nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Science is always wrong.
It never solves a problem without creating 10 more.
George Bernard Shaw

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Volume 44 Number 7 ***nightwatch*** **June 2024**

Club Events Calendar

Jun 15	**Star Party – Cahuilla Park**
Jun 21	**General Meeting 7:30 PM Ken Elchert "DART Mission Update"**
July 10	**Board Meeting 6:15 PM**
July 19	**General Meeting 7:30 PM**
July 27	**Star Party – GMARS**
Aug 7	**Board Meeting**
Aug 16	**General Meeting 7:30 PM**
Aug 31	**Star Party – GMARS**
Sept 11	**Board Meeting**
Sep 20	**General Meeting 7:30 PM**
Sept 28	**Star Party – GMARS**
Oct 9	**Board Meeting 6:15 PM**
Oct 12	**Star Party – Cahuilla Park**
Oct 18	**General Meeting 7:30 PM**
Nov 2	**Star Party – GMARS**
Nov 6	**Board Meeting 6:15 PM**
Nov 15	**General Meeting 7:30 PM**
Nov 27	**Board Meeting 6:15 PM**
Dec 7	**Holiday Party**

PVAA Officers and Board

Officers

President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	position is currently open	
Treasurer	Gary Thompson	909-935-5509

Board

Jim Bridgewater (2026).....	909-599-7123
Richard Wismer(2026)	
Ron Hoekwater (2025).....	909-706-7453
Howard Maculsay (2025)……	909-913-1195

Directors

Membership / Publicity....	Gary Thompson .	909-935-5509
Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

General Meeting May 17, 2024

We started out our May meeting with announcements and voting for the PVAA board members. No surprises.

Our speaker for the night was Denise Kaisler of Citrus College and her topic was "What Billionaires Want from Space," focusing on the main three billionaires Elon Musk, Jeff Bezos, and Sir Richard Branson. In the fall of 2023 Professor Kaisler had a sabbatical semester teaching estimation (approximation, ballpark figuring) to improve the students' number sense, promote "real world" readiness and increase engagement/retention in STEM courses. One goal was to develop and disseminate a database of estimation questions (Fermi problems). Fermi was able to predict, within an order of magnitude, the atomic blasts for the Manhattan Project. She then created a ZCT (Zero Cost Textbook) in only eight weeks, titled "SPACE FOR EVERYONE An Introduction to Astrobiology" by Denise Kaisler.

We now have a new Space Age. We have the traditional countries of Russia, United States, and China, now along with the European Union, India, Japan, North & South Korea, and Israel. But now we have commercial companies doing what only countries have done before. Virgin Galactic, SpaceX and Blue Origin have all launched people into space. As of this writing, Boeing has launched 2 people who are currently on the International Space Station with their "Starliner" spacecraft.

So, where does space begin? Even at 400 miles above the surface of the Earth, you still have an occasional air molecule. Back in the 1950s the US Air Force defined the edge of space beginning at 50 miles above sea level, or 80 kilometers. The European Union uses the von Karman Line to define the beginning of space. He thought it should be about 80 kilometers, but it was defined as a nice round number of 100 kilometers (62 miles), because it would be easier to remember.

Virgin Galactic sent its CEO Richard Branson on the company's "VSS Unity" spaceplane to space on July 11th, 2021. It was dropped from a carrier plane at an altitude of about 40,000 feet, ignited its engine, and after consuming its fuel, coasted to an altitude of 86.182 kilometers (53.551 miles), crossing the USAF/NASA line for space, but not the von Kaman line. Virgin Galactic sells tickets for $450,000 each. (up from the original price of $250,000.) Virgin Galactic is now in the process of developing version 3 of its spaceplane and carrier craft. So far Virgin Galactic has sent 61 passengers and crew into space, with some crew members going more than once. Sir Branson wants to normalize space for multi-millionaires and develop point-to-point suborbital travel. (Like London to Paris or LA to Tokyo via sub-orbital space.)

Blue Origin currently has a rocket/capsule suborbital system named New Shepard that can send 6 passengers with no crew to space. The capsule separates from the booster after MECO (Main Engine Cut Off) and glides up past the Karman line. The capsule then uses parachutes and air bags to land back on the ground, which they will then re-use the capsule. The rocket booster does a landing burn to land and be re-used. As of this writing, Blue Origin has sent 37 people into space.

Blue Origin is building a large rocket called the New Glenn to launch medium to heavy payloads into Earth orbit. They are also working on a lunar lander called "Blue Moon" and want to establish a Moon base. One of Jeff Bezos' goals is to move heavy industry off-earth.

SpaceX has the Falcon 9 Rocket and the Dragon 2 space capsule to take people to Earth orbit and the ISS. SpaceX regularly transports passengers and cargo to the ISS. SpaceX has launched 50 passengers into orbit. (Axiom Chief Astronaut Michael López-Alegría has gone twice.) Elon Musk – founder and CEO of SpaceX - wants to reduce the costs for space launches, help NASA establish a Moon base, and establish a Mars base; making humanity multi-planetary. Currently under construction/testing is "Starship" with a "Super Heavy" first stage booster. This is the largest and most powerful rocket ever flown. The Super Heavy has 16.7 million pounds of thrust versus the Saturn V's 7 million pounds. In 2023 SpaceX alone sent 80% of the world-wide mass into orbit, with China doing about

10% and the rest of the world doing 10%.

Is this the start of the next space race? Professor Kaisler ended with a request to review her book: “SPACE FOR EVERYONE An Introduction to Astrobiology” by using this QR code:

Spaceship II vs. New Shepard

Passenger experience

Lifted by White Knight II	Rocket and capsule launch together
Lands like a plane	Rocket -> launch pad; capsule parachutes down
Two crew, four passengers	Six passengers, autonomous flight
Several minutes of weightlessness	Several minutes of weightlessness
Originally $250 000/ seat (now more)	Based on prestige (0- 28M)

Gary Thompson

July 2024 Another Look

Cepheus

New moon Fri July 5 at 1458. Full Strawberry Moon Sun. July 21 at 0217.
In Spanish its luna llena de julio
In French its pleine lune de juillet
In German its Vollmond im Juli
In Italian its luna piena di luglio
Throughout Europe the June Full Moon is called the Rose Moon. It is also called the Hot Moon.
In No. America, other native names are Berries Ripen Moon, Green Corn Moon, and Hot Moon.
The Celtic names are Mead Moon, Horse Moon, Dyan Moon, and Rose Moon. Other English names are Flower Moon and Planting Moon.

For such an insignificant dude, Cepheus surprisingly has a lot going for it, though its objects are usually pretty faint. For example, one of the favorite targets of astrophotographers now-a-days is IC 1396 and its famous elephant trunk. In addition to this interesting star forming region, you will find also embedded in 1396 Herschel's Garnet Star, Mu Cephei. Burnham says its the reddest star we can see unaided and there is a ton of dark nebula to delight and frustrate you. Likewise, the head of Cepheus bathes in the Milky Way, meaning there are a few galaxies in our range, but in Cepheus, the Open Cluster shines.

Scholars still debate when they began, but there appears to be a consensus that the circumpolar constellations were identified in their more of less modern form about 3500 BCE when pictographic proto-writing starts developing towards writing proper in Sumer; thus starting what is technically considered history. But it wasn't just in the East. We have found a first monument of which there is still a trace at Duma na nGiall, built on the Hill of Tara, the ancient seat of the High King of Ireland and it would be foolish to ignore Egyptian astrologers and the civilizations rising in meso-america, also near 3500 BC.

The where ranges from the valley of the Nile up through the Eastern Mediterranean and into the Tigris/Euphrates delta. In 3500 BCE the Egyptians were identifying as a civilization with king and culture. At the northern tip of the Persian Gulf the empire of the Chaldea's blossomed for a little while only, but gave us the names Akkadia, Akkadian and the Biblical names Kasdim. The great cities of the Mediterranean coast, Tyre and Sidon were centuries away from being built though their foundations are planted as mud walled villages and stops along the trade routes. That narrow strip of arable land between the Mediterranean and the Syrian desert has been coveted and conquered and fought over and claimed for at least the last 6000 years. It was over that inland peninsula that the only trade passed from south to north, continuing even after the proto-phonician emerged hugging the coastlines in their first sea-going vessels.

We do not know how far back to go to determine the beginning of the Royal Family and its Consorts. Zoroastrianism is only about 4000 years old, and it was monotheistic, so I suppose we have to go further back to those enigmatic Chaldean's and early Egyptians and possibly, even further back to those humans who stepped fearfully out of their caves to gaze in wonder at those brilliant pinpricks of light.

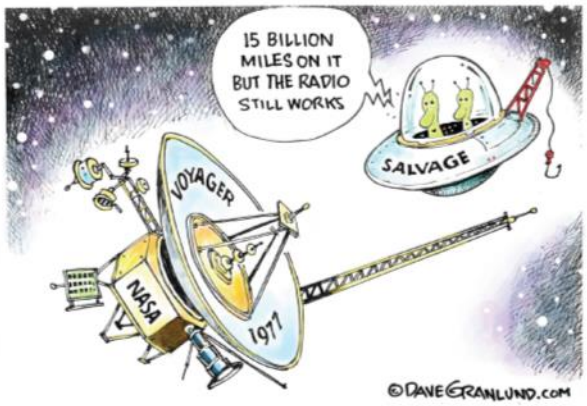
It is true we are ignoring the vast sub-continent of India, the countries surrounding it and the immense expanse of China and Eastern Asia, not to mention Southern Mexico and Central America. As these civilizations grew, they formed their own Zodiacs, their own constellations and their own star lore.

Either way, we have no account of the origin of the names, and it is possible that we may have to seek it, if ever we find it, from other sources—for it would appear that similar names were used for the same constellations by India. This seems inevitably proved by what is related by Wilford (Asiatic Researches, III.) of his conversation with an astronomer, on the names of the Indian constellations.

> "Asking him," he says, "to show me in the heavens the constellation of Antarmada, he immediately pointed to Andromeda, though I had not given him any information about it beforehand. He afterwards brought me a very rare and curious work in Sanskrit, which contained a chapter devoted to Upanacchatras, or extra-zodiacal constellations, with drawings of Capuja (Cepheus), and of Casyapi (Cassiopeia) seated and holding a lotus flower in her hand, of Antarmada charmed with the fish beside her, and last of Parasiea (Perseus) who, according to the explanation of the book, held the head of a monster which he had slain in combat; blood was dropping from it, and for hair it had snakes."

Later He becomes the French Céphée, the Italian Cefeo and our Achilles Tatios, probably during our 5th century, It is claimed that the constellation was known in Chaldaea twenty-three centuries before our era, when the earthly King was recognized in that country's myths as the son of Belos, of whom Pliny wrote,

"Inventor hie fuit sideralis scientiae"
(This inventor was a star of Science)

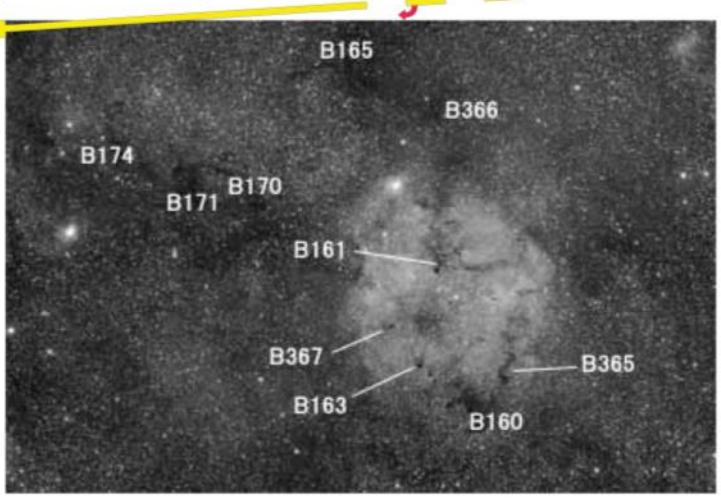


So, I guess we can now address the elephant in the room, better known as IC 1396. I have this terrific B&W image of 1396 placed next to a finder chart for the object.

IC 1396 Mosaic in Ha Light
https://ocastronomers.org/wp-content/uploads/2018/12/IC1396_2x2-Mosaic.jpgs

Sadly, this is not what you will see; Nor this, but that.

https://stellarscenes.net/object_e/ic1396wide.htm
This is closer to what you will see.



A Ha filter does wonders, but it will take some time to pinpoint all those dark nebula. IC 1396 will be a challenge from your backyard, it lacks contrast against the background stars so you will have to work for it even if your Go-To puts you right in the area. You don't actually need a Go-To, just point your finder at Mu and you are there.

Nor shall blank silence whelm the harassed house
Of Cepheus ; the high heavens know their name,
For Zeus is in their line at few removes.
Cepheus himself by She-bear Cynosure,
lasid king stands with uplifted arms.
From his belt thou castest not a glance
To see the first spire of the mighty Dragon.

Eastward from him, heaven-troubled queen, with scanty stars
But lustrous in the full-mooned night, sits Cassiopeia.
Not numerous nor double-rowed
The gems that deck her form,
But like a key which through an inward-fastened
Folding-door men thrust to knock aside the bolts.
They shine in single zigzag row.
She, too, o'er narrow shoulders stretching
Uplifted hands, seems wailing for her child.
" For there, a woeful statue-form, is seen
Andromeda, parted from her mother's side. Long I trow
Thou wilt not seek her in the nightly sky.
So bright her head, so bright
Her shoulders, feet, and girdle.
Yet even there she has her arms extended.
And shackled even in heaven ; uplifted.
Outspread eternally are those fair hands. "

Her feet point to her bridegroom
Perseus, on whose shoulder they rest.
He in the north-wind stands gigantic.
His right hand stretched toward the throne
Where sits the mother of his bride. As one bent on some high deed,
Dust-stained he strides over the floor of heaven."
Aratus "The Skies"

Once there, fortunately, you eye does not keep adding photons till everything is overexposed, instead you will be able to discern Trumpler 37, the star cluster in the center of 1396, so,keep at it.

There are ten Open Star Clusters in Cepheus magnitude 10 and brighter, making this an excellent constellation for honing you observing skills. Look for many of them down by the head of Cepheus.
Though not the brightest, NGC 7380 is called the Wizard Nebula, not least because you'll need to be a wizard to find it visually, though discovered by not other than Caroline Herschel. The nebulosity is almost the size of a full moon and with the right filter, you'll pick it out.
https://ocastronomers.org/wp-content/uploads/2018/12/NGC7380-Ha-S2-O3-082408-S.jpg

The Milky Way has an irregular border sliding up into Cepheus and the area is littered with clusters, nebula and even a galaxy or two. I'm not going to get into characteristics, after all open clusters can be a little dense or sparse, oval or rounder, brighter or dimmer.
NGC 6939 is a good example. You will find it okay and also find in the same wide field NGC 6946, nicknamed the Fireworks. **NGC 6946 fireworks Widefield (seasonzhang813) - Full resolution | AstroBin Cite seasonzhang813.**
It is also interesting to note that 6946 has had 10 supernova found in it. A remarkable number.
(NGC 7160) https://www.astrobin.com/full/u227o6/0/ **https://www.astrobin.com/270343/?q=ngc 7538**

NGC 7538 is over on the other side of Cepheus, near Cassiopeia, and very close to the Bubble Nebula and wrapped in nebulosity.

Another interesting note is that the largest, yet to be found, protostar is in 7538.

The brightest open cluster in Cepheus is NGC 7160 at 6th magnitude. It is brighter because the is somewhat more concentrated and further from surrounding nebulosity,
7160 is spread out about half the size of the full moon.

Caldwell 1, NGC 188, is reckoned to be one of the oldest open clusters and the closest open cluster to the North Celestial Pole. One of the Herschel's found it 200 years ago. **https://www.astrobin.com/full/9ht3vq/0/**

As long as we're talking about Caldwell objects, Cepheus has four of them. C1, C2, C4 and C9

C2 is the Bow-Tie nebula, NGC 40, an 11th magnitude planetary nebula rather ill-defined, but with a bright central star.

C4 is the Iris nebula. NGC 7023 a 7th magnitude reflection nebula The Iris is a star cluster embedded inside a nebula.

There are two really fine images of 7023 on the ocastronomers.org website. This one is by Bill Patterson but the image by Marcelo Reginato is equally fine.

https://ocastronomers.org/user_images/iris-nebula-ngc7023/

https://en.wikipedia.org/wiki/NGC_7129#/media/

C4 is an interesting star foundry. It is lit by several close stars including B Cephei. The star cluster is Collinder 429. **https://www.astrobin.com/9gdxws/0/**

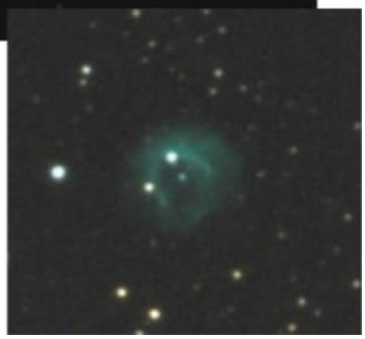
C9 is Sharpless 155, an emission/reflection/dark nebula easily found at 8th magnitude. Apparently Patrick Moore was unhappy with the currently designated "Cave Nebula" in Cepheus, Ced 201 (Cederblad), so he gave the name to number 9 on his list. Sh155 is the subject of a lot of science. NGC 7129 should be mentioned although its visual magnitude is in the 11's. Most images blow it out to collect the nebulosity, but visually you will see a buzzing of equal bright stars with a dusting of nebulosity. Its a pretty one.

(NGC 7139), https://www.astrobin.com/full/s6ejy7/0/

Near as I can tell, the only thing that makes NGC 2276 interesting is its location next to the pole. The two bright galaxies in the image are 11th and 12th magnitude and not especially big, thought two galaxies in the same field of view is always worth pursuing. The image shows Arp 25, consisting of NGC 2276 and 2300. The image shows also four more galaxies, can you find them before clicking on the link?

NGC 7354 is over half the size of the full moon and at 12th magnitude should be visible in you 8" telescopes under pretty dark skies. It is an obvious blue, but like I said, spread out. It will be interesting if you can resolve the shell or even the central star. This image by Gary Imm was taken with a 5 "lens.
https://www.astrobin.com/38yl3j/0/

Moving from open clusters to planetaries, there are 18 planetary nebula in Cepheus, most quite hard.



NGC 7139 is huge, over twice the size of the full moon, but in the 13th magnitude. Abell 75 is also over twice the size of the full moon, but also in the 13th. Minkowski 2-55 (PK116+ 8.1) is a whole magnitude brighter at 12th and a little smaller at 1.5x full moons (42"x36").

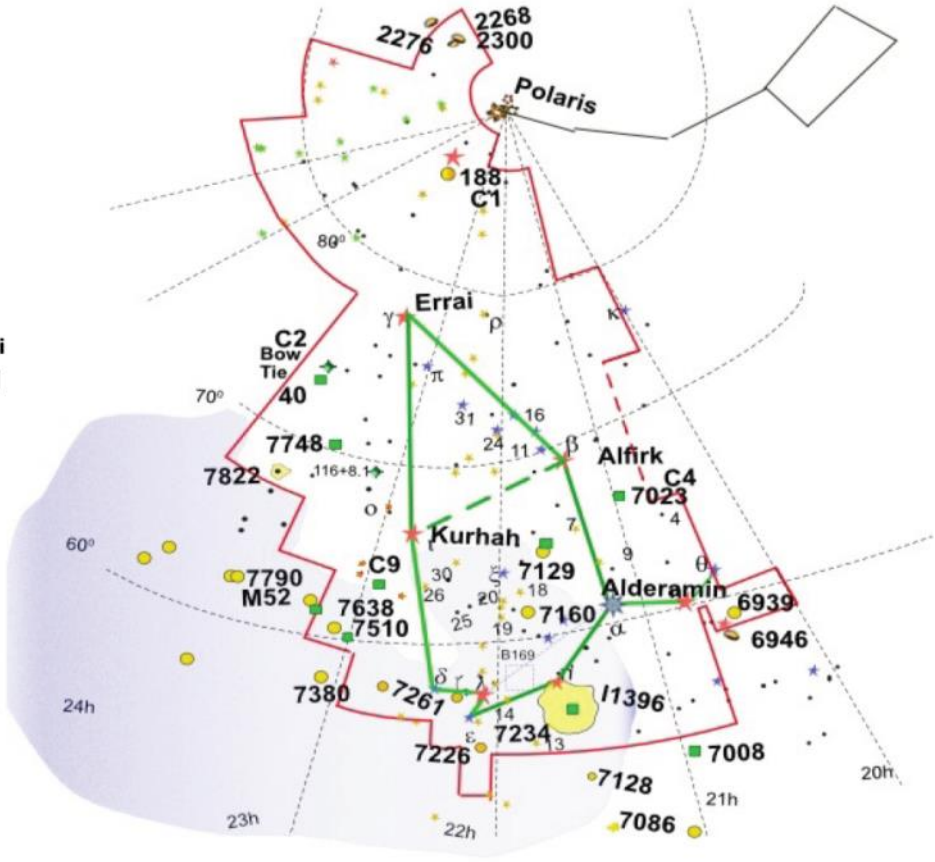
(NGC 7076) https://www.astrobin.com/full/a0ilkv/0/

If you find dark desert skies and you have your 12.5 or 14 with you that night, you are in for a very satisfying evening of star cluster and planetary hopping adventure.

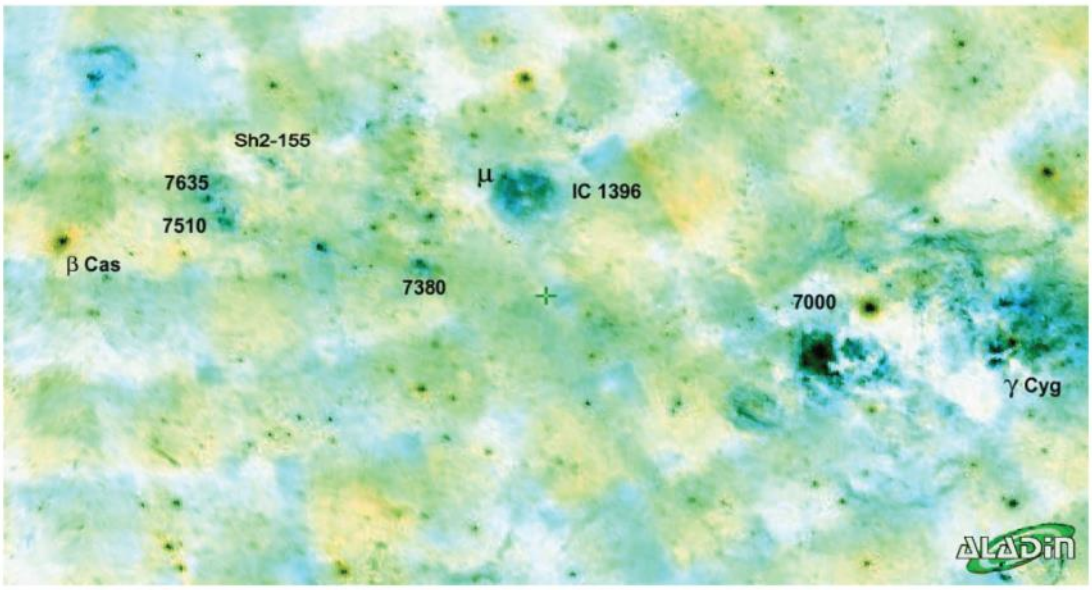
There are 28 extra-solar planets in Cepheus ranging from near moon size to γ Cephei Ab, over 17 times Jupiter's mass. Γ's (gamma) name is Errai and is a relatively newly named double star. Burnham, revised in 1978, did not list it as a double. Since then we have learned that γb is a red dwarf (no magnitude listed) and that γa has a planet.

In December 2015, the IAU gave the nod to the Syrian Astronomical Association and it was announced that γ Cephei Ab was formally given the name Tadmor. Tadmor is the ancient Semitic name and the modern Arabic name for the city of Palmyra.

A conundrum for you to consider is the case of NGC 7748. Is is a misidentification?, a misnomer?, a mistake?, what?. Dreyer describes it in the NGC as "a very large nebulosity, surrounding a 7th magnitude star". Amateurs have not found 7748 yet, so no images to look at, but PanSTARRS (**https://aladin.cds.unistra.fr/AladinLite/**) does show what I guess could be a halo and UVOT had an ultraviolet image that definitely looked poofy. Maybe someone could check the POSS plates. I await your visual observations.



The most celebrated star in Cepheus is Delta Cephei. δ is a rapidly pulsating supergiant and the prototype of the Cepheid variable. In addition, Cepheus has a few of the largest stars known, including RW Cephei, an orange hyper-giant and the red super-giants MY Cephei, VV Cephei and V354 Cephei.



There are 30 stars of visual magnitude in Cepheus, Erakis is μ Cephei, Herschel's Garnet Star, the reddest star to our unaided eye and embedded in IC 1396 is 4th mag.. Other bright stars are ζ at 3rd, η at 3rd, ι at 3rd, δ at 4th and ε at 4th. At closing, let's mention the interconnected tissue of our galaxy, seen here in the macro. I cobbled together this image from Deep Space Survey images I found on the Aladin website. It shows an unbroken line of light and dark nebula interlaced in space from Cassiopeia to Cygnus. Somehow its all there, all together, all amazing and all wonderful and as Scotty would say, poetic.

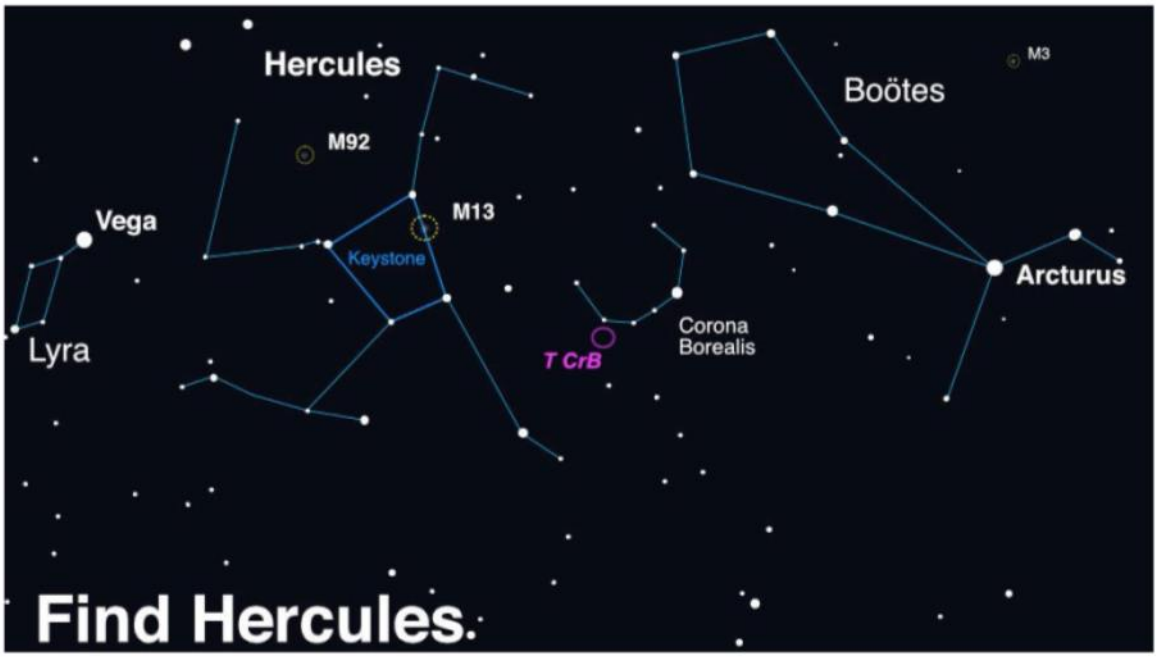
Dark Skys Dave Phelps

This article is distributed by NASA's Night Sky Network (NSN).
The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

July's Night Sky Notes: A Hero, a Crown, and Possibly a Nova!

By Vivian White

High in the summer sky, the constellation Hercules acts as a centerpiece for late-night stargazers. At the center of Hercules is the "Keystone," a near-perfect square shape between the bright stars Vega and Arcturus that is easy to recognize and can serve as a guidepost for some amazing sights. While not the brightest stars, the shape of the hero's torso, like a smaller Orion, is nearly directly overhead after sunset. Along the edge of this square, you can find a most magnificent jewel - the Great Globular Cluster of Hercules, also known as Messier 13.



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 a smaller globular cluster 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

Globular clusters are a tight ball of very old stars, closer together than stars near us. These clusters orbit the center of our Milky Way like tight swarms of bees. One of the most famous short stories, *Nightfall* by Isaac Asimov, imagines a civilization living on a planet within one of these star clusters.

They are surrounded by so many stars so near that it is always daytime except for once every millennium, when a special alignment (including a solar eclipse) occurs, plunging their planet into darkness momentarily. The sudden night reveals so many stars that it drives the inhabitants mad.

Back here on our home planet Earth, we are lucky enough to experience skies full of stars, a beautiful Moon, and regular eclipses. On a clear night this summer, take time to look up into the Keystone of Hercules and follow this sky chart to the Great Globular Cluster of Hercules. A pair of binoculars will show a faint, fuzzy patch, while a small telescope will resolve some of the stars in this globular cluster.

A red giant star and white dwarf orbit each other in this animation of a nova similar to T Coronae Borealis. The red giant is a large sphere in shades of red, orange, and white, with the side facing the white dwarf the lightest shades. The white dwarf is hidden in a bright glow of white and yellows, which represent an accretion disk around the star. A stream of material, shown as a diffuse cloud of red, flows from the red giant to the white dwarf. When the red giant moves behind the white dwarf, a nova explosion on the white dwarf ignites, creating a ball of ejected nova material shown in pale orange. After the fog of material clears, a small white spot remains, indicating that the white dwarf has survived the explosion. NASA/Goddard Space Flight Center

Bonus! Between Hercules and the ice-cream-cone-shaped Boötes constellation, you'll find the small constellation Corona Borealis, shaped like the letter "C." Astronomers around the world are watching T Coronae Borealis, also known as the "Blaze Star" in this constellation closely because it is predicted to go nova sometime this summer. There are only 5 known nova stars in the whole galaxy. It is a rare observable event and you can take part in the fun! The Astronomical League has issued a Special Observing Challenge that anyone can participate in. Just make a sketch of the

constellation now (you won't be able to see the nova) and then make another sketch once it goes nova.

Tune into our mid-month article on the Night Sky Network page, as we prepare for the Perseids! Keep looking up!

Blue Moon Pantoum

Moon you do look a little blue tonight,
Is it worshipful humans you've seen or heard?
You're usually so chaste a shade of silvery white,
as you look down, in full, so self-assured.

Is it worshipful humans you've seen or heard?
A moon-mad suicide in midnight pain,
as you look down, in full, so self-assured,
your distant orb watching with disdain.

A moon-mad suicide in midnight pain,
a drunken poet who sees you in his cup,
Your distant orb watching with disdain,
a child who views you just by looking up.

A drunken poet who sees you in his cup,
a lost sailor who feels an odd pull of tides,
a child who views you just by looking up,
a telescope man who probes with his inner eye,

A lost sailor who feels an odd pull of tides.
You're usually so chaste a shade of silvery white.
A telescope man who probes with his inner eye,
moon you do look a little blue tonight.

Lee Collins