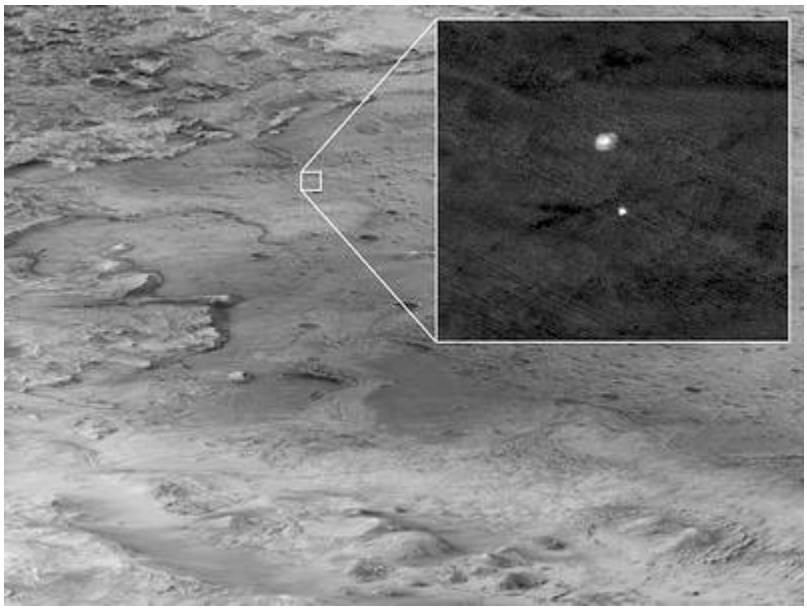
CVA is Still Limiting its Activities due to the COVID Virus Threat-Check the CVA Website and Facebook Page for any Possible Changes

THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno March-April 2021

Perseverance Lands on Mars



The above image, taken by the Mars Reconnaissance Orbiter, shows the Perseverance rover, in its protective aeroshell, descending to the Martian surface via parachute. Perseverance landed safely and on target at Jezero^ Crater, the site of an ancient lake that had a delta and rivers flowing into it. After initial testing, Perseverance will spend the next two (Earth) years searching for possible life in the Martian soil as well as collecting and caching soil and rock samples for pickup and return to Earth by another robotic craft, which is now expected to be launched in 2026.

Image-NASA/JPL

See page 2 for explanations of * and ^

Quote of the Month-

"Dare Mighty Things"*

The message, depicted in binary code, on Perseverance's parachute as it made its way to the surface of Mars.

In this Issue-

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The Editor's Message-

Hopes that all of you are staying safe and healthy. Indications are that, with the vaccination effort underway, covid infection rates are declining and more restrictions may be eased in the near future. But everyone still needs to be vigilant and large gatherings of any kind are still strongly discouraged. So, no public star parties or similar events for the foreseeable future.

Even though one may consider 2020 a major bummer of a year, there was still much to celebrate. America got back into space for the first time in almost nine years, thanks to Crew Dragon. The Mars Perseverance rover was successfully launched. Great strides were made in understanding the nature of dark matter and dark energy. Betelguese was found to have a case of the hiccups. Comet NEOWISE thrilled a world that badly needed a pick-up, and the conjunction of Jupiter and Saturn on the 2020 winter solstice brought awe and wonder during difficult times. While we sincerely mourn those who were lost to the virus, we can also say that it was a year of accomplishment and insight. To paraphrase Charles Dickens, "It was the worst of times, but it was also the best of times."

2021 is starting out on a positive note for those in astronomy. Perseverance landed safely on Mars on February 18; the next Crew Dragon mission to ISS will take place in April; Boeing's long delayed Starliner will be launched in early April as well; the James Webb Space Telescope will(finally!!!) be launched in October; and Artemis-1 may be launched in November. The Vera Rubin Telescope in Chile is on schedule for first light by the end of the year, and the Hubble Space Telescope, having reached its thirtieth anniversary of operation in 2020, keeps churning out images of unsurpassed quality and imagination.

So, there is much to be thankful for right now: the many people who risked their lives to help others during the pandemic, and also those who, despite the obstacles, kept knowledge moving forward. CVA salutes them as they strive to make 2021 a much better year for all.

Stay safe and healthy and clear skies always-
Larry Parmeter, Observer editor

***The saying is from Theodore Roosevelt and is now the motto of NASA's Jet Propulsion Laboratory. The parachute also carried, again in binary code, the GPS coordinates for JPL.**

^The name Jezero is pronounced "Ye-zeh-ro." In the southeastern European Slavic languages such as Bosnian, Croatian, and Serbian, jezero means "lake." The crater on Mars is named after the town of Jezero in Bosnia.

Profiles in Astronomy

Thomas John Hussey 1792-?(presumed dead 1866)

Hussey was born and raised in Kent, England, into a family of wealthy landowners. He attended Eton School and later Trinity College, Dublin, where he earned a Doctor of Divinity degree and was ordained a clergyman. Shortly afterwards, he became a rector at a church in Hayes, in Kent, and would stay there for much of the rest of his life. He became well known for his sermons; several were eventually published, and he also translated and published a new(at that time) version of the Bible.

Along with his religious career, Hussey always had an interest in astronomy, and around 1820 established his own private observatory, using telescopes made by William Herschel and Joseph Fraunhofer. Over the years, he observed and calculated Venus's rotation, developed highly accurate star charts, and also followed and plotted sun spots. He was one of the first to see Halley's comet when it came into the inner solar system in 1835. He is best known for, though, in being one of the first to speculate, in 1834, and attempt to calculate the existence of planet beyond Uranus. At the time, most other astronomers believed that his theories and calculations were in error, but when Neptune was found in 1846, it was realized that his theory, at least, was correct.

Hussey had many friends in high places. Charles Darwin was a neighbor, and he also knew and corresponded with John Herschel, among other well-known scientists. His death, or disappearance, is perhaps the most interesting part of his life. After his wife died in 1854, Hussey resigned his position at Hayes and moved to Algiers in what was then French Algeria. His children heard from him sporadically over the years; in his last letter in 1866, he informed them that he was planning to move to Paris, and afterwards nothing was ever heard from him again, despite efforts in England, France, and Algeria to find him. In 1893, a British probate court ruled that he died in 1866, shortly after his last correspondence.

Source-Wikipedia

Star Stories

Deneb

Deneb, also known as Alpha Cygni, is the well-known and brightest star in the constellation Cygnus and one of the three stars that forms the summer triangle, the other two being Vega and Altair. It is a blue-white class A2 star with an apparent magnitude of 1.25 and an absolute magnitude of -8.4. The exact distance to Deneb is not known with certainty, but the best measurements have it about 2,600 light years from Earth. It is a supergiant with a mass almost nineteen times that of the Sun and its diameter is almost two hundred times that of the Sun, so it is a pretty large star.

Deneb began as a class O star but is now off the main sequence and it its last stages of evolution. Scientists believe that in the future, several thousands of years from now, it will turn into a red supergiant and will probably eventually explode as a supernova. It has also been identified as an irregular variable star which pulses from magnitude 1.21 to 1.29 over a period lasting up to one hundred days. Scientists have also theorized, through spectroscopic studies, that Deneb may have a very small companion star, but no visual evidence of this star has ever been found.

The term Deneb comes from Greek and refers to the tail of an animal. Deneb has been used in conjunction with other words in several other constellations as well, especially in Cetus the Whale and Capricornus the Goat. Being so prominent in the sky, many cultures have myths about Deneb.

What's New in Space

Biden Administration Announces Support for Artemis Program

On February 4, Jen Psaky, President Biden's press secretary, said that the Artemis moon landing program has the approval and support of the new administration. Up to then, NASA had suspended all major decisions on the moon program pending word from the White House. Now, NASA will go ahead with the next major decision, choosing the finalists for the moon lander. Currently three companies are in the running: Space-X, Blue Origin, and Dynetics; a decision will be made by April on which two will go forward with the next phase. In the meantime, NASA and Boeing say that they have identified and are working on fixing the problem that caused the "Green Hot Fire test" of the SLS rocket to cut off after 67 seconds in January. NASA says that another test will be performed as early as March. Both agencies are still hoping that the first launch, Artemis-1, an unmanned circumlunar mission, will take place by the end of this year.

Space-X Goes Forward with Two Non-NASA Crewed Flights

On Tuesday, February 2, Space-X announced that it will provide the Crew Dragon spacecraft and a Falcon 9 rocket for what it calls the "first completely civilian spaceflight," to be launched by the end of this year. The mission, known as Inspiration4, will be commanded and sponsored by Jared Isaacman, 37, a Silicon Valley billionaire tech entrepreneur who has civilian and military piloting credentials, but no astronaut experience. The flight is intended to be a fundraiser mission: Isaacman will give $100 million to St. Jude's Children's Hospital; in exchange, Hayley Arcenaux, a physician's assistant at St. Jude's and a childhood cancer survivor, will occupy one of the seats. A second seat will be decided by a nationwide raffle; those wanting to go will pay $10 for a ticket; the money from the raffle will also go to St. Jude's. The third seat will go to an up-and-coming tech entrepreneur. The entire crew will be announced in March, and will immediately begin intensive training at NASA's Johnson Space Center. The flight will last between two and four days and will be an Earth-orbital mission. In the announcement, Space-X said that this will only be the first of several such private civilian missions over the next few years, as it ramps up its goal of making space accessible to more people. At the announcement, Space-X founder Elon Musk said that he will fly aboard a Crew Dragon space mission, but not anytime soon. At the same time, NASA announced that it has given its approval for this flight.

Also, on Tuesday, January 26, NASA and Axiom Aerospace announced the first crew for Axiom's privately sponsored and paid-for mission to ISS, now known as AX-1. The commander is Michael Lopez-Alegria, a space shuttle veteran and current Axiom vice-president. His three paying tourist passengers are American businessman Larry Conner, from Ohio; Mark Pathy, a Canadian investment executive; and Eytan Stibbe, a former Israeli Air Force pilot and now the head of an investment firm in Israel. All three have had long associations with medical research centers and say they will spend their time aboard ISS conducting scientific and biomedical experiments. They will soon begin training at NASA's Johnson Space Flight Center for an eight day flight which is now scheduled for early next year.`

Spaceflight Short

Boris Volynov, who commanded the Soyuz 5 and Soyuz 21 missions, is, at 86, the last living member of the original group of twenty pilot-cosmonauts chosen by Sergei Korolev in 1960.

Astronomy, Navigation, and Timekeeping-Part 1

This article came about as a result of the Young Astronomer program; our student John asked at one point about the origin of observatories. Many were established in the 1600s and 1700s to determine accurate timekeeping, based on the Sun and the stars. This would, in turn, lead to precise navigation, especially while sailing the oceans, a prime consideration for the economic and political goals of many nations.

Astronomy, navigation, and timekeeping have been intertwined from the earliest days. Explorers and travelers have always used the Sun, the Moon, and the stars to determine their locations(an example-the ancient Polynesians developed highly accurate star maps to guide them in their long voyages across the Pacific Ocean), and also the time of day or night(another example-cowboys on cattle drives in the Old West could tell the time of day by the position of the Sun in the sky and the time at night by the position of the Big Dipper relative to Polaris). The ancient Babylonians, Sumerians, Chinese, and Greeks, among many others, used the stars and the Sun to find location and time of day. So, navigation and timekeeping based on celestial objects goes way back.

The ancient Phoenicians were the first, as early as 600BC, to develop a method of determining how far north or south their ships were on the oceans, similar to latitude, based on how far above the horizon the Sun and certain stars were. In 300BC a Greek mathematician proposed that the Earth be divided up into north-south and east-west lines for use in navigation(the word *navigate* comes from the Latin *navis*-a ship or boat, and *agere*-to move or sail-*navis+agere*-to sail a ship. The word *navy* comes from the same root). Modern latitude and longitude lines came into being in the 1500s during the Age of European exploration of the New World(the notion that people believed the world was flat prior to Columbus's voyages is a myth. Almost all educated people at that time knew that the Earth was a sphere). Even then, the problem was the same. Finding latitude was easy. Finding longitude was the hard part. Various methods using the moon and the stars were employed, but none were really accurate. The invention of the sextant in the early 1700s made finding longitude somewhat better, but it was not until the development of reliable clocks and watches in the mid-1700s that precise calculations of longitude could be made. By the late 1700s, accurate clocks combined with accurate longitude and latitude maps made navigation a highly precise science, one which was expected to be mastered by all sailors. How did it work? Every ship carried two clocks-one was set to the time of a precise longitude line on land-known as a meridian. The other was set every day based on the Sun's zenith(local noon) wherever the ship was-this was done using the sextant. The two times were then compared, and deviation of hours and minutes was converted into degrees away from the meridian line. This measurement would then give the ship an accurate position on longitude. More sextant readings would give an accurate latitude reading, and the ship would know exactly where it was on the ocean. The whole system was dependent on accurate timekeeping; as such, most astronomical observatories of the 1600s and 1700s were actually established to determine time based on the movement of the stars and the Sun. The celestial coordinate system of declination and right ascension came into being at about the same time for the same purpose-to track the movement of the stars for precise timekeeping (This was one of the reasons England became a world power starting in the 1700s-it mastered timekeeping, which led to highly accurate navigation, thus allowing its ships to sail throughout the globe).

Part 2 will be in the May-June Observer

Another in a continuing series on lesser-known-but still important-astronomical observatories throughout the world

Tuorla Observatory

Tuorla Observatory is the observing arm of the physics and astronomy department of Turku University in Finland. It is currently the largest and best-known facility doing astronomical research in Finland. In addition to its program of astronomical research, it also has a highly renowned optics laboratory which produces telescope mirrors and other optical equipment for scientific facilities throughout the world.

Tuorla Observatory was established in 1952 as a replacement for an earlier observatory which was located in Turku itself, but was suffering from light pollution. A relatively light-free location was found near the town of Tuorla in the southwest coast of the country. Over the years, the observatory has gone through several changes of management. At first it was directed by the astronomy department, then in 1974 it was taken over by the physics department; in 1991, it became an independent institute run by the university, then in 2009, it was once again under the control of the physics and astronomy departments.

The observatory currently has four telescopes: its main instrument-a one meter reflector; a .6 meter reflector; a .7 meter Schmidt camera, and a 2 meter radio telescope. Much of its research in recent years has focused on galaxies, especially those with active nuclei. It is also active in studying binary stars, dark matter, and solar studies. Top right-the tower and dome for the one meter telescope
Source-Wikipedia

Astronomy Short-

In the late 1940s, Fred Hoyle, a English astrophysicist, developed the idea that the universe always was and always will be pretty much the same. During a BBC radio interview in 1948, he was asked what this universe would be called, and on the spot, he gave it the name of the "Steady State." Then the interviewer asked him about Lemaitre and Gamow's competing idea that the universe emerged from a single atom-like particle and has been expanding ever since. Hoyle very quickly gave it a name as well-the "Big Bang," and both names have stuck ever since then.

A few years later, Hoyle played a key role in the formulation of the synthesis of the elements in stars, along with William Fowler and Geoffery and Margaret Burbridge. But he was denied a share of the Nobel Prize in the discovery, which went to Fowler, probably because he advocated the then heretical view that life came to Earth inside meteorites(Margaret Burbridge was also denied the Nobel Prize for her contributions, most likely for a far more prosaic reason-she was a woman).

Something to Ponder

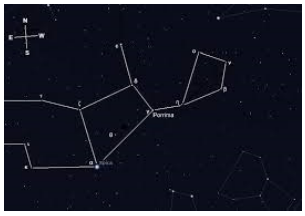
It's been estimated that there are more stars in the universe than grains of sand on Earth, but there are more atoms in a grain of sand than there are stars in the universe-
Author unknown
from didyouknowfacts.com

First Astrophotography Image

CVA member George Silva has decided to get into astrophotography, and as a first attempt, took this image of Procyon in the winter sky. He used a Canon camera with the IR filter removed and piggybacked it on his 8" reflector. He says that it shows a lot more red and brings out the blue more than usual. In the future, he plans to use Stellarium to control the telescope from his main computer. A good image for a first project!

Three Good Spring Objects to See

The Leo Triplet-M65, M66, and NGC 3628-All three can be seen in the same field of view with the right eyepiece. M65, at magnitude 10.2, and M66, at magnitude 8.9, were both first seen by Charles Messier in 1780. NGC 3628, at magnitude 10.4, was first observed by William Herschel in 1784.



Porrima-Often overlooked in the Virgo galaxy cluster, Porrima, also known as Gamma Virginis, is a beautiful binary star system in Virgo. It consists of two F stars with nearly identical magnitudes: 3.65 and 3.56, both of which are 38 light years from Earth. A challenge for amateur astronomers is to separate the two.

M108-Also known as the Surfboard Galaxy, it is one of the lesser known Messier objects. First seen by Messier's assistant Pierre Mechain in 1782, it is an almost edge-on spiral with a magnitude of 10.7. It is in Ursa Major.

Number of exoplanets found as February

2021-4,687

How many more are out there?

From the Observer Archives

A Decalogue for Star Gazers-by Saul Levy
(from the September 1982 Observer)

Thou shalt not shatter the darkness at the observing site. All manner of man-made light, thou shall askew, except faint red ones. May he who violates this rule be simultaneously plagued with coma, misalignment, forgotten eyepieces, diarrhea, and mosquitos.

Carefully thou shall walk, taking pains not to stumble over power lines, telescope legs, rattlesnakes, and sleeping babies. Thou art at liberty to break thy own neck, but thou must never jostle a piece of equipment in doing so.

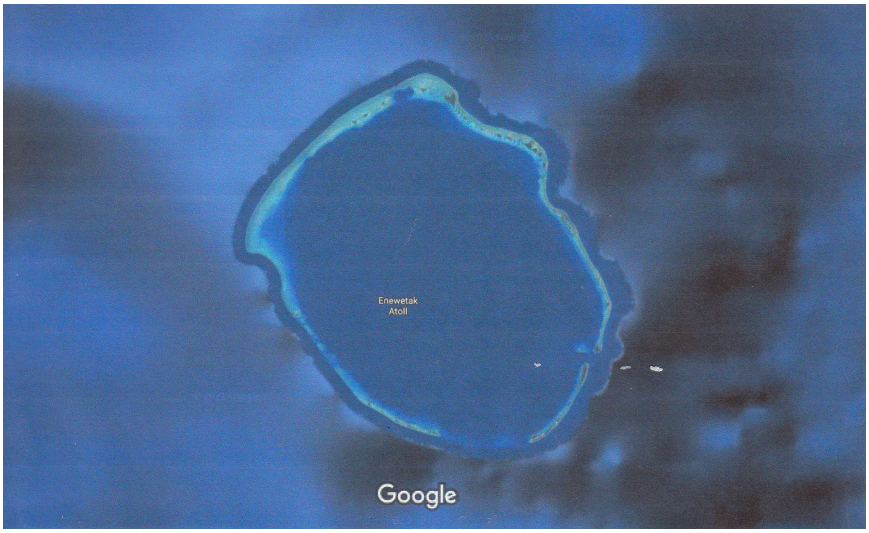
Thou shalt not raise a cloud of dust with thy clumsy clodhoppers. Neither shalt thou "burn rubber" or "lay scratch" with thy hot rod.

Toot not thy horn; race not thy motoer; express not, with loud talk, thy tonsils to the night air. Even as the condemned man saith, "No noose is good news," so the observer sayeth, "Noise annoys."

Squabble not with thy spouse. If the soul sighteth a flying saucer, belittle not the mate's judgement, but help that one count the little green men, lest ye be left for a more agreeable companion. Although the plural of mouse is mice, the plural of louse is lice, the plural of spouse is not spice, it is bigamy!

Thou shalt clean up the observing site before thou leavest. A sense of civic duty benefits one associated with amateur astronomers, whose motto might be,"We try harder because we have to see farther."

The Power of Stars-and of Humans



I came across this image, from Google Maps, a few years ago, and have been both fascinated and bothered by it ever since. This is Enewetak Atoll in the Marshall Islands in the South Pacific. What is interesting is the large circle, and a smaller one next to it, at the north end of the atoll. The large circle was the site of the world's first thermonuclear explosion, codenamed "Mike," on November 1, 1952. The same process that powers stars-nuclear fusion-also provided the energy for Mike, whose strength was estimated at a little over ten megatons. It was enough to completely vaporize the island, known as Eleugelab, it was placed on, and leave a one mile wide crater in the ocean. The mushroom cloud that was created rose thirty miles into the atmosphere. Physicist John Wheeler, who worked on Mike and witnessed the test, was said to be amazed that an entire island had been destroyed by a single bomb. The Mike device weighed eighty-two tons and took up a large shed, but some of today's thermonuclear bombs are the size of a backpack and weigh less than one hundred pounds. Think about it. (The smaller crater is from a later H bomb test explosion)

Source-Kenneth W. Ford, *Building the H Bomb,* 2015