

A very rare capture of Aurora Borealis from our Anza site. This was taken by Dave Kodama in May of this year using a Nikon camera and wide angle lens.

### Upcoming Events - free and open to the public

<b>Beginner's class</b>	Friday, 2 August at 7:30 to 9:30 PM <b>IN PERSON</b> This is session 6 of the class covering basics of astrophotography, types of cameras, other equipment and some considerations for taking good pictures.
<b>Club Meeting</b>	Friday, 12 July at 7:30 to 9:30 PM <b>IN PERSON</b> at Chapman University and <b>ONLINE</b> "What's Up?": Chris Butler from OCA (in person) Main speaker: Dr. Olivia Barber from Northwestern University speaking on "What Cleaning the International Space Station Can Teach Us About a Human Health Crisis on Earth"
<b>Open Spiral Bar</b>	Saturday, 13 July at 10:00 to 11:30 PM <b>ONLINE</b> Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face.
<b>Star Parties</b>	Saturday, 6 July at the OCA Anza site. ??? Irvine site dates are yet to be determined

The monthly club meeting is viewable in progress on Zoom and our social media platforms. The recording is available on these platforms after the meeting is over.

<https://twitter.com/OCAstronomers>  
<https://www.facebook.com/OrangeCountyAstronomers>  
<https://www.youtube.com/@ocastronomers>

**Please consult the calendar on the OCA website to RSVP online meetings (required)**

# President's Message

By Barbara Toy

## Outreach Update

I'm very happy to report that Martin Christensen, a long-time club member who has been active with the Outreach program for many years and is familiar with how it worked in the past, has volunteered to be our new Outreach Coordinator. He's lost no time working to get the program back on track, and quickly set up a couple of outreaches this summer; the first will already be behind us by the time you see this. The second is on August 20 at Crystal Cove, in conjunction with the grunion run. It's possible that he'll get more set up over the summer, and we expect that the schools will want to set up events when they learn that the program is back in business. Keep an eye on our website calendar for the latest information on upcoming events. Martin is recruiting volunteers to bring telescopes out to these events, which are some of the most fun and rewarding activities we have in our club. Even if you think you could only come to one event a year, please contact him at [Martin@ocastronomers.org](mailto:Martin@ocastronomers.org) to let him know you're interested in volunteering.

We're all very excited about Martin taking on this position and looking forward to seeing how the program develops under his leadership!

## How to Use Your Telescope Class (Beginners Astronomy Class)

The July session of the monthly Beginners Astronomy Class is our "How to Use Your Telescope Class." This is an in-person class where people bring their telescopes and volunteers help them set them up and (hopefully) show them how to locate and view some objects with it. The goal is to get them past the initial difficulties of setting up and working with their telescopes so they'll be more likely to continue to use them. The class is at 7:30 p.m. on Friday, July 5, at the Heritage Museum at 3101 West Harvard Street, Santa Ana, CA – if you can be there as a volunteer, please contact David Pearson at [p.davidw@yahoo.com](mailto:p.davidw@yahoo.com).

## 2024 Starbecue

As mentioned last month, our annual Starbecue potluck will be at the August Anza Star Party this year, which means that it will be in the evening of August 3. We generally set up tables behind the club observatory by around 5:00 p.m. to hold the food, and the club provides paper plates, tableware and napkins. We don't have a formal list of who is bringing what, so bring a dish that you enjoy for sharing with the group. We plan to have a barbecue running for those who bring patties, hotdogs, etc., to grill. Besides a dish to share, it's a good idea to bring a chair, as we don't have many at the observatory, and something to drink.

These parties are always fun and give us all a chance to catch up with friends, meet new friends, and talk astronomy shop with fellow enthusiasts. I look forward to seeing you all out there!

© Barbara Toy, June 2024

# Social Media Coordinator

If you enjoy social media and would like to help keep our accounts active, we are seeking a social media coordinator and would love to hear from you. We have a lot to tell people about OCA events and upcoming meetings as well as general astronomical information. We currently have Instagram, Facebook and X/Twitter accounts. There is a lot of flexibility in what can be done with this volunteer role. If you are interested, please contact our webmaster (also our Vice President), Reza AmirArjomand at [Reza@ocastronomers.org](mailto:Reza@ocastronomers.org).

## From the Editor

Due dates for submission of articles, pictures and advertisements

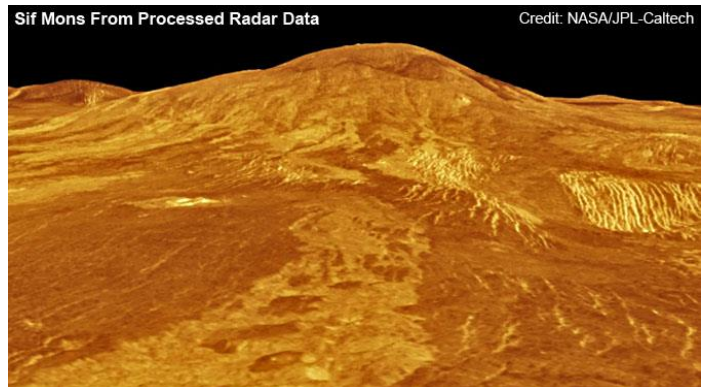
<u>Issue</u>	<u>Due date</u>
August	20 July
September	24 August
October	21 September
November	19 October

# AstroSpace Update

July 2024

Astronomy and space news summarized by Don Lynn from NASA and other sources

**Venus Volcanic Activity** – Careful comparison of old (1990s) and new radar images of the surface of Venus show changes that are attributable to lava flows. These flows were found in areas known as Sif Mons and Niobe Planitia. This is the best evidence that the planet is still undergoing volcanic activity. This has long been suspected but has been difficult to prove.



**Pluto Ocean** – Many astronomers believe there is likely a water ocean beneath the nitrogen/methane/water ice on the surface of Pluto. A new paper has examined this in detail. Evidence for the ocean includes ice and water vapor emitted by cryovolcanoes and cracks and bulges in the surface. The new study found that the cracks could be explained only by an ocean lying between 25 and 50 miles below, and with salinity that makes the ocean about 8% denser than Earth's oceans.

**Martian Frost** – Examination of images taken by Mars Express and Trace Gas Orbiter spacecraft show that water ice frost forms in the calderas of the tallest Martian volcanoes every morning from late fall to early spring. It evaporates within a few hours. The frost coating is thought to be only the thickness of a hair, but the large area adds up to about 150,000 tons of ice. Scientists were surprised that frost could form under these conditions, but simulations of Martian atmosphere show that frost can form when winds across tall volcanoes drop into the calderas at their summits.



**Lunar Sample Mission** – China's Change'6 mission has soft-landed a lander and a rover on the far side of the Moon, in the far south Aitken Basin. The lander deployed science instruments and took images and also gathered rocks and lunar soil from the surface and from drilling below the surface. It then sealed these samples in a return capsule, and as of my writing this, the capsule is on its way back to Earth. China completed Change'5, a similar lunar sample return mission, but landing on the front side of the Moon, about 4 years ago.

**Unusual Exoplanet** – An exoplanet, dubbed TOI 4633 c, has been discovered with an unusual set of properties. It orbits one of a pair of Sun-like stars that orbit each other once every 230 Earth years. The planet is in the class known as mini-Neptunes; that is, though smaller in mass than Neptune, it is still a gas giant or ice giant. Its year is 272 Earth days, and this puts it in the habitable zone, that is, the distance from its star where temperatures may allow liquid water to exist. However, such water is unlikely due to its huge hydrogen-helium atmosphere. There is evidence for a 2<sup>nd</sup> planet in the system, with a 34-day orbit, though this hasn't been confirmed. Theorists need to do a lot of work to explain how this planetary system with such unusual properties could have formed and remained stable for a long time. TOI 4633 c was found by citizen scientists searching through data from the TESS planet-finding space telescope.

**Sulfur-Rich Exoplanet** – Observations of an exoplanet known as GJ 3470 b show that its atmosphere is rich in sulfur dioxide. It is a Neptune-like planet about 96 light-years away. It takes only 3.3 Earth days to orbit its star. That sulfur compound is found in larger and hotter planets but was not expected for this size and temperature. Also found were methane and water, but those were not surprising. It is believed that the sulfur dioxide is formed by a chemical reaction in the atmosphere triggered by its star's radiation. The planet has high metallic content in its atmosphere, and this may stimulate the reaction that produces sulfur dioxide.

**Puffy Exoplanet** – Astronomers discovered an exoplanet dubbed TIC365102760 b, which is in the hot Neptune class, that is, it is roughly the size of Neptune, but orbits quite close to its red giant star, heating it. The heat from the star should have blown away the planet's atmosphere, but instead the atmosphere just puffed up and remained in place. The planet is 6.2 times the size of Earth and orbits its star every 4.2 Earth days. The discoverers are looking for other puffy hot Neptunes to try to understand them. They have already found a dozen candidates that they hope to observe.

**Carbon-Rich Disk** – Astronomers used the James Webb Space Telescope (JWST) to study a very young low-mass red dwarf star known as ISO-ChaI 147 and found that the planet-forming disk about it is rich in carbon-containing gas. Because this carbon is in the form of gas, not solids, it is unlikely to be included in any rocky planets that might form in the future. The carbon found is represented by 13 different types of molecules, including ethylene, propyne, and methyl radical. This carbon richness differs profoundly from the chemistry found in the planet-forming disks around Sun-sized young stars. These astronomers plan similar observations of other young low-mass stars.

**Finding Supernovas** – JWST is turning out to be an excellent supernova finder. Many of the deep images JWST has taken have contained supernovas, and not just any supernovas but mostly extremely distant ones. Only a handful of supernovas have ever been found that are so distant that they exploded during the first quarter of the life of the Universe and we are just now seeing their light. Examination of JWST deep images found about 80 more of these. The astronomers are looking to see if supernovas that exploded so long ago differ from ones that explode now. So far, no differences have been found, but investigation of this will continue. The most distant of the new discoveries is a core-collapse supernova that occurred when the Universe was only 1.8 billion years old. The most distant Type Ia supernova found exploded when the Universe was 2.3 billion years old.

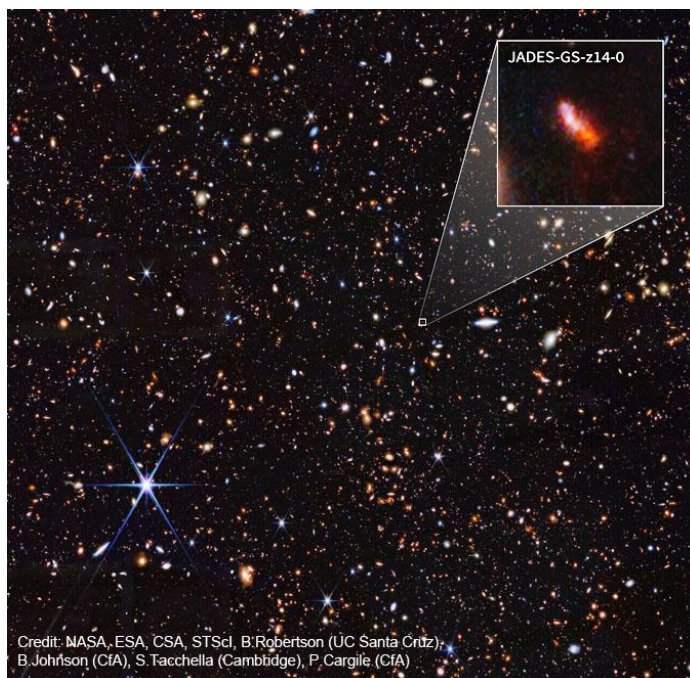
**Distant Galaxy** – Observations with JWST have once again broken the record for the most distant known galaxy. The new record holder is known as JADES-GS-z14-0 because it was found in the JADES survey and has a redshift ( $z$ ) of 14. The redshift of an object is defined as the factor by which all space has stretched (by expansion of the Universe) since light left the object. It is easily measured from observations of known spectral lines. The light we are seeing left the galaxy only 290 million years after the Big Bang.

**Missing Dust** – JWST observed the star Beta Pictoris and failed to find silicate dust that had been found about the star 20 years ago by the Spitzer Space Telescope. Astronomers concluded that some event, likely a collision of asteroids, had created silica dust shortly before the Spitzer observations and that the star's radiation blew the dust away in just several years. It was also suggested the dust might be from collision of comets.

**Slow Rotator** – Astronomers using the ASKAP radiotelescope array in Australia discovered an object that appears to be a neutron star, though some dispute that it might be a white dwarf star. Its unusual property is that it takes 54 minutes to rotate, which is extremely slow for this type of object. If indeed it is a neutron star, it holds the record for slowest spin. When ordinary stars collapse to form a neutron star, conservation of spin momentum causes them speed up their spin to typically rotate in seconds or fractions.

**Old Nova** – In 1975 the nova HM Sagittae was seen to explode, but over the subsequent years it refused to return to its pre-nova dimness. Recent observations of it were made with the Hubble Space Telescope and combined with observations made with the SOFIA airborne infrared telescope (which was retired in 2022) to see how the nova had changed in the last several years. In ultraviolet spectra, ionized magnesium appeared. Temperature measurements showed the nova is 50,000 degrees hotter than in 1989, though overall it has dimmed a bit. Exactly why the nova is behaving this way long after the original explosion remains to be seen.

**Early Spirals** – A new study using data from JWST found that galaxies started forming spiral arms quite early in the history of the Universe. Previous work found very few spirals among very distant galaxies (which we see as they were when the light left them long ago). However, this new study found that spirals are common with very distant galaxies, but before JWST we just couldn't make out most very distant spiral shapes. To put numbers to it, the new study found that about 35% of all galaxies were spirals when the Universe was only 1.5 billion years old. This means theorists have to now come up with how galaxies can so commonly develop spiral arms more quickly than previously believed.



Credit: NASA, ESA, CSA, STScI, B. Robertson (UC Santa Cruz), B. Johnson (CfA), S. Tacchella (Cambridge), P. Cargile (CfA)

**Aligned Jets** – JWST was used to study the Serpens Nebula, where many new stars are forming. A surprising discovery was that the jets or outflows from protostars in this nebula tended to be aligned. This implies that the forming stars shared the same spin direction in space, possibly inherited from the spin of the cloud that is collapsing into stars. Previous study of other star-forming regions has not found such alignment. This may suggest that this kind of alignment dissipates over time, so we just happened to catch this nebula before the dissipation occurs. The Serpens Nebula is about 1300 light-years away and is only 1-3 million years old.

**Black Hole Spin** – X-ray observations of a supermassive black hole have for the first time been used to calculate the spin rate of such objects. As a black hole spins, it drags space-time with it, influencing the surrounding accretion disk as it glows in X-rays due to material pulled off a star passing too closely falls into the disk. The black hole measured is about a billion light-years away and was seen to have a star fall into it. The black hole was found to be spinning at about  $\frac{1}{4}$  the speed of light, slower than predicted. The measurement technique should be applicable to hundreds of other black holes in relatively nearby galaxies.

**Black Hole Growth** – A new study combined X-ray and other wavelength observations of supermassive black holes with computer simulations of galaxy development (including mergers) to try to pin down exactly how those black holes grew over the life of the Universe to their present huge masses. Black holes grow either by accreting matter or by merging with other black holes. The X-ray observations of 8000 supermassive black holes, made over 20 years by 3 different space telescopes, showed how much black hole accretion was taking place at various distances, and therefore look-back times. The finding was that black holes in different circumstances vary in their speed of growth, time of growth, and their fractions of growth attributable to accretion or merging. In most cases accretion dominated, but the more massive black holes were often dominated by merger growth. Most black hole growth occurred in the early part of the life of the Universe.

**Merging Quasars** – Observations using the Gemini North and Subaru telescopes in Hawaii were combined to identify a merger of two distant quasars. The merger turned out to be the most distant one known, and therefore it happened earlier in the life of the Universe than any other known quasar merger. It happened only 900 million years after the Big Bang. Quasars are supermassive black holes that happen to be consuming a great amount of material, which glows brightly as it is falling in. When the Universe was much younger, average distances between galaxies were far less, and mergers of galaxies and their black holes were more frequent than now.

**Astronaut Bill Anders** died in a plane crash at age 90. He took the iconic image known as "Earthrise" during the Apollo 8 mission, which orbited (but did not land on) the Moon. That image got the world thinking about how fragile the Earth appears. Of the 24 astronauts who orbited and/or landed on the Moon (in the period 1968-1972), only 6 now remain alive.

**Starship Test Flight** – SpaceX's Starship rocket atop a Super Heavy booster made a successful test flight on the 4<sup>th</sup> try. The first 3 exploded. This test not only reached near orbit, but also recovered both the stages for possible reuse. This is the largest and most powerful rocket ever launched. It took off from Texas and the upper stage splashed down in the Indian Ocean. Starship will probably be used to take astronauts from lunar orbit down to the Moon's surface and back to orbit as part of the Artemis program. Starship is also expected to be used in future missions to Mars.

**Hubble Gyros** – The Hubble Space Telescope normally points and stabilizes using 3 gyros, one in each dimension. 6 new gyros were installed in Hubble in 2009, the last time the telescope was serviced by astronauts. Since then, 3 gyros have failed, and a 4<sup>th</sup> is cutting out temporarily on occasion. NASA years ago, wrote Hubble software that works with either 2 or 1 gyro, though more slowly and without the ability to track fast-moving objects (which it rarely does). In fact, the telescope has been run in both modes in the past. NASA made the decision in May to switch the telescope to single gyro mode and keep the other working gyro unused until needed. It took 3 weeks to make the switch. Hubble is back to normal observations, except a little slower. Hubble has been in space for 34 years.

**Boeing's Starliner** spacecraft, after many delays, finally made it to the International Space Station (ISS) with 2 astronauts aboard on June 6. Its previous test flight to ISS was without astronauts. As of my writing this, Starliner is scheduled to return the same crew to Earth near the end of June.



# Another Look – Cepheus

July 2024  
Dave Phelps

New moon Fri July 5 at 1458. Full Strawberry Moon Sun. July 21 at 0217.

In Spanish it's luna llena de julio

In French it's pleine lune de juillet

In German it's Vollmond im Juli

In Italian it's 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 this is the reddest star we can see unaided and there are tons 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 and where they began, but there appears to be a consensus that the circumpolar constellations were identified in more or less their 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 Mesoamerica, 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-Phoenician 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.

Let's not ignore the vast sub-continent of India, the countries surrounding it, the immense expanse of China and Eastern Asia, and certainly not 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 from other sources—for it would appear that similar names were used for the same constellations by India. This is supported by Wilford (Asiatic Researches, III.) as he relates 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 Cepheus 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 Chaldea 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,

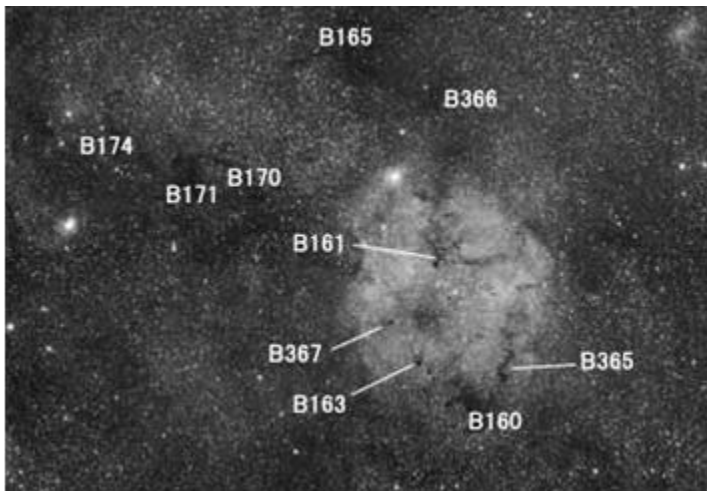
"Inventor hie fuit sideralis scientiae"

(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. Sadly, this is not what you will see; nor the nice image of the nearby dark nebula. That the one in the lower right is closer to what you may expect.



IC 1396 Mosaic in Ha Light – Stevan Hart  
[https://ocastronomers.org/wp-content/uploads/2018/12/IC1396\\_2x2-Mosaic.jpg](https://ocastronomers.org/wp-content/uploads/2018/12/IC1396_2x2-Mosaic.jpg)



Dark nebula around IC1396 – Naoyuki Kurita  
[https://stellarscenes.net/object\\_e/ic1396wide.htm](https://stellarscenes.net/object_e/ic1396wide.htm)



An Ha filter does wonders, but it will take some time to pinpoint all those dark nebulae. 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.

Once there, fortunately, your 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.

*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.  
Equidistant from the tip of her tail  
And from each other are his feet.  
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"*

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, yet it was discovered by none other than Caroline Herschel. The nebulosity is almost the size of a full moon and with the right filter, you'll pick it out.



**NGC7380 from John Castillo (OCA)**

<https://ocaastronomers.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. NGC6939 is a good example. You will find it okay and in the same wide field with NGC 6946, nicknamed the Fireworks galaxy. It is also interesting to note that 6946 has had 10 supernovas found in it. Quite a remarkable number!

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 6<sup>th</sup> 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.



**NGC7538 from Adam Jaffe**

<https://www.astrobin.com/270343/?q=nqc 7538>



**NGC7160 from Josef Buchenmeister**

<https://www.astrobin.com/full/u227o6/0/>



There are ten Open Star Clusters in Cepheus magnitude 10 and brighter, making this an excellent constellation for honing your observing skills. Look for many of them down by the head of Cepheus. 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.

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 11<sup>th</sup> magnitude planetary nebula rather ill-defined, but with a bright central star.

C4 is a 7<sup>th</sup> magnitude reflection nebula called the Iris nebula (LBN487) and the open cluster (NGC 7023 or Collinder 429) within. C4 is an interesting star foundry. The nebula is lit by several close stars including B Cephei. There are two really fine images of 7023 on the ocastronomers.org website. You may follow the link to the one by Bill Patterson though the image by Marcelo Reginato is equally fine. [https://ocastronomers.org/user\\_images/iris-nebula-ngc7023/](https://ocastronomers.org/user_images/iris-nebula-ngc7023/)



**NGC188 from Ron Adams**  
<https://www.astrobin.com/full/9ht3vq/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. It's a pretty one. [https://en.wikipedia.org/wiki/NGC\\_7129#/media/](https://en.wikipedia.org/wiki/NGC_7129#/media/)



**NGC7129**

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 11<sup>th</sup> and 12<sup>th</sup> magnitude and not especially big, though 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?



**NGC2276 and NGC2300 from Loran Hughes**  
<https://www.astrobin.com/9qdxws/0/>

NGC 7354 is over half the size of the full moon and at 12<sup>th</sup> 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.

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



**NGC7139 from Peter Oberc**

NGC 7139 - <https://www.astrobin.com/full/s6ejy7/0/>  
 NGC7354 - <https://www.astrobin.com/38yl3j/0/>  
 NGC 7076 - <https://www.astrobin.com/full/a0ilkv/0/>



**NGC7354 from Gary Imm**



**NGC 7076 from Andrea Tasselli**

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  $\gamma$  Cephei Ab, over 17 times Jupiter's mass.  $\Gamma$ '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  $\gamma$ b is a red dwarf (no magnitude listed) and that  $\gamma$ a has a planet.

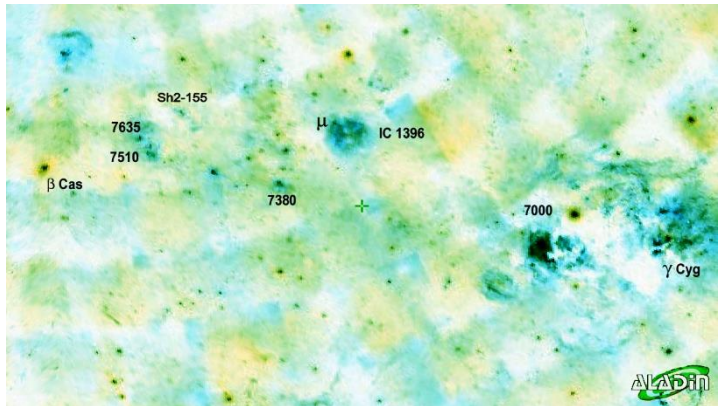
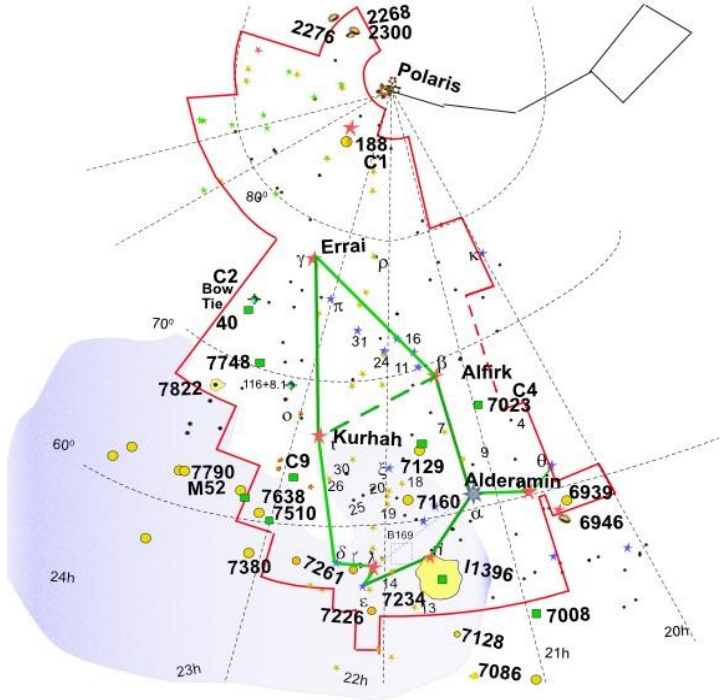
In December 2015, the IAU gave the nod to the Syrian Astronomical Association and it was announced that  $\gamma$  Cephei Ab was formally given the name Tadmor. Tadmor is the ancient Semitic name and the modern Arabic name for the city of Palmyra.

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

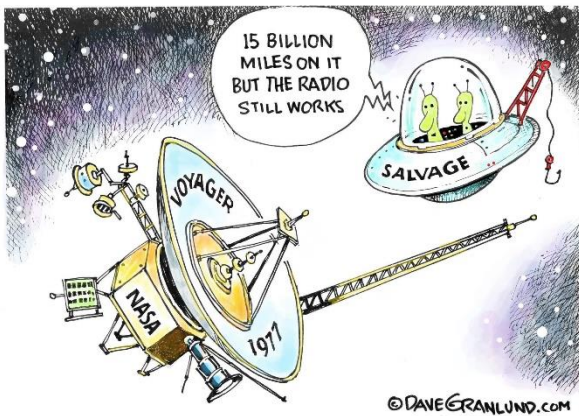
The most celebrated star in Cepheus is Delta Cephei.  $\delta$  is a rapidly pulsating supergiant and the prototype of the Cepheid variable. In addition, Cepheus has a few of the largest stars known, including RW Cephei, an orange hyper-giant and the red super-giants MY Cephei, VV Cephei and V354 Cephei.

There are 30 stars of visual magnitude in Cepheus, Erakis is  $\mu$  Cephei, Herschel's Garnet Star, the reddest star to our unaided eye. Embedded in IC 1396, it is 4<sup>th</sup> mag. Other bright stars are  $\zeta$  at 3<sup>rd</sup>,  $\eta$  at 3<sup>rd</sup>,  $\iota$  at 3<sup>rd</sup>,  $\delta$  at 4<sup>th</sup> and  $\epsilon$  at 4<sup>th</sup>.

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, it's all there, all together, all amazing and all wonderful and as Scotty would say, poetic.



Dark Skys Dave Phelps



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Price is for entire lot. These items are pickup only – one mile from Ontario international Airport. Email me if you have any questions.				

For Sale	contact	Arnie Richards	(562) 644-9775	wannawalk52@gmail.com	
<ul style="list-style-type: none"> <li>Meade 7" LX200 Maksutov-Cassegrain telescope with tripod.</li> <li>Includes tripod, 9 Plossl eyepieces ranging in focal length from 6 mm to 40 mm; and a full aperture solar filter.</li> </ul>				\$ 900	
Originally purchased in 2003 for \$3500; Excellent optics; Alt-Azimuth fork mount in excellent condition but GPS tracking program is slow and cranky. My understanding is that there are local (SoCal) experts who can fix this.					
Photos, including sample images, are available upon request. Will deliver to any location within 100 miles of Downey, CA.					



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