset over a period of a few weeks.

Because of Earth's tilt and its revolution around the Sun, it (the Sun) moves along the horizon throughout the seasons. From the first day of spring until the first day of summer the Sun moves farther north of east and west which gives us longer hours of daylight. From summer to winter it moves in the opposite direction, rising and setting a bit farther south of east and west, giving us shorter hours of day and longer periods of night.

May: The nearly Full Moon will obscure the Eta Aquarids meteor shower month. The peak is May 5-7. If you decide to keep an eye on the sky anyway, best viewing night will be the predawn hours of the 6th. These meteors are a result of the passing of Halley's Comet. The debris left behind remains in the same locale since there is no wind in space. Earth passes through various debris fields which means we get to catch - at least a glimpse of - a falling star. Rainwater dripping off the roof and captured in a bucket after a meteor shower can provide you with a fallen star to keep.

Hercules is one of the constellations we can enjoy during this time of the year. Rising out of the east, Hercules is above the horizon about ten o'clock P.M. this time of year, all the stars are nearly the same brightness to a viewer in South Texas. The shape resembles a spider or a distorted toad following Boötes, the Herdsman. Boötes is marked by that orange-y blazing star mentioned at the beginning of the column. Hercules and Boötes are not part of the same myth but do visit at the same time of the year. The kite shape of the Herdsman is relatively easy to discern on a dark cloudless night when the Moon is not in the way. See if you are able to locate these two constellations this week.

In the high southern sky, the second largest constellation Virgo has been rising higher and earlier each evening to grace the darkening night with her radiant star Spica. This widely known constellation has a variety of names, depending on the culture that identified it. The Egyptians called it Isis; the Greeks Persephone, the daughter of Demeter. The Saxons called it Eostre, from which the Christian celebration of Easter derives. Spica marks the sheaf of wheat carried in Virgo's arm. It rests quite near the ecliptic so you may occasionally see a planet nearby.

The Virgo cluster of galaxies resides between Virgo and Coma Berenices. The cluster represents an estimated 3000 galaxies, including the incredibly lovely Sombrero Galaxy, M104.

Below Virgo the trapezoid of Corvus the Crow stands just above Hydra, the Water Snake. This long curving constellation stretches from below just Jupiter in the southwest to beyond Spica in the southeast. Just above its back at midpoint is the constellation Crater, the Cup or Chalice.

See you next issue; DO KLU. ★

Biography

Carol Lutsinger is the founder of the South Texas Astronomical Society. She spent 40 years as a teacher, serving students from Pre-K through college. Carol attributes her astronomy enthusiasm in part to her experience in the American Astronomical Society's AASTRA program from 1994-96, and her space excitement from serving as a Solar System Educator, and later Ambassador, for the NASA/JPL program. She has been writing the Stargazer newspaper column since 1998, which is carried in the Brownsville Herald and the Valley Morning Star. Retired from formal education since 2020, she still makes every opportunity to share meteorites which she carries in her purse and to ask folks in parking lots if they know what that point of light is.

STARS PROGRAMS & INITIATIVES

The South Texas Astronomical Society (also known as *STARS* or *STARSociety*) is an organization composed of space enthusiasts from the Brownsville/Rio Grande Valley community. Our mission is to ignite curiosity in space science and provide open access to science resources for people of all ages.

STARS is dedicated to bringing the excitement of astronomy and space science to our community through programs and initiatives that are both informative and entertaining. Our organization hosts a variety of events throughout the year, including star parties, educational workshops, and public talks featuring experts in a wide range of fields related to space science and exploration.

We believe that access to science should not be limited by economic or social status, which is why we strive to provide opportunities for everyone in our community to participate in our events and access local STEM resources. Our members are passionate about sharing their knowledge and expertise with others and are always eager to welcome new members who share our enthusiasm for the universe.

Through our efforts, we hope to inspire the next generation of scientists, engineers, and astronauts from our community. We believe that by working together, we can make a significant impact on the future of space exploration and discovery.

If you are able to support our mission and help us continue to provide access to science resources and programs for our community, we would greatly appreciate any contributions that can be made through the following link:

https://starsocietyrgv.org/donate

If you are unable to provide a monetary donation but are interested in getting involved with any STARS programs or initiatives in another way, please send us an email at **contact@starsocietyrgv.org**.

SPRING 2023 EVENTS

Space, Science, & STARS

STARS hosts free, family-friendly STEM workshop events in partnership with the Brownsville Public Library System designed to ignite curiosity in *students grades K-6*. During these programs, students engage in lessons about relevant space exploration topics followed by exciting hands-on STEM activities.

When: Every 2nd Saturday (except May & June)
Where: Brownsville Public Library (check for which branch!)

Astronomy at the Park

Astronomy at the Park is an all-ages community star party hosted in collaboration with UTRGV's Cristina Torres Memorial Observatory. The stargazing event includes observatory tours, lessons in night sky navigation, astrophysics presentations, and telescopic planetary and lunar observations.
(For more info about CTMO, visit starsocietyrgv.org/ctmo)

When: March 24 & May 5, 8-11pm
Where: Resaca de la Palma State Park

Launchpad

Launchpad gives *local high school students* the opportunity to work together to design, build, and launch a model rocket by summer 2023. Through this program, students learn about the science and engineering aspects needed to design and build a functional rocket while working with experts in various STEM fields.
(For more info about Launchpad, visit starsocietyrgv.org/launchpad)

When: Every Sunday, 2-4pm
Where: Brownsville Public Library - Main Branch (Space-14)

Cup o' Cosmos

Join us every other Monday evening for a public coffee shop meetup, where experts and enthusiasts gather to engage in stimulating conversations about astronomy. We welcome all space enthusiasts to join us for an evening of discussion and insight into the latest developments in space exploration.

When: Every other Monday, 6-8pm
Where: Angelita's Casa de Cafe

EXPANDING ACCESS...

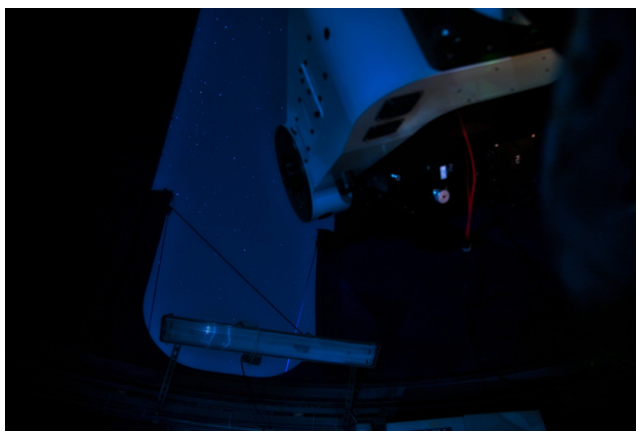
... to Observatories in the RGV

We work with local Institutions to expand access to scientific resources, including astronomical observatories.

The *Cristina Torres Memorial Observatory* is operated by members of the Time Domain Astronomy Group at the Center for Gravitational Wave Astronomy under the direction of Dr. Mario Díaz. The observatory's system consists of a CDK 17-inch PlaneWave reflector telescope and ProLine CCD camera for astronomical imagery.

In 2019, STARS partnered with the Brownsville Public Library System to restore and upgrade the *Southmost Library Observatory*. This observatory is equipped with a 14" Meade LX850 ACF telescope.

For more info, visit starsocietyrgv.org/ctmo and starsocietyrgv.org/southmostobservatory



... to the Night Sky

Light pollution has many negative effects in the RGV, including causing issues with bird migration patterns, nesting turtles, human sleep cycles, and astronomical observations. STARS is teaming up with community members and organizations to spread education and awareness about the benefits of reducing light pollution.

For more info, visit starsocietyrgv.org/dark-sky

... to Local Experts in Space Exploration

Receding Horizons is a podcast for exploring topics in astronomy and space science. As the RGV is entering into the next phase of human space exploration and participating in the era of multi-messenger astronomy, STARS is providing a forum of discussion among people of all ages and expertise to bring awareness about our role in this next exciting era.

For more info, visit starsocietyrgv.org/receding-horizons

CREATING PATHWAYS FOR THE NEXT GENERATION OF EXPLORERS

Launchpad

Launchpad gives local high school students the opportunity to work together to design, build, and launch a model rocket. Through the program, students learn about the science and engineering aspects needed to design and build a functional rocket while working with experts in various STEM fields. Through *your contributions*, we can get the materials we need for our students to successfully build and launch a model rocket by 2023.

For more info, visit starsocietyrgv.org/launchpad

Carol Lutsinger STEM Scholarship

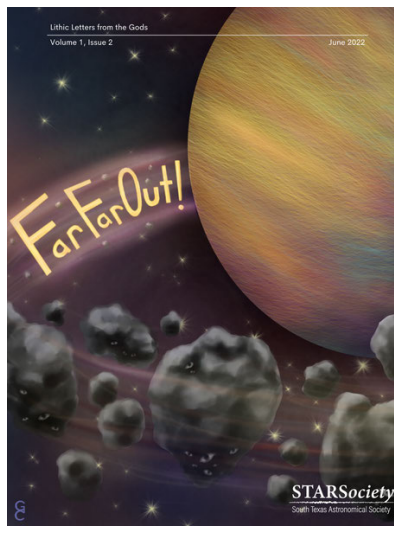
In 2021, STARS announced the creation of a new scholarship fund named after the founder of STARS. Between 2022-2023 we raised enough money through the community to grant six (6) $500 scholarships for students pursuing higher education degrees in STEM-related fields during the 2023-2024 school year. With *your help,* we can continue providing opportunities for local students with dreams of reaching the stars and benefiting humanity through space exploration.

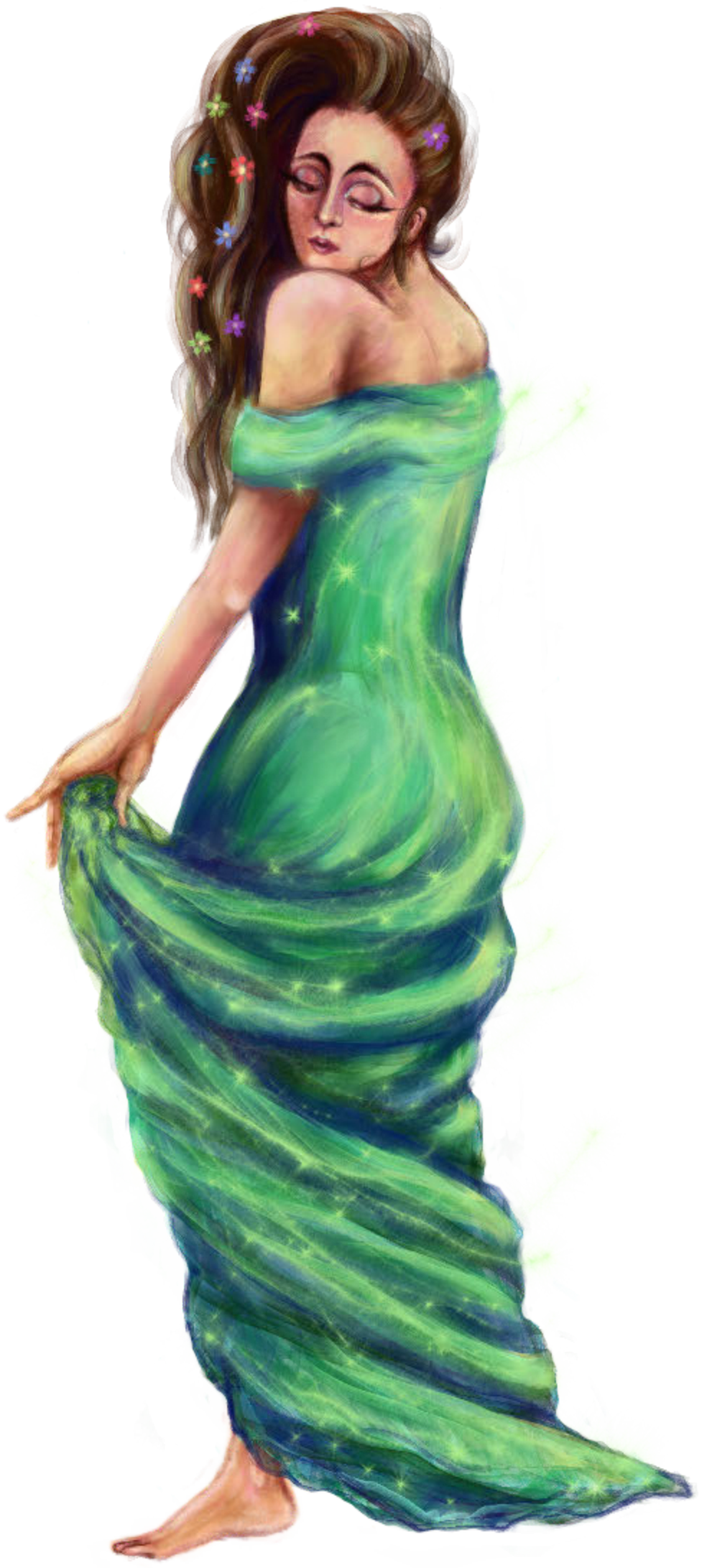
For more info, visit starsocietyrgv.org/scholarship

The FarFarOut! Newsletter

The objective of the *FarFarOut*! newsletter is to provide an exciting platform to spread education and awareness for astronomy and space science, and give field experts the opportunity to share their unique perspectives with the RGV community. Through this newsletter, local high school students have had the opportunity to research for and write scientific articles that are published alongside accomplished cosmologists and astrophysics researchers. Last year (2022) STARS completed the first volume of *FarFarOut!*, which consisted of four issues.

All issues of FarFarOut! released to-date are available at starsocietyrgv.org/farfarout





Virgo

A maiden in
Greek Mythology

It Only Takes One Person to Make a Difference: An Interview with Carol Lutsinger

Anna Szołucha

Anna Szołucha (AS): I wanted to start from your personal story. How did you get interested in astronomy and in space?

Carol Lutsinger (CL): As a teacher, I thought well, one thing I need to know is everything. And I knew nothing about astronomy. I mean, I knew the Sun was there, I knew the Moon was there, I knew there were lights in the sky, but I didn't know how to pick out a constellation. Our school district bought a portable planetarium, and the principal sent me to the training and I was really excited. Being able to go out in the night sky and look up and say: "Oh, there's Arcturus and there's this that and the other, it was a real exciting time for me and being able to share that with the kids at school was even better and I kept looking for ways to use that planetarium and one way was to: "oh, maybe I could take it to the library" because nobody cared what I did. By that time, I was already doing a role as a science mentor teacher so I was outside of my classroom and many other classrooms, and so I would just go and say that I needed the Starlab and take it to the library. Once a month, I would do usually three shows in the evening and get to experience the Starlab. Every student that I have encountered over the years told me: "oh, Mrs. Lutsinger, I still remember that big bubble that you took us in". Where else can you get that? It was an eye opener for me and for them. And each month when we had the programs, the programs lasted about 45 minutes and I would have anywhere from 5 to 30 people at a time, sometimes there were three sessions that night because a lot of people wanted to find out more about it too. So that was the first thing and then I got to go to Chicago and spent a whole month at Loyola University through a grant that a professor at Loyola [Dr. David Slavsky] and an astronomy professor at UT Austin [Dr. Mary Kay Hemenway] had written a grant for. There were 30 of us teachers there and the deal was we would be trained, and got paid for that too, and got real astronomy. We got to go to the Yerkes Observatory, we've got to go to several different places and learn about hands-on, "here's how to do this with your students" and we were supposed to do teacher training when we came back home. I came back and a week later I was doing a teacher training. And because I had done things like that over the course of the grant, I got to go back the two following summers as the master teacher which was really big for me! And I just felt like I was special, and I was gonna get to tell the whole world about astronomy and in the course of that time I was teaching. And one of the kids, her uncle worked for the Brownsville Herald and he came to see what we were doing because she was talking to him about the Stardust mission and he wanted to know what that was and I said: "would you like an astronomy column for the Herald?" And he said: "well, write something and we'll see". And I said: "well, how long?" He said: "oh, a paragraph". So I said: "how long of a paragraph?" So I wrote my paragraph and I hand delivered it over to the Herald because the Internet wasn't going there yet and they printed it. And so I wrote another one and this one was a little bit longer. I started that in 1998 and this is 2022 and it comes out in the Herald every Monday and now the Valley Morning Star in Harlingen has picked it up and they have been running it for the last, I think, four years and it's there on Sunday and it's not a paragraph long, it's two pages, double spaced. And they just keep printing it and I keep writing it and I don't even get a free subscription but anyway. [laughs] At least the newspaper is still printing it and people come up to me on a street and say: "Oh, you're the lady that writes the column in the newspaper." And I get a kick out of that and the hardest thing is when they say: "I don't really understand it but I like to read it." And I'm thinking:

"Well, I'm writing it for 6th graders, I'm sorry you can't understand it." Because basically, it really is an understandable column. Hey, if I can understand it, anybody should be able to. As I mentioned, the Stardust mission, JPL in California, and NASA collaborate on a lot of space missions. They for a while had individual teacher ambassadors for that. The first one that I was part of was for the Galileo mission to Jupiter which was really an incredible mission, and it was working so well that they kept extending the mission. I was a Galileo Ambassador and all those other missions, the Stardust mission and the Mars mission, they all merged into the Solar System Ambassador program. I don't know how many years I have been part of that, but they provide us with the resources, stickers and bookmarks and things like that. I always was curious as to why somebody like Elon Musk, although this is before Elon Musk, didn't start doing space launches at Port Mansfield or in that empty area on the King Ranch between here and Kingsville. So when Elon Musk bought this property out here and started doing these, I thought: "Oh, that's pretty great." A man with a mission and one person making a difference. I've done numerous teacher trainings, I've done many, many programs for kids and have done things on my own at the library for the Galileo mission, had started finding information on the Mars mission, I would have events at the public library and I just set tables out because it was just me. One of the fun things was the Genesis mission to the Sun to collect solar particles and the mission crashed. It was an amazing mission and because NASA does everything so precisely and the mirror setup was similar to the Webb telescope, but each mirror was coated with a different element or substance like sapphire. When the probe was out there and it was open and was collecting those photons and then it closed back up and it came back to Earth, helicopter pilots practiced for two years to capture that thing as it was coming in from space and catch it on the way down so it didn't crash land. One of the thrusters fired backwards and so it didn't come the way they could catch it. It crashed at the desert but because they've been so precise about what was on each of those mirrors, they knew that they could get science out of it. And the Stardust mission, I got to be at the launch, which was incredible, and that was again part of the Solar System Ambassadors, because at that time there was a lot of money thrown at NASA to fund things like that. And so there was a large group of teachers who got to go out there for that launch. I borrowed a video camera for this, that was before cell phones. I borrowed a video camera from a family friend, did not know that you had to charge the thing so I'm there at the stand, a mile or so from the launch site, at the VIP place watching, and an armadillo is walking across the asphalt, and I am videotaping the armadillo and the camera stops. But I got the armadillo! [laughs] And then because I had done a lot of outreach with that mission, I got to be back for when they opened the capsule and they brought it back. We're outside looking through the clean room window when they were opening the capsule and taking out the thing, it was like "oh my Gosh!" I had a lot of fun with astronomy and space stuff because I've had fun, I wanted to share it with everybody who would stop and listen. I'm probably the only person in Brownsville or probably anywhere else who walks around with a couple of meteorites in her purse and says "Oh, would you like to see a meteorite while you're waiting in the grocery store checkout line?" [laughs]

AS: Where did you get those?

CL: One of them a friend gave me and the other one another friend gave me and I have a moldavite that I bought at the rock shop in Port Isabel because the moldavite is just a tiny bit bigger than the meteorite. And I bought that because I was teaching at a middle school and we were talking about density and mass and I would give them those and say that they are the same size but the glass one is formed when a meteorite hit sand and made glass and it's a heck of a lot lighter, so it's just I want to get kids excited

and energized and remember it when they're a little older.

AS: From your professional experience, because you've been in education for so many years, what is your assessment of how interested in space or in astronomy people here are, either students or adults in comparison to, say, other scientific fields?

CL: My assessment would be that we still have far too many people who have never even heard of the International Space Station. They have never gone outside and looked as it flies over Brownsville because I've asked people and they say: "What's that?" And that is shocking to me. I believe that part of that is because, until Elon Musk came and there was a big deal about SpaceX, people did not think about it. It wasn't in the news. 50-55 years ago we sent people to the Moon, so what? Astronomy is not taught in the school curriculum. It's glossed over at the elementary level in 2nd grade and 5th grade. It's touched upon a little bit more in the 6th grade curriculum. It's touched on a little bit more in the 8th grade curriculum, but if it's not in the curriculum, it's not brought in. There are a handful of teachers who do something exciting. Before I retired, I was working as a science specialist, and I would get email alerts from JPL about video presentations and I would send that information out to the teachers. It was a an opportunity for the kids to put questions in the chat and the people who were talking would answer the questions. One 2nd grade teacher from a school on one of the poorest sides of town, her kids all had little tablets because our school district was very good about getting that into the 2nd grade, so I was telling the lady about the Stardust model that I have and she wanted me to please come out and talk to the kids. The next day I went out and her kids had been on that video with those people at JPL talking about it and when I brought the Stardust model in, one of the little kids says: "Can I take a picture of it?" I was picturing dad's Instamatic camera. Oh, no, he went and got his tablet and as soon as he did, a cluster of little 2nd graders were there with their tablets and they were narrating as they were videoing and telling about what they had just seen and it blew my mind. One 2nd grade teacher made an impact on those 20 little kids and that's the only way that it's getting out. Again it's one.

AS: Do you think there is a difference in the level of people's awareness about space between the time before SpaceX started building their site in Boca Chica and after they moved to the area?

CL: That's lit a fire. People talk about Elon Musk, people talk about SpaceX. There is a difference, and a lot of the kids tell me: "Oh, my daddy [or uncle] works for SpaceX" so they are employing a lot of people, I imagine as welders, not many engineers, but hey. The thing that intrigued me, I got to go out there with a group of kids from First Baptist High School and every weld on what we saw: "Proudly done by so-and-so." I thought, now that's a twofold thing - they can know who goofed and they have pride in their work. That's a big deal - having pride in your work, if you are only doing one little weld, you might think it's not a prideful thing but it is a prideful thing and again it's one person making a difference. When that thought came to me Sunday, it's occurred to me before but I kept realizing how many one individuals have made an impact just on me for good or bad and how we take each one of those depends on where we go with it. I had one teacher tell me I was stupid. And I wasn't one of those kids who would say: "I will show you." I was one of these kids that would say "Oh, good, I don't have to worry about it anymore" and it was with math and I kept thinking if only she hadn't said that and if only I had not taken that to heart, and not been a kid who was "Oh good, I won't have to worry," I would push forward, I might have been working on that NASA mission but then I wouldn't have my kids so. God has it all planned and I'm going along for the ride. And sometimes I pay attention and sometimes I don't, but he doesn't say "Well, that's all right for you but no

more for you. He's been very merciful to me. I've had some accidents and I've had some things happening and I'm still here.

AS: When people talk about Brownsville, I've heard them talk about it in very different ways. Some people are saying that it's the poorest or one of the poorest towns in the whole of the United States and some people are talking about it in terms of its amazing potential and they say that good things are going to happen so just wait. And I've been wondering how you have thought about Brownsville. Can you tell me a little more about what the town means to you?

CL: We moved to Texas in 1946, after World War II. My dad got a job as a machinist on a dredge that was cleaning out the channel. I grew up in Brownsville and it was a very small town. I can remember the first population that I paid attention to was something like 45,000 people. Graduating from high school, I'm not sure how many kids, but maybe five or six hundred. I've never counted. It was a manageable group. And if you stayed here going to school, you went to school to Texas Southmost College. I went there a year and got married and had my family and Brownsville was growing but slowly; we were mainly agriculture. And the freeze came and the citrus froze, and the agricultural and the shopping centers grew and the town center went outside the center of town and the University connected with the Edinburgh University. And we finally had a four-year degree here and I got back to school and got my degree there and now it's part of the University of Texas system and the buildings are beautiful and expensive and lovely and when you graduate now, you get a UT Brownsville diploma. Before Elon Musk came, Brownsville was growing. There was a good interest, some people that I never knew growing up here invested a lot of money in what's called the Mitte Cultural District. I think as the younger group came up, the 30-somethings, they weren't going to settle for the status quo. Of course, the Internet came along, and people got to know that there was a lot more out there than just going to work at the maquiladora or in the bank. Even at the time when I was at high school, we had kids graduating from Brownsville high school who went to work for NASA. One of our classmates was one of the doctors who checked out the astronauts who came back from the Moon, a boy from Port Isabel and Brownsville. Another one of ours was associated with the federal government in a high office. A lot of our kids went off to Stanford and different universities and made names for themselves in their professions, but I would say in the last 20 years there's been an exponential growth and change in attitudes. I mean the coffee house [Angelita's Casa de Café] is a perfect example of that. Who thought that Brownsville would ever have a coffee house? And it was started by two teachers and run by their very efficient son. Downtown is incredible, that renewal and money coming in from grants and things has made a big difference but the aura of Elon Musk and SpaceX, I mean it is a huge thing. The different people coming in who want other things and want opportunities to go out in the evening and have a nice dinner and not go across the river because that used to be where everybody went - across the river. I don't think that they do that much anymore. There is a lot more things there directly because of that and he's given a lot of money to the area, a lot of money and so has the foundation. And of course, there are other things going on to that that I don't know about. Big differences.

AS: And now turning to the history of the STARSociety, could you tell me how it came about? How did you get that started?

CL: When I came back from Chicago after having seen a real telescope in a real observatory, my husband had bought me a telescope and it was one of the wobbly ones that wouldn't stay even focused on the Moon and by the time I got it focused, the Moon was out of position. And I thought: "You know,

this is for the birds" but I'd never tell him that! [laughs] I had a very kind, loving husband. So I thought, you know, I think I can find somebody with a telescope. The fellow who bought the planetarium had a summer academy for kids in the BISD and a friend of his had bought a couple of telescopes. I thought I'm gonna call him and see if he'd bring his telescope when we do our things at the library. So he did and I thought, you know, maybe we could have our own astronomy society. So he and I said okay, we made arrangements with the library. They let us have a free room because I was doing this Starlab program. We would have a meeting once a month and two to three people would come, but it was never the same two or three people. It just kind of fizzled out. You can't have an astronomy organization if you've only got two people with a telescope and two or three people coming once in a while. So I gave up on that but they'd still bring the telescope and they'd still do things at the library and people would come. I really kept hoping that our school district would build a planetarium. One of the smaller ones up the Valley has one. But they didn't and the observatory that belongs to the University I kept hoping things would grow there but the school district never got interested in it. My personal opinion is because astronomy is not on a state test and who cares, if it's not on the test, we don't worry about it. I kept thinking: "Oh, surely, surely somebody at some point is gonna do this" and here I was 75 and thought this was never gonna happen. And I said: "well, just forget about it." Two years ago, my phone rang and it was Victor De Los Santos. He said: "Hello, I'm Victor De Los Santos, I contacted Dr. Díaz at the University and he said to call you" and I thought: "Wow!" Dr. Díaz and I had collaborated on a couple of big astronomy events, but it was his, he does gravitational wave research and that's a big deal. He had an associate that worked with him and she and I would collaborate and we would have events in the old mall and people would come in to do stuff but she moved away and he didn't have the resources. You know, things ebb and flow. Victor had called Dr. Díaz about the observatory out at Resaca de la Palma and Dr. Díaz said call Carol Lutsinger and he did and he and Marija Jette and I got together in my favorite restaurant that's closed now and I was so discouraged. I told him that I really felt like there was no hope, nobody cared, I was getting old and I couldn't do those things that I had used to do and he just took it and ran with it. Because he was not even 30 yet and he grew up with the computer stuff, the first thought that he had was "oh, we need a website" and "all we need is this and all we need is that" and hung out here with Marty. And Marty said: "My parents have space up there [in Angelita's Casa de Café] and you can just go up there and meet." And I thought I don't know about that. My things I try to keep them at the library so there are insurance issues or accident issues, it was at the library, not somewhere else. Some nights I think we had 25 people crammed in up there and we were getting the organization going. And Debbie Cox who was sitting there with me on Sunday, she had worked with the city, and she knew how to keep things organized. She had her chart paper up there, she wrote down everything we talked about. That grew and then COVID hit but there is a young fellow that is a postdoc student with the University, his name is Richard Camuccio. I'd write an article about what's up for the month and they've been publishing some of the stories I'm retelling and of course, T-shirts and bumper stickers, I mean I never thought about any of that. And it's an amazing, wonderful, marvelous thing because of the influx of new, innovative ideas and exciting people. And he didn't let any grass grow under his feet. As soon as we were sitting there at that initial meeting and I said: "well, there's a lunar eclipse coming," back in 2004 there was a very close approach of Mars and it was hyped everwhere. And I had an astronomy club at a middle school at that time because a teenager whose mother I had worked with and I had taught her kids at the Episcopal day school, said: "Mrs. Lutsinger, why don't you start a club for teenagers?" [laughs] One teacher from that

school said "oh, I'd love to do that" because I was doing teacher training for our school district, I was training every single elementary, middle, and high school teacher in a hands-on inquiry-based science thing so I would go to every one of those trainings and say, if you want anything, only one teacher out of all those hundreds said I want to. Again. The other science teachers helped out, but she was the one that said I'd love to do it. We put on a show that night of the closest approach of Mars and the kids all had stations at the cafeteria where they would do different activities that would help them understand, that were related with Mars and Mars missions and how astronomers used color filters to get their information and blah blah blah. The little girl said why don't you start with her personal telescope. I think we had 12 telescopes altogether because the University brought some telescopes, and Don and Tom had brought some telescopes, we had over a thousand people there that night and I was really panicking but this is how God works. He takes care of me. I had all those kids inside, one person again who had been a Charro Days traffic person, he knew how to direct traffic, showed up because he was one of the professors at another school that I went to and he and I had a personal friendship because of that. He was out there directing traffic. We had no problems. 12 telescopes, a thousand people, I mean it was marvelous. I was talking to Victor and he said: "My mother is a principal and I bet she could get something done." Two weeks later she had it on a Sunday night at her school with 400 parents and kids out there and it was chilly, for Texas 50 is chilly and it's cold. We really should be home in bed but they're out there looking through the telescopes that some of the kids from the University were part of and they brought the telescopes out. We watched the lunar eclipse, not that you needed a telescope to see it, but it's fun to have a telescope. We didn't have another event at her school, but she was very supportive and of course her baby boy. When we have events at the park and his parents are both there and help to get things going. He's put new life into it and the flame is burning and it's in good hands.

AS: When was your first attempt at establishing an astronomy society? What year was that?

CL: It was around 2000.

AS: Can you tell me a little bit about the impact of the society?

CL: Every time we're at the park, people keep wanting to know more about it. When we have events out of the Resaca de la Palma, we have people who specifically come out directly because of that connection. Once we get started meeting in person, I think we'll see a big difference. That was the original plan and that was what was happening until COVID hit and shut everything down. It was Victor's group that got BISD to have a downlink so that the kids who were selected could communicate with the International Space Station as it was passing over Brownsville. That was a direct link.

AS: That's amazing. He also had a couple of events at the Rocket Ranch.

CL: He did that. I was out of that, but it was a big success.

AS: In anthropology we love telling stories and I was thinking in terms of the impact that the society has had on the people in the area, do you recall any particular instance or story where that impact has manifested itself?

CL: I will share one, I think it was the first summer before COVID. We were trying to have a summer camp kind of a thing where we were training people to do activities so when we had things at the library or the park, we'd have people to do it. A woman drove every day from Edinburgh to Brownsville with her daughter who wanted to be an astronomer and

didn't known anything about astronomy, a 16-year-old. They were getting up early in the morning because it is a good hour-and-a-half drive to come, her mother sat there while her daughter went through the thing for half a day and then go home. Otherwise, her daughter wouldn't have the opportunity because of all of the activities we did were how an astronomer could work. We were too new at doing outreach and too restricted by the COVID restrictions to have done big, life changing whatever.

AS: Have you ever wanted to go to Mars or to the Moon?

CL: I would have loved to. Not to Mars, that's a one-way trip. Mars is a one-way trip. With our current ways of traveling, it takes seven months to get there. Seven months to come back and you'd have to stay there a year and a half unless you lived on a pill instead of food. It is going to be really risky. I'd have to laugh at all these people who were saying "I'll go!" Of course, maybe they know where they are going when they kick the bucket and that's okay. I know where I'm going but I don't play with rattlesnakes. [laughs] I would have loved to have gone to the Moon but at the time I was married and had children and didn't know the math! [laughs] You know, I'm part of the generation of Sputnik, oh my gosh, we're in real trouble. I can remember standing on a playground and jet contrails over us and all of us kids standing, looking up and thinking what is that? And one of the boys says: "Oh that is a jet contrail." Oh, and that was okay.

AS: Do you think we're going to keep up this pace of technological development?

CL: If we don't blow ourselves up. I mean seriously. If we would overcome our humanity and learned how to work together and play nice, take turns and share, we could do a lot of things. Of course, maybe that's like the tower of Babel too. You think you can do what you think you can do? You'll all speak a different language now and right now our language that we speak is one of anger and fear and greed. Human nature is human nature.

AS: How do you think about space, what feeling or impression does thinking about space leave on you?

CL: What a mighty God because I do believe in creation. I look at that and when I see the clouds, I think: "Oh, there is a nebula." [laughs] Someday that's going to be a protostar. You know because it's magnificent. When we have these telescopes that reveal the secrets of those same elements that are out there and they are here, they are in us, that's awe.

AS: How do you think about the future of space exploration, especially in relation to what's going to happen in this area?

CL: If things go like he [Elon Musk] hopes, this is gonna be a place where they'll build a lot of rockets, I don't know if they are ever going to launch anything from here to go to space because of the structure of the geography here. And given the fact that people on the island are complaining about trembling and broken windows just from the testing, I think that this may be the place where they build stuff and launch it from Florida. I don't think it's going away. I think it's like it's here, he's a pioneer. The pioneers are here, they are building little roads through the trail and someday someone is going to look back and say 'wow' because, if we do go on, it's not going to regress, I think it'll just move forward. And that's the thing about this Valley region. This Valley region has seen a lot of iterations of pioneering efforts from the Carancahua groups that harvested oysters and fish at the bay to SpaceX building rockets, we've seen a lot of one people making a difference.

AS: How do you think about the future of the STARSociety?

CL: It's obvious that when there is somebody like Victor and a crew that's working on it, they will have interested people. I don't think we'll ever be like the National Astronomical Society, but we could be a part of it. I'd like to see that but that takes, you have to have money and we don't have money. We do it because we love to look at the sky and we want other people to be able to look at the sky before it's so light polluted that nobody can see anything but the Moon. We used to have dark skies. We like our electricity, our neon lights, our streetlights and everything else and it's hard to see anything in the sky anymore.

AS: How do you think about the mega constellations and the effect that they may be having on doing astronomy?

CL: They're gonna bother the serious astronomers, I'd imagine, but I don't think they'll bother somebody in the backyard looking up. They'd just say: "Hey, look at all these things, it's a UFO, a whole bunch of them, we're being attacked!" I really don't think that the Starlink will affect the casual backyard observer but the serious one, I'm sure it will. They'll mess up their photographs, but somebody will come up with a computer program that will wash it out and it will all be okay. Put a filter in. [laughs]

AS: In terms of extraterrestrial intelligence or life, how do you think about that? Do you think we're alone in the cosmos?

CL: Sometimes I think we are alone and sometimes I think we are under somebody's microscope. I know people who have seen something in the sky. With so many other planets out there, there could be. I don't worry about it. It could be a bacterium, maybe like COVID. Life is a bacterium and amoeba whatever, it doesn't have to be somebody with four eyes. Anything is a possibility.

AS: When you said that sometimes you feel like we are under somebody's microscope, what did you mean?

CL: I don't mean on the Internet, although that's a possibility. There could be some other planet out there with people who are just watching us, and we are their zoo. "Oh, let's see what happens when we throw this into the mix!" [laughs] We are virtual reality, I'm virtual and I'm real! [laughs]

AS: You've partially answered this question, but I wanted to ask you if you think that people should settle on other planets and other worlds like moons, for example. And if they should, how should they organize their societies?

CL: Well, we've done that. When Europe found this new world and they came in and they took it over. They took it over with their power, their unknown diseases and I'm not making a political statement here, but this is how it is. In the Middle Ages, you were banned from coming inside of the city, the gates were locked, and you were outside and if you had the plague, you were out there and you were on your own. A ship came in at the harbor, they had to fly a yellow flag, if you've got plague onboard, you can't land. There were no rats here from what I understand until the Europeans came and they brought the plague. And then somebody said "Oh, let's give the blankets away." The human heart is deceptively wicked and if the people who were to go to those other planets with wonderful notions, there is always gonna be a fly in the ointment. There just always is and there is unintended consequences. I understand that we had a bacterium outside the space station that's been outside there for three years and it's still alive. I don't know what kind of bacterium it is, but it was on the news the other day. When we sent those spacecrafts out, we've sent them as clean as they could possibly get them. I've seen those clean rooms. If we had the ability and if we did, who knows what the consequences would

be, but people are always going to try. If people quit trying, we wouldn't have anything. There's always the dream and the goal and the high hopes. If we can do it, we're gonna do it. Humans are born to strive for more and they are not willing to settle for the status quo and that's why we have everything that we have. If something becomes available that it can be done, it will be done. And there will be consequences, results, good things and bad things.
★

The interview has been edited for length and clarity.

Biography

Anna Szołucha is a space anthropologist and the principal investigator in the ARIES project (Anthropological Research into the Imaginaries and Exploration of Space) at Jagiellonian University, Kraków, Poland. www.aries-project.com

Is There Anybody Out There? Part I

Mario Díaz

Have you ever seen an UFO (unidentified flying object)? Do you know of anybody who claims to have been kidnapped by extraterrestrial aliens? Do you believe that extraterrestrial aliens exist?

If you confront this issue as a scientist, your first reaction would be to use a good dose of healthy skepticism. A scientist would always question the veracity of claims not based in facts.

An unexplained UFO sight does not imply the existence of an extraterrestrial civilization. There is an area of astronomy where scientists try to seriously elucidate the probability of the existence of other civilizations outside our solar system and the chances of establishing a communication with them.

The field as such has been called SETI (Search for Extraterrestrial Intelligence). One of the founders of the field was Dr. Frank Drake, an American astrophysicist and astrobiologist who worked at the National Radio Astronomy Observatory, Jet Propulsion Laboratory, Cornell University, Unversity of California at Santa Cruz, and the SETI Institute, and passed away just last year.

He made famous one particular way of estimating the number of intelligent civilizations in our galaxy. The calculation is based on the now called Drake equation, devised by Drake himself in 1961. It is a rather simple probabilistic equation. The number can be obtained just multiplying different factors that quantify all the different ingredients in the problem.

$$N = R_* \times f_p \times n_e \times f_l \times f_i \times f_c \times L$$

Here N is the number we want to know, i.e. the number of civilizations in our Galaxy with which we could establish communication, R_* the average rate of star formation in our Galaxy, f_p the fraction of these stars that have planets, n_e the average number of planets that can potentially support life per each star that has planets, f_l is the fraction of planets that could support life and that actually develop life at some point, f_i the fraction of these planets with life that effectively developed civilizations, f_c the fraction of these civilizations that develop a technology capable of releasing signals of its existence beyond their planet, and finally L is the length of time for which such civilizations will be emitting signals into space which could be detected. You can make your pick for what these numbers are. Until very recently astronomers could only make very crude estimations for them.

In particular the number R_* is quite uncertain. The observed star formation rate in the Milky Way (SFRobs), averaged over the recent history of the Galaxy, is estimated to be 1.65–1.9 Suns (the technical term is solar masses, mass equivalent to the Sun) per year. This observed rate is rather low compared to the theoretical estimates that could be obtained inferring from the molecular clouds collapse observed. This latter valued fp could f_p as much as 200 times higher.

I will not attempt in these few lines to make an estimate of the different numbers that go into the Drake equation. I just want to call our attention to the tremendous improvement, made over the last decade by astronomers, in getting a much better idea for what two of the numbers that go into the equation could be. These numbers are f_p, the percentage of these stars which have planets, and ne, the fraction of these planets which would support life. Also, the estimation of fl , f_l e fraction of planets that had actually developed life at some point, although quite uncertain yet, is closer to be

understood better than ever before.

The first scientific detection of an exoplanet (a planet outside our solar system) occurred in 1988. Since then a flurry of observations took place early in our century. On March 6, 2009 NASA launched the Kepler spacecraft with the fundamental mission of exploring our galactic neighborhood in search of exoplanets. After viewing more than 100,000 stars for years at a time, looking for planetary transits (the times when the passage of a putative planet diminishes the star light observed from the instrument), the Kepler mission reached a startling conclusion: practically all stars have at least one planet. On April 18, 2018, NASA launched the TESS mission successfully from Cape Canaveral Air Force Station aboard a SpaceX Falcon 9 rocket. The Transiting Exoplanet Survey Satellite (TESS) is a NASA-sponsored Astrophysics Explorer-class mission that is performing a near all-sky survey to search for planets transiting nearby stars. The primary goal of TESS is to discover planets smaller than Neptune that transit stars bright enough to enable follow-up spectroscopic observations that can provide planet masses and atmospheric compositions.

As of February 22, 2023 the combined results from Kepler, TESS and other ground based observations reached the stunning number of 5,272 exoplanets confirmed
(https://exoplanetarchive.ipac.caltech.edu/). TESS itself confirmed 291 of these and observed new 6,176 candidates that require confirmation.

After viewing hundred of thousand of stars for years at a time between the two missions, looking for planetary transits, scientists thought that practically all stars have at least one planet.

But in a recent article by Ethan Siegel posted in his blog "Starts with a Bang", he wrote that 99.9% of the exoplanets are surrounding metal-rich stars. On the contrary metal-poor stars are overwhelmingly planet-free.

To understand the role that "metals" play in this story we need to review a little bit of the natural history of our Universe. When the Universe began some 13.8 billion years ago right after the big explosion dubbed the Big Bang, the first atomic nuclei were formed in the very few first minutes through nuclear fusion processes. About 3/4 of the elements formed then were hydrogen atoms, the remaining 1/4 was essentially helium. There were minute fractions of deuterium (a stable, heavy isotope of hydrogen), helium-3 (a stable, light isotope of helium), and lithium-7.

Siegel argues that the first stars formed with this material could not form planets. The most accepted scenario for planet formation involves the collapse of a molecular cloud of gas (i.e. a hydrogen molecule of is the resulting of binding two atoms) that contracts because of its gravity and as it cools down keeps attracting surrounding matter. Eventually lumps of this matter collapse forming a proto-star, and the environment around that proto-star forms what scientists call a circumstellar disk.

Planets can be formed out of this disk through two possible different scenarios. One is called the core accretion scenario, where a sufficiently massive core of heavy elements can first form a rocky core, with the remainder of a planet, including light elements and comet-like material, converging around it. The disk instability scenario, is a completely different one, where far from the central star, matter can quickly collapse into a giant-sized planet.

Most of the rocky close to the parent star planets formed, seem to arise from the core accretion scenario. But the giant gaseous planets revolving around their star far from it, seem to have arisen from the disk instability scenario. But observing Jupiter-sized planets at very large distances from their

parent stars is quite difficult. This seems to be an obstacle that new powerful telescopes like the James Webb Space Telescope could overcome in the near future. Siegel argues that for the core accretion scenario, which should be valid for all planets found with orbital periods ranging from hours to a few Earth-years, could only work if the circumstellar disks contain at least a minimum of heavy elements to sustain the core accretion scenario.

The fact that the early universe did not contain heavy elements makes it almost impossible the core accretion scenario to work for early stars. It seems that rocky planets could not have formed in the earliest stages of our Universe.

He concludes that when looking at the exoplanets that exist around stars in detail, we find that there's a steep drop-off in their abundance based on how many heavy elements are present. For stars with fewer than about 20-30% of the heavy element abundance found in our Sun, there's a very steep decline in the number of exoplanet population. We know that heavy elements are manufactured in stars as a result of the thermonuclear fusion of hydrogen and helium in their nucleus. But elements heavier than iron are manufactured only when stars explode creating supernovae or in the collision of neutron star binaries that have been loosing progressively gravitational energy through a dance that lasts millions of years. In other words many generations of stars are needed to form rocky planets around stars.

It seems then that we will only find planets in the regions where heavy elements exist and that the number of planets that exist drops off as their parent stars possess only lighter elements.

There still may be many planets in our "today's" universe with of them many inhabited also. How easy would be to develop civilizations in these and how easy would be to get information about possible life in them? or how could we know if civilizations have developed in them?

Stay tuned for a second note on the subject in the next issue of FFO. ★

Biography

Mario Díaz is Director of the Center for Gravitational Wave Astronomy and a Professor of Physics at UTRGV. He is Director of Cristina Torres Memorial Observatory, principal investigator of the Transient Robotic Observatory of the South Collaboration, and a member of the LIGO Scientific Collaboration. Mario serves as President of the National Society of Hispanic Physicists. He received a PhD in general relativity and gravitation from University of Cordoba, Argentina.

Alien Life on Planet Terra: A First-Hand Adventure Tale

Carol Lutsinger

When I was a teen I realized my calling was to search out the unknown on other planets. My home planet was filled with opportunities for an adventurous person to explore the unknown planets in our solar system.

My name is Cassie Opeia. My best friends are Ben There and Dun Thaat. We decided to apply for an upcoming mission to the newly discovered planet Terra in the Milky Way galaxy. This galaxy was largely uninhabited and a mysterious blue dot when seen through our space-based observing stations. We wanted to be the first to go there.

When we were accepted into the program we were exposed to dangerous levels of radiation to increase our ability to function in the distant gap between our home galaxy and the Milky Way. It was painful, but well worth it. We also experienced medical testing for our optical systems, our digestive and tactile systems, as well as the function of our intelligence gathering and mobility equipment.

After weeks of preparation, we were launched via our Critical Intergalactic Authority (CIA) space vehicle. The vehicle sped the three of us at light year+ mode and it took a mere seven months to reach our goal - the blue planet Terra!

We were allowed to be there on the surface a few hours to accommodate the relationship between our galaxy and the Milky Way so we knew we would have to hurry. Donning our specially-designed suits to allow us to breathe the possibly toxic air on Terra we carefully opened the hatch of our ship, being careful not to damage the sign TERRA or BUST someone had placed on the side by the egress.

When our optical systems finally adjusted to the incredible light that surrounded us, we saw tall cylinders of various shades of brown and gray which held an incredible array of waving fronds. We were not sure what was causing the swaying of those fronds but it did appear that the cylindrical features were affixed to the surface and an invisible force was causing the waving of the fronds.

Feeling relatively safe we proceeded into the shadowed region ahead of us. To our horror, we witnessed an attack on a small furry beast that was creeping along in the shadows. The being that attacked the small beast must have been one of the creatures we have heard of - a predator. And what a shocking sight it was to witness the swiftness of its attack, and the demise of the tiny creature.

I wrote this description in my scientific discovery notebook: "The large flying predators are tan and white with exceedingly powerful wings that span 39-49 inches in width!"

"These previously unknown to us creatures have a heart shaped face and large black eyes. Their elongated cylindrical bodies are covered in light brown and white feathers. They have two appendages with which they grasp the prey. Two other appendages are used to maneuver silently through the air. They emit a sound like a shriek instead of a hoot. The body is thick with feathered legs and a short square-shaped tail. "The specimens we observed could not turn their eyes and so the head was turned to the sides to look around."

"The flying creature swooped down on silent wings to use its talons to grab a small furry animal that was scampering through the grass. Flying to a nearby tree with the prey in curved talons, the beast devoured the prey whole, hide, hair, bones, and nails! I've never been so shocked in my life!"

For several hours the beast sat in the tree until it began to make terrifying coughing sounds. Eventually a mysterious pellet flew out of the open beak and fell to the ground beneath the tree. The monster flew off into the darkness. As soon as it was light enough, Ben and I crept over with great care and retrieved the mass that was ejected by the predator. We then wrapped it in our safety aluminum packets and brought them back with us for our scientists to dissect and discover what might be in the pellet."

Even now, after 250 moons I still remember the terror of this experience. Aliens DO exist and it is hoped that none ever visit our planet. The idea of a feathered predator among our beasts that graze on polymers they damage would be terrible, to say the least.

Perhaps one day we will visit other planets, but for now planet Terra should not be explored by any being from our planet. ★

Cosmic Watergate: The Roswell Incident

Jaqueline Peña

Leased Wire
Associated Press

Roswell Daily Record

RECORD PHONES
Business Office 2288
News Department
2287

ROSWELL, NEW MEXICO, TUESDAY, JULY 8, 1947

Movies as Usual

GRAND

Claims Army Is Stacking Courts Martial

Indiana Senator Lays Protest Before Patterson

RAAF Captures Flying Saucer On Ranch in Roswell Region

House Passes Tax Slash by Large Margin

Defeat Amendment By Demos to Remove Many from Rolls

Security Council Paves Way to Talks On Arms Reductions

No Details of Flying Disk Are Revealed

Roswell Hardware Man and Wife Report Disk Seen

Ex-King Carol Weds Mme. Lupescu

Former King Carol of Rumania and Mme. Elena Lupescu relax aboard the S. S. America bound for Cuba and Mexico in May, 1941. A member of Carol's household in Rio de Janeiro said the ex-king and his companion for 23 years, reign and exile were recently married at their hotel in Copenhagen Palace suite. (AP Wirephoto).

Some of Soviet Satellites May Attend Paris Meeting

Roswellians Have Differing Opinions On Flying Saucers

American League Wins All-Star Game

Miners and Operators Sign Highest Wage Pact in History

Perhaps the most infamous case of a UFO recovery, conspiracies, and cover-ups, the Roswell incident first hit the public with a front page cover title.

"RAAF Captures Flying Saucer On Ranch in Roswell Region." - July 8, 1947, The Roswell Daily Record [1]

The breaking news stated that the 509th Bomb Group of the Eighth Air Force, had just come into possession of a flying disc after a local rancher, Mac Brazel, alerted authorities of what he had stored in his ranch.

In time passing, the original text was speculated to be littered with inconsistencies [2]. Mac Brazel did not store a flying disc on his ranch. What he had found a month prior had already been in a state of debris, however the debris did not resemble a flying saucer. To this present day, the question lies in what exactly did Mac Brazel find?

Let's put this on a timeline.

July 6, 1947
Mac Brazel shows up to the Chaves County sheriff's office carrying pieces of debris he has found on his ranch. The sheriff, George Wilcox, contacts the Roswell Army Air Field (RAAF) and talks to the intelligence officer, Jesse A. Marcel. Marcel was instructed to collect a team to recover evidence and bring it to be flown to the Eighth Air Force headquarters, and from there to Washington, DC for examination [3].

July 7, 1947
Marcel and his team load up more crash materials to take to the Roswell AAF. On his way to base, Marcel stops at his house to show his wife and kids the materials they collected.

July 8, 1947
The original press release hits the public. The story carries over to the radio station, KGFL, as well as runs on the AP wire. Calls begin to swarm in. Various witnesses step forward to claim they saw alien bodies at the crash site. That afternoon, a sudden press conference is held in which Marcel is photographed with a pile of debris [4].

July 9, 1947
Now here's the twist.

"When the debris was gathered up the tinfoil, paper, tape, and sticks made a bundle about three feet long and 7 or 8 inches thick, while the rubber made a bundle about 18 or 20 inches long and about 8 inches thick." – July 9, 1947, The Roswell Daily Chronicle [2]

Conveniently the very next day, the press released an interview with Mac Brazel, in which all of yesterday's claims are seemingly retracted. This new report states Brazel had come across a high altitude weather balloon. The misreport was simply attributed to a proclaimed "flying saucer" craze of a never full, flashy press. Odd, but an entirely plausible news report.

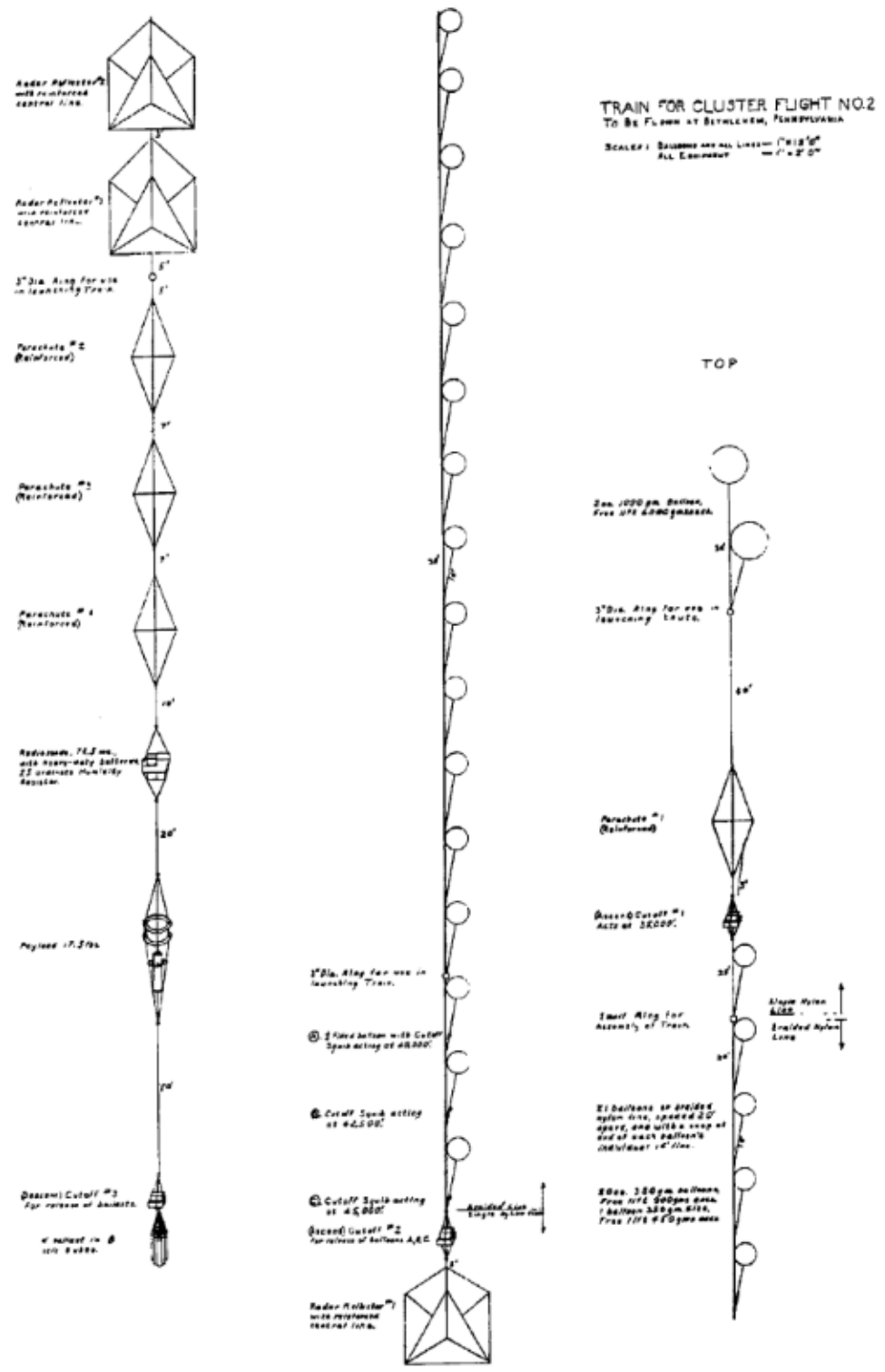
With the height of the Cold War rounding around the decade, the Roswell incident faded from the headlines. It wasn't until the 1970s that Roswell hit the platform for discussion once more. Stanton Friedman, a known UFOlogist, interviewed Marcel on the first hand account. Marcel, now retired, stuck to the story claiming the event was extraterrestrial. Friedman used this as inspiration to continue his research on obscure Roswell developments. This collection later became the basis for the start of renewed interest and in turn exposes on Roswell [2].

The cover-up of a cover-up

With this new slow swarming craze, the government faced inquiry once more. In 1997, the United States Air Force came "clean."

Having declassified the documents under The Roswell Report: Case Closed, the debris found at the crash site were claimed to have remnants of a top secret military operation named Project MOGUL.

Project MOGUL was set to work with various high altitude balloons theorized to be capable of detecting sound waves of atomic weaponry from thousands of miles away. This military operation would reveal nuclear possessions against foreign enemies [5].



The testing of these balloons were carried out at various locations over the United States, however favorable conditions centered around Alamogordo AAF in New Mexico. Majority of the projects flew from here over the next four years, that including the summer of 1947 [6].

Furthermore, the repost goes as far as to respond to the alien body claims, stating the supposed alien bodies were actually flesh colored crash test dummies.

With the original publication failing at peak military tension against the Soviets, the government admitted to playing along with the convenience of a false alien mystery as it was more convenient than releasing details of classified sonar technology.

The Grand Scheme of Things

Is it ever a surprise the government has an affinity to covering up super high tech war technology? No. But if they lied once, would it not be fitting to lie twice? And if you're a real tinfoil hat freak about these things, is it far fetched to draw red strings between the fishy formation of the Majestic 12, Project Sign, and the National Security Agency right after Roswell? Objective. That's its own can of worms to unpack. Something is to be taken from all the witness accounts and official documentation; someone is lying. The only concrete evidence agreed on is something crashed into Roswell in the summer of 1947. ★

References

[1] *Roswell Daily Record*, Homepage, https://airandspace.si.edu/multimedia-gallery/roswell-daily-record-newspaper-ufo

[2] *The Roswell UFO Incident Story*, https://www.roswellfiles.com/story.htm

[3] *Jesse Marcel Jr. and the Roswell Incident*, JESSE MARCEL, JR., https://www.jessemarceljr.com/timeline.html

[4] *ABC News*, ABC News Network, https://abcnews.go.com/blogs/headlines/2013/07/something-strange-in-the-sky

[5] *Media.defense.gov*, https://media.defense.gov/2010/Oct/27/2001330219/-1/-1/0/AFD-101027-030.pdf

[6] Kreidler, Marc, *Roswell UFO 'Strange Metal' Mystery*, Skeptical Inquirer, 22 Nov. 2017, https://skepticalinquirer.org/newsletter/roswell-ufo-strange-metal-mystery

[7] *Roswell Reports, Vol. 6.* YouTube, 25 Dec 2009, https://www.youtube.com/watch?v=YadmGZcvgr8

[8] *UFO Explorations: Roswell UFO Cannot Be Reverse-Engineered*, Ufoexplorations, https://www.ufoexplorations.com/roswell-ufo-not-reverse-engineered

[9] *Brig. General Arthur E. Exon*, http://www.roswellproof.com/exon.html

[10] *R/Aliens - My Timeline for Roswell & Why the Facts Don't Support Mogul Explanation*, Reddit, https://www.reddit.com/r/aliens/comments/xtb3jb/my_timeline_for_roswell_why_the_facts_dont/?utm_source=share&utm_medium=android_app&utm_name=androidcss&utm_term=1&utm_content=share_button

[11] */TARDIR/Mig/A232109 - Internet Archive*, https://ia800105.us.archive.org/5/items/DTIC_ADA323109/DTIC_ADA323109.pdf

Biography

Jaqueline Peña is a senior at James Pace Early College High School. She is president of the school's SkillsUSA Drafting chapter and an intern and ambassador for the South Texas Astronomical Society. She wishes to pursue a career in aerospace engineering.

Astrobiology: A Brief History for the Search for Life Beyond the Earth

Andrew Maurer

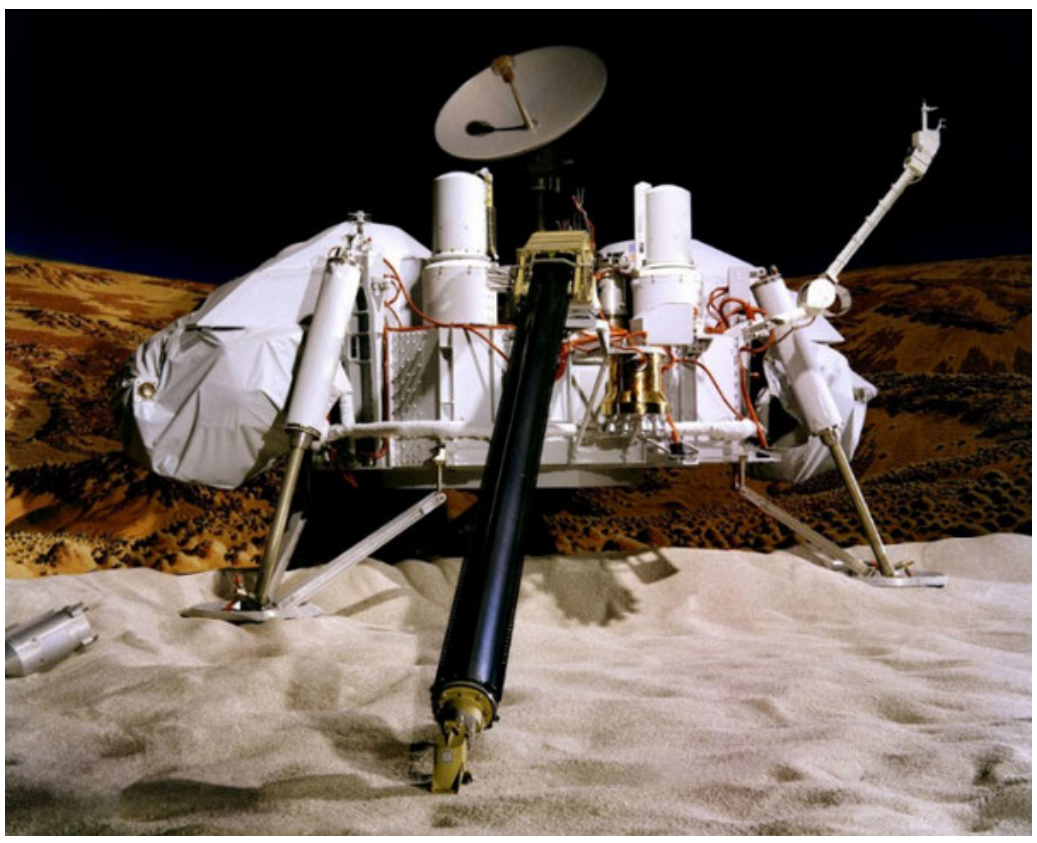
Are we alone in the universe? Is there life on other worlds? And if so, what does it look like? These and similar questions have fascinated people of every age and from every culture since its inception. As a species, we have always gazed upon the night sky with awe, curiosity, and wonder. Until recently though, the concept of exploring for life beyond Earth was a fantasy, only reserved for the plots of sci-fi novels and movies. This recent fiction though is morphing ever closer into a reality as each decade passes, and the name for this field of research is called astrobiology. Astrobiology is the interdisciplinary study of the origin, distribution, and development of life on Earth and beyond. Because of the interdisciplinary nature of astrobiology, advances in related fields are crucial to the general foundation of astrobiology. Examples of proximate studies include climatology, evolutionary biology, geology, geochemistry, and paleontology, among other subfields. The closely affiliated terms 'xenobiology' and 'exobiology' are sometimes used interchangeably with the term astrobiology: Xenobiology is reference to the study of life exclusively foreign to Earth and hypothetically non-organic life. Exobiology is indeed more of a synonym to astrobiology and has competed for use with 'astrobiology' being the more recognizable term [1].

Why is this field relevant? The foundational questions to astrobiology are existential for humanity: the possibility of life elsewhere in the cosmos, that we're not alone. Discoveries in astrobiology would yield crucial reference points for every natural science field in existence, but especially with biology and its subfields. Additionally, the discovery of life outside of Earth raises major philosophical and religious questions of humanity's place in the universe, especially if the lifeforms found can communicate. More pragmatically, astrobiology is an avenue through which to locate potential worlds for exploration and later habitation. Although relatively nascent, astrobiology is a rapidly developing field since its founding during the mid-20th century. As technological advancements in astronomical study and space travel continue, the potential for comprehensive exploration of worlds beyond our own is realized.

Though the buildup to our modern conception of astrobiology spans much of human history through advancements in several academic fields such as astronomy, optics, and microbiology, the formal use of the term 'astrobiology' happened only in 1953 by Russian astronomer Gavriil Adrianovich Tikhov [1]. As stated earlier, the term 'exobiology' competed with the term 'astrobiology' to describe similar research topics for the detection of life beyond Earth; the American molecular biologist Joshua Lederberg coined the term in a 1960 Science article exploring the potential research for life on other planetary bodies [13]. Lederberg was part of a new, federal organization, the National Aeronautics and Space Administration (NASA), that was established in 1958 with the intent of space exploration [11]. Although space travel and an American lunar landing were the primary objectives, NASA would later shift its focus to direct biosignature searches withing the solar system through several satellite and lander missions, the first lander mission being the Viking Project.

The primary objective of the Viking Project was to successfully land an American spacecraft on Mars and take photographs of the Martian surface [23, 26]. The Viking Project consisted of a pair of identical orbital-landers, Viking 1 and Viking 2. Both landers possessed meteorological and sediment analysis instruments to more accurately detail the conditions of the Red Planet. Viking proceeded

several fly-by and orbital spacecraft missions, the Mariner missions. Two significant Mariner spacecraft were Mariner 4 and Mariner 9; Mariner 4 for relaying the first detailed photographs of Mars' surface, and Mariner 9 for being the first artificial satellite to orbit Mars [14, 15]. Both Mariner spacecraft yielded incredible insight in the geologic and meteorological nature of Mars; Mariner 9 witnessed a month-long dust storm and was the first satellite to send detailed images of Mars' moons: Phobos and Deimos [14, 15].



A model of the identical Viking 1 and 2 landers. Image credit: NASA

Viking 1 was launched from Cape Canaveral, Florida on August 19, 1975, followed by Viking 2 at the same location on September 9, 1975 [23]. Prior to landing on the surface, Viking 1 and 2 arrived within Martian orbit and orbited: Viking 1 entered Martian orbit on June 19, 1976 and Viking 2 on August 7, 1976 [23]. After analyzing potential landing sites, the Viking 1 lander descended to the western slope of Chryse Planitia on July 20, 1976 [23, 26]. The Viking 2 lander followed suit on September 3, 1976 to its landing site, Utopia Planitia [21]. Both orbital-lander pairs operated well beyond their intended lifetimes of 90 days after their arrival to Mars. The landers operated longer than the orbiters; Viking Lander 1 sent its final transmission, and the last of the data gathered from the Viking Project, on November 11, 1982 [23]. In contrast, the last orbiter to operate was Viking Orbiter 1 and it operated until August 7, 1980. The result of their weather and ground analysis yielded a seismically inert, cold, and desolate Mars. The coldest predawn temperature recorded was -120°C (-184°F), near the freezing point of carbon dioxide [23]. The atmosphere is thin and is carbon-dioxide dominant. The soil is iron-rich, dry, and ultraviolet radiation-saturated; researchers believed that the Martian ground was self-sterilizing because the soil would oxidize when exposed to moisture [23]. The apparent desolate landscape and a lack of recognizable life on the Martian surface placed astrobiology-focused Martian missions on hiatus, though the search for life in the cosmos at large continued.

In parallel with space flight, satellite, and lander missions, the search for intelligent life through ground-based operations like radio telescopes and observatories continued. On November 20, 1984, the Search for Intelligent Life Institute, or SETI, was established by Thomas Pierson and Jill Tarter [6]. SETI is famous for its dedication to radio wave detection and occasional radio wave transmission towards fixed astronomical targets. More accurately, SETI does not detect intelligence, rather potential technology in the form of radio waves. The reason for radio wave detection is two-fold: radio waves do not interfere with cosmic dust, celestial bodies, and the Earth's atmosphere as much as other wavelengths of electromagnetic radiation do and radio waves are energetically low-cost to capture and generate [9]. SETI collaborates globally with academic and private institutions, and various radio telescope arrays have contributed to the collection of radio wave data across the decades and into the present. In addition, renowned scientists Carl Sagan, Frank Drake, and Stephen Hawking have collaborated with SETI; Sagan and Drake have served as members of the SETI Board of Trustees [6]. As these ground-based observations continued, paradigm shifts in

astrobiology continued with the discovery of planets outside of our solar system.

An exoplanet is a planet that orbits a star other than the Sun. The existence of planets beyond our solar system is fundamental to astrobiology; for Earth-like life to emerge elsewhere, Earth-like planets need to exist. The first detection of an exoplanet was published in January 1992 by astronomers Aleksander Wolszczan and Dale Frail [27]. Pulsar PSR B1257+12, a neutron star with a rotation of 6.2 milliseconds, was revealed to have two planetary bodies in its orbit with revolutions of approximately 66 and 98 days; a few years later, a third exoplanet was discovered by Wolszczan, the first documented planetary system outside of our solar system [27, 28]. In April 1994, the first exoplanet in orbit around a main-sequence star, a star like the Sun, was discovered by Didier Queloz and Michel Mayor [22]. The main-sequence star is 51 Pegasi, and its orbiting exoplanet, 51 Pegasi b, defined a whole category of commonly detected exoplanet, the "hot Jupiter". A "hot Jupiter" exoplanet is a gas giant that tightly orbits around its star; 51 Pegsi b orbits 0.05 AU from its star, a distance even closer than what Mercury orbits our Sun [22]. The question now becomes, how were these exoplanets discovered?

The primary techniques for exoplanet discovery are the radial velocity method and the transit method. Both methods involve how exoplanet orbits affect the observed light from the orbited star. With the radial velocity method, a spectrometer is implemented to detect the wavelength of a star's radiation; a periodic red-blue shift (an example of the Doppler Effect) is evidence for the presence of an exoplanet [8]. The transit method measures the luminosity, or apparent brightness, of a star and periodic dips in luminosity is evidence for the presence of an exoplanet. In the discovery of 51 Pegasi b, Queloz and Mayor detected the exoplanet using the radial velocity method with a spectrometer at the Haute-Provence Observatory 22 . In contrast, the first two exoplanets orbiting PSR B1257+12 were detected through the former radio telescope at the Arecibo Observatory in Puerto Rico. The pattern of irregular frequencies was statistically significant at approximately 98.2 and 66.6 days [27, 28]. Furthermore, Wolszczan and Dale determined the orbital distance of the exoplanets to be 0.47 AU and 0.36 AU, or about the same orbital distance of Mercury to our Sun [27, 28]. These revolutionary discoveries were conducted at ground-based observatories. The Earth's atmosphere interferes significantly with most incoming radiation, and therefore information, from these distant stars. The limit of atmospheric interference would be circumvented by the advent of telescopes in space.

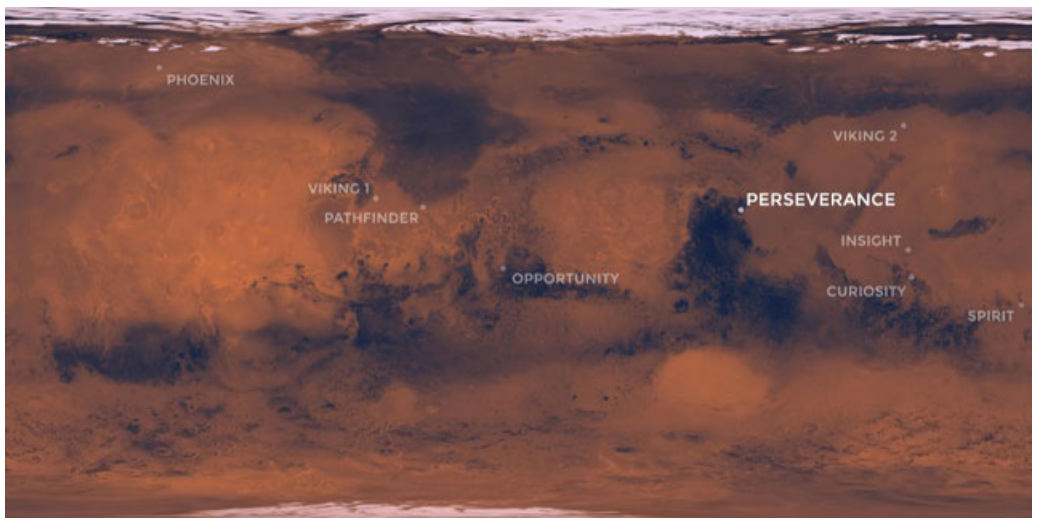
On April 23, 1990, the Hubble Space Telescope was launched and would be crucial in the assistance of exoplanet detection, collecting data in the visible-light range of the electromagnetic spectrum outside of the influence of Earth's atmosphere [5]. Shortly thereafter, other space telescopes were launched to perform similar tasks. The Spitzer telescope is unique due to its focus on infrared radiation from Earth-sized exoplanets, and in conjunction with the Hubble Space Telescope, the Compton Gamma-Ray Observatory, and the Chandra X-Ray Observatory, contributed to NASA's Great Observations Program [25]. Because of its focus in the infrared, Spitzer was capable of detecting cooler celestial bodies like brown dwarfs, M-class stars, and molecular clouds; Spitzer is credited as the first telescope to detect light from an exoplanet [25]. On March 6, 2009, the Kepler Space Telescope was launched with the explicit intention to hunt for Earth-sized exoplanets via the transit method and to determine the percentage of those Earth-like exoplanets orbiting in or near the habitable, or Goldilocks, zone [10, 12]. It observed a section of the Cygnus and Lyra constellations for four years, continuously collecting data on over 1500 stars in that section of the cosmos [12]. After malfunctions with its maneuverability, the Kepler telescope transitioned into another set of

objectives through the K2 mission. K2 shifted focus into planetary system characterization in a significantly shorter period than during Kepler's primary mission, and the observational fields varied depending on its orbital plane with the Sun [7, 12]. On October 8, 2018, the Kepler telescope permanently ended observations due to fuel depletion [12]. The legacy that Kepler left is invaluable, including the documentation of the first Earth-like exoplanet orbiting within the habitable zone of its star, Kepler-186f, in addition to over 2500 confirmed exoplanets [10, 12]. As space telescopes pierced the unknown celestial skies to search for Earth-like exoplanets, the Red Planet had a revitalization of exploration.

Mars-targeted orbiter and lander missions resumed in the late 1990s and early 2000s. The first couple of missions to initiate the modern wave of Martian exploration campaigns include the orbiter Mars Global Surveyor and lander Pathfinder launched in November and December 1996, respectively [16, 18]. Mars Global Surveyor relayed invaluable, long-term atmospheric and meteorological observations, and observational data from it and Pathfinder supported a Martian environment that once supported liquid water on its surface [16, 18]. Pathfinder also deployed the first Martian rover, Sojourner. In 2001, the deployment of the orbiter Mars Odyssey followed with the objective of water detection through spectrographic, chemical analysis; Odyssey mapped the distribution of water-equivalent hydrogen in order for scientists to determine the presence of subterranean water ice [17]. It also acted as a communication relay for the later Mars rovers, Spirit and Opportunity. While Odyssey could not directly interact with the northern water ice deposit, the lander mission Phoenix set out to do just that. Landing in Vastitas Borealis, the northern polar plains, on May 25, 2008, Phoenix used its robotic arm to dig sediment samples for chemical analysis using on-board equipment [19, 24]. Geochemical analysis supports the findings of the missions before it - the presence of subterranean water ice at the northern Martian pole. Prior to Phoenix, the Mars Reconnaissance Orbiter, or MRO, deployed in 2005 to further explore the history of liquid water on an ancient Mars, and whether liquid water persisted long enough for life to evolve [20]. MRO revealed more data in support of an ancient Mars with a significant amount of flowing, liquid water on its surface [20]. Even evidence of ancient hydrothermal vents was discovered by MRO in a former ocean in the Martian southern hemisphere; hydrothermal vents are a strong candidate of where life began on Earth [20]. Furthermore, life continues to persist in this and other seemingly hadean environments.

The ancient presence of liquid water on Mars's surface is indirectly supported through geochemical and stratigraphic analysis. After the Viking mission, scientists looked to extant environments on Earth, in order to determine if life could persist in harsh environments like the Martian surface through comparative observations. The Atacama Desert in Chile and the Dry Valleys of Antarctica are proximate examples of Martian conditions on Earth [26]. Though extremely hardy macroscopic organisms do exist in these conditions, microscopic organisms are of major interest in these conditions due to the significantly thinner atmosphere on Mars. Microorganisms have been discovered thriving in inhospitable environments like deep-water hydrothermal vents, arsenic pools, in deserts, and underneath polar icesheets. These microorganisms are called extremophiles, and their discovery in these environments renewed curiosity for the possibility of life on other planetary bodies. The presence of life thriving in these extreme locations on Earth lead astrobiologists to speculate that similar lifeforms exist in similar conditions. Thus, "follow the water" became the motto for astrobiologists; the Jovian moons Ganymede and Europa, and the Saturnian moons Enceladus and Titan, are of interest due to the likely presence of subterranean, liquid water [11]. Meanwhile, the search for evidence of ancient life on

Mars continues into today.



A map of Mars with the landing sites for successful lander and rover missions marked. Note that the only mission not mentioned in this article is the Insight lander, whose objective was to gather information on the formation of Mars. Image credit: NASA/JPL-Caltech

The Mars Science Laboratory, or Curiosity rover, is the second most recent Martian rover mission to be deployed. Curiosity is massive (about twice as long and five times as heavy as Spirit and Opportunity) and before the Perseverance rover's arrival, carries the most advanced equipment on the planet's surface [21]. Curiosity is still in operation near Gale Crater and has been successful in acquiring vital insight into the ancient Martian environment since its arrival on August 6, 2012 [21]. In conjunction with Perseverance, the geologic data gathered from the rover missions support the model of ancient Mars providing liquid water on its surface. Furthermore, the chemical composition of rock supports interaction with liquid water as part of the rock's formation at both Gale and Jezero craters [21].

While rovers and orbiters dominate Mars, the successor to the Kepler telescope, the Transiting Exoplanet Survey Satellite (or TESS) surveys the distant stars for Earth-like exoplanets [2, 3]. TESS's primary objective is to observe the 200,000 brightest stars near the sun to find exoplanet candidates that will be evaluated by ground-based telescopes [2, 3]. As of the writing of this article, TESS has surveyed the entire celestial sphere, collected over 5000 exoplanet candidates with 243 confirmed, and will undergo its second operation that focuses on specific fields of view for observation and will continue operations until October 2024 [4]. In addition, the James Webb Space Telescope launched on December 25, 2021 and has already presented profound information about several cosmic phenomenon like the behavior of black holes and the origin of the universe itself, and is an invaluable asset with exoplanet analysis and discovery. All of this is at the cusp of a new wave of interest in astrobiology and space exploration.

Though only formally recognized in the latter half of the 20th century, astrobiology is a burgeoning field with a wealth of potential for further growth and refinement. Currently, the Artemis missions will have humanity return to the Moon and will certainly build momentum towards future in-person missions to Mars and beyond. In addition to the current missions presented, future missions are set to different parts of the solar system. From the retrieval mission for the Perseverance sample caches on Mars to Europa Clipper, an orbiter mission set to observe the Jovian moon Europa, to the observations of TESS and the James Webb Space Telescope, the astrobiology branch of NASA and its affiliated organizations like the European Space Agency (ESA), the Japan Aerospace Exploration Agency (JAXA), and other air and space agencies around the world are more active than ever before. Moreover, advancements in space travel technology are ever-closer to in-person space travel, a revolutionary feat that was once thought as mere science fiction. Indeed, that is the origin of astrobiology itself - poetic that the culmination of human achievement in astronomy and biology has us venture out into the heavens in search for more life in the final frontier. The field of astrobiology is as bright as the light that it seeks to observe, if we allow it to be. ★

References

[1] Cockell, Charles S. *'Astrobiology' and the Ethics of New Science*. Interdisciplinary Science Reviews, vol. 26, no. 2, pp. 90–96, 2001, https://doi.org/10.1179/isr.2001.26.2.90

[2] Garner, Rob. *About TESS.* NASA – TESS Exoplanet Mission, NASA, 15 July 2016, https://www.nasa.gov/content/about-tess

[3] Guerrero, Natalia. *TESS – Transiting Exoplanet Survey Satellite.* TESS Transiting Exoplanet Survey Satellite, The Massachusetts Institute of Technology, 1 September 2022, https://tess.mit.edu/

[4] Guerrero, Natalia. *TESS Begins Its Second Extended Mission.* TESS Transiting Exoplanet Survey Satellite, Massachusetts Institute of Technology, 1 September 2022, https://tess.mit.edu/news/tess-begins-its-second-extended-mission/

[5] *Historic Timeline.* NASA: Exoplanet Exploration Planets Beyond Our Solar System, NASA 26 July 2022, https://exoplanets.nasa.gov/alien-worlds/historic-timeline/

[6] *History of the SETI Institute.* SETI Institute, SETI Institute, https://www.seti.org/history-seti-institute

[7] Howell, Steve B., et al. *The K2 Mission: Characterization and Early Results.* Publications of the Astronomical Society of the Pacific, vol. 126, no. 938, pp. 398–408, 2014, https://doi.org/10.1086/676406

[8] Impey, Chris. *Radial Velocity Method.* Astrobiology: Exploring Other Worlds, https://www.coursera.org/learn/astrobiology-exploring-other-worlds/lecture/oSA6I/the-radial-velocity-method. Accessed 19 March 2023

[9] Impey, Chris. *SETI.* Astrobiology: Exploring Other Worlds, https://www.coursera.org/learn/astrobiology-exploring-other-worlds/lecture/pv8sZ/seti. Accessed 25 March 2023

[10] Johnson, Michele. *Mission Overview.* NASA, NASA, 14 April 2015, https://www.nasa.gov/mission_pages/kepler/overview/index.html

[11] Kaufman, Marc. *A History of Astrobiology.* Astrobiology at NASA: Life in the Universe, NASA, 7 August 2022, https://astrobiology.nasa.gov/about/history-of-astrobiology

[12] *Kepler and K2.* Astrobiology at NASA: Life in the Universe, NASA, https://astrobiology.nasa.gov/missions/kepler/

[13] Lederberg, Joshua. *Exobiology: Approaches to Life Beyond the Earth.* Science, vol. 132, no. 3424, pp. 393–400, 1960, https://doi.org/10.1126/science.132.3424.393

[14] *Mariner 3 & 4.* NASA Science: Mars Exploration, NASA, 7 September 2019, https://mars.nasa.gov/mars-exploration/missions/mariner-3-4/

[15] *Mariner 8 & 9.* NASA Science: Mars Exploration, NASA, 7 September 2019, https://mars.nasa.gov/mars-exploration/missions/mariner-8-9/

[16] *Mars Global Surveyor.* NASA Science: Mars Exploration, NASA, https://mars.nasa.gov/mars-exploration/missions/mars-global-surveyor/

[17] *Mars Odyssey.* Astrobiology at NASA: Life in the Universe, NASA, https://astrobiology.nasa.gov/mission/mars-odyssey/

[18] *Mars Pathfinder.* NASA Science: Mars Exploration, NASA 7 September 2019, https://mars.nasa.gov/mars-exploration/missions/pathfinder/

[19] *Mars Phoenix.* NASA Science: Mars Exploration, NASA, 7 September 2019, https://mars.nasa.gov/mars-exploration/missions/phoenix/

[20] *Mars Reconnaissance Orbiter.* Astrobiology at NASA: Life in the Universe, NASA, https://astrobiology.nasa.gov/missions/mro

[21] *Mars Science Laboratory/Curiosity.* NASA Science: Mars Exploration, NASA, https://mars.nasa.gov/internal_resources/824/

[22] Mayor, Michel and Queloz, Didider. *A Jupiter-Mass Companion to a Solar-Type Star.* Nature, vol. 378, no. 6555, pp. 355-359, 1995, https://doi.org/10.1038/378355a0

[23] *NASA Facts - Viking Mission to Mars*. NASA Jet Propulsion Laboratory, https://mars.nasa.gov/internal_resources/828/

[24] *Phoenix Mars Mission.* Phoenix Mars Lander, NASA, https://mars.nasa.gov/internal_resources/817/

[25] *Spitzer Space Telescope.* Astrobiology at NASA: Life in the Universe, NASA, https://astrobiology.nasa.gov/missions/spitzer/

[26] *Viking Project.* Astrobiology at NASA: Life in the Universe, NASA, https://astrobiology.nasa.gov/mission/viking-1-and-2/

[27] Wolszczan, A. and Frail, D. A. *A Planetary System around the Millisecond Pulsar PSR1257+12.* Nature, vol. 355, no. 6356, pp. 145-147, 1992, https://doi.org/10.1038/355145a0

[28] Wolszczan, A. *Confirmation of Earth-Mass Planets Orbiting the Millisecond Pulsar PSR B1257+12*. Science, vol. 264, no. 5158, pp. 538-542, 1994, https://doi.org/10.1126/science.264.5158.538

Biography

Andrew Maurer is a graduate of the University of Pittsburgh, where he received a bachelor of science in biology in 2016. He has keen interests and future goals of research in paleobiology, genetics, and zoology. Andrew currently works with the clinical molecular laboratory at MicroGen DX, and has previous clinical experience in the veterinary field.

Spacetown - Special Report: EXCLUSIVE to the BTN

By Surely Nott

This reporter has obtained an exclusive interview with astronauts who recently returned from Planet Terra with strange tales of feathered predators that attack furred creatures. According to our intrepid explorers, the large flying predators are tan and white with exceedingly powerful wings that span 39-49 inches in width!

These previously unknown creatures have a heart shaped face and large black eyes. Their elongated cylindrical bodies are covered in light brown and white feathers. They have two appendages with which they grasp the prey. Two other appendages are used to maneuver silently through the air. They emit a sound like a shriek instead of a hoot. The body is thick with feathered legs and a short square-shaped tail. "The specimens we observed could not turn their eyes and so the head was turned to the sides to look around," stated Astronaut Ben There.

Astronaut Cassie Opeya expressed her surprise at the behavior of the creature she observed in this way, "The flying creature swooped down on silent wings to use its talons to grab a small furry animal that was scampering through the grass. Flying to a nearby tree with the prey in curved talons, the beast devoured the prey whole, hide, hair, bones, and nails! I've never been so shocked in my life!" she exclaimed, shaking her head in amazement.

"For several hours the beast sat in the tree until it began to make terrifying coughing sounds. Eventually a mysterious pellet flew out of the open beak and fell to the ground beneath the tree. The monster flew off into the darkness. As soon as it was light enough, Ben and I crept over with great care and retrieved the mass that was ejected by the predator. We then wrapped it in our safety aluminum packets and brought them back with us for our scientists to dissect and discover what might be in the pellet."

Your newshawk will keep readers informed on what our scientists discover about the contents of the mysterious pellets.

Please see "Note to Scientists".

Note to Scientists

In the wild, barn owls feed on mice, squirrels, voles, and shrews, but may capture small birds, insects, and reptiles when other food is scarce. They do not have teeth and hence are unable to chew their food. So, they catch small creatures and swallow them whole. Sometimes if they find larger prey they must tear it into smaller pieces before swallowing. They bring back the swallowed food for regurgitating the indigestible parts such as bones, nails, and hair or feathers. There are two stomachs in an owl's body to carry out the regurgitation process. The food eaten by the owl goes into the first stomach where the digestive juices separate the food stuff from the indigestible items. The separated food then goes into a second stomach to nourish the owl and the indigestible parts are squeezed together in the form of a pellet in the first stomach. The owl finally hacks up the pellet.

Distinctive Hunting Abilities

Barn owls are nocturnal and usually wait until dark to hunt. However, they may venture out during daylight hours when they need to feed their young. It makes no sound when in flight, and swoops down to catch the prey off-guard by its long slender talons. The bird has good low-light vision, which enables it to easily spot its prey at night by sight. However, its hearing abilities are *par excellence*. It has the best ability to locate the prey by sound alone, of all the animals that have been tested. It can catch mice in

complete darkness in the lab or hidden by vegetation or snow out in the real world.

Habitat

Barn owls inhabit open spaces that include marshes, deserts, grasslands, and strips of forest, agricultural fields, shadowed or enclosed area in old buildings, tree cavities, or a hole in a rocky cliff. A pair of owls require about 20-25 km of a field edge with various suitable roosting sites. The best suitable habitat for owls is the rough grasslands with a good availability of rodents, especially voles. Field edges with sufficient water sources and grasslands alongside prove to be ideal hunting habitat for these birds. As far as migration is concerned most of them prefer stability, however some, especially the young ones, move south during the fall.

Unique Features

The unique and amazing fact about barn owls is the position of their ears. The opening of one ear is higher than the other ear. This enables the bird to locate its prey at the ground level. The facial disc of this bird acts like a radar dish or reflector channeling sounds into ears. A clue as to which direction the sound is coming from is determined by the time required for the sound to reach each ear. Also, the intensity of the sound perceived by each ear is another cue to locate the location of the sound. For example, if the sound is coming from above it will seem louder to the ear with the higher opening and the owl will know the exact location of the prey. If the sound is equally loud in both ears it indicates that the prey is right in front. Another noticeable fact about this bird is that it is associated with omens, witchcraft, and death.

While the barn owl population is stable in some parts of the world, the seven mid-western states and nine other states list the as threatened and a species of concern. The reason for the decline is severe loss of habitat. This loss of habitat is due to drastic changes in agricultural techniques, use of pesticides, and rapid growth in urbanization. In modern agricultural techniques, using pesticides and insecticides is indirectly killing the food source of these birds. Similarly, their nesting and roosting places such as barns and trees are destroyed due to modernization.

★

Constellation of
Virgo

Cosmic Coordinates

Spring 2023

Apsides

Mar 03, Moon at Apogee
Mar 09, Moon at Aphelion
Mar 19, Moon at Perigee
Mar 19, Moon at Perihelion
Mar 29, C/2019 U5 (PANSTARRS) at Perihelion
Mar 31, Moon at Apogee

Apr 08, Moon at Aphelion
Apr 13, Jupiter at Apogee
Apr 15, Moon at Perigee
Apr 17, Moon at Perihelion
Apr 17, Venus at Perihelion
Apr 28, Moon at Apogee

May 07, Moon at Aphelion
May 08, C/2020 V2 (ZTF) at Perihelion
May 09, C/2020 K1 (PANSTARRS) at Perihelion
May 11, Moon at Perigee
May 14, Mercury at Aphelion
May 17, Moon at Perihelion
May 25, Moon at Apogee
May 30, Mars at Aphelion

Appulses

Mar 01, Venus and Jupiter
Mar 24, Moon and Venus
Mar 28, Moon and Mars

Apr 16, Moon and Saturn
Apr 23, Moon and Venus
Apr 25, Moon and Mars

May 13, Moon and Saturn
May 23, Moon and Venus
May 24, Moon and Mars

Conjunctions

Mar 02, Mercury and Saturn
Mar 02, Venus and Jupiter
Mar 15, Neptune at Solar Conjunction
Mar 17, Mercury at Superior Solar Conjunction
Mar 19, Moon and Saturn
Mar 22, Moon and Jupiter
Mar 24, Moon and Venus
Mar 28, Moon and Mars
Mar 31, Venus and Uranus

Apr 11, Jupiter at Solar Conjunction
Apr 14, 136199 Eris at Solar Conjunction
Apr 15, Moon and Saturn
Apr 21, Moon and Mercury
Apr 23, Moon and Venus
Apr 25, Moon and Mars

May 01, Mercury at Inferior Solar Conjunction
May 09, Uranus at Solar Conjunction
May 13, Moon and Saturn
May 17, Moon and Jupiter
May 17, Moon and Mercury
May 23, Moon and Venus
May 24, Moon and Mars

Dichotomies

Apr 08, Mercury

Earth

Mar 20, March Equinox

Elongations

Apr 11, Mercury at Highest Evening Altitude
Apr 11, Mercury at Greatest Elongation East

May 21, Venus at Highest Evening Altitude
May 29, Mercury at Greatest Elongation West

Moon

Mar 07, Full Moon
Mar 14, Last Quarter
Mar 21, New Moon
Mar 28, First Quarter

Apr 05, Full Moon
Apr 13, Last Quarter

Cosmic Coordinates

Spring 2023

Apr 19, New Moon
Apr 27, First Quarter

May 05, Full Moon
May 12, Last Quarter
May 19, New Moon
May 27, First Quarter

Occlusions

Mar 13, Lunar Occultation of Delta Scorpii
Mar 24, Lunar Occultation of Venus

Apr 09, Lunar Occultation of Delta Scorpii

May 06, Lunar Occultation of Delta Scorpii
May 17, Lunar Occultation of Jupiter

Oppositions

Mar 21, 1 Ceres
Mar 29, 136472 Makemake

Apr 20, 136108 Haumea
Apr 30, 7 Iris

Cosmic Coordinates

Spring 2023

Definitions

Appulse - the minimum apparent separation in the sky of two astronomical objects.

Apsis - the farthest (*apoapsis*) or nearest (*periapsis*) an orbiting body gets to the primary body. Plural is *apsides*. Special terms are used for specific systems: *aphelion* and *perihelion* are used for any object with respect to the Sun; *apogee* and *perigee* are used for any object with respect to the Earth.

Conjunction - when two astronomical objects or spacecraft share the same right ascension or ecliptic longitude as observed from Earth. For superior planets, conjunction occurs when the planet passes behind the Sun (also called *solar conjunction*). For inferior planets, if the planet is passing in front of the Sun, it is called *inferior conjunction*; if behind, it is called *superior conjunction*. Conjunctions are the most difficult periods to view a planet with a telescope.

Dichotomy - the phase of the Moon, or an inferior planet, in which half its disk appears illuminated.

Elongation - the angular separation on the sky between a planet and the Sun with respect to the Earth. When an inferior planet is visible in the sky after sunset, it is near its *greatest eastern elongation*. When an inferior planet is visible in the sky before sunrise, it is near its *greatest western elongation*.

Occlusion - when one astronomical object passes in front of the other. An *occultation* is when the foreground object completely blocks the background object. A *transit* is when the background object is not fully concealed by the foreground object. An *eclipse* is any occlusion that casts a shadow onto the observer.

Opposition - when two astronomical objects are on opposite sides of the celestial sphere. Opposition only occurs for superior planets and objects. It is the best time to view a planet with a telescope.

Meteor Showers

Spring 2023

--- Major Meteor Showers (Class I) ---

Lyrids (LYR)
Peak: Apr 23, Apr 15 - Apr 29
Radiant: Hercules, α = 18:10, δ = +33:18
Speed: 46 km/s
Max ZHR: 18

η Aquarids (ETA)
Peak: May 06, Apr 15 - May 27
Radiant: Aquarius, α = 22:30, δ = -01:06
Speed: 65 km/s
Max ZHR: 60

--- Minor Meteor Showers (Class II) ---

η Lyrids (ELY)
Peak: May 10, May 06 - May 15
Radiant: Lyra, α = 19:22, δ = +43:30
Speed: 43 km/s
Max ZHR: 3

--- Variable Meteor Showers (Class III) ---

π Puppids (PPU)
Peak: Apr 24, Apr 16 - Apr 30
Radiant: Puppis, α = 07:22, δ = -45:06
Speed: 15 km/s

--- Weak Meteor Showers (Class IV) ---

ξ Herculids (XHE)
Peak: Mar 12, Mar 06 - Mar 20
Radiant: Hercules, α = 16:58, δ = +48:36
Speed: 35 km/s

δ Mensids (DME)
Peak: Mar 12, Mar 02 - Mar 26
Radiant: Mensa, α = 04:09, δ = -74:24
Speed: 30 km/s

Meteor Showers

Spring 2023

β Tucanids (BTU)
Peak: Mar 13, Mar 02 - Mar 26
Radiant: Mensa, α = 04:07, δ = -77:00
Speed: 31 km/s

δ Pavonids (DPA)
Peak: Mar 31, Mar 11 - Apr 16
Radiant: Pavo, α = 20:32, δ = -63:00
Speed: 58 km/s

April ε Delphinids (AED)
Peak: Apr 09, Mar 31 - Apr 20
Radiant: Delphinus, α = 20:30, δ = +11:30
Speed: 60 km/s

κ Sepentids (KSE)
Peak: Apr 16, Apr 11 - Apr 22
Radiant: Hercules, α = 16:30, δ = +17:54
Speed: 45 km/s

α Virginids (AVB)
Peak: Apr 18, Apr 06 - May 01
Radiant: Virgo, α = 13:26, δ = +03:54
Speed: 19 km/s

h-Virginids (HVI)
Peak: May 01, Apr 24 - May 04
Radiant: Virgo, α = 13:35, δ = -11:24
Speed: 17 km/s

Meteor Showers

Spring 2023

Definitions

Activity - the range of expected dates over which a meteor shower event is observable.

Class - an intensity scale for meteor showers developed by Robert Lunsford

Major Meteor Shower (Class I) - annual, stronger meteor showers with ZHRs of 10 or greater

Minor Meteor Shower (Class II) - consistent, weaker meteor showers with ZHRs between two and 10.

Peak - the date on which the highest ZHR for a meteor shower is expected.

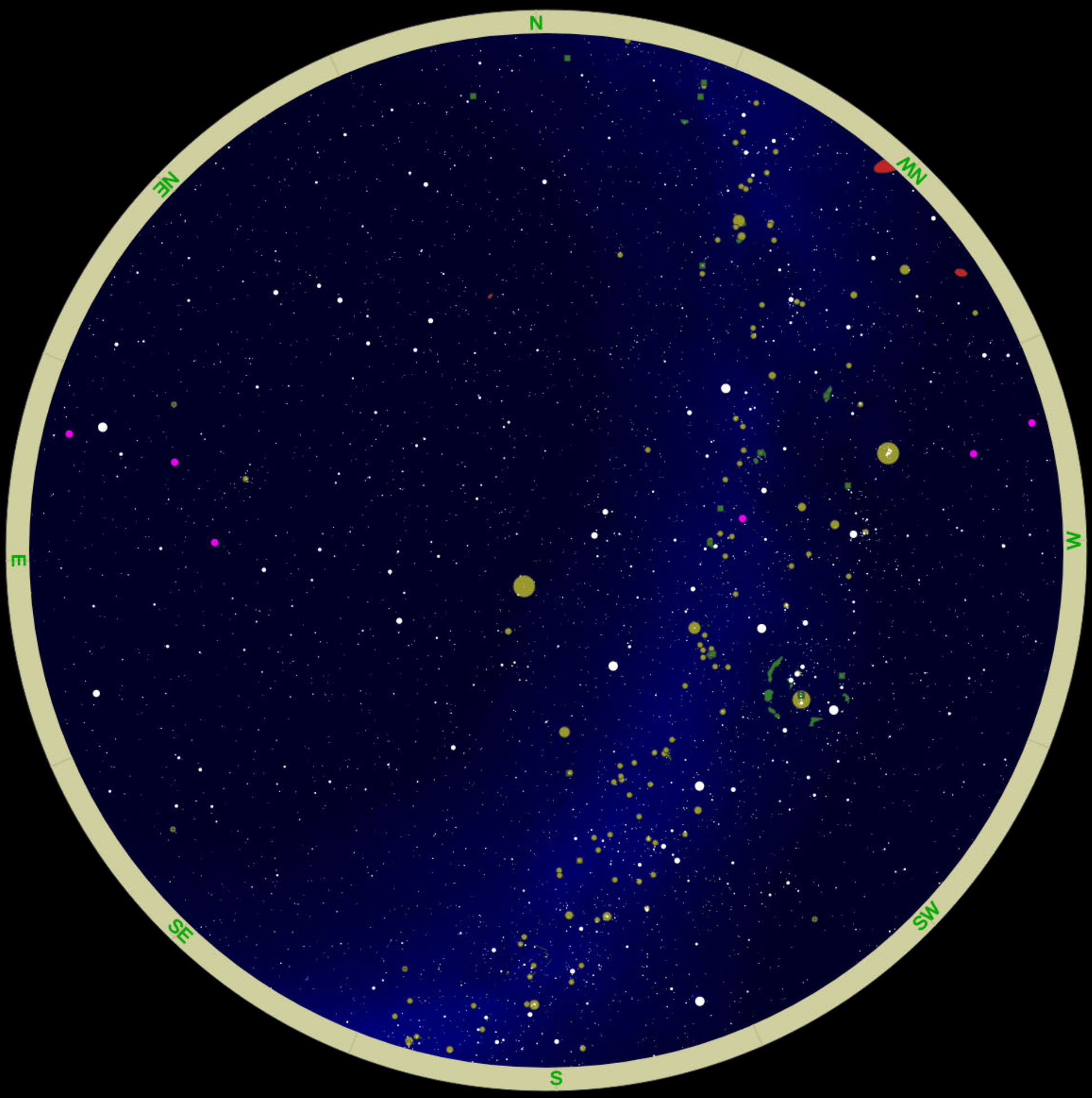
Radiant - the point from which a meteor shower appears in the sky. Here it is defined as two sky coordinates: right ascension (α, hh:mm) and declination (δ, dd:mm).

Speed - average speed of meteors as they enter the atmosphere.

Variable Meteor Shower (Class III) - inconsistent, yet potentially spectacular meteor showers

Weak Meteor Shower (Class IV) - weakest meteor showers reserved for observers seeking a challenge, with ZHRs less than two.

Zenith Hourly Rate (ZHR) - the expected number of observed meteor events per hour if the radiant of the shower was at zenith and observed under ideal conditions (limiting magnitude of +6.5).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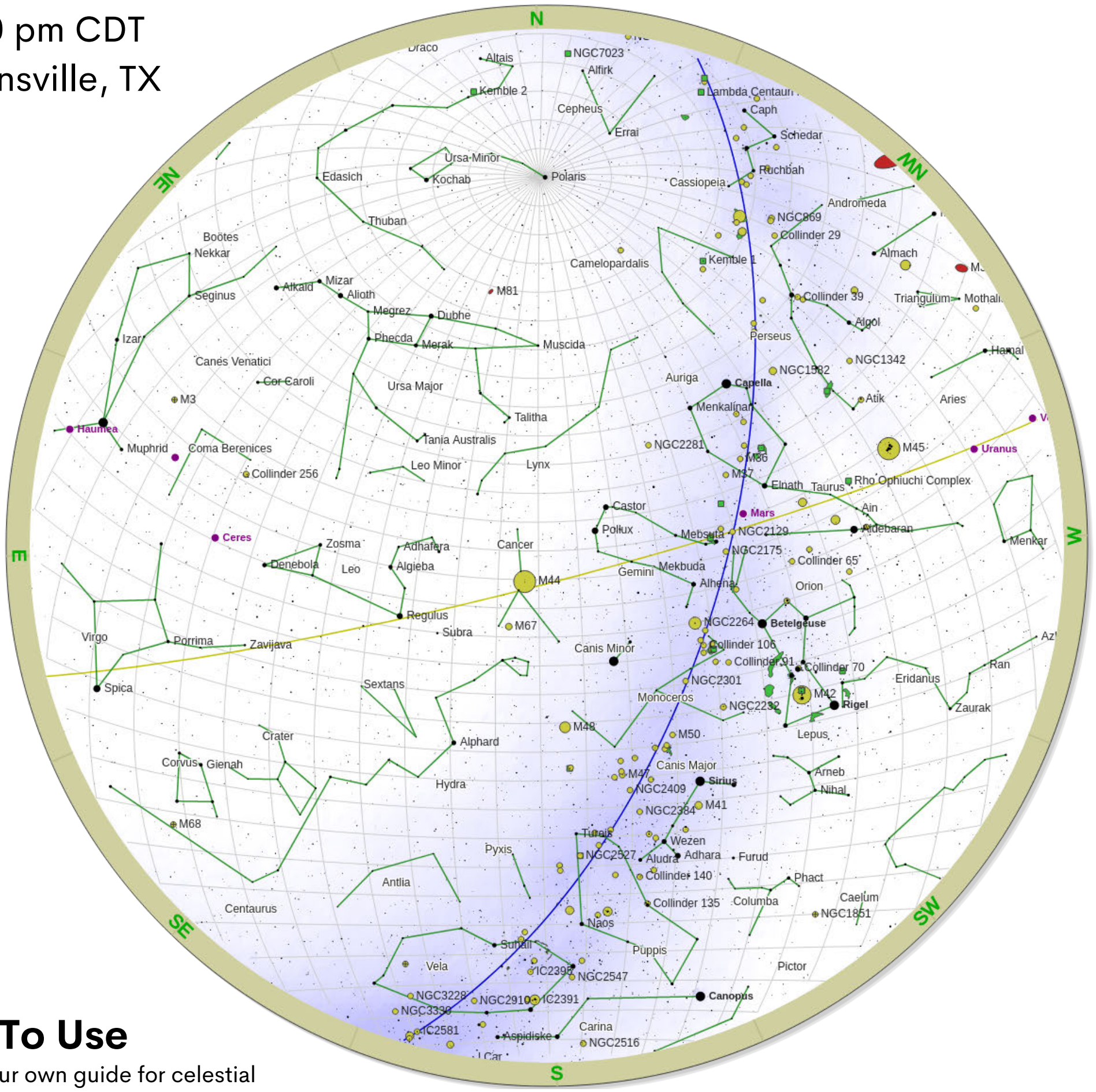
Sky Map

20 March 2023
10:00 pm CDT
Brownsville, TX



How To Use

Here is your own guide for celestial navigation: your very own sky map, allowing you to select and observe the finest of cosmic objects. If you find yourself within the Rio Grande Valley, this map will be accurate to help you along your celestial journey. Good luck, and clear skies! [Source: In-The-Sky.org]

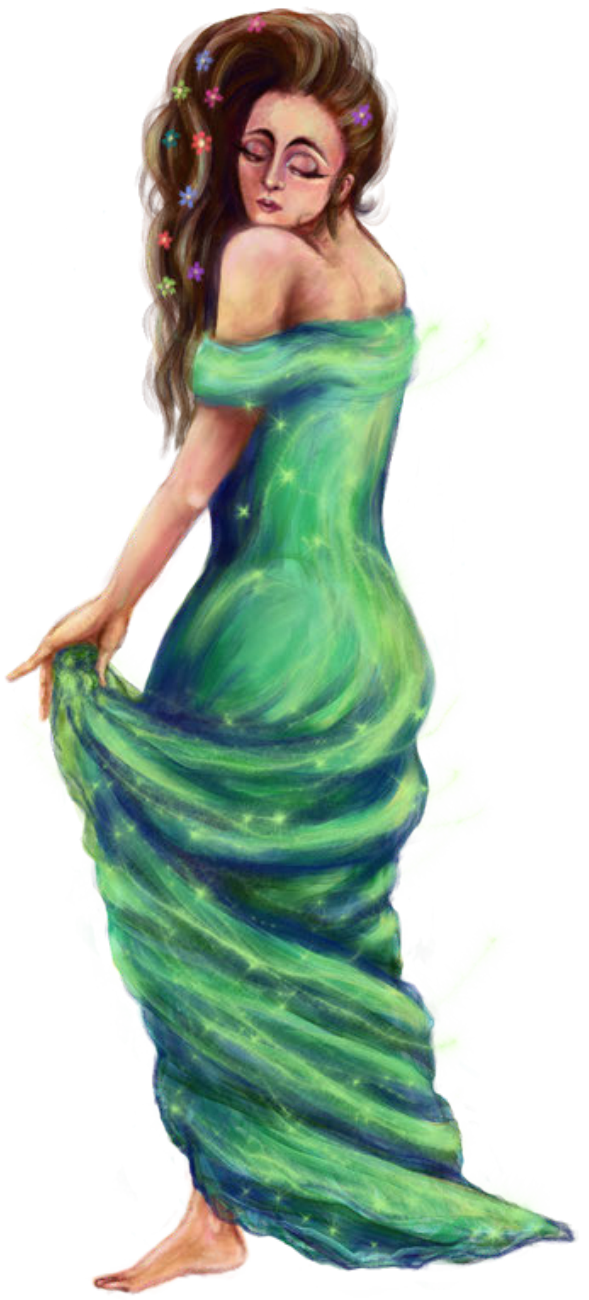
Sky Map Legend

The Equator
Ecliptic Plane
Galactic Plane
Galaxy
Bright nebula
Open cluster
Globular cluster

Constellation of Virgo

Virgo

A maiden in Greek Mythology



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Submissions

We encourage submissions from anyone interested in contributing to our newsletter. Any readers with ideas for our newsletter, or who are interested in submitting their own articles, illustrations, or other content, please contact the Editor-in-Chief at: richard.camuccio01@utrgv.edu

The South Texas Astronomical Society (STARS) is a nonprofit organization connecting the Rio Grande Valley community to space and science.

Our Mission is to ignite curiosity in the RGV through space science education, outreach programs, and by developing pathways to STEM for community members.

Our Vision is that STARS nurtures the innate human desire for exploration and discovery by fostering connections to science and the cosmos across the RGV.

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