Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers October 2021

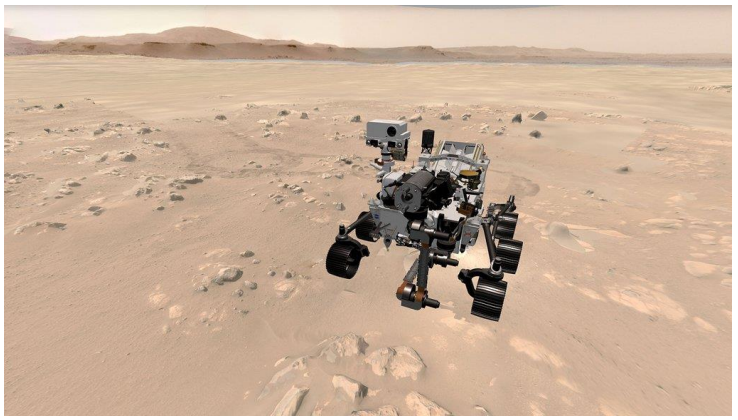
Events: General Meeting, Monday, October 4, 2021, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, at 6:00 PM.

- **IFI & Gallery by Clark Williams**
- **Refreshments by TBD**

Star Parties at South Coast Winery every Friday evening in October.

For upcoming school Star Parties check the Calendar on the web page.

Take a 3D Spin on Mars and Track NASA's Perseverance Rover



WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Paul Kreitz <pkreitz@sbcglobal.net> by the 20th of the month for the next month's issue.

General information:
Subscription to the TVA is included in the annual $25 membership (regular members) donation ($9 student; $35 family).

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Cosmic Comments
by President Mark Baker

FIFTY YEARS…!!! It was fifty years ago that I picked up the gauntlet thrown down by Dr Thomas Tsung, my Physics professor, counselor, and mentor. Fifty years pursuing a life mission to support the effort to make humanity extra-planetary. Sometimes in the forefront, but most often from the fringes, or even the shadows…

By 1980, I thought I'd taken on a fool's errand… but a paradigm shift in my attitude and understanding gave me new direction and energy. Dr Louis Friedman was very hard on my willingness to quit and give up… and I've been forever in his debt since.

There are things that humanity needs in spite of itself, and becoming multi-residenced is the most important one… no, it's not necessary to colonize the solar system, but being out there, pioneering and exploring, is essential to the species!! Just think of all the things we don't yet know…

As I pass on the mantle, as it was passed to me, I know it can be done… I always have!! And I'm in a position to witness the pinnacle of human experience, if not participate. But that was never part of the deal for me or my predecessors, as much as I wish it was…

Thanks to those that blazed the trail this far, and my admiration to those that will now make it so… those that are driven to pick up their own gauntlet by having simply Looked Up, wondered in awe, and pondered the potential!!!

My thanks to the TVA for being an important cog on the wheel of such progress, and for inspiring and edifying. As we Norse say…SKOAL

Clear, Dark Skies my Friends…

Editor's Note
by Paul Kreitz

I'm still hoping to have some of our great astrophotographers contribute images for the upper right Page One of the Newsletter! Please send images to me (pkreitz@sbcglobal.net), along with a brief description of the subject, where the image was taken, and the equipment used.

Looking Up Redux – October 2021

Compiled by Clark Williams
from these sources:
SeaSky.org
Wikipedia.com
in-the-sky.org
The American Meteor Society, Ltd.
cometwatch.co.uk
NASA.gov
TVA App (2.0.1296)
FullAndNewMoon App (2.0)
Starry Night Pro Plus 8
SkySafari 6 Pro
Stellarium
timeanddate.com/astronomy
https://www.fourmilab.ch/earthview/pacalc.html

ALL TIMES ARE LOCAL PACIFIC TIME (PDT / PST) UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is hours, mm minutes, ss seconds)
hh:mm:ss or hhmmss
hhmm+ (time of the next day)
hhmm− (time of the previous day)
hhmm (seconds not shown)
yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

Moon Phases for the month by date:

Wednesday	**the 20th**	**@ 0757 FULL in PISCES**
Thursday	**the 28th**	**@ 1858 THIRD QTR in CANCER**
Wednesday	**the 6th**	**@ 0406 NEW in VIRGO**
Tuesday	**the 12th**	**@ 2026 First QTR in SAGITTARIUS**

Apogee comes on 2021-10-24 @ **0831** **– 405,614 km (252,307 mi)**
Perigee comes on 2021-10-08 @ **1029** **– 363,387 km (225,798 mi)**

2021 has: (12) new moons, (13) 1st Qtr moons, (13) Full moons, (12) 3rd Qtr moons
(1) Blue moon and (0) Black moons

Daylight Savings: Starts: 2021-Mar-14 : Ends: 2021-Nov-07

Luna: Luna is Waning Crescent on the first of the month, headed for NEW on the 6th rising at **0128**, transiting at **0852** and setting by **1610**. Luna by mid-month is 81% illuminated, Waxing gibbous. Rising at **1604** and transiting at **2132** and setting at **0300+**. By the-end-of-the-month Luna is in the 3rd Quarter, 17% illuminated rising at **0220** transiting at **0908** and setting by **1551**.

Highlights: (distilled from**: SeaSky.org** and **Clark's planetary Orrey** program[s]**)**

October 6 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at **0406**. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

October 7 - Draconids Meteor Shower. The Draconids is a minor meteor shower producing only about 10 meteors per hour. It is produced by dust grains left behind by comet 21P Giacobini-Zinner, which was first discovered in 1900. The Draconids is an unusual shower in that the best viewing is in the early evening instead of early morning like most other showers. The shower runs annually from October 6-10 and peaks this year on the night of the 7th. This year, the nearly new moon will leave dark skies for what should be an excellent show. Best viewing will be in the early evening from a dark location far away from city lights. Meteors will radiate from the constellation Draco, but can appear anywhere in the sky.

October 20 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at **0757**. This full moon was known by early Native American tribes as the Hunters Moon because at this time of year the leaves are falling and the game is fat and ready to hunt. This moon has also been known as the Travel Moon and the Blood Moon.

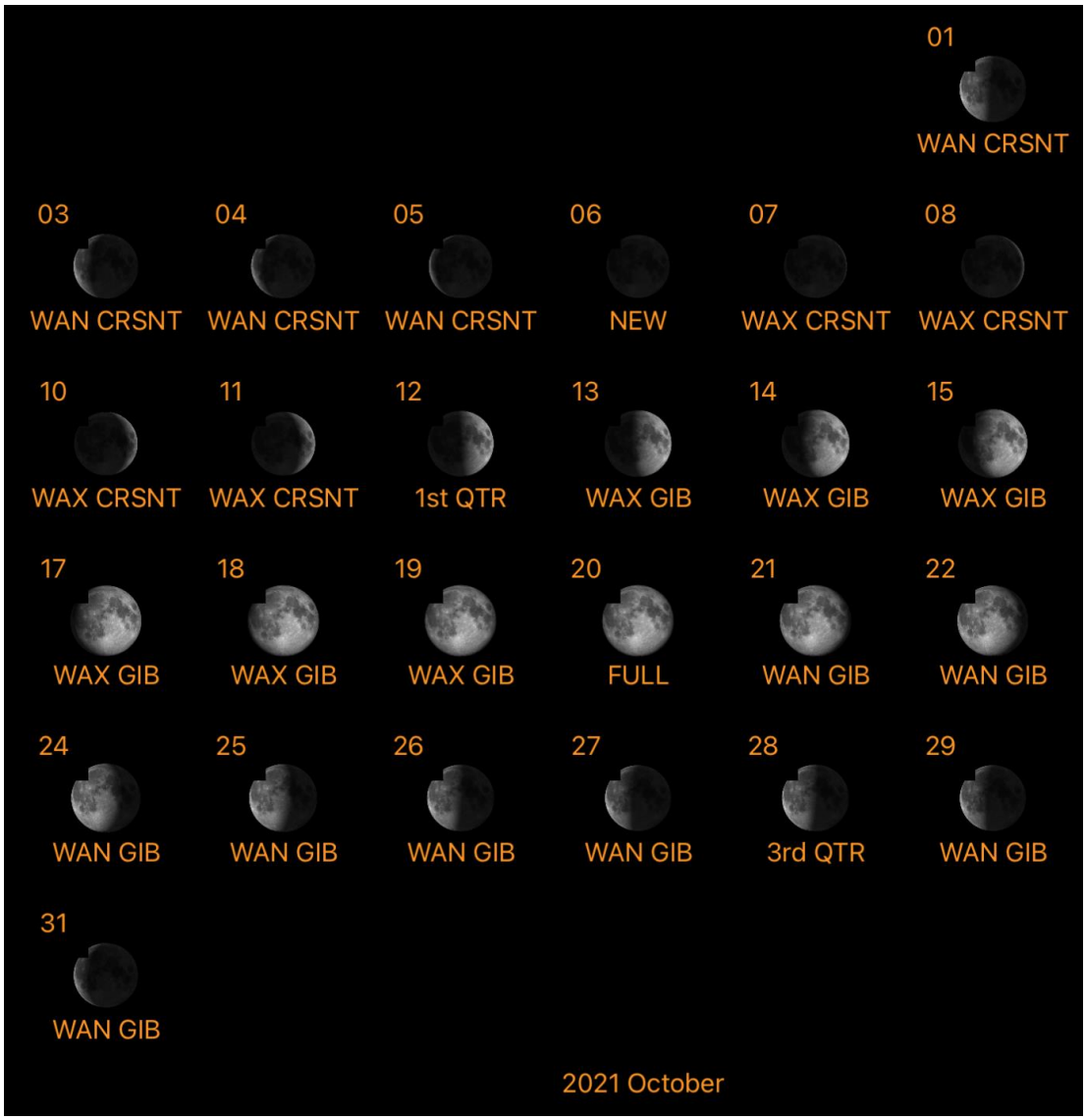
October 21, 22 - Orionids Meteor Shower. The Orionids is an average shower producing up to 20 meteors per hour at its peak. It is produced by dust grains left behind by comet Halley, which has been known and observed since ancient times. The shower runs annually from October 2 to November 7. It peaks this year on the night of October 21 and the morning of October 22. The full moon will be a problem this year for the Orionids. Its glare will block out all but the brightest meteors. But if you are patient, you should still be able to catch a few good ones. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Orion, but can appear anywhere in the sky.

October 25 - Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 18.4 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. Look for the planet low in the eastern sky just before sunrise.

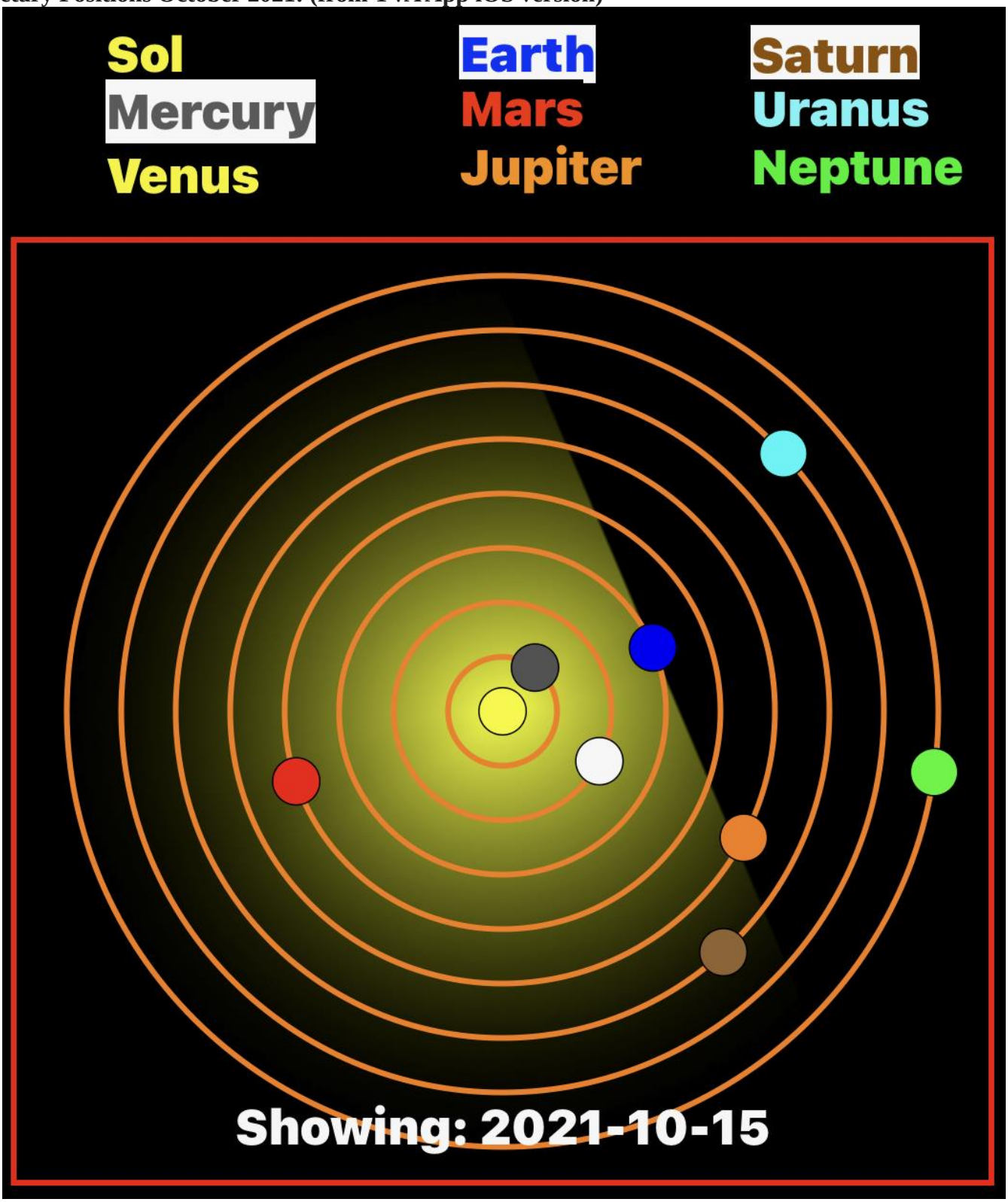
October 29 - Venus at Greatest Eastern Elongation. The planet Venus reaches greatest eastern elongation of 47 degrees from the Sun. This is the best time to view Venus since it will be at its highest point above the horizon in the evening sky. Look for the bright planet in the western sky after sunset.

Algol minima: (All times Pacific Time)

10/02/2021	**2224**
10/05/2021	**1913**
10/08/2021	**1602**
10/11/2021	**1250**
10/14/2021	**0939**
10/17/2021	**0628**
10/20/2021	**0317**
10/23/2021	**0005**
10/25/2021	**2054**
10/28/2021	**1743**
10/31/2021	**1432**



Planets:
Planetary Positions October 2021: (from TVA App iOS version)



- **Mercury:** Mercury is a evening object in the beginning of the month. Sunset is at **1834** and Mercury follows at **1858**. Mercury by mid-month has become a morning object rising at **0559**, followed by the sun at **0652**. By the 31st Mercury is rising by **0545** followed by sunrise at **0705**.
- **Venus:** Is the Evening Star on the first of the month, setting by **2034**, preceded by sunset at **1834**. By mid-month Venus is setting at **2031** preceded by sunset at **1816** with a waxing gibbous moon following and setting at **0359+**. By the 31st Venus is setting at **2033** preceded by sunset at **1758**.
- **Mars:** Mars is lost to the sun on the first, setting at **1841**, with sunset at **1834**. By mid-month Mars is still too close to the sun, Mars is setting at **1810** followed by sunset at **1816**. End-of-month finds the Warrior as a morning object rising at **0629**, followed by sunrise at **0705**.
- **Jupiter:** Jupiter is an evening object on the first of the month transiting at **2146.** By mid-month Jove is transiting at **2049**, setting at **0211+**. Come the end of the month Jupiter is transiting at **1948**, and sets at **0110+**.
- **Saturn:** Saturn transits about **2042** and not setting until **0152**. Saturn by mid month transits by **1947** and sets at **0057+**. By the end-of-the-month Saturn is transiting at **1846** and does not set until **2356**. Saturn is fading from the evening sky fast.
- **Uranus:** On the first of the month Uranus is rising by **2004.** Uranus will transit at **0250+**. By the ides Uranus is rising at **1907**. Uranus will transit at **0153+**. End-of-month finds Uranus rising at **1802** just four minutes after sunset. Uranus transits at **0048+**.
- **Neptune:** Neptune is rising before sunset and transiting at **2334** in the beginning of the month. Neptune sets at **0525+**. By the 15th Neptune is transiting at **2237**. There will be a waxing gibbous moon 21° 04' to the west of Neptune shining at 80%. By the end of the month Neptune transits at **2133**, setting by **0324+**.
- **Pluto:** Pluto transits at 1950 on the first of the month, setting by 0049+. By mid-month Pluto is rising by 1759 while the Moon is 99% illuminated and only 35° 48' to the west; so you probably won't get a good view. By the 31st Sunset is at 1759, two minutes after Pluto transits. Pluto will not set though until 2256. So you should get in a good view of Pluto if you're up until the wee hours**.**

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2021 with a reasonable magnitude; say less than or equal to +10 in October there is nothing except the regulars: Juno, Vesta. Hebe, Eros and Herculina. So consult your local planetarium software or try: **https://www.asteroidsnear.com/year?year=2021**

Meteors:

- Draconids Meteor Shower is back! **See *Highlights*** (above).
- Orionids Meteor Shower is back! **See *Highlights*** (above).

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believed to come from the Kuiper Belt and have periods in excess of 20-years.
  - Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
  - Short period comets October have a near circular orbit or an elliptical orbit. The latter being far more common.
- 2) Long Period comets – thought to originate from the Oort cloud these comets have periods of over 200 years and have random inclinations around the celestial sphere.

This month we'll keep our eye on SOHO (342P). On the first of the month SOHO (342P) is off to the ESE rising at **1016** 7° 43' to the west of Venus. Its apparent magnitude is an unimpressive 6.96. By mid-month SOHO (342P) is setting at **1831**, 15-minutes after sunset at **1816**. Its apparent magnitude will be an impressive 1.65. By the end-of-the-month SOHO (342P) will be back to 7.19 apparent magnitude and very close to the sun. SOHO (342P) will be setting **1816** while sol retires at **1758**.

Deep Sky:
Notes:

L/Z abbreviation for ALT/AZ
R/D abbreviation for Right Ascension/Declination
α is right ascension
δ is declination
In each case, unless otherwise noted, you should look for the following on or about the 15th Day of October 2021 at 2100 PDT and you will have about 20 minutes of viewing time total.

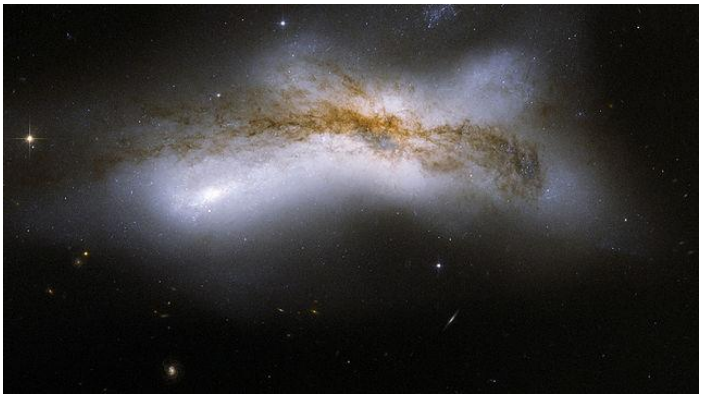
One especially for Paul this month; an interesting cluster.

- **NGC 457:**

Illustration 1: By Gabbygall - File:NGC457WIKI.jpg, CC BY 3.0, https://commons.wikimedia.org/w/index.php?curid=95013289

NGC 457 (also designated Caldwell 13, and known as the Owl Cluster, E.T. Cluster, Dragonfly Cluster, or Kachina Doll Cluster) is an open star cluster in the constellation Cassiopeia. It was discovered by William Herschel in 1787, and lies over 7,900 light years away from the Sun. It has an estimated age of 21 million years. The cluster is sometimes referred by amateur astronomers as the Owl Cluster, the E.T. Cluster (due to its resemblance to the movie character) or the "Skiing Cluster". Two bright stars Phi Cassiopeiae (magnitude 5) and HD 7902 (magnitude 7) can be imagined as eyes. The next brightest star is the red supergiant variable star V466 Cassiopeiae. The cluster features a rich field of about 150 stars of magnitudes 9-13. (Wikipedia)

- **NGC520:**



llustration 2: By NASA, ESA, the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration, and B. Whitmore (STScI) - http://hubblesite.org/newscenter/archive/releases/2008/16/image/bo/ (direct link), Public Domain, https://commons.wikimedia.org/w/index.php?curid=3951743

NGC 520 is a pair of colliding spiral galaxies about 105 million light-years away in the constellation Pisces. They were discovered by astronomer William Herschel on 13 December 1784.

Halton Arp called this the second-brightest very disturbed galaxy in the sky, and it is as bright in the infrared and radio bands as the Antennae Galaxies. Simulations indicate this object consists of two galactic disks that began interacting about 300 million years ago. The system is still in an early stage of its merger, showing two separate velocity systems in the spectra, and two small tails. Two galactic nuclei have been detected, and one is an H II nucleus. (Wikipedia)

October is great for both viewing and imaging.
Spend some time outside with your scope. Summer is here.

For now – Keep looking up.

RANDOM THOUGHTS

By Chuck Dyson

IS ASTRONOMY A SCIENCE?

I find that the title of this column is a good way to get the attention of the students when I give my first lecture of the year in the Astro club. More than just a wake-up call, this statement really asks the question "if astronomy is not a science, then what is the science behind astronomy?". Well, astronomy is more of an observational activity than a science, but if you want to understand what you are looking at, what it is made of, and how far away it is and how fast is it moving you need to be sitting on a stack of math (with emphasis on geometry) physics, and chemistry books. If you are into planetary astronomy then books on meteorology, geology, and biology are going to be really helpful too.

In 1835 Auguste Comte (a philosopher who promoted positive outlooks) said "We can only know a star's shape, size, distance, and movement. We can never, by any means, know their mineralogical structure, their chemical composition, or their mean surface temperature". By extension, we can also assume that if

you were to ask him about exo-planets and alien life he would think you to be quite mad. So, Comte had a positive outlook; positive, that is, that there are things that we can never know and even his hopes that we can measure the distance to stars must be questioned until we can prove that the "laws" of physics on Earth are the same in other parts of the universe and on all scales ("extraordinary claims require extraordinary proofs" Carl Sagan).

Let's tackle the size and mechanics and chemical structure of our universe in small steps, starting with our solar system. And we get off to an early start when in 194 BC Eratosthenes uses the angle of the sun at noon to measure the diameter of the Earth. The only problem was that no one could verify his results by using independent and different means. This is REALLY important in science. With the Greeks and Romans in love with math in general and geometry in particular, they are soon using indirect methods to accurately measure the distances to objects. Merchant sailors are acutely aware that it is important to know your location in the ocean and getting from one port to another as quickly as possible is important if you want to have a profitable voyage; so, they too are working really diligently on navigation techniques and tools. Both sailors and landlubbers get a big Incentive to improve their distance measuring techniques and learn about ballistics in the 12th and 13th centuries when the cannon comes of age. Accuracy with cannons doesn't come easy but it does come and by WWII we see two great examples of superb accuracy with a ballistic object going from one moving body to another moving body. The German battlecruiser Scharnhorst hits a fleeing British carrier at a range of 15 miles and not to be outdone the British battleship HMS Warspite hit an Italian battleship at the same range. Will this technology work in space? In 1959 the Russian Luna 2 probe is launched and successfully lands on the Moon, a hard landing but on target none the less. The ghost of Eratosthenes smiles because his technique has been validated.

We can use our indirect range and motion calculations for objects in the solar system. Will they work on stars?

In 1838 businessman turned professional astronomer W. F. Bessel measured, using the parallax method, the distance to a star; just like the 1990's when there was a flood of exoplanets discovered after the first one in 1992, the 1840's saw a rush to measure stellar distances. Some of the stars whose distances were measured, were gravitational double stars, stars in actual orbit around each other and not optical doubles (chance line of sight stars) and a few of those doubles had orbits that were parallel with our line of sight. With these special doubles we can measure, over a period of years, the orbit size, the star's speed of rotation, where the center of mass is and then using Newton's gravitation equation ($F = G\frac{m1 \times m2}{r2}$) get the separate masses {m1 & m2} of the two suns.

Meanwhile, back at Mt. Wilson, in 1920, Albert Michelson and Francis G. Pease construct an interferometer on the 100 inch telescope were able to determine the diameter of the star Betelgeuse and soon after it was determined that the diameters of our gravitational stars could be determined. We now have, using verified methods, determined everything on Mr. Auguste Comte's check list of what we can know about a star. So, are we at the end?

To know the things that Auguste Comte said we could never know we must first understand much more about "stuff" (you know, the "stuff" the Earth is made of, OK the elements), light, and how they interact. Dimitri Mendeleev in 1869 didn't discover anything, but he organized the known elements into a chart, the chart of periodic elements, that made sense of them and allowed us to predict future elements and what

their chemical characteristics could be. Exactly what are the atomic parts of an element were discovered by J. J. Thompson 1898, the electron, Ernest Rutherford 1919, the proton, and James Chadwick 1932, the neutron. It soon became clear that each element had a unique number of protons, if you have 6 protons you are carbon, if you have 7 protons you are nitrogen, and if you have 8 protons you are oxygen. However, it turns out that you can have a variable number of neutrons and just be an isotope of the same element, carbon has 15 different isotopes although only 3 are stable enough to last any length of time. Now that we have a better understanding of "stuff" let's look at light.

In astronomy ground zero for what we need to know about light starts with Isaac Newton holding not one but two glass prisms. With one prism Newton splits the white sunlight into a rainbow of colors and with the other he converges the different colors back into white light. This elegant experimental design conclusively shows that the different colors that we see all combine to make the white light. William Herschel, excited by Newton's work, sets up his own experiment where he creates a spectrum of sunlight and puts test tubes with water and a thermometer in them to understand how much radiant energy there is in each part of the spectrum. Herschel, who is also a careful experimenter, sets up a control temperature tube just beyond the red end of his spectrum to verify that the temperature rise in the spectrum tubes is not due to a change in the room temperature. To Herschel's, and everyone else's, shock the control's temperature does rise; there is energy coming from the Sun that we cannot see. Herschel has just discovered infrared energy. Inspired by Herschel, John Wilhelm Ritter does exactly the same experiment except he puts the temperature tube just beyond the violet part of the spectrum and discovers UV, ultraviolet, radiation. We now know that there is radiation, that we cannot see on both sides of our visible spectrum.

"STOP THE PRESSES!" shouts James Clerk Maxwell from the sidelines. I have been playing with my favorite equations and I am here to tell you there is a lot of invisible to the eye radiation, coming from the Sun. Inspired by Maxwell researchers quickly discovered radio waves, the long "stuff" and X-rays/ gamma rays, the short "stuff". Maxwell has one more announcement to make and it is that he has an idea about how bodies radiate energy. If, Maxwell says, the Sun only radiates energy and does not receive energy from an outside source, like the Earth being warmed by the Sun, then its energy curve will have a very specific shape that is dependent on the total amount of energy released by the Sun. He calls this a black body radiation curve. And Maxwell continues with building excitement, you can measure just one part of the curve and determine the Sun's total energy output and max temperature. Astronomers immediately turned their telescopes to the sun and measured its energy curve. Unfortunately, the curve did not look like Maxwells predicted curve but it was unclear if the Sun was not a black body or if it was atmospheric interference. In 1948 the American scientists launched a series of V2 rockets to study the Sun and in 1949 the good news was announced: from space the Sun was an almost perfect black body. Because all stars behave as black bodies we can know their temperature, Mr. Comte your predictions are in big trouble.

We need just a few mor items to complete our stellar studies science kit. The first comes from Joseph Von Fraunhofer who is trying to build a better refractor telescope and reasons that if he uses two types of glass that bend the colors of light differently he can reduce the chromatic aberration in the telescope. To understand how much each color of light is bent Fraunhofer needs a much higher quality of spectrum than can be obtained from just a prism; so, he mounts the prism in a holder and then mounts a small telescope in line with the prism. This, he reasons, will give him a high quality spectrum and let him test the light bending properties of glasses made from different chemical formulations by changing out the objective

lens of the telescope. Out of this research comes the famous crown and flint glass combination of the Fraunhofer telescope and he also notices dark vertical lines in the spectrum. Fraunhofer has no idea what they represent but he diligently documents them and reports them. In Germany Gustav Kirchhoff is studying the different colors he gets in a Bunsen burner flame from different elements. He reads about Fraunhofer's work and builds his own spectral telescope, now called a spectroscope. Kirchhoff sees that each element has a unique set of lines, but his lines are bright and Fraunhofer's are dark. Kirchhoff then works out why some lines are bright and others are dark and is also able to show that bright or dark they represent the same element. This allows astronomers to turn their telescopes into spectroscopes and study the spectra of stars. In 1868 an observer records a strong dark spectral line in the yellow part of the Sun's spectra and try as they might researchers can find no element on Earth that shows this line. This is really bad news because it indicates that the Sun and other stars have elements not found on Earth. This means we can never really know what "stuff" the universe is made of. In 1895 researchers studying the elements produced by the decay of radioactive materials note that a gas is given off by some of the decay processes. When the spectra of this gas were obtained there was a bright yellow line in the spectra just where the dark line of the Sun spectra was. The Sun has no special elements. The gas, Helium, is on Earth as well as the Sun and we can determine the Sun's and all-stars chemical composition. Detailed analysis of solar spectra shows that virtually all elements found on Earth are in the solar spectra. At this time astronomers can tell from the spectra what is there but not how much of each element is there. This limited information leads astronomers to speculate that the Sun is a rocky body, much like the Earth, and it hot because gravity is crushing all of its matter ever tighter together. The trouble with this theory is that it does not give the heat we need over the time that we need it, but it is the best theory we have.

The final item that we need to really study the stars is a permanent photographic record of our spectra as this will allow us to compare and contrast the spectra of different stars and to measure the strength, brightness or darkness of different spectral lines. In 1840 on his second attempt with a five inch refractor and a 20 minute exposure time John Draper obtains the first photograph of a celestial object, the Moon (talk about a really slow film). In 1872 John Draper with son Henry record the spectra of Vega with enough fidelity to show the spectral lines and yes, these two are the Drapers of the catalogue fame. Putting it all together in 1925, Cecilia Payne-Gaposchkin, using the black body curve of the Sun, works out the solar temperature and thus the amount of each wavelength of radiation. The wavelength of each light particle is its specific color in the Solar spectrum. With this knowledge Cecilia knows that if there is a strong spectral line at a wavelength that is weakly produced by the Sun then there is a lot of that element in the solar atmosphere. Conversely if an element's spectral line is weak at a wavelength that is strongly produced by the Sun then she knows that there is very little of that element in the solar atmosphere. When this study was complete it was very clear that the Sun was a little less than 25% Helium and a little less than 75% Hydrogen and only a little less than 1% of all the other elements, and yet astronomers say our Sun is a metal rich star.

Sorry Mr. Auguste Comte but we can and now do know the chemical composition, the mineral structure, and the surface temperature of stars. But we also know that the Sun is not a solid body and we are going to need a new theory of how it generates energy.

Astronomy may not be a science, but there is a lot of science behind astronomy.

Cheers,
Chuck

A Skywalk in the Park after Dark

By Dennis Ammann

Although this article is dated, Mark Baker, our Temecula Valley Astronomers (**TVA**) President, asked me to write about it anyways as our first TVA outreach event high in the mountains just 6 miles south of Julian at K.Q. Ranch RV Resort (**KQR**), on June 12, 2021.

I have dual memberships with San Diego Astronomy Association (**SDAA**) and TVA along with my sister, Annette Brown. As such, I'm the SDAA Outreach Coordinator for KQR. With all SDAA outreach events shut down since mid-March 2020, I was asked by the Manager of KQR to continue on, which I agreed to do, but as an individual, not affiliated with SDAA during the pandemic. This personal outreach to the campers at KQR has been fun. Sometimes I would share the starry dark night sky with 30-40 campers all alone.

Last December, only five campers turned out, three very enthusiastic teenagers and their two parents who wanted to go back to their camper. I shared the dark winter night skies with those brave souls who would venture out, showing them celestial objects that no one sees because of the cold temperatures. I've seen the humid dew run off the side of my steel tube telescope like a waterfall and last January watched the humid beads turn to ice. I've stood with campers viewing the night winter sky at 32º F and slept in my tent, when the temperature went down to 27º F. Was I cold? Yes, but I was able to adapt by wearing layers of clothes, hand warmers, and an excellent sleeping bag! I will do this again in winter 2021!

So last June, while visiting my sister in Temecula and lending a hand at TVA's outreach at South Coast Winery, I invited Mark and Debra to KQR, and they accepted. Mark's been there before, visiting his sister, where I first met him, many years ago. This was a **FIRST** for TVA with four members participating: Mark, Debra, Annette, and myself!

Arriving at KQR about 3:30 PM, I started walking around the RV resort soliciting our stargazing event. Annette arrived about 4:30 PM, so we started to pitch our tents at campsite #6. Mark and Debra arrived at 5:00 PM and pitched their tent next to ours, making campsite #6 very cozy for the night. Once our campsite was readied, we headed over to the tennis court to set up our telescopes and my COVID-19 sanitation table. Weather was perfect with clear blue skies and no wind.

Some of the campers arrived early, so we showed them how we calibrate our scopes and how they operate. Throughout the night, I figured about **30** people visited us at the tennis court. There seemed to be more children as school was out for the summer.

I brought my Orion 10" Dobsonian reflector and Orion 70mm refractor. Mark brought his Celestron CPC11 (11" SCT) and Debra brought her huge 12.5" Dob reflector. Annette was

armed with her 10x50 Nikon binoculars and worked my 10" Dob. We pointed out the summer constellations to the campers throughout the night and the brightest stars. Annette loves summer, because she can point out her favorite constellation, tiny Delphinus next to the Northern Cross. Vega is always fun to start with, as it's usually the first star to see during sunset. Although Venus was hidden behind a pine tree, low in the west, it was shining brilliantly at -4.0 magnitude. Annette immediately moved the 70mm telescope to the southern edge of the tennis court and was able to give the campers a quick look at Venus and the moon before they followed the Sun below the western horizon. With Mark and Debra's powerful telescopes, they were giving a wonderful celestial sky show, covering objects that are too faint for my scope to show. The Ring Nebula (M57) in Lyra was a favorite for the campers. Another popular one was Hercules Star Cluster (M13). Other targets were: Mizar/Alcor, M6, M7, M8, M20, M22, M70, Albireo, and the Milky Way. As a NASA Solar System Ambassador, Mark brought a lot of cool stuff to give away, i.e., NASA stickers, planet cards, etc. As always, it seems the last camper(s) left are always the most fun!

Usually, most observers retire to their respective campsites by 9:30 PM, leaving the ones that really want to be there. We were left with a young couple who would have stayed well past 11:30 PM, but 'nature was calling them.' Unfortunately, most of the campers didn't get to see Scorpio the Scorpion because it rose to its full length at 11:00 PM, when most of the campers were gone. We started to tear down our scopes and pack-out, finishing about 12:30 AM.

A ritual my sister and I have is to take a walk just before we're ready to retire for the night and one last look at the starry night sky. We saw the Milky Way straight up as it threaded through the trees that were reaching up to the stars, then walked to the edge of the tree line to the south where a huge meadow opened up the sky to give us an unobstructed view of the southern sky. What a wonderful KQR sky we had that night, along with the wonderful KQR campers who ventured out to view the **dark** *starry* sky.

Sunrise was at 5:30 AM, no problem the trees provide shade until 6:30 AM. We can all sleep longer by rolling over and ignoring our G2 yellow dwarf main sequence star. Unfortunately, at 7:00 AM that sun heats our tents and turns them into ovens! So out you go and pack-out your camping gear.

At 8:30 AM we were heading back to Temecula for one of the highlights of this event, breakfast at Richie's Restaurant at 10:00 AM. This was so much fun, the four of us talking shop and eating a delicious breakfast out of the 1950s! Yum Yum!!!

It was so much fun working with Mark and Debra at KQR and walking the campers across the starry dark night sky. Mark and Debra graced us with their presence last year at KQR, but this event was an ALL-**TVA** stargazing event.

Keep looking up!

Another Look
By Dave Phelps

If you go outside at midnight on Oct. 6th and look up, the pronounced asterism of Cassiopeia and the less bright constellation of Cepheus are nearly overhead. M31 is a nearby glow. The winter constellations of Orion and Taurus, Gemini and Auriga are peeking over the Eastern Horizon. Cygnus, Lyra, Hercules, and Aquila are slipping off into the west.

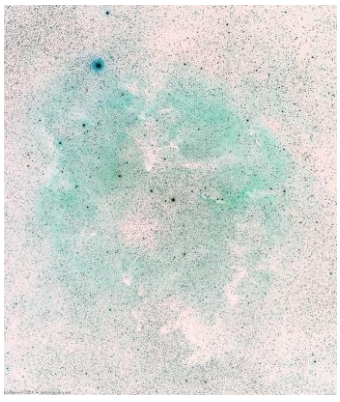
Still, lots of great constellations are up right now; Triangulum, Lacerta, Pegasus, Aquarius, Pisces.
Have we got a great pastime or what?

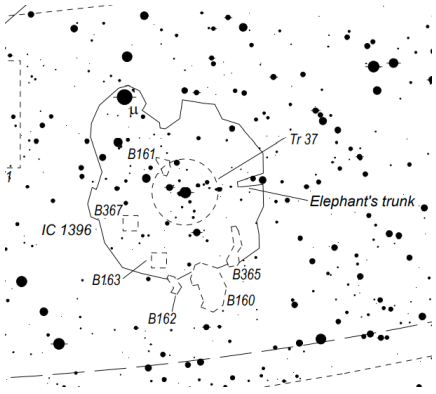
A little tangent on planispheres. I love them all. Tall, Short, Narrow or Wide I never found one I didn't like. Except the ones for my Android phone. The creators think they have to keep adding "features" to their program. Besides the fact that they ruin your night adaptation most are unreadable.

Find yourself a nice paper or plastic one (The September **Reflector,** the publication of the **Astronomical League** has an advertisement for a "Star Finder" three bucks delivered to your door.) and a dim red flashlight. Sit down in a comfy chair and open your eyes and look for all those constellations I just wrote down. There you go, a word of thanks to all those great astronomers whom we now emulate and on whose shoulders we now stand.

We are going to start this month with Hershel's Garnet Star. We could probably stop there, also. There is so much to see in the immediate area. The base of the pentagram that make up Cepheus is made up of Alpha (Alderamin – Right Arm) and Delta Cephei. Mu Cephei is, I am told, (Burnham) perhaps the reddest star visible to the naked eye in the northern hemisphere. Mu is a supergiant like Betelgeuse and like Betelgeuse an irregular variable. Nearby Delta is the star Cepheids are named in honor of. Looking at that star in your telescope is looking at scientific history. It is a good reason for looking at Cepheus. Most of the Cepheus deep sky objects are somewhat difficult, but, hopefully, worthy of the effort.

Years ago when star hopping around Cepheus and Cassiopia, the Garnet Star was always on the list. Not only is it in itself interesting, but, as you can see it is embedded in IC 1396.





So, IC 1396 and its nearby buddy Sharpless129; I never saw Sh2-129 visually. It wasn't named in my Sky Atlas

2000.0 and is not even shown on the more modern online Deep Sky Hunter atlas.

I have a negative I made of Dave Kodoma's IC 1396 to compare side by side with the atlas picture. The faintness of the image should give you an idea of what you may see visually. I remember the garnet star immersed in a thickening grayness. I have the Barnard's labeled for you on the map. Sharpless 129 (the Bat) is only about 2 degrees NE of IC 1396. They are featured on APOD, July 23 2021. Good Luck.

APOD, 7/23/2021

Just east of the Bat is an open cluster NGC 6939 and in the same finder field of view is the Fireworks Galaxy NGC 6946. The interesting thing here is to see how much aperture and magnification it would take to resolve them, maybe even in the same field of view. Each are by themselves quite worthy, however. I have no idea why 6946 is called Fireworks, but it is a nice face on spiral that looks a little bit like a smaller Triangulum. On the other hand, NGC 6939 will take a little power to display its brilliant stars.

Splitting the constellation boundaries of Cepheus and Cassiopeia let's start with M52. M52 was discovered in 1774 and was described by Messier as a cluster of very small stars mingled with nebulosity. Burnham tell us he is wrong about the nebulosity and your eye will bear him out. We like M52 because it is a very nice open cluster and also because it is the point where you start looking for the Bubble Nebula, NGC 7635. NGC 7635 was also a Herschel discovery in 1787 and probably needs a largish scope to see. The 17.5 showed a little structure and with a nebular filter I was able to see some of the surrounding nebulosity. The central star is 9th magnitude, but I don't remember seeing it.

Look nearby for NCG 7510, a small flattish open cluster about Magnitude 8 notable because it is designated a member of the Perseus Arm and near really faint Sh2-157. I never saw Sh2-157, it isn't even in my old Tirion but certainly a goal for another night.

The new moon is Oct. 6. For those interested, Oct 13 is half moon. Follow down the terminator and you will observe Mares Firigoris, Serentalis, Tranquilitatis, Nectaris, Crisium and Foecunditatis. Along the terminator you will find the large craters Albategnius and Hipparchus.

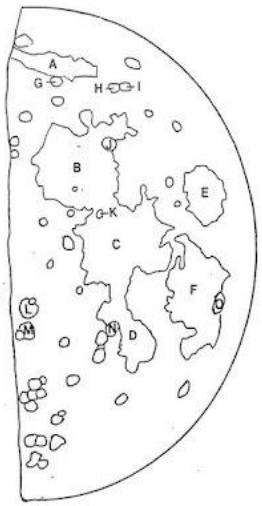
Up next to Mare Frigoris are the craters Hercules and Atlas, close is the round plain Endymion. Stay on it for a couple of days after first quarter for your best contrast.

Seas/Mare

A – Frigoris (Cold)
B – Serentatis (Serenity)
C – Tranquillitatis (Tranquillity)
D – Nectaris (Nectar)
E - Crisium (Crises)
F – Foecunditatis (Fertility)

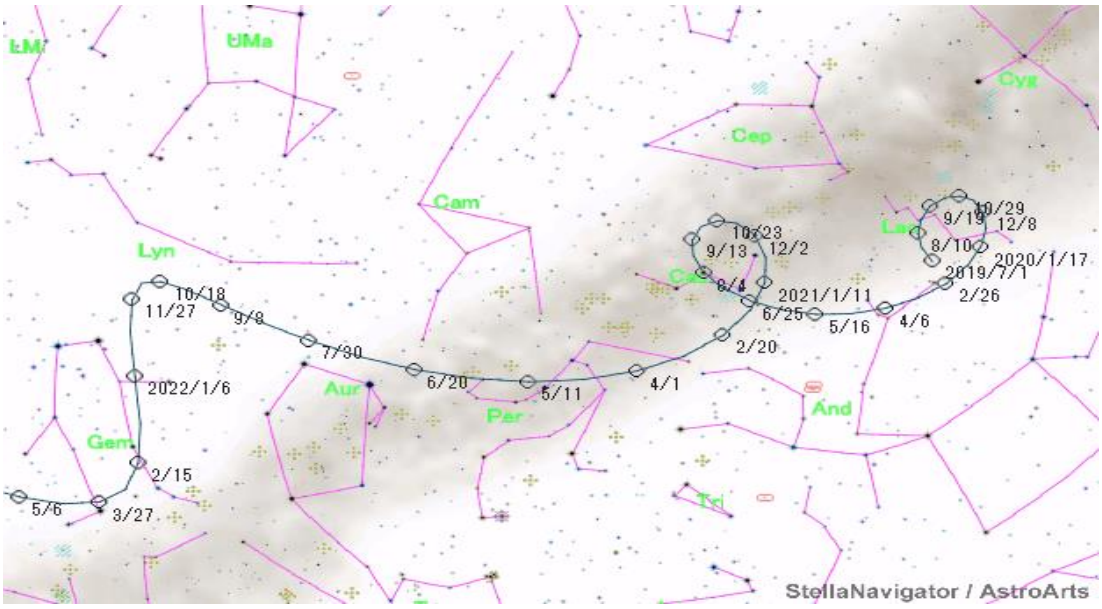
Craters

G – Aristoteles (55 / 12,000 ft)
H – Hercules (45 / 12,500 ft)
I – Atlas (54 / 10,000 ft)
J – Posidonius (60 / low, walled plain)
K – Pliny (27 / 10,500 ft)
L – Hipparchus (93 / 10,800 ft – lava filled/wall impact)
M – Albategnius (81 / 14,400 ft)
N- Theophilus (65 / 23,300 ft)
O- Langrenus (85 / 16, 200 ft)



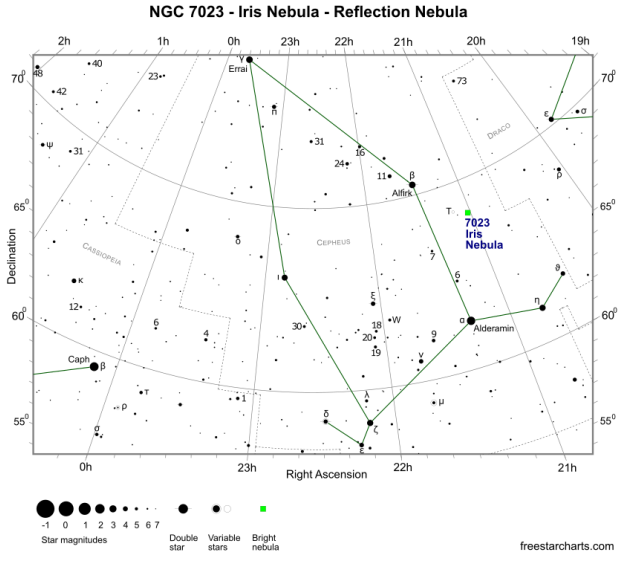
Lastly I would like to look at a possibly visible Comet. C/2019 L3 (Atlas) is expected to be visible in moderately sized telescope this month and some months to follow. It is reasonably well placed between Gemini and Lynx in the early morning hours of October and will be up earlier in the following months. The Japanese web sites say that it is in the 11th magnitude now and is expected to brighten by a magnitude over the next year. Thank you to **http://www.aerith.net/** for the data.

Of course reports of your observations are welcome, let us know what you find on the moon, in Cepheus and the comet.



Something of a Challenge

The Astronomy Picture of the Day for September 3rd was a magnificent image of NGC 7023, The Iris Nebula. I mention it because it is also in Cepheus and, like the Bubble, less than 20 min. of arc in diameter. Tough to find, so let's go out and find it. I am sure I have never looked for it before, many of my older atlases don't even show it though Sky Atlas 2000 has it. I'm making it easy for you this month; finder chart attached.



Dark Skies

Dave Phelps

Weird Ways to Observe the Moon

By David Prosper – NASA / JPL

International Observe the Moon Night is on October 16 this year– but you can observe the Moon whenever it's up, day or night! While binoculars and telescopes certainly reveal incredible details of our neighbor's surface, bringing out dark seas, bright craters, and numerous odd fissures and cracks, these tools are not the only way to observe details about our Moon. There are more ways to observe the Moon than you might expect, just using common household materials.

Put on a pair of sunglasses, especially **polarized sunglasses**! You may think this is a joke, but the point of polarized sunglasses is to dramatically reduce glare, and so they allow your eyes to pick out some lunar details! Surprisingly, wearing sunglasses even helps during daytime observations of the Moon.

One unlikely tool is the humble **plastic bottle cap**! John Goss from the Roanoke Valley Astronomical Society shared these directions on how to make your own bottle cap lunar viewer, which was also suggested to him by Fred Schaaf many years ago as a way to also view the thin crescent of Venus when close to the Sun:

"The full Moon is very bright, so much that details are overwhelmed by the glare. Here is an easy way to see more! Start by drilling a 1/16-inch (1.5 mm) diameter hole in a plastic soft drink bottle cap. Make sure it is an unobstructed, round hole. Now look through the hole at the bright Moon. The image brightness will be much dimmer than normal – over 90% dimmer – reducing or eliminating any lunar glare. The image should also be much sharper because the bottle cap blocks light from entering the outer portion of your pupil, where imperfections of the eye's curving optical path likely lie." Many report seeing a startling amount of lunar detail!

You can **project the Moon!** Have you heard of a "Sun Funnel"? It's a way to safely view the Sun by projecting the image from an eyepiece to fabric stretched across a funnel mounted on top. It's easy to make at home, too: directions are here: bit.ly/sunfunnel. Depending on your equipment, a Sun Funnel can view the Moon as well as the Sun– a full Moon gives off more than enough light to project from even relatively small telescopes. Large telescopes will project the full Moon and its phases, with varying levels of detail; while not as crisp as direct eyepiece viewing, it's still an impressive sight! You can also mount your smartphone or tablet to your eyepiece for a similar Moon-viewing experience, but the funnel doesn't need batteries.

Of course, you can join folks in person or online for a celebration of our Moon on October 16, with International Observe the Moon Night – find details at moon.nasa.gov/observe. NASA has big plans for a return to the Moon with the Artemis program, and you can find the latest news on their upcoming lunar explorations at nasa.gov.

Sun Funnels in action! Starting clockwise from the bottom left, a standalone Sun Funnel; attached to a small refractor to observe the transit of Mercury in 2019; attached to a large telescope in preparation for evening lunar observing; projection of the Moon onto a funnel from a medium-size scope (5 inches).

Safety tip: *NEVER use a large telescope with a Sun Funnel to observe the Sun, as they are designed to project the Sun using small telescopes only. Some eager astronomers have melted their Sun Funnels, and parts of their own telescopes, by pointing them at the Sun - large telescopes create far too much heat, sometimes within seconds! However, large instruments are safe and ideal for projecting the much dimmer Moon. Small telescopes can't gather enough light to decently project the Moon, but larger scopes will work.*

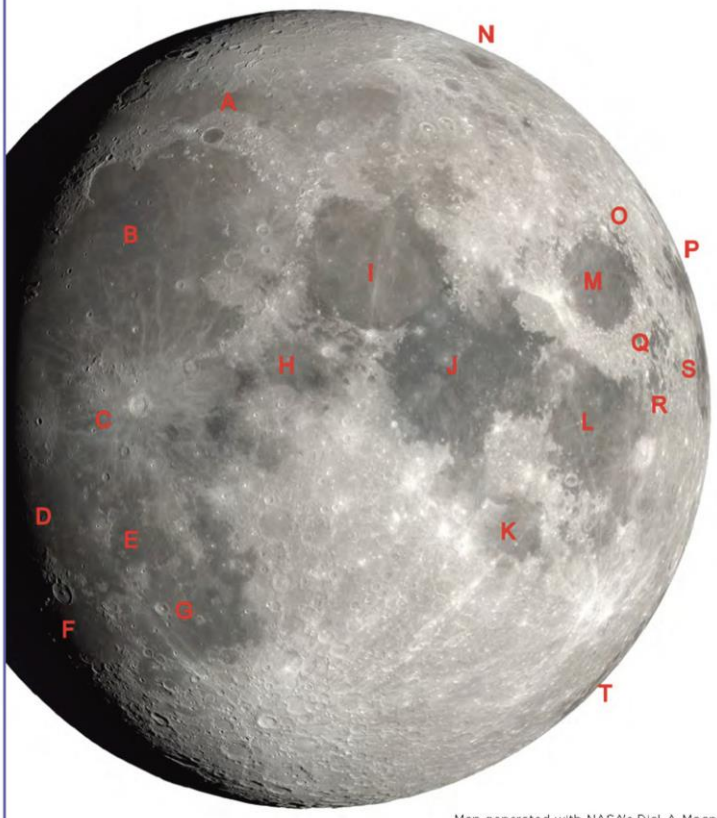
OBSERVE the MOON

International OBSERVE THE MOON NIGHT 2021 SATURDAY OCTOBER 16TH

NORTHERN HEMISPHERE MOON MAP WITH LUNAR MARIA (SEAS OF BASALT)

Moon Map
This map was created for International Observe the Moon Night 2021. It depicts the Moon as it will appear from the northern hemisphere at approximately 11:00 PM EDT on October 16, 2021 (3:00 AM UTC on October 17).

Lunar Maria (Seas of Basalt)
You can see a number of maria tonight. Once thought to be seas of water, these are actually large, flat plains of solidified basaltic lava. They can be viewed in binoculars or even with the unaided eye. Tonight, you may be able to identify 18 maria on the Moon. This includes four seas along the eastern edge that are often hard to see. Because of libration, a slight apparent wobble by the Moon in its orbit around Earth, tonight we get to peek slightly around the northeast edge of the Moon, glimpsing a sliver of terrain normally on the Moon's far side.



Map generated with NASA's Dial-A-Moon (https://svs.gsfc.nasa.gov/4874)

A. Mare Frigoris (Sea of Cold)
B. Mare Imbrium (Sea of Rains)
C. Mare Insularum (Sea of Isles)
D. Oceanus Procellarum (Ocean of Storms)
E. Mare Cognitum (Known Sea)
F. Mare Humorum (Sea of Moisture)
G. Mare Nubium (Sea of Clouds)
H. Mare Vaporum (Sea of Vapors)
I. Mare Serenitatis (Sea of Serenity)
J. Mare Tranquillitatis (Sea of Tranquility)
K. Mare Nectaris (Sea of Nectar)
L. Mare Fecunditatis (Sea of Fertility)
M. Mare Crisium (Sea of Crises)
N. Mare Humboldtianum (Humboldt's Sea)
O. Mare Anguis (Serpent Sea)
P. Mare Marginis (Border Sea)
Q. Mare Undarum (Sea of Waves)
R. Mare Spumans (Sea of Foam)
S. Mare Smythii (Smyth's Sea)
T. Mare Australe (Southern Sea)

MOON.NASA.GOV/OBSERVE #ObserveTheMoon

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