Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers August 2021

## Events:

**Virtual meeting via Zoom on 2 August at 7 PM. Watch your club email for meeting ID and password.**

- **IFI & Gallery by Clark Williams**
- **Virtual Refreshments by Annette Brown**

**Star Parties at South Coast Winery every Friday evening in August.**

**Hurkey Creek Star Party 8/7**

**Lake Skinner Star Party 8/21**

**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.

The little engine that could… twice as many flights as planned now, ten times farther, twice as fast, twice as high, and scouting the way for Perseverance. All in a day's work…

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

President: Mark Baker 951-691-0101
<shknbk13@hotmail.com>
Vice President: Sam Pitts <sam@samsastro.com>
Past President: John Garrett <garrjohn@gmail.com>
Treasurer: Curtis Croulet <calypte@verizon.net>
Secretary: Deborah Baker <geedeb@gmail.com>
Club Librarian: Vacant
Facebook: Dave Ng <heli_av8r@sbcglobal.net>
and Mark Baker <shknbk13@hotmail.com>
Star Party Coordinator and Outreach: Deborah Baker
<geedeb@gmail.com>
Newsletter Editor: Paul Kreitz pkreitz@sbcglobal.net

Address renewals or other correspondence to:
Temecula Valley Astronomers
PO Box 1292
Murrieta, CA 92564

Members' Mailing List:
<tvastronomers@googlegroups.com>
Website: http://www.temeculavalleyastronomers.com/

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## Cosmic Comments
## by President Mark Baker

It is so gratifying to experience a literal tempest of space related activity of late, from national organizations to international collaborations, and even corporations are now at the forefront of pushing the threshold ever wider. The Cosmos has become a focus worldwide of the positive side of what humanity can do when its mind is set on expanding our base of understanding… the pioneering spirit is at an all time high and portends of mighty things to come. Whether they be great, or even good remains to be seen…

One drawback to so much hubbub is that many truly worthwhile projects and programs get lost in the cacophony… few people know how much effort goes into studying our home planet through LEO and space related activities. Even my pet project, the Mars Helicopter Ingenuity, has gone from stage front just a couple of months ago to a backstage draw, hardly worth a yawn even though it is performing far and above its original mandate. Do you know the James Webb Space Telescope is set to launch this November?? How about the LUCY Mission?? Did you know that JUNO is still providing wow's through the science we are gleaning from it?? What about the Chinese Lunar and Mars successes?? Or the United Arab Emirates orbiter contributions??

These are just a few of what were once footlighted efforts that now work from the shadows… and it's okay that we can't keep up, as long as we understand that humanity is not resting on its laurels, or even taking a breather.

So what does this have to do with Astronomy?? EVERYTHING…!!! If humans had never Looked Up, they would not be pursuing anything offplanet… it all started with curiosity, wondering about the What's and Why's!! And this is a large part of the mission of TVA… getting people to Look Up and be awed, and to query everything around them. So even though we play a small part perhaps, we are never insignificant… never!!! Saying "Thanks for all you do" is meager appreciation for the results you provide… but Thank You!!!

Clear, Dark Skies my Friends…

## Editor's Note
### by Paul Kreitz

It's heartening to see that TWO TVA members have reacted to my pleas for new sources of Newsletter articles! Sam Pitts has submitted the first of what promises to be a series of articles on "Astronomy 101". Dave Phelps has provided Another Look at what's up this month, and promises subsequent articles as time permits. Thanks to Sam and Dave!

If you would like to join in the fun, please send your submission to pkreitz@sbcglobal.net, (by the 20th of the month) and see it in print next month!

# Looking Up Redux – August 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 (PST / PDT) 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:**

| | | |
|---|---|---|
| **Sunday** | **the 22nd** | **@ 0503 FULL in AQUARIUS** |
| **Monday** | **the 30th** | **@ 0014 THIRD QTR in TAURUS** |
| **Sunday** | **the 8th** | **@ 0651 NEW in LEO** |
| **Sunday** | **the 15th** | **@ 0820 First QTR in LIBRA** |

Perigee comes on 2021-08-02 @ **0036 – 404,410 km (251,289 mi)**
Apogee comes on 2021-08-17 @ **0225 – 229,364 km (142,520 mi)**
Perigee comes on 2021-08-29 @ **1923 – 404,098 km (251,095 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 8th rising at **0028**, about 21 minutes after Uranus, transiting at **0724** and setting by **1425**. Luna by mid-month is

42% illuminated, Waxing crescent. Rising at **1228** and transiting late afternoon at **1802** and setting at **2335**. By the end of the month Luna is in the 3rd Quarter, 40% illuminated rising at **0011-** transiting at **0736** and setting by **1505**.

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

**August 2** - Saturn at Opposition. The ringed planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than any other time of the year and will be visible all night long. This is the best time to view and photograph Saturn and its moons. A medium-sized or larger telescope will allow you to see Saturn's rings and a few of its brightest moons.

**August 8** - 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 **0651**. 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.

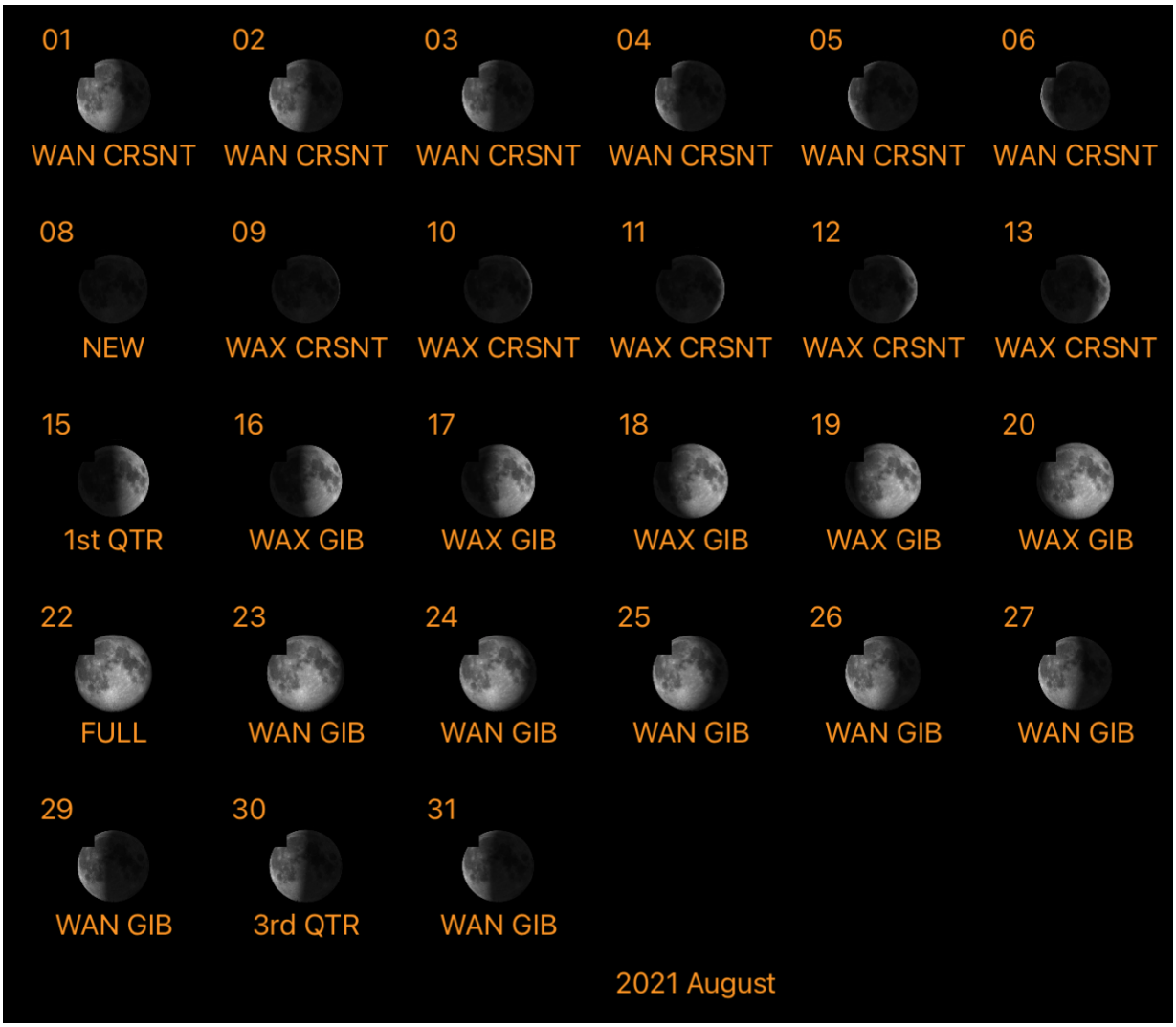
**August 12, 13** - Perseids Meteor Shower. The Perseids are one of the best meteor showers to observe, producing up to 60 meteors per hour at its peak. It is produced by comet Swift-Tuttle, which was discovered in 1862. The Perseids are famous for producing a large number of bright meteors. The shower runs annually from July 17 to August 24. It peaks this year on the night of August 12 and the morning of August 13. The waxing crescent moon will set early in the evening, leaving dark skies for what should be an excellent show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Perseus, but can appear anywhere in the sky.

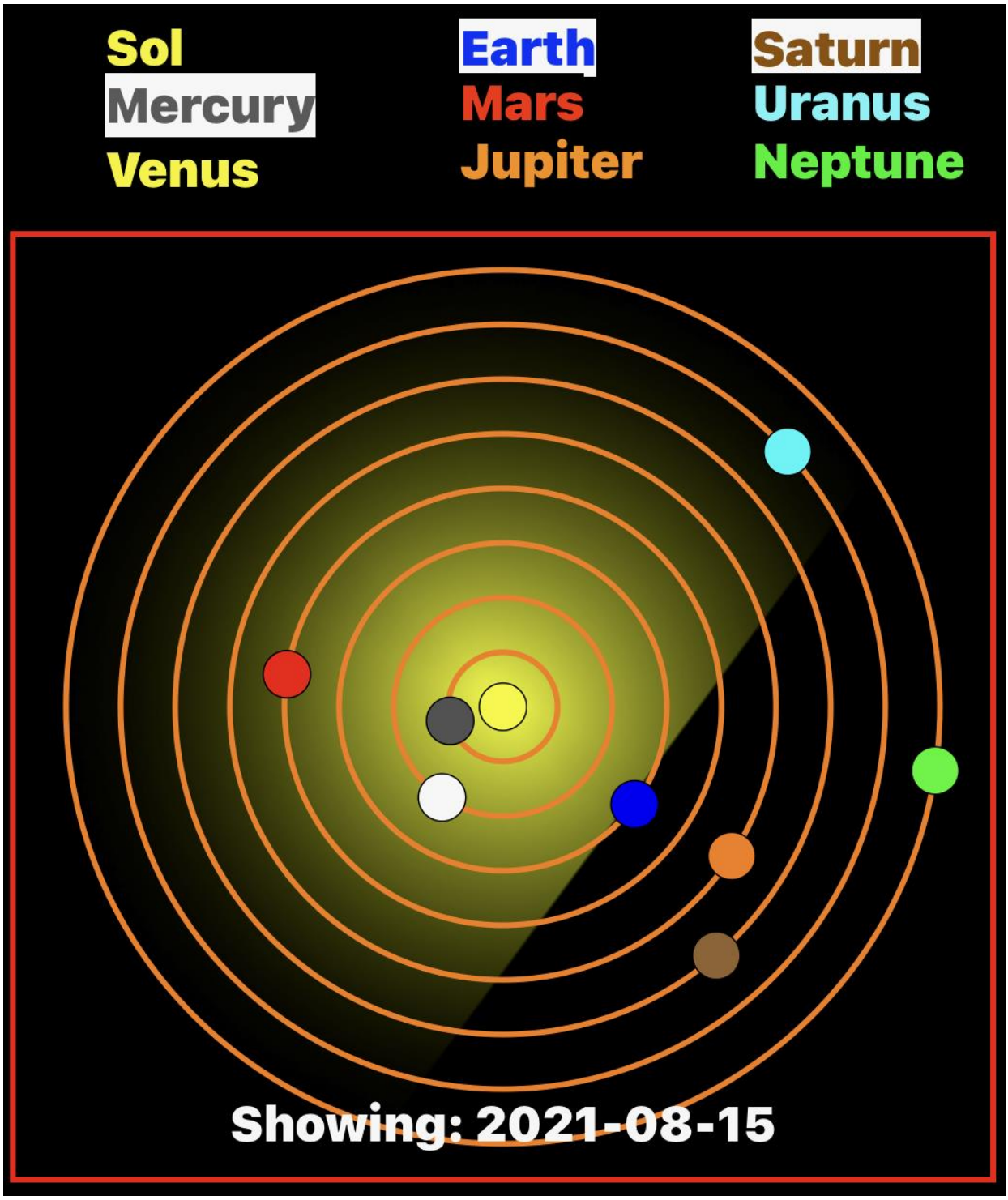
**August 19** - Jupiter at Opposition. The giant planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than at any other time of the year and will be visible all night long. This is the best time to view and photograph Jupiter and its moons. A medium-sized telescope should be able to show you some of the details in Jupiter's cloud bands. A good pair of binoculars should allow you to see Jupiter's four largest moons, appearing as bright dots on either side of the planet.

**August 22** - Full Moon, Blue 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 12:02 UTC. This full moon was known by early Native American tribes as the Sturgeon Moon because the large sturgeon fish of the Great Lakes and other major lakes were more easily caught at this time of year. This moon has also been known as the Green Corn Moon and the Grain Moon. Since this is the third of four full moons in this season, it is known as a blue moon. This rare calendar event only happens once every few years, giving rise to the term, “once in a blue moon.” There are normally only three full moons in each season of the year. But since full moons occur every 29.53 days, occasionally a season will contain 4 full moons. The extra full moon of the season is known as a blue moon. Blue moons occur on average once every 2.7 years.
Note: the above is the original definition of “Blue Moon”, as defined in the *Old Farmer's Almanac*, of a “Blue Moon”. The modern definition is two full moons in a single month.

**Algol minima: (All times Pacific Time)**

| | |
|---|---|
| 08/03/2021 | 1724 |
| 08/06/2021 | 1412 |
| 08/09/2021 | 1101 |
| 08/12/2021 | 0750 |
| 08/15/2021 | 0438 |
| 08/18/2021 | 0127 |
| 08/20/2021 | 2215 |
| 08/23/2021 | 1904 |
| 08/26/2021 | 1552 |
| 08/29/2021 | 1241 |






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

- **Mercury:** Mercury is lost to the Sun in the beginning of the month. Mercury by mid-month is rising after sunrise. By the 31st Mercury is an evening object (barely). Rising by **0814** and setting at **2015**, about an hour after sunset at **1916**.

- **Venus:** Is the Evening Star on the first of the month, setting by **2130**, preceded by sunset at **1950**. By mid-month Venus is setting at **2116** preceded by sunset at **1936** with a waxing gibbous moon following 60°21' and setting at **0015+**. By the 31st Venus is setting at **2059** preceded by sunset at **1916**.
- **Mars:** Mars is still in the sky on the first, setting at **2059**. By mid-month Mars is transiting at **1401** and setting at **2027**. End-of-month finds the Warrior transiting at **1335** and not setting until **1951**.
- **Jupiter:** Jupiter is an evening object on the first of the month rising at **2043.** However a Last-Quarter Moon is rising by **0100+** and 35% illuminated. By mid-month Jove is rising at **1943.** Transiting at **0110+**. Come the end of the month Jupiter is peaking above the horizon by **1834**. and transiting at **2359.**
- **Saturn:** Saturn rises about **1943** on the 1st, transiting about midnight and not setting until **0608+**. Saturn by mid-month is rising by **1845** and transiting a little earlier at **2356**. By the end-of-the-month Saturn is rising at **1738**. Saturn transits at **2249** and does not set until **0400+**.
- **Uranus:** On the first of the month Uranus is rising by **0009.** Uranus will transit at **0658+** preceded by sunrise at **0559+**. By the ides Uranus is rising at **2315**. Uranus will transit at **0602+** followed by sunrise at **0609+**. End-of-month finds Uranus rising at **2208**. There will be a 31% Waning Crescent Moon 33°41' toward the north along the horizon plane.
- **Neptune:** Neptune is rising at **2146** in the beginning of the month. With a 34% illuminated Moon about 66° to the east along the Ecliptic. Neptune transits at **0339+**.By the 15th Neptune is rising at **2050**. If you wait until 0130+ you'll have a beautiful train from west to east of Pluto, Saturn, Jupiter, Neptune and Uranus in an arc along the Ecliptic. By the end of the month Neptune is rising at **1947** and transits at **0139+**. The planetary pearls will still be in the sky in the same order.
- **Pluto:** Pluto rises by **1859** on the first of the month and transits at **2358**. The planetary pearls along the Ecliptic mentioned in Neptune (above) will be visible except for Uranus at transit. By mid-month Pluto is rising by **1759** while the Moon is 56% illuminated getting ready for moonset at **0015+**. By the 31st Pluto is rising at **1855**, transiting at **2154**.

**Asteroids:**

- **Still a dearth of asteroids. I searched for asteroids in 2021 with a reasonable magnitude; say less than or equal to +10 in August 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:**

- **Perseids Meteor Shower is back! See August 12 – 13 in *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 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.

Your best bet this month is comet 8P/Tuttle. It is at Mag +10.3 on the first about 0540 on August 01. Sunrise is at 0601 so it will be close. By the 15th 8P/Tuttle will have improved slightly to Mag +9.5 try between 0515 and 0545 on the 15th. End of month 8P/Tuttle will still be hanging about at +9.5 same Bat-Time, same Bat-Direction of almost due East. The comet will be highest in the sky on the 1st and farthest from sunrise. As the month progresses 8P/Tuttle will approach the sun and get lower on the horizon.

**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 August 2021 at 2100 PDT and you will have about 20 minutes of viewing time total.**

**One especially for Paul this month; an interesting cluster:**

- **Caldwell 41 (Melotte 25)**

The Hyades (/ˈhaɪ.ədiːz/; Greek Ὑάδες, also known as Caldwell 41, Collinder 50, or Melotte 25) is the nearest open cluster and one of the best-studied star clusters. Located about 153 light-years (47 parsecs) away from the Sun, it consists of a roughly spherical group of hundreds of stars sharing the same age, place of origin, chemical characteristics, and motion through space. From the perspective of observers on Earth, the Hyades Cluster appears in the constellation Taurus, where its brightest stars form a "V" shape along with the still-brighter Aldebaran. However, Aldebaran is unrelated to the Hyades, as it is located much closer to Earth and merely happens to lie along the same line of sight. (Wikipedia)

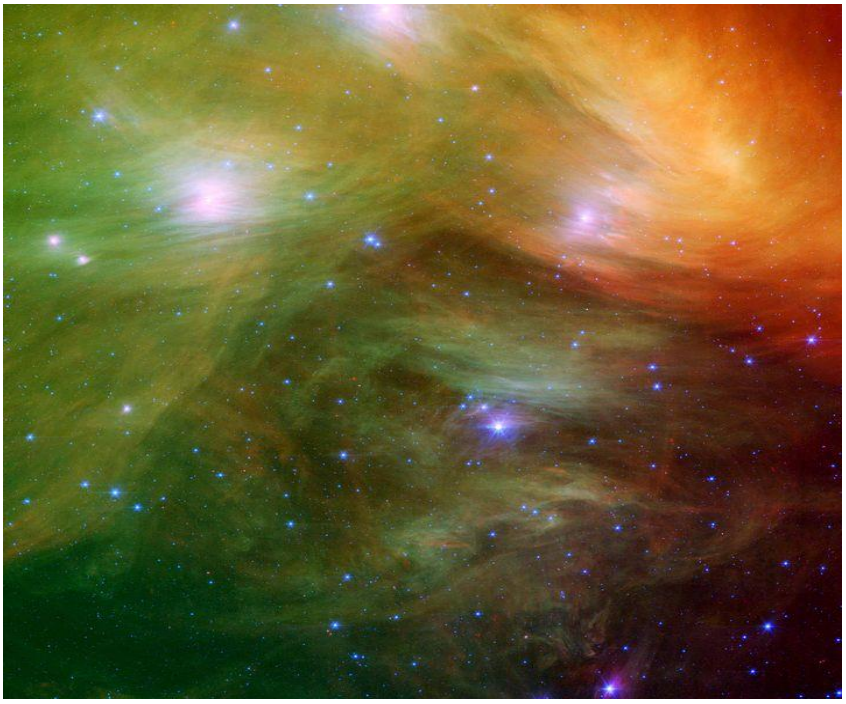


*Illustration 3: By John Stauffer (Spitzer Science Center, Caltech)credits: Credit: NASA/JPL-Caltech/J. Stauffer (SSC/Caltech) - http://gallery.spitzer.caltech.edu/Imagegallery/image.php?image_name=ssc2007-07a, Public Domain, https://commons.wikimedia.org/w/index.php?curid=1939861*

**NGC 1435 – The Merope Nebula:**
The Merope Nebula (also known as Tempel's Nebula and NGC 1435) is a diffuse reflection nebula in the Pleiades star cluster, surrounding the 4th magnitude star Merope. It was discovered on October 19, 1859 by the German astronomer Wilhelm Tempel. The discovery was made using a 10.5cm refractor.[3] John Herschel included it as 768 in his General Catalogue of Nebulae and Clusters of Stars but never observed it himself.. (Wikipedia)

August 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

# OOPS!!

The job of science is to ask a question about something that you actually know nothing about. The experiments that can come from asking such a simple question as “How far away are other stars from our sun?” can change our vision of the universe. In school the experiments that we learn about are the ones that are spectacularly successful and not the dozens or even hundreds of experiments that are failures, sometimes in cringe-worthy fashion. Science OOPS are not the exclusive domain of astronomers either, as biologists are always eager to join the party. Two recent, and cringe-worthy, examples of biologists getting into the act are the harvesting and freezing of Ming the Clam. Ming was, and I say was because the researchers from the National

Museum of Cardiff after harvesting Quahog clams from the bottom of the Atlantic ocean, froze Ming and the others, thus killing them, for study back at the lab. At the lab in Cardiff the researchers discovered that Ming was 507 years old and this is the oldest animal ever found. Science changed Ming from a clam to a cigarette ash tray and a cup of chowder. Not to be outdone by the British, researchers from the University of California were determining the ages of bristlecone pines in the White Mountains at the California Nevada border. To determine the tree's age a small hollow drill that would take a core sample of the tree from its surface to its core and then the rings would be counted, a tree adds one ring per year; so, the number of rings equals the tree's age. The team had two core bits with them and managed to get both irreversibly stuck in one tree. After consulting with the Forestry Department and getting their blessing, the tree was cut down and sectioned to retrieve the core bits. Later, in the lab, when the rings were counted it was found that the tree was 4862 years old, this is the oldest multi celled organism that has ever been found, OOPS! Wouldn't it be ironic if somewhere there was a coffee table made from the wood of the bristlecone with a clamshell ashtray from Ming the clam on it?

Answering the question of "How far away are other stars from our sun?" is actually a good starting point for looking at an astronomical OOPS or two. Measuring, by parallax, the distance to or between objects on earth was easy and well understood by the Greeks; so, it should be no surprise that the distance to the moon was determined by Hipparchus around 125 B.C. with a fair degree of accuracy. The next obvious step was to measure the distance to the other planets. This however would prove to be a bigger step than many supposed. The first object, after the moon, to have its distance from Earth measured was Mars by Giovanni Cassini in 1672 and it has only taken about 1800 years for this to happen; so, it is a really "big deal" and gets every one eager to jump on to the parallax band wagon. It may have been a "big deal" but, it didn't answer all the questions.

In order to get the size of the Solar System, using Kepler's planetary laws, we need to know the distance from the Earth to the Sun not the Earth to Mars distance, and we want to know the distance to the crystal sphere that the stars are on to prove or disprove the geocentric theory of the universe. In a fit of excitement our OOPS boy Robert Hooke tries to measure stellar parallax. At the time Hooke tries to measure stellar parallax it is known that all light is refracted by the earth's atmosphere and the farther from the meridian, the point directly over your head, the greater the refraction and the more you must correct for it. Hooke reasons, correctly, that stars passing directly overhead will be the easiest to measure for parallax shift as there will be no refraction correction. The trouble with this method is that only a few stars will qualify as targets, and an absolutely stable perpendicular telescope is needed. The first problem Hooke can do nothing about, but for the second he has a solution: bolt the telescope to the chimney of his house. Please remember that, at this time, an f15 refractor was considered a very fast refractor and to get the optical quality that was needed Mr. Hooke's refractor would need to be an f30 or f40. To this end our Mr. Hooke has a carpenter bore a hole next to the chimney from the roof to the basement and then bolts the telescope to the chimney and lays on his back in the basement to make his observations. Mr. Hooke's OOPS is not that after four years of observing he has only four good measurements. OH NO!, the OOPS is that Mr. Hooke is renting the house and does not own it. This little liberty with the rented property probably gets Mr. Hooke an honorable mention the great real estate book of "Terrible Tenants".

We are not quite finished with our Mr. Hooke, but before we go on let me introduce him to you. Young Robert was one of five children to a minister and teacher. When his father died when Robert was 13 he inherited 40 pounds, a fair bit of money in those days, that he took to London to finance an apprenticeship. After working with some of the instructors it was quickly realized that Robert was not just smart, but he was brilliant in every subject area. Robert was soon on his way to university, with scholarship in hand, where he proved to be and outstanding student. Robert's particular talent was the ability to grasp new concepts and then be able to communicate these concepts to others and, perhaps more importantly, create demonstrations that showcased the main concept ideas. Robert was soon hired by the Royal Society of London to give lectures and demonstrations of the new findings of the day. This was the top scientific society of England.

If Robert Hook had a failing it was his inability to stick with a subject, because after he had mastered the principles of something and done a few basic demonstrations of the principles he was ready to move on to the next subject. People who attended the now adult Mr. Hooke's lectures and demonstrations would often go on to duplicate and expand on those demonstrations with the results advancing societies' understanding of the subject. Mr. Hooke had the recurring habit of accusing those people of plagiarism and theft of intellectual property. Yes, over time, he accumulated many enemies. At one lecture Mr. Hooke spoke of gravity and his belief that the force of gravity decreased with the square of the distance between two bodies. One person at this lecture was Isaac Newton, who later claimed to have already had the same idea. Newton went on to create his three laws of motion and gravity and Mr. Hooke went on to claim that Newton was a thief of intellectual material. Hell hath no fury like a Newton scorned and a lifelong battle of claims and counter claims ensued. To avoid a big OOPS with a person like Newton the first rule is, DO NOT DIE FIRST! In 1703 Mr. Hooke dies and, as luck would have it, Mr. Newton is appointed president of the Royal Society of London. Mr. Newton is president of the Society from 1702 to 1727 and during that time many of Mr. Hooke's papers disappear and his official Royal Society painted portrait is burned. Any guesses who did it?

At the start of the twentieth century everybody knew that the universe was big but nobody knew just how big. So, opinions varied and debates raged, all to the benefit of reporters who were discovering that articles on science topics could really be a boon to your career. In 1908 Henrietta Levitt publishes in a paper her observations of 16 regularly variable stars that she had identified in the Small Magellanic Cloud. Although the stars have different periods the periods are always the same for each star and the longer the period the brighter the star is at its peak of the period. By 1922 Levitt, who passes away in 1921, has a paper with 25 of her variable stars identified and the astronomer Elijah Hertzsprung, using proper motion analysis, determines, roughly, the distance to several of these variable stars in our own galaxy; finally, by identifying a star as one of Levitt's regular variable stars and with Hertzsprung's distance versus luminosity scale the scale of the universe can be known. Meanwhile, back on the astronomy conference circuit debates are being held on just how the universe is structured and is our sun at the center of the galaxy. One debate in 1920, entitled "The Great Debate" is held between Harlow Shapley and Herbert D. Curtis. Shapley, based on his observations of some regularly variable stars in the globular clusters around our galaxy, says that our galaxy is 300,000 light years in diameter and is the one and only galaxy in the universe (in a world where airplanes can only hit 200 miles per hour in a dive, 300,000 light years is a mind-numbing distance). To the question as to whether or

not our Solar System is at the center of the galaxy, no. Shapley believes that it looks like our Solar System is at the center of the universe because dust in the galaxy only lets us see so far in all directions and it just appears as though we are the center when, in fact, we are way out in the galactic suburbs. Curtis, for his part, and based on his results from studying the brightness of supernovas, had noticed that supernovas that were not associated with spiral nebulae, the name for galaxies before we knew that they were galaxies, were much brighter than the ones that occurred within spiral nebulae and thus he concluded that spiral nebulae were actually galaxies in their own right and very far away, the universe is bigger than you think Mr. Shapley. Curtis acknowledged that there were clumps of dust in the galaxy, the great rift cloud that stretches from Cygnus to Sagittarius and the coal sack next to the Southern Cross, but no way was there enough outside of these areas to actually cut off all star light from far away stars. Meanwhile, back at the 100 inch telescope on Mt. Wilson, Hubble and Humason were spending every night they could taking pictures of the Andromeda Galaxy.

The preceding paragraph may sound like the master plot from a soap opera and it kind of is but, I will do the reveal in one paragraph instead of the usual two and a half years of plot development for you. Henrietta Levitt correctly identifies and gages the luminosity of her Cepheid variables. Unfortunately her sample size is so small and selective she does not realize that there are actually three types of stars that have period luminosity behavior. There is the Type I Cepheid that is a high metallicity short period star with high intrinsic brightness. There is the Type II Cepheid that is a low metallicity long period star with a lower intrinsic brightness than type I. And finally there is the RR Lyrae that are low mass stars with very short periods and very low intrinsic brightness. RR Lyrae stars are very common in globular clusters and Shapley, studying the globular clusters around our galaxy, records their period and brightness and compares it to Levitt's Type I Cepheids and this leads him to conclude that our galaxy is very much larger than it is. After the different types of variable stars became known our galaxy shrunk to "only" 100,000 light years in diameter. Curtis was proved to be completely correct in his argument that all of the spiral nebulae were in fact separate galaxies at mind boggling distances from us. As to his argument that there is just not enough dust in space to obscure all of the light from distant stars and our sun was the center of the galaxy, OOPS. There is very little space dust in a cubic mile of space but there are many, many, many cubic miles between us and even the nearest star and starlight does get extinguished leading to the impression that we are the center of the galaxy when we are definitely not. I happen to know a 4.2 million solar mass black hole in Sagittarius that agrees with me. As for Hubble and Humason they just kept gathering data on variable stars in the Andromeda spiral nebula and when they had enough data to make a good argument for the distance to Andromeda Hubble did two things. First, he sent Shapley an advance copy of the paper. After reading it Shapley told his team "Hubble just destroyed my version of the universe". Second, he published a paper declaring that the data clearly showed that Andromeda was 900,000 light years from Earth and had to be a separate galaxy from our own. Hubble's claims were immediately tested by other groups and they discovered that just by chance Hubble's calibration stars in our galaxy were Cepheid Type II, the dimmer ones, and the stars that he measured in Andromeda were all Cepheid Type II, the brighter ones. this meant that Andromeda was farther away than Hubble had supposed. Before he died Hubble was able to tell his team "Today we just doubled the size of the universe".

No one experiment ever gets everything correct. But by taking the experimental bits of data that do reveal the true nature of the universe and then designing new experiments to get more bits of information and combining our bits of information together we get to go from a small, Earth centered universe to one with two billion Galaxies in it today. And people, the journey ain't over yet, not by a long shot.

Cheers, Chuck

## Another Look

**By Dave Phelps**

Thirty years and more ago I belonged to a small group of amateur astronomers near Pomona. I wrote a few "What's Up's" based on my experience through my 17.5" Coulter. All the objects I observed were found using a finder scope and star hopping, everything I did was with the eye. My photography skills were and still are minimal. Things have changed. I have a little telescope with a computer that's driven by a motor not my arm. I am sure it is a massive improvement even if it is alt-az.
It's a swell telescope, still, I believe the best way to teach astronomy to the youngsters is with our eyes and a pair of binoculars.

That being said, assuming this makes it into print, let me know what you think.

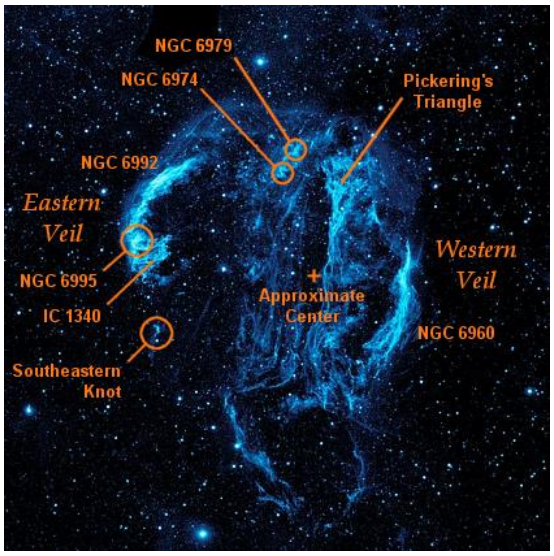
In August, the Milky Way cascades down from Lacerta, through Cygnus and Aquilla, to Scutum and Sagittarius and Scorpius finally to join the southern constellations beyond the horizon.

In the north, marking the head of the Swan, (Cygnus is flying south), is Albireo, Beta Cygni, an unimaginably beautiful double star. Albireo's two components are blue and gold and together shine at 3rd magnitude, blue Beta Cygni B about 2 magnitudes fainter than gold A. Albireo is visible in binoculars, but a larger telescope will intensify the colors. I think Albireo is a must see for public star parties like ours.

North of Albireo is Sadr, Gamma Cygni per Google, Arabic for Lotus. Sadr marks the intersection of the arms of the cross and is the second brightest star in Cygnus after Deneb. Less than two degrees southwest of Sadr, right on the edge of the Great Rift is M29, NGC 6913, a small open cluster. Visually there is swimming an hourglass or trapezoidal knot of a dozen stars superimposed on the stars of the Milky Way.

Sadr also marks the beginning of the Great Rift and a starting point for low power scanning up and down the Milky Way.

I marveled back then at those new nebular filters and super bright mirror coatings that were becoming available . I still remember stopping in at DayStar's store front to buy their nebular filter. I was glad I had it when I looked for the Veil.



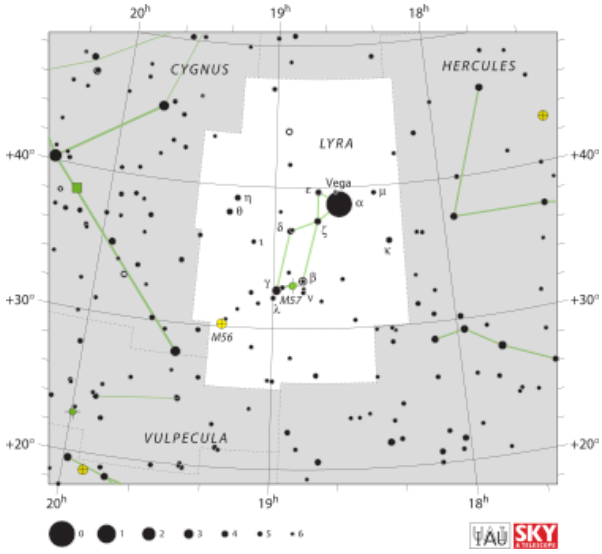
Veil Nebula - Wikipedia

The Veil is a difficult object. Three different pieces spread across several eyepiece fields three degrees apart. At the tip of the wing, you want to look near Epsilon Cygni, a decent multiple star system that may be a test for your skills. Epsilon's Arabic name is Gienah, the "wing". Near Gienah is 52 Cygni, an easy starhop away. Ok, so you're there, now what? Try to refrain from using your GOTO. You are looking at the Veil Nebula, a huge, 6 to 7.5 degree supernova remnant. There are three pieces you can see. NGC 6960 and NGC 6992. Think of them as the right and left or east and west sides. Between them is a triangular notch a little, maybe, fainter. I used to use my long lost Tirion as a chart to explore the Veil. Today photographs from every source will help you look. There are knots and loops and filaments, 5 NGC's and 1 IC to search for and identify. Use your widest field of view and your nebular filter, have dark skies and dark adapted eyes.

In 1955 I got my first telescope, a 3' refractor. The first thing I looked at after the moon was Vega, Alpha Lyrae. It has been so for each of my telescopes since then. Vega is a blue-white giant that will sparkle in your eye. Look close enough and you will see that Vega is a triple star system visually with 10 and 12 magnitude companions with less than one minute of arc separation. Though not physically bound, Vega is an interesting conjunction of bright and dim stars.

A short star hop from Vega is another interesting multiple star system, Epsilon Lyrae. Epsilon is a double in low power but each component splits into two under higher power. True multiple star systems revolve around a common center of gravity like the earth-moon and the earth-moon-sun systems. In that context, according to Burnham's Celestial Handbook, Epsilon 1 and Epsilon 2 have a "year" a million years long.

At the base of the Parallelogram that is the body of the Lyre are Beta Lyrae, Sheliak, which apparently means the tortoise, and Gamma Lyrae. Beta is another multiple star system with six components brighter than 13th magnitude. You have seen the diagrams of eclipsing variable stars so close together that their shapes are ovoid and streams of matter connect the two… Beta is a prime example.



Constellation Lyra - Wikipedia

A little more than a third of the way from Beta to Gamma is M57, famously known as the Ring Nebula.

The Ring is an actual Charles Messier discovery. It is slightly ovoid and should be recognizable as a fuzzy not-a-star in 7x50 binoculars. A few days ago at Herkey Park Sam, Mike and I looked through a 3" F14 at it. Using the standard 25mm eyepiece Celestron supplies with its new scopes, The Ring was reasonably large thanks to the focal length and reasonably visible thanks to the 50 power magnification. Just more or less an oval blob and a hint of a dimmer center, but not bad and great for the kids to look at. What size telescope is needed to resolve its shape, what size its ring structure? I never saw the central star in my 17.5. Send you observation to the Newsletter, we can do a compilation. I am sure we would all love to see your drawing or image of the Ring.

Moving way south, M4 is a bright globular cluster next door to Antares in Scorpius. Back in the late Eighty's I was a correspondent with Walter Scott Houston, a well-known writer and observer. In his Sky and Telescope column in June 1988 he posed a question. He asked for confirmation that the bar through M4 is composed of a double line of stars. Can you see for yourself? Visually, photographically? Sadly "Twinky" is no longer with us, but, no doubt all TVA members would love to see your results. BTW it is reported that Walter could see M4 with the naked eye. It's a degree west of Antares.

Dark Skies.
Dave

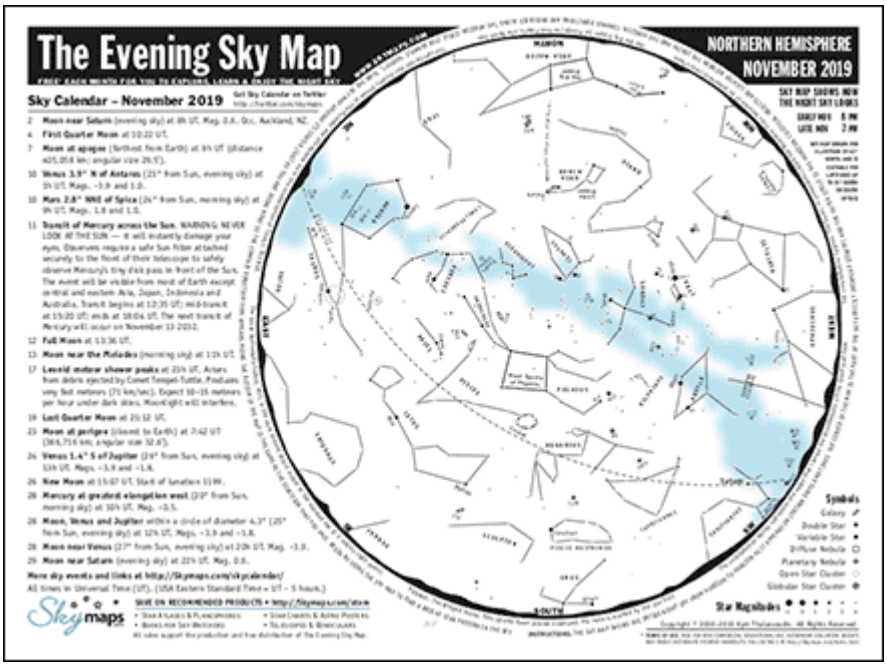
## Beginner's Basic Observational Astronomy (1st in a series)

**By Sam Pitts**

Observing the night sky can be enjoyed while using some really basic tools. While doing an imaging run I like to get back to basics and employ many of the techniques that follow.

First and foremost find a convenient place to observe, even a light polluted backyard is a good start. The most important rule in Observational Astronomy is to get out and look up at the stars. It is ideal try to find a safe, comfortable location that offers the darkest night skies possible, but not imperative. Have several venues to observe from, your backyard, nearby campground, park or astronomy club observing site.

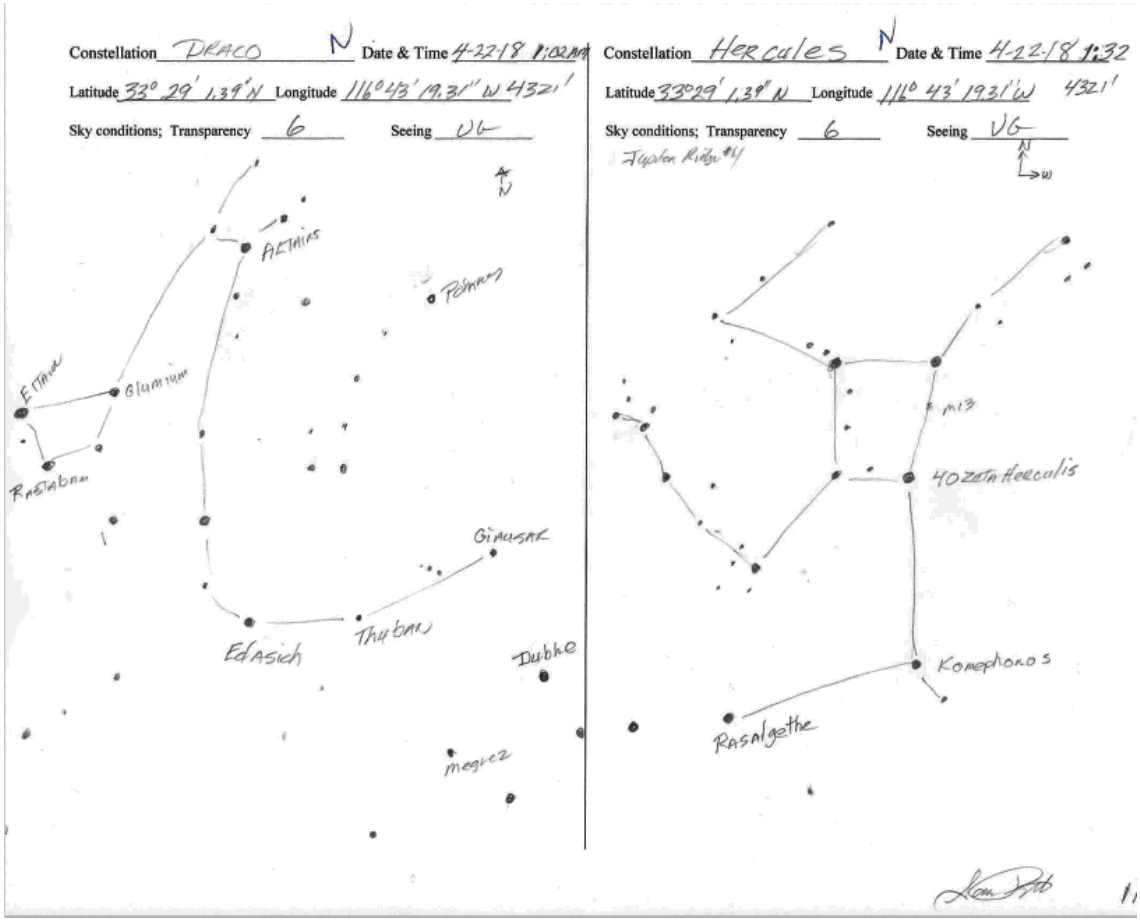
Take a Planisphere or the latest copy of Astronomy or Sky & Telescope magazine's center page-Star Charts. You can also find free charts you can print at "Skymaps.com". Some of the basic equipment I find important; a nice lounge chair, small table, pillow; mosquito repellent; jacket/ blanket and red flashlight to be essential. It is much easier to look up from a reclined position, less neck/back fatigue.




Astronomical twilight comes after sunset when the sun is 12-18 degrees below the horizon. This is when you can really see all the wonders or the night sky. However, it is also challenging to start observing earlier than astronomical twilight to see the major stars appear and try to locate fainter objects using the star charts and watch them brighten. It is also great to use some of the free apps on your cell phone or other devices to see what's up after sunset and try to locate and observe them to learn the sky. Celestron Sky Portal is a nice basic free app for your phone. When you first start out, don't be overly concerned with dark adaptation, this is more important for advanced observing sessions. When we are learning, just getting out is paramount!

To get really dark adapted vision will take about 30 minutes to an hour. Wearing sunglasses prior to sunset can help cut the adjustment time down. Once adapted to the dark avoid lights and use a red flashlight sparingly if you plan on trying to discern faint objects and details of the sky. Coming from a totally red light environment (observatory) it takes about 10-15 minutes for my eyes to adapt. You can actually see the North American nebula naked eye from a Dark Sky site!

A great resource is the Astronomical League's Observing Programs. They have programs tailored for beginners with just naked eye observations and more advanced binocular observing programs. They are fun and help you learn the sky, while finding and identifying objects. Check out their web site under (https://www.astroleague.org/al/obsclubs/AlphabeticObservingClubs.html Writing down observations, along with some real basic sketches, really help you learn the night sky. You don't have to be an artist; just simple stick drawing is all you need.




One tool that will really improve your experience and joy of the night sky is a pair of binoculars. You may already have a pair, but daytime views are much more forgiving than night views of the sky and pinpoint stars. Binoculars are usually listed as 7 x 50, the first number is the magnification the second objective size (front lens). Most common sizes for basic night sky observing are 8x40, 7 x 35, 7x50 & 10x50. The 50mm objective is best for gathering light and not too heavy. Dividing the magnification into the objective size yields the exit pupil cone of light. 10x50 binoculars (50 ÷ 10 = 5mm) have an exit pupil of 5mm. Once we hit age 30 we lose about 1 mm of exit pupil every 10-15 years of age. The human eye's exit pupil is 5-9mm and degrades with age. Some of us seniors have only 4-5mm exit pupil. What this means, is if the binoculars have an exit pupil of 7 mm and our eyes only have a 5mm exit pupil, some of the extra light is wasted. In a telescope exit pupils down to 0.5 mm are normal. As an example a 200mm telescope (8") at 175x, has a 1.1 mm exit pupil. This does not address other anomalies that plague our eyes as we age: stigmatism, floaters, cataracts, etc.

You will need binoculars of good quality. That does not mean you have to go out and spend $300-1,000 on a pair of premium binoculars. They should have a 50mm objective and a magnification of 7-10x. Larger 50mm objectives gather lots of light, while still being light enough to hold comfortably and steady. That is why I like a reclined lounge chair to help steady the view. 62mm to 70mm are real nice, but I used a 70mm set for many years, they were heavy and I found myself not using them as much as a lighter pair. The Nikon 8247 ACULON A211 7x50

($ 105) are good, I use the 8248 ACULON A211 10x50 ($ 112 ). Stay away from higher magnifications, they are harder to handle, try them before you buy them.


Nikon ACULON A21110 x 50


Celestron-SkyMaster 15 x 70

Celestron-SkyMaster Giant 15x70 are popular. While they don't have great optics, they are reasonably priced at $100 and are great to use on a tripod, with a FOV of 4.4° at 3.3 lbs. Now that doesn't sound like much weight, it really is hard to keep steady un-supported. . You can also try the Sky-Master 12x60 (5.3°). Remember you usually get what you pay for when buying optics. The difference in binoculars usually translates to blurrier stars near the edge of the FOV (field of view). The inner 75% is usually pretty sharp, but degrades from there. Binoculars with 15x or higher magnification are best used with a tripod and usually come with an adapter for mounting them.

Photo by: Dennis di Cicco / Sky & Telescope
July 30, 2015 S & T Magazine

## Corner the Great Square of Pegasus

By David Prosper – NASA / JPL

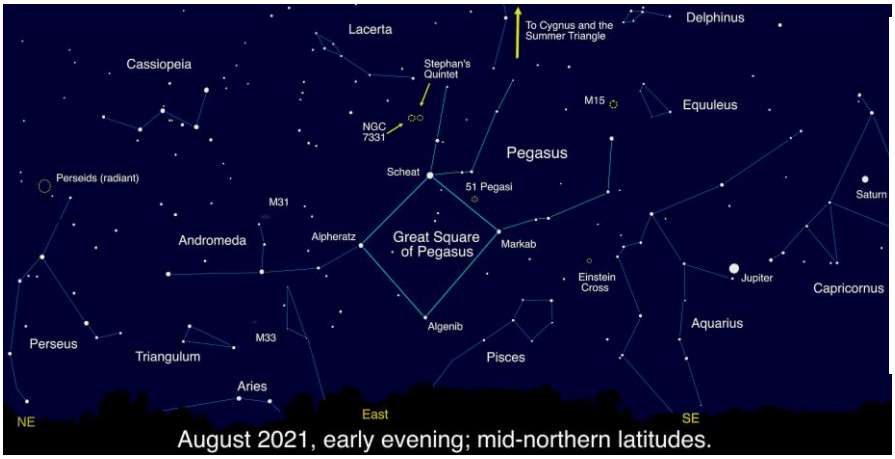
The Summer Triangle may be the most famous seasonal star pattern, but during early August evenings another geometrically-themed asterism rises: the Great Square of Pegasus. This asterism's name is a bit misleading: while three of its stars - Scheat, Markab, and Algenib - are indeed found in the constellation of the winged horse Pegasus, its fourth star, Alpheratz, is the brightest star in the constellation Andromeda!

August evenings are an excellent time to look for the Great Square, as it will be rising in the east after sunset. If not obvious at first, wait for this star pattern to rise a bit above the murky air, and remember that depending on your point of view, it may appear more like a diamond than a square. Look for it below the Summer Triangle, or to the southeast of nearby Cassiopeia at this time. As the Great Square rises in prominence during autumn evenings, it becomes a handy guidepost to finding more constellations, including some of the dimmer members of the Zodiac: Aries, Pisces, Aquarius, and Capricornus. Like the Summer Triangle, the Great Square of Pegasus is also huge, but Pegasus itself is even larger; out of the 88 constellations, Pegasus is 7th in size, and feels larger as the stars in its neighboring constellations are much dimmer.

There are many notable deep-sky objects found within the stars of Pegasus - ranging from easily spotted to expert level targets - making it a great constellation to revisit as your observing skills improve. Notable objects include the densely-packed stars of globular cluster M15, a great first target. The potential "Milky Way look-alike" galaxy NGC 7331 is a fun target for more advanced observers, and expert observers can hop nearby to try to tease out the much dimmer interacting galaxies of Stephan's Quintet. A fascinating (but extremely difficult to observe) object is a gravitationally-lensed quasar famously known as the Einstein Cross. Pegasus has quite a storied history in the field of exoplanet research: 51 Pegasi was the first Sun-like star discovered to be host to a planet outside our solar system, now officially named Dimidiam.

While observing Pegasus and its surroundings, keep your eyes relaxed and ready to catch some Perseids, too! August 2021 promises an excellent showing of this annual meteor shower. The crescent Moon sets early on the evening of the shower's peak on August 11-12, but you can spot stray Perseids most of the month. If you trace the path of these meteors, you'll find they originate from one point in Perseus - their radiant. Giant planets Jupiter and Saturn will be up all evening as well. Look south - they easily stand out as the brightest objects in the faint constellations Aquarius and Capricornus.

Pegasus truly holds some fantastic astronomical treasures! Continue your exploration of the stars of Pegasus and beyond with NASA at nasa.gov.




*While the stars of the Great Square of Pegasus are not as bright as those of the Summer Triangle, they still stand out compared to their neighbors, and make a great foundation for exploring this area of the night sky. Note that the brightness of the stars near the horizon is exaggerated in this picture.*

*Stephan's Quintet is one of the most famous deep-sky objects in Pegasus. First discovered in 1877, it contains the first galaxy group discovered (which includes 4 of the 5 galaxies making up the Quintet) – and has been studied extensively ever since. One day this group will merge into one supergalaxy! While famous, these galaxies are hard to spot in all but the largest backyard telescopes – but are a favorite target of astrophotographers. Take a virtual flyby of these galaxies with a tour created from Hubble data at: bit.ly/quintetflyby*
*Credit: NASA, ESA, and G. Bacon, J. DePasquale, F. Summers, and Z. Levay (STScI)*

**This article is distributed by NASA Night Sky Network**

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The TVA is a member club of The Astronomical League