



# Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers July 2022

**Events: General Meeting, Monday, July 18, 2022, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.**

- Gallery of JWST First Light Images by Clark Williams
- Movie "Search For Planet B"
- Popcorn and water by TVA

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

**For upcoming school Star Parties check the Calendar on the [web page](#).**

## WHAT'S INSIDE THIS MONTH:

**Cosmic Comments**  
by President Mark Baker

**Looking Up Redux**  
compiled by Clark Williams

**Random Thought – A Different Perspective - Part II**  
by Chuck Dyson

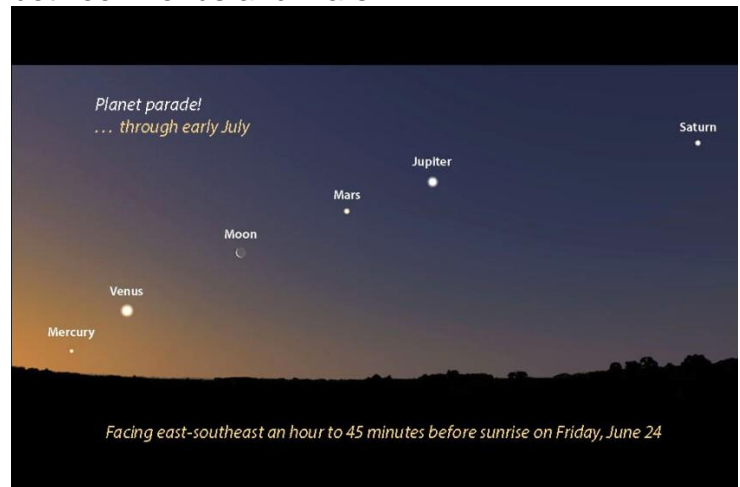
**Another Look**  
by Dave Phelps

**Find Hercules and His Mighty Globular Clusters**  
by David Prosper (NASA/JPL)

Send newsletter submissions to Paul Kreitz <[pkreitz@sbcglobal.net](mailto:pkreitz@sbcglobal.net)> by the 20<sup>th</sup> of the month for the next month's issue.

## Planetary Alignment-

The Naked-eye planets all lined up in order of their distance from the Sun in late June – early July. On June 24 and June 25 the waning crescent Moon joined the party, fitting in order, between Venus and Mars.



## 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 – July 2022

By Mark Baker

I've got two topics to cover this month... the obvious one is the receipt of First Light images from the James Webb Space Telescope (JWST). We should all be excited to see the Universe in a "different light", literally!!! The use of Near Infra-red wavelengths lets us see things that were nigh impossible in visible light... and the anticipation is almost tangible!!! There are so many aspects that will be enhanced by this latest in our information arsenal, and one of my favorites will be exo-planets...seeing them, knowing what they are made of, grasping atmospheric content, etc. gets us closer and closer to getting there, albeit in a probable far flung future!!! Stay tuned for one exciting ride...

The second topic is more personal... as many of you know, I was an early proponent of extensive pervasiveness of water throughout the solar system, not just on Earth. On a scientific scale, this placed me just below snake oil purveyors as this was in complete opposition of prevalent thinking!!! Of course, time has vindicated my math and my stance, BUT nothing sent chills up my spine as having the ESA Trace Gas Orbiter, ExoMars, CONFIRM that liquid water exists today on Mars... yes, today!!! Its analysis has determined that liquid water in an aquifer condition may be as close as one meter below the surface... and the current hypothesis is that Mars lost a lot of water over the last few billion years to the solar wind, but not as much as was projected. Maybe only 15%...!!!

And that leads me to Valles Marinaris... by now you all know that for me, INGENUITY is the first step in eventually exploring this intriguing geological structure, hopefully in my lifetime. But I'm even more adamant about getting scientific instrumentation down in the "canyon" that would stretch from New York to California on Earth, and at a depth of up to 8 kilometers (5 miles) as ExoMars has CONFIRMED the presence of liquid water in the gorge...

It will be great if PERSEVERANCE finds record of fossilized life, but how much even more game changing would it be if even microbial LIFE exists down there?? Food for thought...

And again, we of TVA get to be in the vanguard of inspiring the next wave of scientists and engineers in such awesome endeavors... that's pretty heavy stuff!!! Keep up the great work...

Clear, Dark Skies



## Looking Up Redux – July 2022

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:

**Wednesday the 13<sup>th</sup> @ 1138 FULL in SAGITARIUS**

**Wednesday the 20<sup>th</sup> @ 0719 THIRD QTR in PISCES**

**Thursday the 28<sup>th</sup> @ 1056 NEW in TAURUS**

**Wednesday the 6<sup>th</sup> @ 1915 First QTR in VIRGO**

Apogee comes on 2022-07-26 @ **0323** – 406,274 km (252,447 mi)

Perigee comes on 2022-07-13 @ **0209** – 357,263 km (221,993 mi)

2022 has: (13) new moons, (13) 1<sup>st</sup> Qtr moons, (12) Full moons, (12) 3<sup>rd</sup> Qtr moons  
(0) Blue moons and (2) Black moons

**Daylight Savings:** Starts: 2022-Mar-13 : Ends: 2022-Nov-06

**Luna:** Luna is waxing crescent on the first of the month, headed for 1<sup>st</sup> quarter on the 6<sup>th</sup> rising at **0745**, transiting at **1507** and setting by **2223**. Luna by mid-month is 91% illuminated. Rising at **2206** and transiting at **0336+** setting at **0906+**. By the-end-of-the-month Luna is 1 day past new.



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10.7% illuminated rising at **0836** transiting at **1519** and setting by **2156**.

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

July 13 - Full Moon, Supermoon\*. 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 **1113**. This full moon was known by early Native American tribes as the Buck Moon because the male buck deer would begin to grow their new antlers at this time of year. This moon has also been known as the Thunder Moon and the Hay Moon. This is also the second of three supermoons for 2022. The Moon will be near its closest approach to the Earth and may look slightly larger and brighter than usual.

July 28 - 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 **1056**. 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.

July 28, 29 - Delta Aquarids Meteor Shower. The Delta Aquarids is an average shower that can produce up to 20 meteors per hour at its peak. It is produced by debris left behind by comets Marsden and Kracht. The shower runs annually from July 12 to August 23. It peaks this year on the night of July 28 and morning of July 29. This is a great year for this shower because the new moon means dark skies for what should be an excellent shower. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

\* Note: "Supermoon" is an astrological term **NOT** an astronomical term.

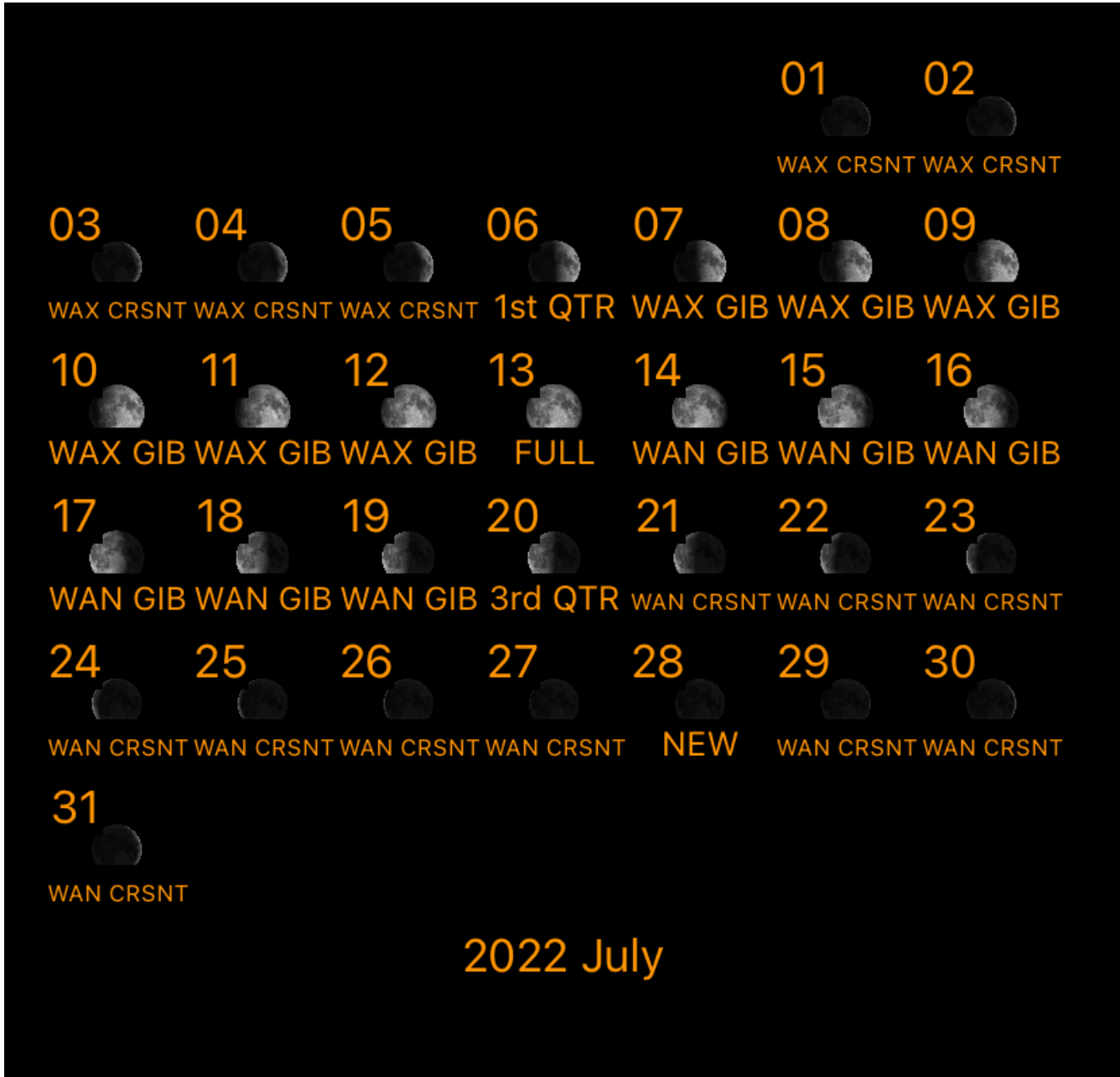
**Algol minima: (All times Pacific Time)**

<b>07/02/2022</b>	<b>0838</b>
<b>07/05/2022</b>	<b>0526</b>
<b>07/08/2022</b>	<b>0215</b>
<b>07/10/2022</b>	<b>2304</b>
<b>07/13/2022</b>	<b>1952</b>
<b>07/16/2022</b>	<b>1641</b>
<b>07/19/2022</b>	<b>1330</b>
<b>07/22/2022</b>	<b>1018</b>
<b>07/25/2022</b>	<b>0707</b>
<b>07/28/2022</b>	<b>0356</b>
<b>07/31/2022</b>	<b>0044</b>



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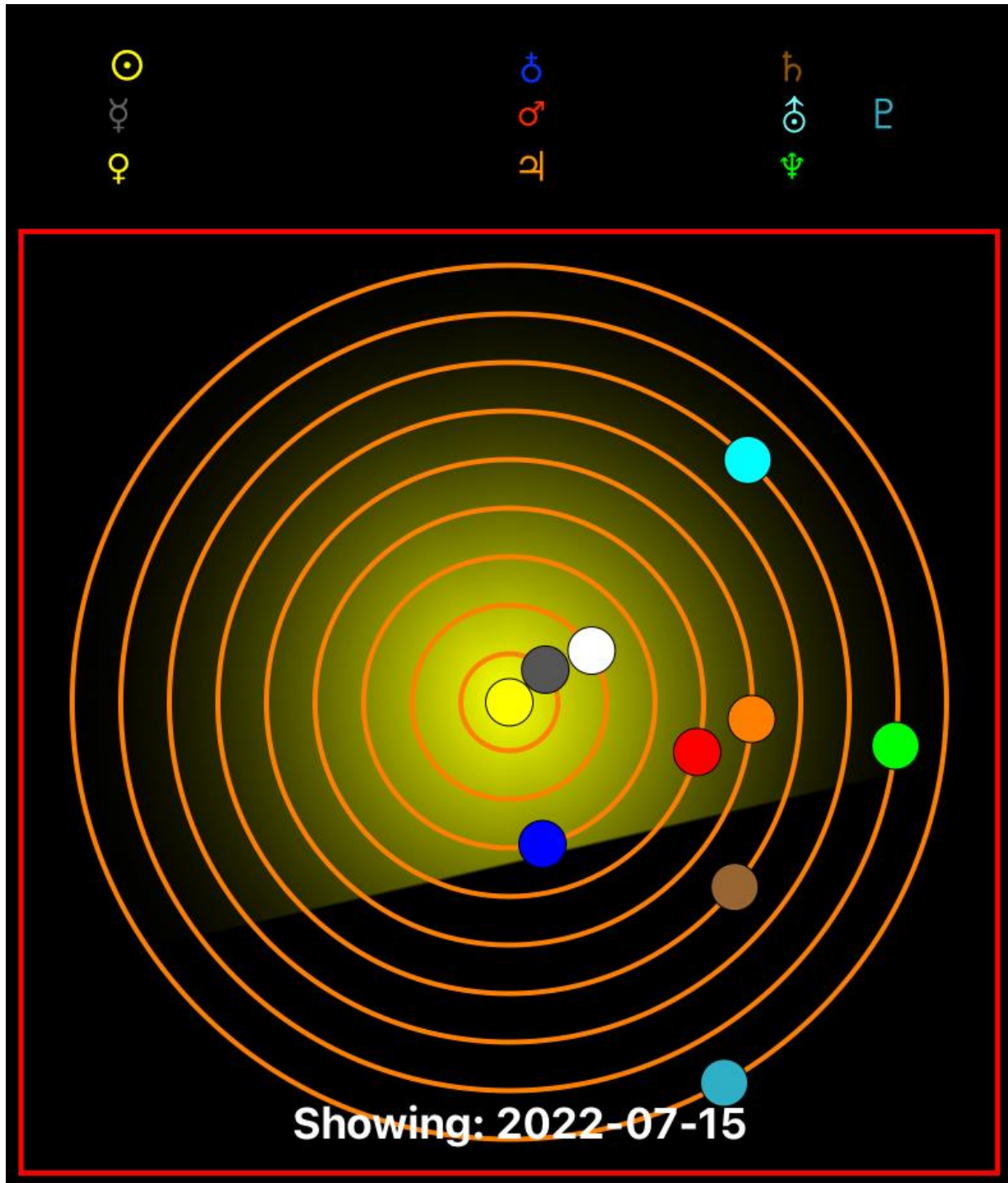
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## Planets:

Planetary Positions July 2022: (from TVA App iOS version)



- **Mercury:** Mercury is a morning object in the beginning of the month. It is illuminated at 73% and -0.76 apparent magnitude. Mercury rises at **0432** with the sun following at **0540**. Mercury transits



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at **1141** and sets at **1851**. Mercury by mid-month is lost to the Sun. By the 31<sup>st</sup> Mercury has become an evening object. Mercury rises at **0712** preceded by sunrise at **0559**. Mercury sets at **2044** preceded by the Sun at **1951**.

- **Venus:** Is the morning star on the first of the month, rising by **0343**, with sunrise at **0540**. By mid-month Venus is rising at **0353** followed by sunrise at **0548**. By the 31<sup>st</sup> Venus is rising at **0414** followed by sunrise at **0559**.
- **Mars:** Mars is back in the sky as a morning object; on the first rising at **0127**. Sunrise follows at **0540**. By mid-month Mars is rising at **0100**. End-of-month finds the Warrior rising at **0029**.
- **Jupiter:** Jupiter is a morning object on the first of the month rising at **0032** and preceding sunrise at **0540**. By mid-month Jove is rising at **2336** the sun follows at **0548+**. Come the end-of-month Jupiter is peeking above the horizon by **2234** with sunrise at **0559+**.
- **Saturn:** Saturn rises at **2232** on the 1<sup>st</sup>. Saturn transits at **0356+** and doesn't set until **0920+**. Saturn by mid-month rises at **2135** and transits at **0258+**. Unfortunately, a 90% illuminated Moon is rising at **2206**. By the end-of-the-month Saturn is easily visible by **2100** and transits by **0151+**.
- **Uranus:** On the first of the month Uranus is a morning object rising at **0222**. By the ides Uranus is rising at **0128**, followed by sunrise at **0548**. End-of-month finds Uranus rising at **0027** followed by sunrise at **0558**.
- **Neptune:** Neptune is rising at **2356** in the beginning of the month. Neptune transits at **0551+**. By the 15<sup>th</sup> Neptune rises at **2301**. Neptune sets at **1051+**. By the end of the month Neptune is rising at **2157**.
- **Pluto:** Pluto on the first of the month is at mag 14.33 apparent magnitude and rising at **2109**. By mid-month Pluto is rising at **2013**. By the 31<sup>st</sup> Pluto is probably not visible until **2109**.

## Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2022 with a reasonable magnitude; say less than or equal to +10 in July 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=2022>

## Meteors:

- Delta Aquarids Meteor Shower. (see Highlights July 28-29 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 July 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.

One comet of interest this month. Comet **C/2017 K2.**, a comet in OPHIUCHUS, visual magnitude +6.9 on the 28<sup>th</sup> of July 2022 at **2100**. It irises at **1518** but doesn't set until **0236**.

## Deep Sky:

### Notes:

L/Z abbreviation for ALT/AZ

R/D abbreviation for Right Ascension/Declination

$\alpha$  is right ascension

$\delta$  is declination

In each case, unless otherwise noted, you should look for the following on or about the 15<sup>th</sup> Day of July 2022 at 2100 PDT and you will have about 20 minutes of viewing time total.

Let's take a look at some difficult objects (at least for me):

- **Whirlpool Galaxy:**



The Whirlpool Galaxy, also known as Messier 51a, M51a, and NGC 5194, is an interacting grand-design spiral galaxy with a Seyfert 2 active galactic nucleus. It lies in the constellation Canes Venatici, and was the first galaxy to be classified as a spiral galaxy. Its distance is 31 million light-years away from Earth.

The galaxy and its companion, NGC 5195, are easily observed by amateur astronomers, and the two galaxies may be seen with binoculars. The Whirlpool Galaxy has been extensively observed by professional astronomers, who study it to understand galaxy structure (particularly structure associated with the spiral arms) and galaxy interactions. ([Wikipedia](#))

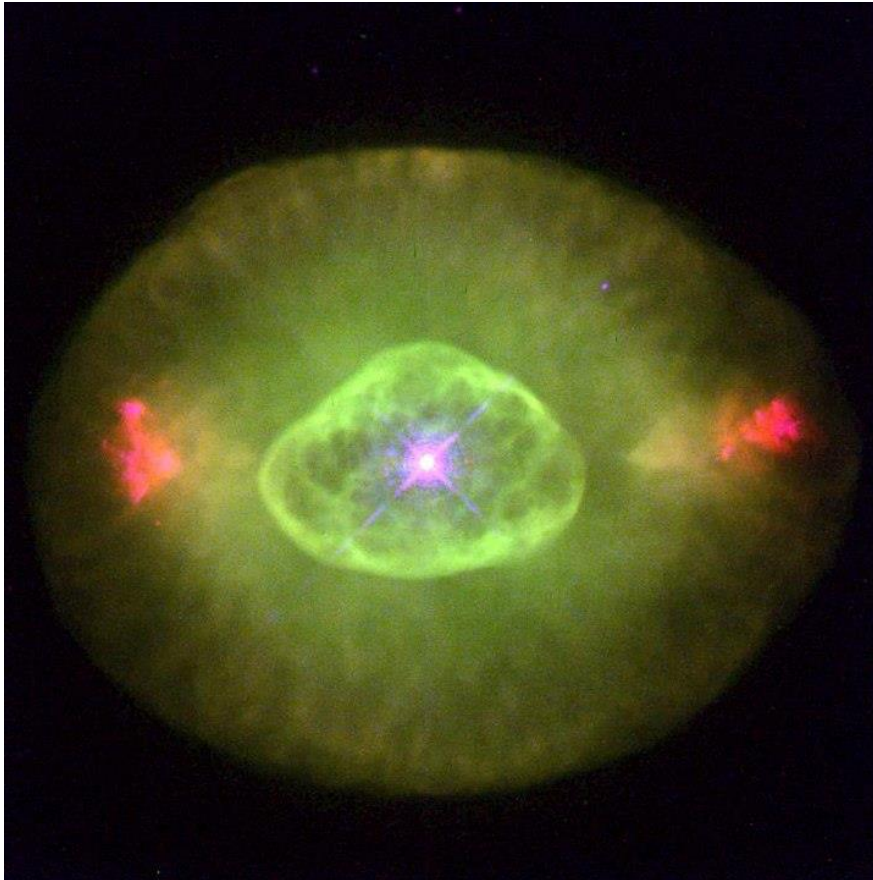
*Illustration 1: By NASA and European Space Agency -*

*<http://antwrp.gsfc.nasa.gov/apod/ap050428.html> SOURCE OF 2ND VERSION:*

*<http://www.spacetelescope.org/images/heic0506a/> also bigger versions up to about 12000x8000 pixel available, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=3863746>*



- NGC 6826:



NGC 6826 (also known as Caldwell 15) is a planetary nebula located in the constellation Cygnus. It is commonly referred to as the "blinking planetary", although many other nebulae exhibit such "blinking". When viewed through a small telescope, the brightness of the central star overwhelms the eye when viewed directly, obscuring the surrounding nebula. However, it can be viewed well using averted vision, which causes it to "blink" in and out of view as the observer's eye wanders.

A distinctive feature of this nebula are the two bright patches on either side, which are known as Fast Low-Ionization Emission Regions, or FLIERS. They appear to be relatively young, moving outwards at supersonic speeds.

The central star of the planetary nebula is an O-type star with a spectral type of O6fp.. ([Wikipedia](#))

*Illustration 2: By Bruce Balick (University of Washington), Jason Alexander (University of Washington), Arsen Hajian (U.S. Naval Observatory), Yervant Terzian (Cornell University), Mario Perinotto (University of Florence, Italy), Patrizio Patriarchi (Arcetri Observatory, Italy) and NASA - <http://hubblesite.org/newscenter/archive/releases/1997/38/image/d/>, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=1577513>*

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

For now – Keep looking up.

## RANDOM THOUGHT

By Chuck Dyson

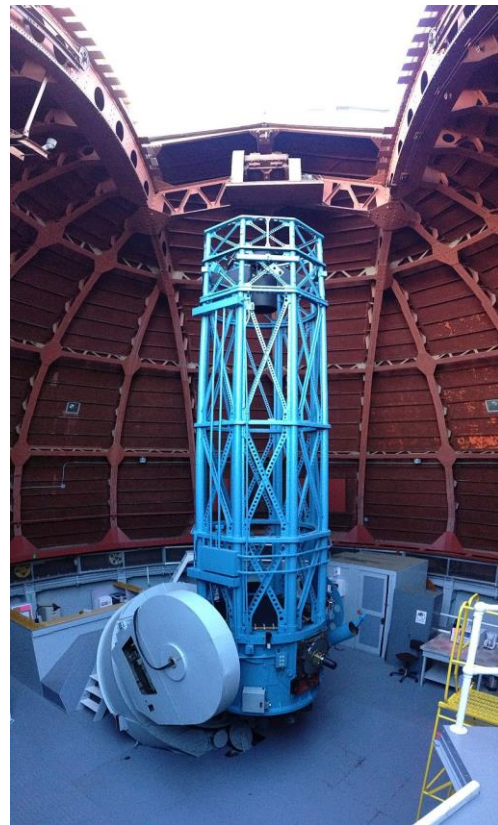
### A DIFFERENT PERSPECTIVE PART TWO A NIGHT OF VIEWING

Last month Matt gave us his impressions, as a non-astronomer, of the Mt. Wilson science city. This month Matt recounts his experience at the eyepiece and yes, he kept notes on what was viewed and questioned everyone on what he was seeing. Unlike the average person that we see at the eyepiece of our telescopes who just says that's nice and then goes on to the next eyepiece Matt, by the nature of his clinical training is primed to ask questions about what he is seeing and gain understanding. That his clinical training helped him remember what he had seen and then was told about the different objects is evidenced by the detailed descriptions written on the objects.

Without further comment, at this time by me, let us now return to Matt's story.

### Matt's Words

The daylight was fading. A loud gear-crunching sound penetrating the dome persisted. Looking around I see no one phased. The observatory's opening grew larger from the horizon position to the zenith revealing a clear blue sky. People began to do more talking, moving, and eating as if heat were added to a chemical system increasing the incident of contact. The catalyst in this case; however, was anticipation. Meanwhile, one of the active participants in this group set up his nice personal telescope outside. He aimed it at the setting crescent moon for all to view. I was impressed at the power of that thing and the amazing detail. The moon's craters popped out at me. As I was thanking the man for being so gracious the sight of the observatory's dome rotating plagued me with urgency. I raced up the stairs to catch the event live. The movement was disorienting but I welcomed the strange feeling and in fact embraced it. Suddenly, it stopped with a locking sound and the docent took charge describing what our first look would entail.





## Matt's Telescope Views

1. We looked at Jupiter first because it was setting on the horizon. Its low sky position dictated the telescope's horizontal stance and subsequently required the use of one of those tall, steel ladders used at Home Depot in order to peer through the large eye piece. Some of the cloud bands were clearly present as well as three of Jupiter's moons. With Jupiter being the first viewed item of the evening, I'll list the rest of the viewed items in chronological order and give a brief description of what I saw and was told that night. Chuck's note: *what Matt didn't say was that in the 60 inch scope the Galilean moons are not just points of light but are real planetary bodies with different surface colors, no surface features discernable.*
2. M13 Cluster Nebula: This was used to mark the distance in the Milky Way galaxy showing that we were not at the center of the galaxy. Chuck's note: *M13 is one of 150 or so globular clusters orbiting around our galaxy. In 1914 Shapley, using this very Mt. Wilson 60 inch reflector, determined the distance to different globular clusters by using the Cepheid variable period luminosity relationship; with this method Shapley was able to determine the size of our galaxy, that the center of our galaxy was in the constellation of Sagittarius, and that our sun was 26,000 light years from the center.*
3. Cat's Eye Nebula: A bright focal point surrounded by a blue halo. Massive amounts of energy causing gasses to reach escape velocity in waves and exciting the present gases to the next energy level like fluorescent lights. Chuck's note: *a good description how planetary nebula work.*
4. Carbon Star: Very sharp and bright red point of light apart from white points in the distance. This is an earlier version of the above Cat's Eye Nebula. Chuck's note: *carbon stars are sun size stars that are approaching the end of their lives and are going into the unstable phase of their life. In this phase they have turbulences that drag up carbon and other elements from the star's core and the carbon gets blown into the star's gaseous envelope and this makes the star look really red.*
5. Ring Nebula. Similar to Cat's Eye Nebula.
6. Double Double: Aside from the fact that the power of suggestion forced me to smell my favorite cheeseburger, this grouping was impressive. At the top of the field of view was a pair of stars as close as possible without beginning to blend luminosity with one another. An identical pair appeared at the bottom of the field of view. Evidently, even with this telescope, such clear separation of the very close pairs is rare. There was talk of the Jet Stream being unusually south and possibly blurring our view, obviously, it wasn't a factor at this time. Chuck's note: *in my six inch scope I need good seeing and 140X to just separate the close pairs at 110X there is no separation.*
7. Neptune: There was a moon at eleven o'clock. Chuck's note: *even in a 60inch scope there is not much to see in Neptune; however, seeing the 841 mile diameter Triton is quite the accomplishment.*



8. Campbell's Hydrogen Star: This was very interesting for me as I am intrigued with Black Holes and how they're formed. In the eyepiece the focal point appeared as many little dots. This is due, I am told, to atmospheric interference. However, the red gas surrounding the central star was astounding. Apparently, this star is burning so hot and so fast that it will eventually supernova and collapse into a Black Hole. Chuck's note: *Campbell's Hydrogen Star is classified as a Wolf-Rayet star (WR star) these stars are identified by their high surface temperature, 20,000K to 210,000K (the highest temp of any star). It is thought that because of the high core temperature the thin, hydrogen rich, outer layer of the star has been stripped off by the high radiation pressure. WR stars are generally categorized by the prominent element in the gas halo surrounding the star. The three most common types of WR stars are carbon, WC stars; nitrogen, WN stars; and rarer oxygen, WO stars. Campbell's star is a WO star' but it is a very rare, peculiar WO star. Instead of being the core of a giant star Campbell's is thought to be the core of a Sun size star and thus is classified as a Central Star Planetary Nebula (CSPNe). At the time we observed Campbell's star it was thought that all WR stars were the cores of massive stars and would end in a supernova explosion that created a black hole. It is now thought that Campbell's star is an extremely rare type of white dwarf star, but astronomers are not completely sure.*

9. NGC7331: *This is a spiral galaxy in the Pegasus Constellation. It appeared blue and had a black band. Chuck's note: this galaxy is 40 million light years away and was thought to closely resemble our Milky Way galaxy, but we now know that the Milky Way is a barred galaxy and not a spiral.*

10. Bubble Nebula (NGC 7635): A treat for the astronomy veterans since most of them had never viewed this before. I found it very challenging to even view the halo around the white focal point. But when I was provided with some sort of ocular filter to view through the halo became obvious. As others were in line to view the Bubble Nebula Chuck allowed me the use of his binoculars and directed me toward Andromeda Galaxy. At 2.2 million light years away, it is the most distant object in the sky visible by the naked eye. It appeared as a light blue cotton ball. Chuck's note: *an OIII filter is needed to really see the Bubble Nebula and because the 60 inch scope has 4 inch diameter eyepieces there are no OIII filters made for it. In order to overcome this obstacle, the staff has you hold a 2 inch filter in your hand and look through it and into the eyepiece, this arrangement works surprisingly well.*

11. M31 Andromeda Galaxy: Due to the extreme power of this telescope only a portion of the galaxy can be viewed at a time. Consequently, everything in the field of view was inside the Andromeda Galaxy. The entire view was blue with white points of light throughout.

12. M110 Galaxy: Unlike the spiral Andromeda the M110 is an elliptical galaxy and therefore less orderly in nature and in viewing.

13. M32 Galaxy: This is another satellite galaxy to Andromeda. It was easy to visualize with its blue cloud like effect. Chuck's note: *M31 is the biggest galaxy in our local cluster and even at 2.5 million light years it still covers 2.8 degrees of sky making it difficult to see the entire galaxy with a large or long focus telescope. M32 and M110 are the two largest, and relatively easily seen in small scopes under moderately light polluted skies, of Andromeda's retinue of 13 dwarf galaxies.*



*M32 is more compact, and it appears like a small globular cluster while M110 is more spread out and looks galaxy-like under darker skies, very difficult object to see under light polluted skies. M31, M32, and M110 are all spectacular objects when viewed in large binoculars under dark skies, and they are all seen in the same field of view also.*

14. NGC 206: Star forming cluster in M33 Galaxy. Chuck's note: *At 4,000 light years across this is an extra galactic star forming region that can clearly be seen if you happen to have a 60 inch telescope.*

15. M15 Globular Cluster: This is off one end of Pegasus. Chuck proudly states "This shows very well." Other comments emerged as more looks were taken such as "Beautiful" and "Very clear." Not to be outdone, I called on my Fourth of July experience and eased out an "Oooooooo, Ahhhhhhh" upon seeing the inspiring, crystal clear, bright grouping of stars. Chuck's note: *M15 is, in my opinion, one of the most spectacular globulars. At 32,600 light years it is just a small blob in a small scope, but as the scope grows so does the detail and complexity of M15, so much so that in the 60 inch scope I did not recognize it as the M15 that I so often viewed even in my 9 1/4 Schmidt-Cassegrain telescope.*

16. Uranus: This may sound absurd, but the first thing that came to mind was the Pepsi logo. I realize other people witnessed a blue-green circle, but I must have had atmospheric interference of something. I saw a red bottom third of a circle, a white center band, and a blue top third. Rather patriotic, don't you think?

### **Matt's final thought**

I learned a lot this evening and leave with a sense of enrichment in my life. This experience is not at all what I thought it would be and so much more than I hoped it could be, As with so many things out there, you've got to see this for yourself.

Chuck's final note: *If, after a star party, you were to ask most people what they had seen in the telescopes that evening and to tell you something about the objects that were viewed you probably would get few answers from the vast majority of people. The fact that Matt made a list of what he had seen and remembered so much that had been said about the objects should help understand why I found him to be one of the best people to work with in the operating room.*

Cheers, Chuck

## Another Look July, 2022

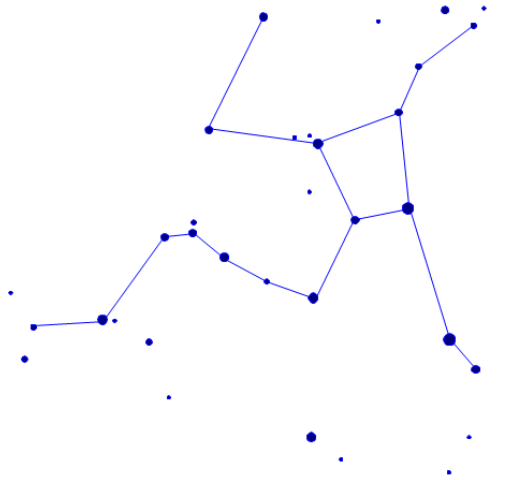
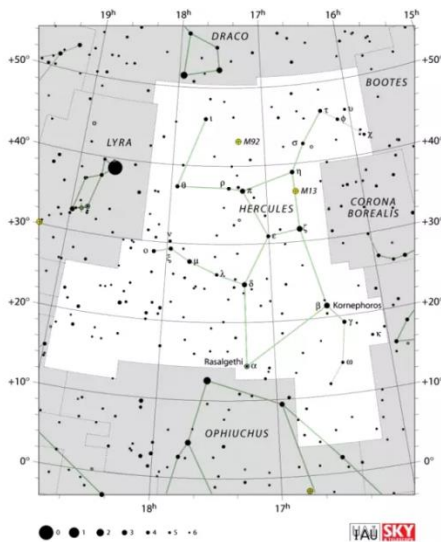
By Dave Phelps

Buck Moon - Some refer to this moon as the Thunder moon, due to the summer storms in this month. Other names include the Hay moon, after the July hay harvest.

New Moon – July 28, 0955 PDT;

Full Moon – July 13, 1038 PDT

Some Native American tribes call it Salmon Moon and Raspberry Moon. In Celtic, this Moon was known as the Claiming Moon, Wyrth Moon, Herb Moon, and Mead Moon.



I once searched for Abell 2151, the Hercules Cluster. It is way off in a corner of Hercules almost in Serpens Caput. I remember it well. It was one of those objects that I could move the Horse to, look through the Telrad and have it in the eyepiece. I nicknamed it the String of Pearls because NGC 6040 and NGC 6041 formed a curving line with NGC 6039 and other fainter galaxies. I was mesmerized. I remember counting nearly a dozen galaxies around NGC's 6040-41 and I have read that there are over 200 galaxies in the field. Uranometria shows around 20 galaxies visible to any telescope that can reach 4<sup>th</sup> and 15<sup>th</sup> magnitude, more to add to the bucket list. The Cluster is part of the larger Hercules Super-cluster and the even bigger Hercules-Corona Great Wall, none of which I have ever studied. Maybe that's a good thing. It seems the experts are disputing whether the H-C Great Wall belongs with the other recognized GW's, though; at least one reference describes it as the largest structure in the universe. [Hercules Constellation: Stars, Myth, Facts, Location... Constellation Guide \(constellation-guide.com\)](https://www.constellation-guide.com/constellation-guide/hercules-constellation/)

Not too far away from Abell 2151 is the Turtle Nebula, NGC 6210, an amorphous planetary a little brighter than 9<sup>th</sup> magnitude and not too far from Beta  $\beta$  Herculis. Beta's name is Kornephoros and is at the shoulder of Hercules and down from the keystone. Kornephoros is the brightest star in Hercules, a few tenths brighter than Rasalgethi, Alpha  $\alpha$  Herculi and a decent triple star system that is tough to resolve.

M92, NGC 6341 and M13, NGC 6205 are closely matched cousins, though M13 gets all the print. They

differ in magnitude by only a half, 6.3 and 5.8 and are almost the same classification, IV vs V. M92 is in the upper regions of the constellation between Hercules' legs, you will see a very sharp nucleus, while, well, you know how to find M13. Point your finder a third of the way down the right side of the keystone and there is the best globular in the north.

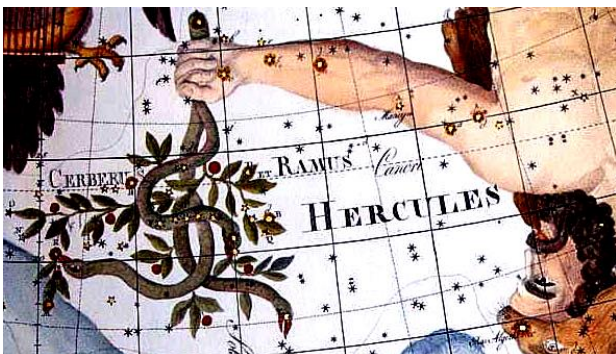
Up closer to the top of Hercules, actually his feet, is NGC 6229 a 9<sup>th</sup> magnitude globular that is apparently quite old and quite rich in metals. Its density class is not listed though its metallicity bimodality is designated as **GC(v)B** in the galaxy morphological classification. Not something I am competent to discuss. If you know, send an email to the editor or the chain and let us all know.

Very close to M92, about a degree north-east is a small group of 14<sup>th</sup> magnitude galaxies, the NGC 6329 group. I remember seeing four galaxies with not much detail. If you have a big enough mirror and an eyepiece that gives you a degree field of view, you can add them to your life list.

The figure of Hercules as a kneeling man goes back thousands of years. The Babylonians associated the asterism with their own legendary heroes, Gilgamesh, Nimrod and their sun-god Isdubar. Phoenicians identified it as the sea-god Melkarth and the Greeks from as early as 450 BC minted coins representing their demi-god Heraklee. Alexander the Great believed he was a direct descendant. In fact, it is written that old Alex seemed to think he was his reincarnation. Funnily enough, though Hercules is the offspring of Zeus and the mortal Alceme, his name translates roughly as "glory of Hera". Bet that ticked her off.

The famous keystone of Hercules is one of the most recognizable in the spring, summer, and autumn skies and usually one of the first things I look for along with Lyra and Cygnus. Hercules has dozens of variable, double, and multiple stars and star systems. One of the finest is Alpha  $\alpha$ , a large orange giant with a companion of "emerald green". (*Mary Proctor, "Evenings with the Stars"*) "[Evenings with the stars](#)";: [Proctor, Mary: Amazon.com: Books](#)

Alpha is an interesting star. As its magnitude varies from 3<sup>rd</sup> magnitude to 4<sup>th</sup> magnitude, it pulsates, ie: its size varies also. For now, imagine it from the center of the solar system to the orbit of Mars, but even more, it has an envelope that extends almost 1000 AU. Alpha's temperature averages 2500 degrees Kelvin. Its density must be about the same as a hard vacuum. I wonder how far we could travel inside that star in our 100<sup>th</sup> generation starliner. ( Do you remember a "Mote in God's Eye"?) [https://en.wikipedia.org/wiki/Ramus\\_Pomifer#/media/File:Bode\\_cerberus.jpg](https://en.wikipedia.org/wiki/Ramus_Pomifer#/media/File:Bode_cerberus.jpg)



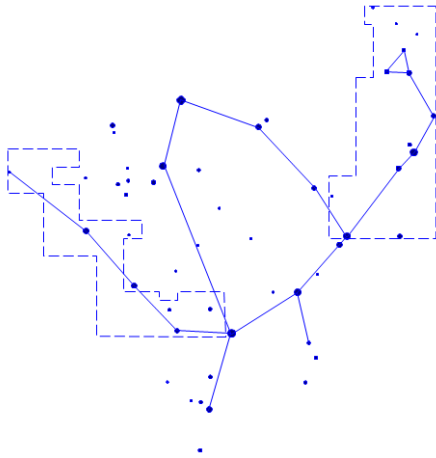
*Ramus Pomifer, the latin for apple branch was a constellation between Hercules and Lyra. It was depicted in the form of a branch held in Hercules' left hand. The also obsolete constellation of [Cerberus](#) made up of much*



*the same stars - became combined with it in later depictions, with the name "Cerberus et Ramus".*

*Serpens Serpens held by Ophiuchus, as depicted in [Urania's Mirror](#), a set of constellation cards published in [London](#) c. 1825. Above the tail of the serpent is the now-obsolete constellation [Taurus Poniatovii](#) while below it is [Scutum](#)  
<https://en.wikipedia.org/wiki/Serpen>*

Ophiuchus is the odd shaped hexagon south of Hercules that holds some of the more interesting objects in the sky along with his brother constellations Serpens Cauda and Serpens Caput. The area has represented snakes or serpents or even maybe dragons since Babylonian time. The Greeks, though, put a pin in it. Generally, Ophiuchus represents Aesculapius, (many variable spellings), mythologically a son of Apollo who learned how to bring back someone from the dead. Serpens is the snake that showed Aesculapius how to do it by bringing another snake to life by dropping herbs on it. The story I remember from my Bullfinch's is that Aesculapius was raised by the Centaur Chiron, for whom, apparently, we have the constellation of the centaur. It was Chiron who taught him the art of healing. It is said that Zeus killed him with a thunderbolt because he was afraid he would make all men immortal.



The name of the large constellation Ophiuchus means "serpent-bearer" in Greek. The ancient astronomer

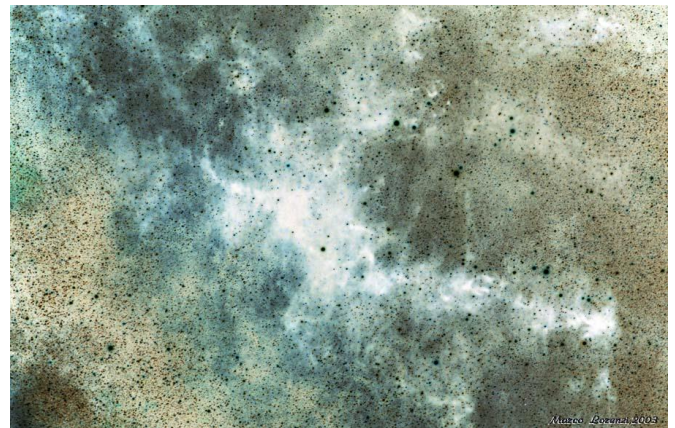
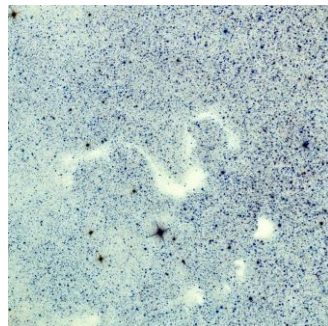
Ptolemy included *Ophiuchus* in his list of 48 constellations which he documented in the 2nd (*Constellations except Zodiac, Northern and Southern - Vector stencils library*) century. (It used to be referred to as *Serpentarius*, which is Latin and has the same meaning.) It is one of the 88 modern constellations.

In Greek myth, *Ophiuchus* was said to depict the god Apollo wrestling the snake guarding the Oracle of Delphi. Although the myth changed many times over the years, it was always associated with a man wrestling a serpent.

Serpens has two Messier's M5 and M16. Ophiuchus has seven Messier's M9, M10, M12, M14, M19, M62 and M107. A happy hunting ground for you marathoners. [Pipe Nebula \(astrosurf.com\)](#)

There are also two Palomar Globulars Pal 15, really tough at 14<sup>th</sup> magnitude, and Pal 6, possible at 11.5 magnitude. The

Palomar Cluster catalog would be a challenge for any experienced amateur with some decent equipment. They are just difficult to see. I can remember the first time I saw Pal 6, it was small and dim and very exciting. It is located down not too far from



the galactic center amid all that munge of star clouds, clusters and dark nebula. As you're looking south, it is just below the Pipe Nebula, the biggest(?) dark nebula in the sky and holder of several Barnard





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numbers, **Barnard 59, 65–67, and 78**. Just up from the Pipe is my favorite dark nebula, the Snake B72. *By en:user:Friendlystar - English Wikipedia, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=4986855>; [https://en.wikipedia.org/wiki/Snake\\_Nebula#/media/File:Snake\\_Nebula.jpg](https://en.wikipedia.org/wiki/Snake_Nebula#/media/File:Snake_Nebula.jpg)*

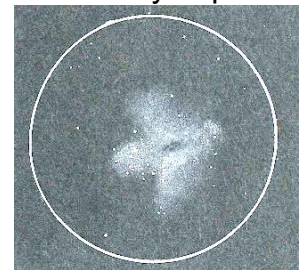
If you decide to search for Pal 15, you will need a strong star chart like Uranometria to do the search. You will find it near the center of Ophiuchus, near M10 and M12. I believe I only saw a glimpse of it back then. Hopefully when I can get some telescope time I can search for it again. If you find yourself intrigued, there are two more Palomar's close – Pal 5 at 12<sup>th</sup> magnitude and Pal 7 at 11<sup>th</sup>. Pal 7 is down in the left hand corner by Nu v where Ophiuchus and S. Cauda meet. Pal 5 is tougher, it's up in S. Caput very close to M5. The Palomar cluster catalog can be found at <http://www.deep-sky.co.uk/observing/palglob/palglob.htm>. *Good luck and Good Hunting.*

As you know this region of the sky is among the richest. The Milky Way, nebulae, clusters, Barnard's and constellations abound. So let me return to a suggestion I made months ago: get a decent planisphere and look at the sky. Like some of you, I was also guilty of tunnel vision. Focusing on some faint and fuzzy while staring at my setting circles. If you can't point out the six stars that make up the body of Ophiuchus and the four stars that make up the head of Serpens Caput, you could use a refresher course on using your eyes.

Let's slip over to the "Cauda" side of Ophiuchus next and find Barnard's star; it's only six light years away and has the largest proper motion recorded. It's a red 9<sup>th</sup> magnitude star. Its history is sorta cool. E.E. Barnard, a great double star hunter, noticed that his star had significant movement when he compared photo-plates twenty-two years apart back in 1916. Since then, he (she, shim?) has been immortalized in the literature of Douglas Adams, Arthur C. Clark and others.

You will find Barnard's star close to Beta Ophiuchi and surrounded by lots of fun stuff. NGC 6572 is a bright planetary nebula of 8<sup>th</sup> magnitude. Very near is IC 4665, a very open star cluster. Barnard's star is between IC 4665 and Mel 186. If you thought 4665 was spare wait till you try to identify Mel 186. There is just a ton of stuff in this area, enjoy you star hopping.

Between M16 and Barnard's star, Aquila, Scutum and Serpens Cauda, is one of the richest square degrees of sky we have, laying there along the edge of the Milky Way. Look in from our solar system in the Perseus arm of our galaxy to the Sagittarius arm, next arm in. Then slip you telescope down the corner where Serpens meets Scutum, and there you have it... Open Cluster NGC 6611. If you put a nebular filter in your eyepiece you will pick up IC 4703, a strong star forming region. Burnham call this object the "Star Queen" nebula because he imagined a throne in the dark notch at the center of IC 4703. He had the virtue of using some big professional instruments in his career as well as access to Mt. Wilson and Palomar plates. Then came the Hubble. You won't see the pillars, they are the back of the Queen's throne, but you can imagine and it would be pretty awesome to see what one of these new hybrid instruments could do.



I've inserted an image that should give you an idea of what to look for in

[https://www.cloudynights.com/uploads/monthly\\_06\\_2018/post-276706-0-67698400-1530396168.jpg](https://www.cloudynights.com/uploads/monthly_06_2018/post-276706-0-67698400-1530396168.jpg)

your backyard telescope. The Horse did a great job especially with a nebular filter but nothing like we see you astrophotographers doing today. I recommend that you go to the OCA web site and look at this image. It is very well done though not attributed. [Emission nebula M16 \(Eagle Nebula\) in Serpens. - Orange County Astronomers \(ocastronomers.org\)](#) While in the



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region, there is Barnard Dark Nebula galore within just a few degrees of the Eagle. Look for B92 and B93 close at hand, B312, up by the Swan, B103, Lynds 443, B97, B95 and B314 nearer to M11 and up there north of Scutum and into Aquila is B111, B119, Lynds 557, 564, 582 and 617.

Dark Skies



## Find Hercules and His Mighty Globular Clusters

by David Prosper (NASA/JPL)

Hercules is one of the standout heroes of Greek mythology, but his namesake constellation can be surprisingly hard to find - despite being one of the largest star patterns in our night skies! Once you find the stars of Hercules, look deeper; barely hidden in the space around his massive limbs and “Keystone” asterism are two beautiful globular star clusters: M13 and M92!

Since the constellation itself is relatively dim but bordered by brighter constellations, you can find the stars of Hercules by looking between the bright stars Vega and Arcturus. They are fairly easy to identify, and we have tips on how to do so in previous articles. Vega is the brightest star in the constellation Lyra and one of the three stars that make up the Summer Triangle (*June 2020: Summer Triangle Corner: Vega*). Arcturus is the brightest star in the constellation Boötes, and can be found by “arc-ing to Arcturus” from the handle of the Big Dipper (*May 2021: Virgo’s Galactic Harvest*). You may be able to locate Hercules’s “Keystone” asterism first; this distinct pattern of four stars is traditionally shown as the torso of the great hero, though some illustrators prefer marking the Keystone as the head of Hercules. What pattern do *you* see in the stars of Hercules?

Globular star clusters appear “fluffy,” round, and dense with stars, similar to a dandelion gone to seed, in contrast to the more scattered and decentralized patterns of open clusters. Open clusters are generally made up of young stars that are gradually spreading apart and found inside our Milky Way galaxy, while globular clusters are ancient clusters of stars that are compact, billions of years old, bound to each other and orbit around our galaxy. Due to their considerable distance, globular clusters are usually only visible in telescopes, but one notable exception is M13, also known as the Great Cluster or Hercules Cluster. During very clear dark nights, skilled observers *may* be able to spot M13 without optical aid along the border of the Keystone, in between the stars Zeta and Eta Herculis - and a bit closer to Eta. Readily visible as a fuzzy “star” in binoculars, in telescopes M13 explodes with stars and can fill up an eyepiece view with its sparkling stars, measuring a little over half the diameter of a full Moon in appearance! When viewed through small telescopes, globular clusters can appear orblike and without discernable member stars, similar in appearance to the fuzzy comae of distant comets. That’s why comet hunters Edmund Halley and Charles Messier discovered and then catalogued M13, in 1714 and 1764 respectively, marking this faint fuzzy as a “not-comet” so as to avoid future confusion.

While enjoying your view of M13, don’t forget to also look for M92! This is another bright and bold globular cluster, and if M13 wasn’t so spectacular, M92 would be known as the top celestial sight in Hercules. M92 also lies on the edge of naked-eye visibility, but again, binoculars and especially a telescope are needed to really make it “pop.” Even though M92 and M13 appear fairly close together in the sky, in actuality they are rather far apart: M13’s distance is estimated at about 25,000 light years from Earth, and M92’s at approximately 27,000 light years distant. Since M13 and M92 appear so close together in our skies and relatively easy to spot, switching between these two clusters in your scope makes for excellent star-hopping practice. Can you observe any differences between these two ancient clusters of stars?

Globular clusters are closely studied by astronomers for hints about the formation of stars and galaxies. The clusters of Hercules have even been studied by NASA’s space telescopes to reveal the secrets of



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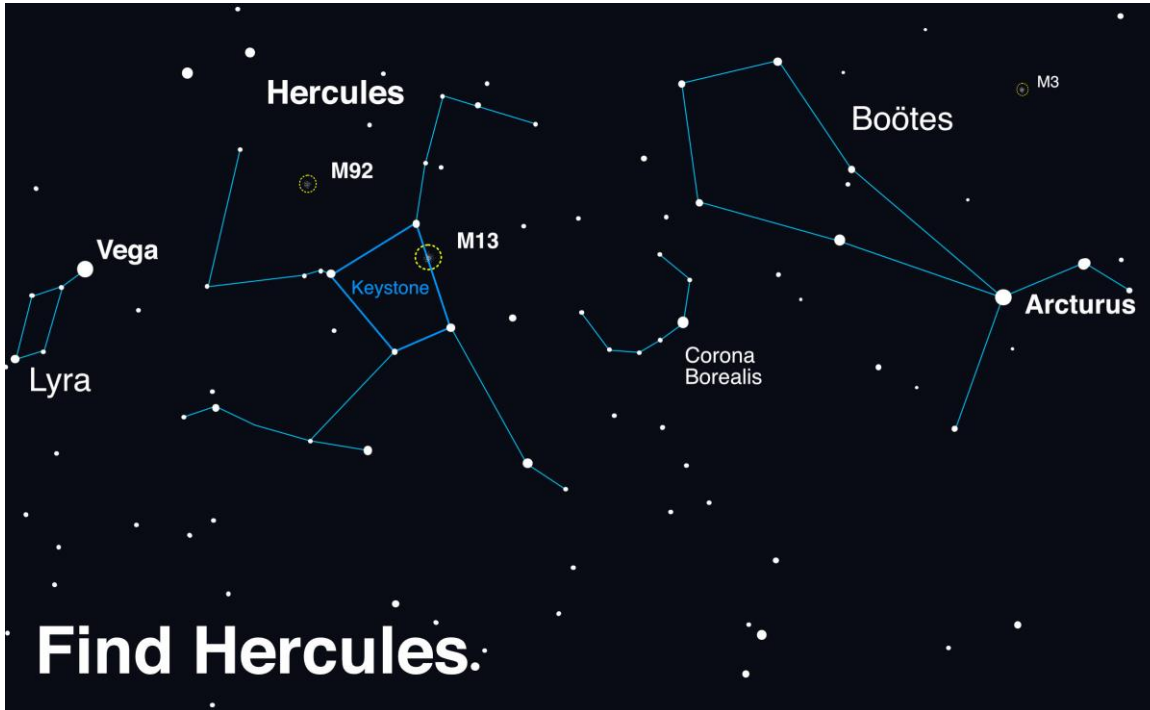
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their dense cores of hundreds of thousands of stars. Find their latest observations of globular clusters - and the universe - at [nasa.gov](https://www.nasa.gov).



*Composite image of the dense starry core of M92 imaged in multiple wavelengths. While your own views of these globular clusters won't be nearly as crisp and detailed, you might be able to count some of its member stars. How far into their dense cores can you count individual stars? Credits: ESA/Hubble & NASA; Acknowledgment: Gilles Chapdelaine. Source: <https://www.nasa.gov/feature/goddard/2017/messier-92>*



*Look up after sunset during summer months to find Hercules! Scan between Vega and Arcturus, near the distinct pattern of Corona Borealis. Once you find its stars, use binoculars or a telescope to hunt down the globular clusters M13 and M92. If you enjoy your views of these globular clusters, you're in luck - look for another great globular, M3, in the nearby constellation of Boötes. Image created with assistance from Stellarium: [stellarium.org](http://stellarium.org)*



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