Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers February 2024

Events: General Meeting, Monday, February 5, 2024, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.

- **IFI & Gallery by Clark Williams**
- **Refreshments by Elvira**
- **Star Parties at South Coast Winery every Friday evening.**
- **For upcoming school Star Parties check the Calendar on the web page.**

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Sharon Smith <sas19502000@yahoo.com> 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 – February 2024
By Mark Baker

Just about 3 years ago I paraphrased…"MARS is Calling, So We Must Go"!!!

The joint Mars 2020 mission of PERSEVERANCE and INGENUITY sparked widespread interest both here and abroad…!!! I still smile when remembering the initial rancor and disdain displayed by Percy's team, who were adamant that they didn't need nor want the little hitchhiker…how quickly they changed their tune once Proof of Concept was accomplished and the possibilities unfolded!!!

Getting Ginny to the surface of Mars is a great story in itself, and I have a presentation that is now well worn on the subject… but the real story is what Ginny was able to do in that incredibly thin Martian atmosphere. Her first flight - and the first controlled flight ever on another planet - was heralded worldwide!!! Ginny was supposed to do three, maybe five, flights to prove it could be done, but by the fourth flight she was officially performing a Reconnaissance Demonstration… and the rest is history!!! A side note reminder that Ginny has a piece of the original Wright Bros Kittyhawk plane that she carried with her… I think that is a great historical connection.

Not every flight went smoothly and even though Ginny was not a "science instrument", we learned things of importance. Flight 6 was the first to experience an anomaly when the navigational cameras got out of sync and dropped a frame here and there… there was a lot of "hemming and hawing" to go with her yawing and pitching I can tell you!!! But her autonomous systems made the proper corrections and landed safely… and only a meter off target!!! The worst part is the signal delay back to JPL… it went from Ginny to Percy and was batched up to the respective orbiter, transmitted to the DSN and then to JPL. Transmission alone could take anywhere from 4 to 22 minutes so it was often a Martian day before the team received the upload…talk about "sweating bullets", day in and day out!!!

Admirably, the team was not shy about pushing Ginny beyond her performance standards…faster, longer, higher!!! One time someone complained to me that they should have used stronger batteries so it could fly farther. This gave me an opportunity to explain that the batteries worked just great and were not the limitation… the extremely high RPM's were, as the motors generated a lot of heat and the Martian atmosphere couldn't assuage the thermal buildup. Hence the flight limitation of 90 seconds… and something to address for future aircraft.

The team also truly learned the importance of line of sight communications as Ginny was assigned a landing spot that ended up being behind a ridge between Ginny and Percy… a ridge neither could "see" over and comm between them was interrupted until Percy could move into an equitable location. Ginny could "ping" the orbiters but otherwise was deaf, dumb, and blind…

But again, flights went as planned for the most part until 71 when contact was lost mid flight… Ginny landed safely and after a check up was cleared for 72. It's important to talk geography and geology at this point as Ginny was flying upstream in an ancient riverbed… one of the primary features were razor dunes with gentle sloping on the upstream side and a sharp drop on the downstream side. In my opinion, based on the images, Ginny's rotors appear to have struck the slope during approach, breaking off about one fourth of both blades on one side. There is ample evidence that Ginny was pushed back as you can see troughs where the leg(s) slid…

So sadly, even though Ginny is fully functional in every other way, she will never take to the skies again. The decision on terminating her is ongoing… some say let her live out her life while others say pull the plug. Regardless, Ginny was an awesome example of human achievement and yes, INGENUITY… you did good!!!

Clear, Dark Skies my Friends…

Looking Up Redux – February 2024

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 7 (7.6.3.1373)
SkySafari 6 Pro (6.1.1)
Stellarium (0.18.2)
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:

Saturday	**the 24th**	**@0434 FULL in LEO**
Friday	**the 2nd**	**@1519 THIRD QTR in LIBRA**
Friday	**the 9th**	**@1500 NEW in CAPRICORNUS**
Friday	**the 16th**	**@0702 First QTR in TAURUS**

Apogee comes on 2024-02-25 @ **1501 – 406,314 km (252,472 mi)**
Perigee comes on 2024-02-10 @ **1851 – 358,087 km (505 mi)**

2024 has: (12) new moons, (12) 1st Qtr moons, (13) Full moons, (12) 3rd Qtr moons
(1) Blue moon and (0) Black moons

Daylight Savings: Starts: 2024-Mar-12 : Ends: 2024-Nov-05 (traditional) CA keeps PDT year-round

Luna: Luna is waning gibbous on the first of the month, headed for New on the 9th rising at **2353**, transiting at **0518+** and setting by **1043+**. Luna by the 15th is in the First Quartert at 44.98% illumination. Rising at **1005** and transiting at **0713** setting at **0026+**. By the-end-of-the-month (29th) Luna is waning

gibbous, rising at **2244** transiting at **0400+** and setting by **0915+**.

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

February 9 - New Moon. The Moon will located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 23:00 UTC. 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.

February 24 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at 12:32 UTC. This full moon was known by early Native American tribes as the Snow Moon because the heaviest snows usually fell during this time of the year. Since hunting is difficult, this moon has also been known by some tribes as the Hunger Moon, since the harsh weather made hunting difficult.

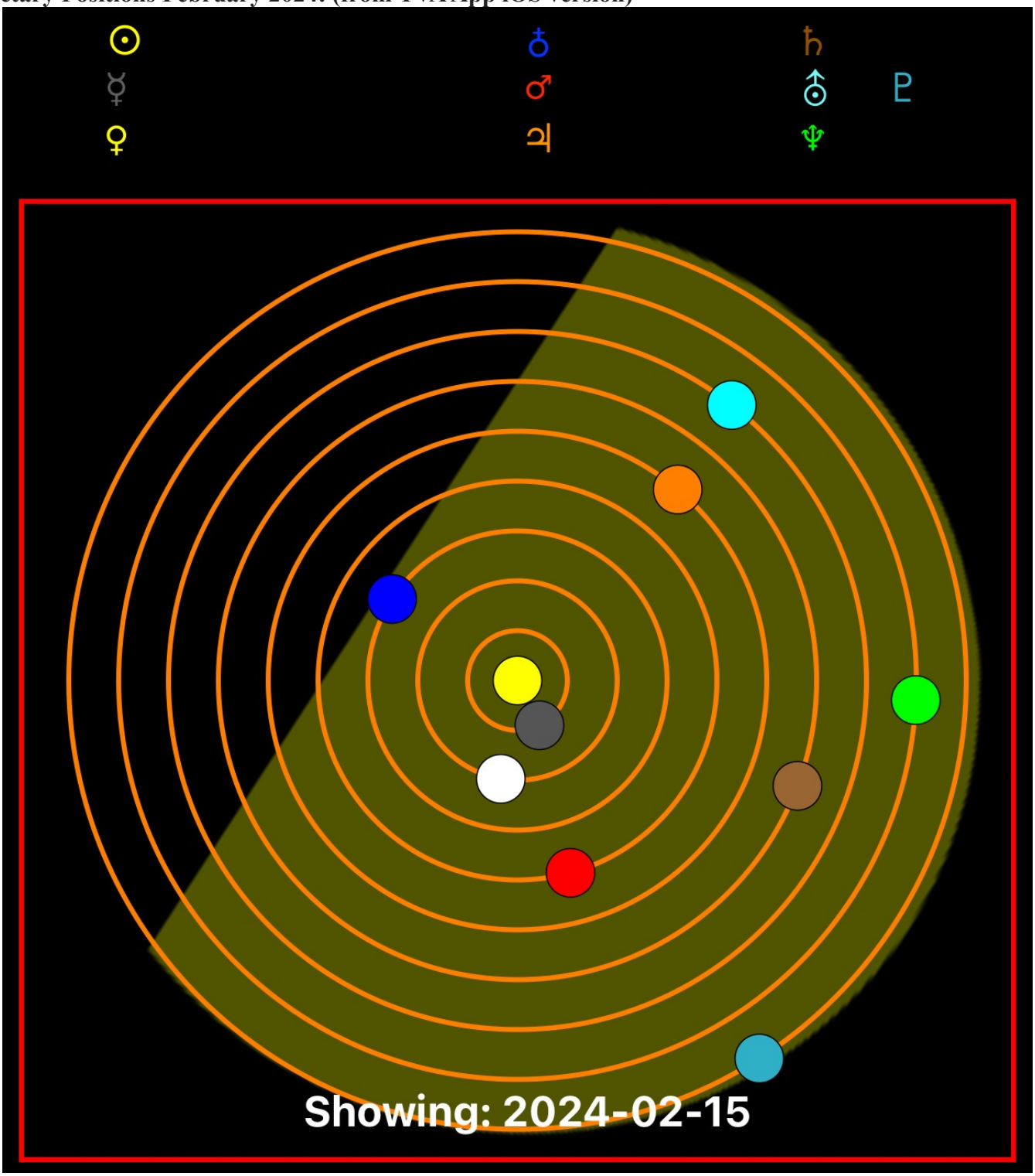
Algol minima: (All times Pacific Time)

02/01/2024	**1225**
02/04/2024	**0914**
02/07/2024	**0604**
02/10/2024	**0253**
02/12/2024	**2343**
02/15/2024	**2032**
02/18/2024	**1721**
02/21/2024	**1411**
02/242024	**1100**
02/27/2024	**0749**


01 WAN GIB
02 3rdQ
03 WAN CRST
04 WAN CRST
05 WAN CRST
06 WAN CRST
07 WAN CRST
08 WAN CRST
09 New
10 WAX CRST
11 WAX CRST
12 WAX CRST
13 WAX CRST
14 WAX CRST
15 WAX CRST
16 1stQ
17 WAX GIB
18 WAX GIB
19 WAX GIB
20 WAX GIB
21 WAX GIB
22 WAX GIB
23 WAX GIB
24 Full
25 WAN GIB
26 WAN GIB
27 WAN GIB
28 WAN GIB
29 WAN GIB
2024 February

Planets:

Planetary Positions February 2024: (from TVA App iOS version)



- **Mercury:** Mercury is a morning object in the beginning of the month. It is illuminated at 88% and -0.03 apparent magnitude. Mercury rises at **0550** with the sun following at **0645**. Mercury is falling into the Sun from our perspective and is approaching the Sun every day. Mercury by the 15th is still a morning object rising at **0614** with the .Sun rising at **0633**. Mercury is now 96% illuminated. By the 29th Mercury has "fallen" in toward the Sun again making it riskier to view. The Sun rises at **0617** and Mercury rises at **0629**.
- **Venus:** Is the Morning Star on the first of the month, rising by **0402**. Venus is 78% illuminated and has an apparent magnitude of -4.05. By the 15th Venus is still the Morning Star, rising at **0427.** By end of month Venus is the brilliant Morning Star rising at **0511**.
- **Mars:** Mars is a morning object onn the first of the month Mars rises at **0536**. However there is a Third Quarter Moon 98% illuminated to the east along the ecliptic. By mid-month (15th) Mars risex at **0521**. End-of-month finds the Warrior transiting at **0502** with Venus in trail risging at **0511**.
- **Jupiter:** Jupiter is an evening object on the first of the month becoming visible about **1830**. Jupiter doesn't set until **0004+**. By mid-month (15th) Jove is still visible by about **1830** in the western sky. Jupiter set**s at 2314**. Come the end-of-month Jupiter is at -2.18 apparent magnitude visible at about the same time in the evening and will set by 2229.
- **Saturn:** Saturn on the first of the month is pretty much lost to the Sun. Saturn by mid month is still lost to the Sun. By the end-of-the-month Saturn is virtually coincident with the Sun.
- **Uranus:** On the first of the month Uranus is an evening object transiting at **1808** and not setting until **0058+**. The Moon does not rise until 2353 so viewing and imaging shoud be good. By the ides (15th) Uranus should be visible by **1900.** Uranus is at apparent magnitude of 5.57 so in dark skies it should be naked eye visible (just barely). Uranus sets at **0003+**. End-of-month finds Uranus again visible at about **1900**. The Moon doesn't rise until **2244** and Uranus doesn't set until about **2310**.
- **Neptune:** Neptune in the beginning of the month should be visible sometime around **1900**. You'll still need a scope to see it; say 200mm (8in). Neptune sets at **20343**. By the 15th Neptune is very close to the western horizon by **1900**. Neptune sets at **1950**. By the end of the month Neptune sets at **1857** and is too close to the Sun to see.
- **Pluto:** Pluto on the first of the month is a morning object rising at **0618** but it is too close to the Sun to see. By mid-month Pluto is a morning object but too faint to see on the morning glare of the Sun. By the 29th Pluto has moved into being a morning object rising at **0424** followed by sunrise at **0617**. You should get to have a good view of Pluto.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2024 with a reasonable magnitude; say less than or equal to +10 in February there is nothing except the regulars: Juno, Vesta. Hebe, Eros and Herculina. So consult your local planetarium software or try: https://www.asteroids near.com/year?year=2024

Meteors:

- None this month.

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believe 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 February 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.

All the comets I could find for February were dimmer than Magnitude 9.0 . Maybe next month.

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 February 2024 at 2100 PDT and you will have about 20 minutes of viewing time total.

Lets take a look at some favorite objects (at least for me):

- NGC 1435**:**

Illustration 1: By John Stauffer
(Spitzer Science Center, Caltech)
Public Domain

The Merope (mero-pee) Nebula AKA: 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. John Herschel included it as 768 in his General Catalogue of Nebulae and Clusters of Stars but never observed it himself.

The Merope Nebula has an apparent magnitude starting at 13 and quickly dimming by a factor of about 15, making most of the nebula dimmer than magnitude 16. It is illuminated entirely by the star Merope, which is embedded in the nebula. It contains a bright knot, IC 349, about half an arcminute wide near Merope, which was discovered by Edward Emerson Barnard in November 1890. It is naturally very bright but is almost hidden in the radiance of Merope. It appears blue in photographs because of the fine carbon dust spread throughout the cloud. Though it was once thought the Pleiades formed from this and surrounding nebulae, it is now known that the Pleiades nebulosity is caused by a chance encounter with the cloud. (Wikipedia)

- NGC 884 (also known as χ Persei) is an open cluster located 7640 light years away in the constellation of Perseus. It is the easternmost of the Double Cluster with NGC 869. NGC 869 and 884 are often designated h and χ Persei, respectively. The cluster is about 14 million years old. Located in the Perseus OB1 association, both clusters are located physically close to one another, only a few hundred light years apart. The clusters were first recorded by Hipparchus, thus have been known since antiquity.

  The Double Cluster is a favorite of amateur astronomers. These bright clusters are often photographed or observed with small telescopes. Easy to find, the clusters are visible with the unaided eye between the constellations of Perseus and Cassiopeia as a brighter patch in the winter Milky Way. The Double Cluster was also included in the Caldwell catalogue, a catalogue of astronomical objects for amateur observation.

  In small telescopes, the cluster appears as a beautiful assemblage of bright stars located in a rich star field. Dominated by bright blue stars, the cluster also hosts a few orange stars that add to the visual interest. Both clusters together offer a spectacular low-magnification view. (Wikipedia)

- **M1:**

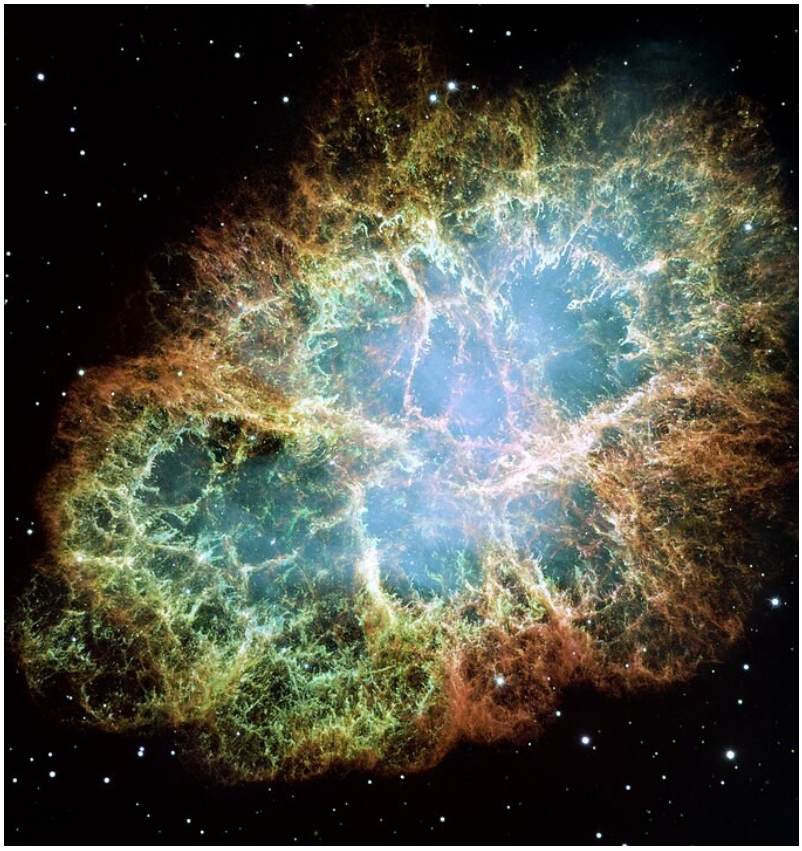


Illustration 2: By NASA, ESA, J. Hester and A. Loll (Arizona State University) - HubbleSite: gallery, release., Public Domain

The Crab Nebula (catalogue designations M1, NGC 1952, Taurus A) is a supernova remnant and pulsar wind nebula in the constellation of Taurus. The common name comes from a drawing that somewhat resembled a crab with arms produced by William Parsons, 3rd Earl of Rosse, in 1842 or 1843 using a 36-inch (91 cm) telescope. The nebula was discovered by English astronomer John Bevis in 1731. It corresponds with a bright supernova recorded by Chinese astronomers in 1054 as a guest star. The nebula was the first astronomical object identified that corresponds with a historically-observed supernova explosion.

At an apparent magnitude of 8.4, comparable to that of Saturn's moon Titan, it is not visible to the naked eye but can be made out using binoculars under favourable conditions. The nebula lies in the Perseus Arm of the Milky Way galaxy, at a distance of about 2.0 kiloparsecs (6,500 ly) from Earth. It has a diameter of 3.4 parsecs (11 ly), corresponding to an apparent diameter of some 7 arcminutes, and is expanding at a rate of about 1,500 kilometres per second (930 mi/s), or 0.5% of the speed of light.

At the center of the nebula lies the Crab Pulsar, a neutron star 28–30 kilometres (17–19 mi) across with a spin rate of 30.2 times per second, which emits pulses of radiation from gamma rays to radio waves. At X-ray and gamma ray energies above 30 keV, the Crab Nebula is generally the brightest persistent gamma-ray source in the sky, with measured flux extending to above 10 TeV. The nebula's radiation allows detailed study of celestial bodies

that occult it. In the 1950s and 1960s, the Sun's corona was mapped from observations of the Crab Nebula's radio waves passing through it, and in 2003, the thickness of the atmosphere of Saturn's moon Titan was measured as it blocked out X-rays from the nebula. (Wikipedia)

If it is clear, February is great for both viewing and imaging. February is also our Monsoon month. Most of our rainfall happens in February and early March. Spend some time outside with your scope when you can; it misses you. Winter is here.

For now – Keep looking up.

RANDOM THOUGHT January 2024
By Chuck Dyson

IS THE BIG BANG REALLY DEAD?

Last month I talked about paradigm changes and how it can take a century, or more, to have a shift in view point really become generally accepted. One of the reasons for people refusing to accept radically new viewpoints is that science is a really messy process. Unfortunately there is no cure for messy science because that's the way it is done.

Perhaps messy is the wrong word and low resolution would be better. Low resolution plots let you look at a large number of objects and answer two key questions. What is out there and what's in the population of objects. However, with low resolution surveys the accepted margin of error of how big, how bright, or how far an object is are much greater than if one does a high resolution study of the same group of objects. The problem with high resolution studies is they can take a lot of operational time for each object and are best saved for interesting or evolving objects. A good example of how much time even a single picture can take is the Hubble Ultra Deep Field photograph; one picture 278 hours of telescope time at $11,000 per hour.

An example of how the system works is shown in several papers just published on the analysis of spectra of galaxies in the early universe. In the first paper the group, using a low resolution spectrograph, identified a Lyman-alpha transition (The Lyman-alpha transition is prominent spectrographic feature that is used to determine the redshift of light.) that was consistent with a redshift of Z-16.2 (The higher the Z factor the longer the light has traveled to reach you.) and that Z factor indicated the light was emitted 13.5 billion years ago, that is 200 million years after the Big Bang, not enough time to build a large galaxy. A subsequent paper using a higher definition spectrograph downgraded the redshift to Z-4.9 or 12.4 billion years ago, plenty of time to build a large galaxy.

In another galaxy the initial data, based on the amount of light emitted from it, was declared to be a supermassive galaxy at a time much too close to the big bang to have been formed by the same processes that formed our galaxy; however, when higher resolution spectra became available it was noted that the light curve of this early galaxy was bluer than the calculated light curve from our galaxy. A bluer light curve indicates that there are more stars in the early galaxy that are larger than our sun than is in our galaxy today (a sun that is ten times more massive than our sun produces just over a thousand times more light than our sun; so, a star system that has just one star ten times the mass than our sun will produce twice the light that 500 suns the same mass as our sun will produce but have only 1/50th of the mass). When astronomers adjusted the solar masses necessary to the bluer spectra the galaxy lost weight like it was at Weight Watchers and the early mass problem was solved.

A group mostly from Colgate University NY has published a paper claiming that three objects in the JWST Advanced Deep Extragalactic Survey (JADES) data are possibly super massive dark star candidates. What the heck is that? First they are not dark stars they are dark matter stars. What the heck is that?? From the studies on the rotational speeds of galaxies we know that there is way more gravitational "stuff" holding galaxies together than just the "stuff" (baryonic or visible matter) than we can see. From the studies of galactic haloes we know that the "stuff" (dark matter) that they are made of does not, in any way, react with the electromagnetic force (absorb and readmit photons) dark matter does react with light

by gravity and bend the light to give us a gravitational lens effect that we can see. Because gravity is so weak, compared to the electromagnetic force, and dark mater particles appear to be massive enough to strongly bend light they are called Weakly Interactive Massive Particles (WIMPs), the name does not tell us anything about the particle just how it interacts with light. The final assumption about WIMPs is that they are their own anti-particle and the only reason that we do not see WIMPs annihilating each other in the universe today is that they are so spread out that they rarely interact. You should also know that when an atom is split, fission reaction, only 0.1% of the mass is converted to energy, when two atoms are fused together, a fusion reaction, 0.7% of the mass is converted to energy, but when a particle anti-particle annihilate each other 100% of the mass gets converted to energy. Particle annihilation events release way more energy than atomic, fission, bomb or hydrogen, fusion, bomb blasts.

The authors of the dark star paper contend that although we do not see dark stars in the universe today in the early universe when the density of both baryonic matter and dark matter was higher than today there could have been areas of gravitational collapse that concentrated both baryonic and dark matter. When the dark matter reached a critical level of concentration and contact between two particles becomes common then the energy released heats the baryonic matter cloud to really high temperatures and it releases as much energy as a massive black hole or galaxy. This interpretation of the power source and size of the three bright objects seen by the JWST solves two major conundrums created by the data, how can you have super massive galaxies and black holes in the early universe, but only if dark matter is its own antiparticle and behaves the way the researchers think. If you would like more information on this subject the paper is by Cosmin Ilir et. Al. in 2023 PNAS, title: Supermassive Dark Star Candidates seen by JWST. The other thing that JWST will be spending some time looking at will be the Tarantula Nebula in the Large Magellanic Cloud, an irregular dwarf galaxy. This nebula is a star forming region in the Magellanic Cloud but different than the star forming regions in our own galaxy, as far as we can see. For comparison the M42 nebula in the Orion constellation is 1,344 light years away, is 25 light years in diameter, and is the home to over 700 new stars; about 12 of which are the massive type O stars. The Tarantula nebula is 161,000 light years away, is 100 light years in diameter, and is home to more than 800,000 catalogued stars; over 300 of which are type O and over 400 of which are type B. We know that the universe has evolved over time and astronomers think that the Tarantula nebula represents the type of star forming region that was common nine billion years ago, this period was known as the Stellar Noon and represents the period of peak stellar formation. Even though the Tarantula Nebula is 161,000 light years away it represents an incredibly close window to how the universe functioned nine billion years ago and that can a tremendous help in interpreting the data from that time period.

The other reason JWST and other scopes will be studying the Tarantula Nebula is because of star R136a1 and several of its close neighbors. Several of R136a1's neighbors are at the theoretical maximum mass for suns, 150 times our sun's mass, and R136a1 maximum calculated weight is 180 solar masses. It appears that astronomers may need to rethink how massive a star can be and try to figure out how they actually get that massive.

All of these early reports on the first data from the JWST, with a little help from Hubble and numerous land based telescopes, could mean that we will eventually need to change or modify our explanation of how the big bang happened on how the early universe started, and almost certainly we will be changing the story on how the early universe evolved, we wait for more and better data on the most interesting, controversial, findings and find we need to do nothing at all. One thing that will not change is the rush by

researchers of all types to get their papers on a particular subject first because that is where the professional recognition and future grant money is.

How can the average person who is interested in astronomy know if the data seriously indicates that our ideas of how the universe works are about to change or if the data just indicates that we need to just take a serious look at the subject? Neil deGrasse Tyson on his Star Talk channel is a good source but only on Star Talk or the occasional Big Think channel all others are just using his face and name as click bate and on those channels you will be going down some very strange rabbit holes indeed. Two other reliable communicators of science in general and astronomy in particular are Dr. Becky Smethurst your friendly neighborhood astrophysicist and Sabine Hossenfelder a theoretical physicist both of these people are great at explaining what is going on in astrophysicist today. Last, but not least, is the continuing PBS show Space Time. This program will give you information without the hysteria and outlandish claims that are in so many other channels.

The JWST should get some help at looking at the Tarantula Nebula at the end of 2024 from the Vera Rubin 8.4 meter telescope in Cerro Pachon Chili. The biggest telescope news is design plans for the Carl Sagen 12 meter space telescope to replace JWST in 2032, one hopes considering how space launch timelines have worked in the past.

STAY CURIOUS

CHEERS CHUCK

February 2024 Another Look

Dave Phelps

"The Ram, the Bull, the Heavenly Twins,
And next the Crab the Lion shines,
The Virgin and the Scales.
The Scorpion, Archer, and He Goat,
The Man that holds the watering-pot,
And Fish with glittering scales."

Saturday the 10th @ 0301 is February's New moon. February's Full moon will be on Saturday the 24th @ 0530. It will be a "Micro" Full moon. Traditionally, February's full moon is called the Full Snow moon. Having lived 20 years in North Carolina on the Blue Ridge Mountains, I can attest to that fact. Native American names for the February moon are Bald Eagle moon, Bear moon, Bony moon, Eagle moon, Hungry moon and Groundhog moon.
In French Pleine Lune de Fevrier, in German, Vollmond im Februar, in Italian, Luna Piena di Febbraio and in Greek, Πανσέληνος Φεβρουαρίου, Panselinos Fevrouariou.

Taurus is old. Known as Le Taureau in France, il Toro in Italy, and is the der Stier of Germany. Seemingly worldwide, via the ancient Zodiacs preserved for us, Taurus **is one** of the earliest and most noted constellations, perhaps the first or one of established, because it marked **the vernal equinox** from about 4000 to 1700 BC. It was called the "Bull of Light" in Babylon. We believe **Taurus was identified with Marduk**, their chief god, and called the "Spring Sun". 15000 years ago the bull, the Pleiades, **the Hyades and the belt** of Orion were painted on a cave wall in Lausaux, France.

Egypt also has Apis, the Bull, In a tomb in Thebes, then **the capital of the lower kingdom**. Twelve constellations have hieroglyphics assigned to them. The **Pleiades represented the bull and was** named Atauria, becoming our Latin Taurus and German Thier. As a zodiacal **sign the bull marked the beginning** of the year, migrating from Akkadia and Babylon through Persia, Chaldea, **India and Egypt, along with their** zodiacs.. Even lingering down the centuries to Mithras, the main deity of the **Roman legions**.

The Persian and Jewish scholars historically named the **zodiacal constellations** by **giving** them letters, such a A, B, C etc. Taurus was A, the first sign of the zodiac **as it was in the Kabbalah**. Prior to the Roman conquest, the Druids of what we now know as the British Isles **a Irel , worshiped** the Bul uring their Tauric festival, when the sun entered the constellation, coming down to **us today as Mayday** and in Scotland the rising of the Bull marking Candlemas.

Among the ancient Chinese Taurus was known as "the White Tiger"; later it was called "the Golden Ox." Strangely enough we find that native South Americans in the Amazon called this star group "the Ox."

In South Africa they are known as the hoeing stars,

"All of this history shows us a proof that for centuries throughout prehistory, there was a transmigration, or a means of communication between the land masses.

Sweet Europa's mantle blew unclasp'd,
From off her shoulder backward borne,
From one hand droop'd a crocus, one hand grasp'd
The mild Bull's golden horn

Europa was the daughter of Agenor and a Princess of Phoenicia. Jupiter is/was not a nice guy. The Greeks seemed to endow

all of their baser instincts into the deities allowing them to be bloodthirsty and ribald, thus excusing themselves of any fault. Jupiter turned himself into a white bull and insinuated himself into Agenor's herd. It seemed Jupiter the bull was so beautiful that Europa could not resist adorning him with garlands of flowers and then climbing onto his back. Jupiter immediately carried her away, swimming to Crete where she bore him three sons: Minos of Crete, Rhadamanthys of the Cyclades and Sarpedon of Lycia. Thought never making it any further west than Crete, somehow she gave her name to an entire continent.

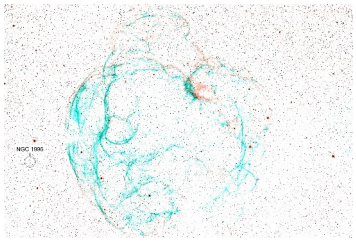
> The strand he gained and forward he sped like a dolphin, faring with unwetted hooves over the wide waves, and the sea as he came grew smooth, and the sea monsters gamboled around before the feet of Jupiter, and the dolphin rejoiced and rising from the deeps he trembled on the swell of the sea. The Nereids arose out of the salt waters and all of them came on in orderly array, riding on the backs of sea beasts. Moschus

As a nascent astronomer, I had a tendency to overlook Taurus somewhat. Between the globulars of Auriga and the Trapezium in Orion, two open star clusters and a crab were dealt with in short order. As I began to learn more, however, I came to realize that Taurus had little to offer the visual astronomer except for two open star clusters and a crab. So we live and learn.

Burnham lists over 120 multiple star systems and variables. Houston raves about a planetary and I have learned about a molecular cloud rivaling M42. Taurus has over 80 systems with exoplanets, some with multiple satellites. There are 5 Collinder open clusters, 11 open clusters total, 5 galaxies 14th magnitude and brighter and 17! named stars.

You won't see too much of the Taurus molecular cloud visually except for two areas of nebulosity associated with dark nebula. IC 2087 and IC 2088. What you will see is a star-scape strewn with diamonds.

Another object that will be very difficult to observe is Simeis 147, a supernova remnant almost 3^0 in size. If your mirror is large enough, you may be able to glimpse it unaided, but a Hα filter will give you your best chance. Look for it up by **β**, Elanth, straddling the line between Taurus and Auriga.



Up near the border with Perseus is a planetary nebula noteworthy for creating a sea-change in astronomical thinking. NGC 1514 is the Snowball Nebula. 1514 is 2 or 3 arc. min. in dimension, about half the apparent size of Tycho crater on the moon. At 9th magnitude you will see the central star easily though results vary on how easy it is to see the planetary shell. Back in 1790 William Herschel wrote:

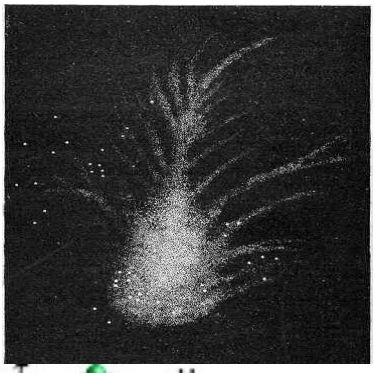
> A most singular phenomenon! A star of about 8th magnitude with a faint luminous atmosphere of circular form, and about 3 minutes in diameter. The star is in the centre, and the atmosphere is so faint and delicate and equal throughout that there can be no surmise of its consisting of stars; nor can there be a doubt of the evident connection between the atmosphere and the star.

There is one Caldwell object in Taurus, C41, the Hyades and 5 Collinder Open Clusters; Cr's 50, the Hyades, Cr 54-N1647, 57 – N1746, 60 – N1817 and 65. They are all easy binocular objects, the dimmest being Cr 60 at 8th magnitude.

Less than an open cluster, N1746 is considered an asterism.

Near the **δ**'s and **ε** is Hind's Variable Nebula. Hind's is illuminated by T Tauri, a variable star shining from 9th to 11th magnitude over a 27 year period. As a result, the nebula with also brighten and fade over the same period. Then, of course, there is the Sasquatch Nebula, He is easy to find, not too far from **ζ** zeta, given name Tianguan. M1 is 2^0 to the NE, a middle Telrad circle. Be reminded that it doesn't look like the photographs, but you can still see a lot using your eye. You'll love it.

Image by Lord Rosse 1848



Taurus has 17 stars with proper names. In the Hyades there is Aldebaran, Theta **θ** Tauri is named Chamukuy, In the mythology of the Maya peoples, Chamukuy is a small bird in the Yucatec Maya language. **E ε** tauri marks one of the vertices of the Hyades triangle. It has the name Ain, derived from the Arabic. John Flamsteed named the star Oculus Boreus, Latin for northern eye. Then there is Prima Hyadum and Secunda Hyadum, meaning the first and second of the Hyades. Prima marks the nose and Secunda marks the multiple star system **δ** delta, Two stars surrounded by many smaller ones, halfway between the nose and the ear, **ε** epsilon.

Other stars to point out in the Hyades are the small bi-color group the theta **θ's.** Also look for close doubles kappa **κ** and mu **μ.** Hoggar is **τ** tau, halfway to Elnath, **β** beta. The tip of the other horn is **ζ** zeta, Tianguam.

> In lustrous dignity aloft see Alpha Tauri shine,
> The splendid zone he decorates attests the Power divine:
> For mark around what glitt'ring orbs attract the wandering eye,
> You'll soon confess no other star has such attendants nigh.
> Serviss

In one of the stories the Hyades and the Pleiades are sisters of Atlas and Pleione. They had a brother named Hyas who died while hunting. This so saddened the sisters that they wept, thus bringing annual storms.

The Pleiades are ancient, much older than the usual Greek myths and older than Homer. There name, however, does come from the Greek word **pleein,** meaning "to sail", clearly referencing that at their setting, stormy winter is passing and spring is nigh.

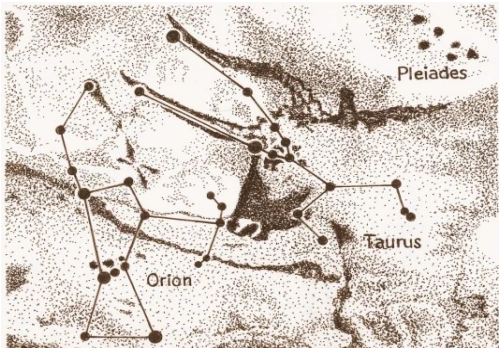
My most memorable view of the Pleiades was through a pair of 25 x100 binoculars setup on the upper telescope field at RTMC. I remember coming back again and again just to reset the image and look once more. The star field was covered in mist and the stars bright and hard. Each time I looked a had to catch my breath.

The Pleiades are the proof how important the stars are historically. The 15,000 year old image from Lausaux cave in France shows a bull under the 7 or is it 8 stars of the Pleiades. I believe he also

painted the Hyades on its head. An imaginative interpretation can find even more figures hidden in the paint.

The name by which the Pleiades are known among the Polynesians is the "Tau". Tau marks a season, and as with the Egyptians, the Pleiades delineates a time of celebration and feasting. Perhaps this is another piece of data that points to cultural mingling going back thousands of years.

It has always been written the we can see only six Pleiades though tribal memory recalls seven. The seven are the daughters of Atlas, or the Atlantides, whose names were Merope, Alcyone, Celaeno Electra, Taygeta, Asterope, and Mala. Per Hyginus, the seventh star in the group dimmed towards the end of the second millennium BCE.



When the Pleiades were photographed in 1888 by Paul and Prosper Henry, it was found that the seven stars were veiled in nebulous folds clinging to and filling the spaces between with filmy mist and wreaths of stellar gauze. Thus was Tennyson's picturesque description written in the well-known lines —

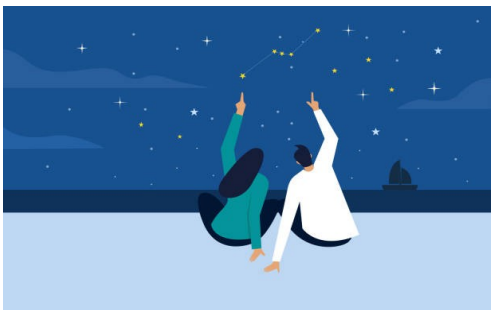
Many a night from yonder ivied casement, ere I went to rest,
Did I look on great Orion sloping slowly to the West.
Many a night I saw the Pleiads, rising thro' the mellow shade,
Glitter like a swarm of fire-flies tangled in a silver braid.

As picturesque as Tennyson writes of Locksley Hall there is a bit of a problem. Charles Messier lived 87 years, passing in 1817. He was a comet hunter and compiled a list of fuzzy objects not to be confused with comets. Messier's telescopes would have had difficulty resolving M45 into stars. Maybe what he saw was a misty ball with specs of stars shining. Tennyson wrote Locksley Hall in 1888, when he was 79 years old, 3 years before he died.

Rather than the "Pleiads" looking through "yonder ivied casement", what he actually saw in a beautiful example of poetic license.

By the way, the Maia nebula bears the NGC number 1432 and vdB 21, the Merope nebula is 1435 and vdB 22. Electra is vdB 20 and Alcyone is surrounded by van der Berge vdB 23. You can find the van der Berge catalog at **https://www.emilivanov.com/CCD Images/Catalog_VdB.htm.**

So, you tell me. Isn't Taurus the month to take your sweetie out to look through your telescope at "a swarm of fire-flies tangled in a silver braid."?



Thank you, "The Far Side"

Their names have been thus recorded by Aratus . — These seven names they bear Alcyone and Merope, Celaeno, Taygeta, and Sterope, Electra, And queenly Maia, small alike and faint, But by the will of Jove illustrious all At morn and evening, he makes them mark Summer and winter harvesting and seed time

Hesiod, who wrote about 200 B C., shows how they were observed in his time as signs for the seasons —

When, Atlas-bom, the Pleiad stars arise
Before the sun above the dawning skies,
Tis time to reap ,and when they sink below
The moon-illummed west, 'tis time to sow

And, of course, per Mrs. Sigourney,
. . . go forth at night
And talk with Aldebaran, where he flames In the cold
forehead of the wintry sky. "The Stars"

Dark Skies Dave

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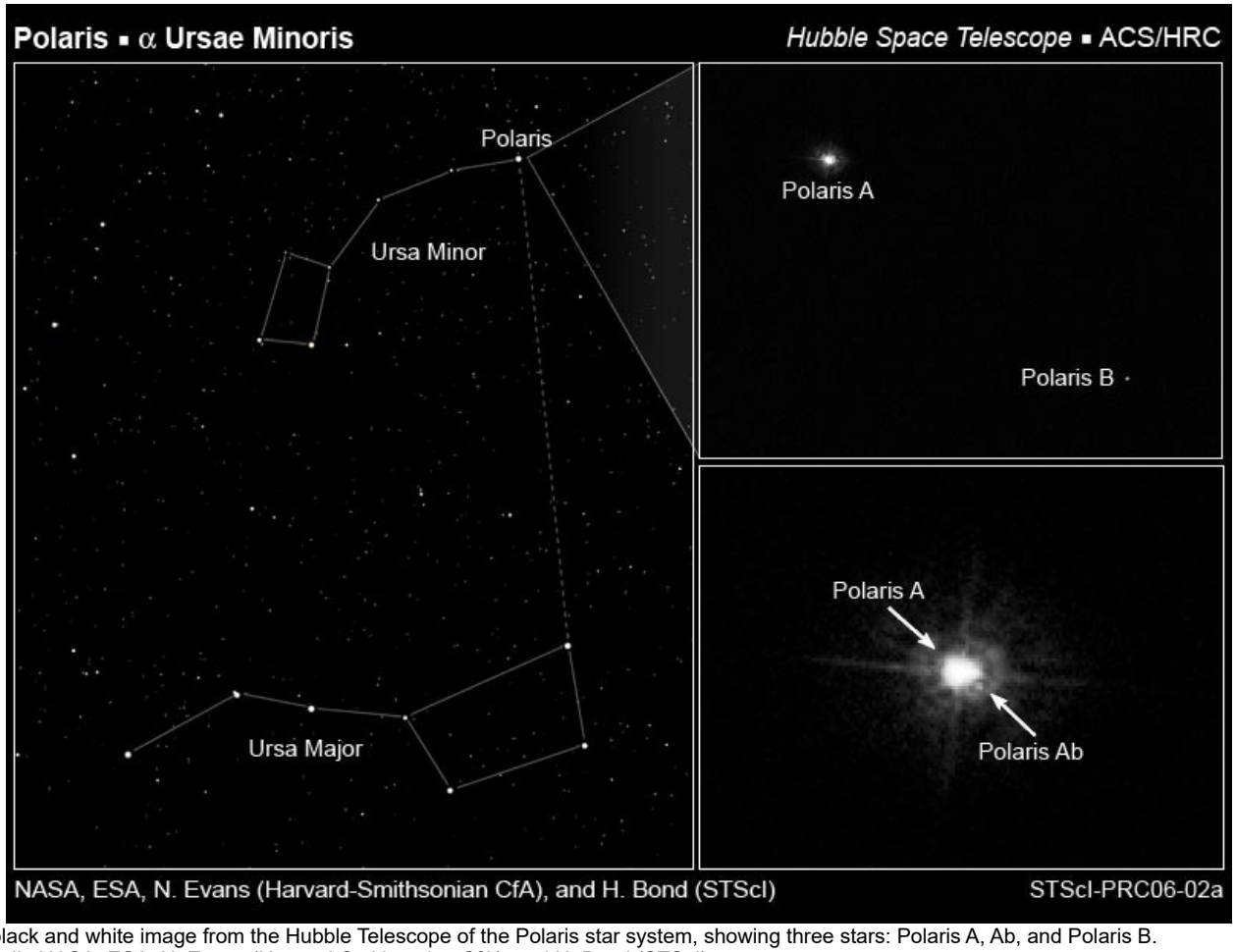
Constant Companions: Circumpolar Constellations, Part I
By Kat Troche

Winter in the northern hemisphere offers crisp, clear (and cold!) nights to stargazers, along with better views of several circumpolar constellations. What does circumpolar mean when referring to constellations? This word refers to constellations that surround the north and south celestial poles without ever falling below the horizon. Depending on your latitude, you will be able to see up to nine circumpolar constellations in the northern hemisphere. Today, we'll focus on three that have gems within: **Auriga, Cassiopeia, and Ursa Minor**. These objects can all be spotted with a pair of binoculars or a small to medium-sized telescope.

The counterclockwise circumpolar constellations Auriga, Cassiopeia, and Ursa Minor in the night sky, with four objects circled in yellow labeled: Pinwheel Cluster, Starfish Cluster, Owl Cluster, and Polaris.
Credit: Stellarium Web

- **The Pinwheel Cluster:** Located near the edge of Auriga, this open star cluster is easy to spot with a pair of binoculars or small telescope. At just 25 million years old, it contains no red giant stars and looks similar to the Pleiades. To find this, draw a line between the stars Elnath in Taurus and Menkalinan in Auriga. You will also find the **Starfish Cluster** nearby.
- **The Owl Cluster:** Located in the 'W' or 'M' shaped constellation Cassiopeia, is the open star cluster known as the **Owl Cluster**. Sometimes referred to as the E.T. Cluster or Dragonfly Cluster, this group of stars never sets below the horizon and can be spotted with binoculars or a small telescope.



A black and white image from the Hubble Telescope of the Polaris star system, showing three stars: Polaris A, Ab, and Polaris B. Credit: NASA, ESA, N. Evans (Harvard-Smithsonian CfA), and H. Bond (STScI)

- **Polaris:** Did you know that Polaris is a triple star system? Look for the North Star on the edge of Ursa Minor, and with a medium-sized telescope, you should be able to separate two of the three stars. This star is also known as a *Cepheid variable star*, meaning that it varies in brightness, temperature and diameter. It's the closest one of its kind to Earth, making it a great target for study and conceptual art.

Up next, catch the King of the Planets before its gone for the season with our upcoming mid-month article on the Night Sky Network page through NASA's website!

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