Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers July 2024

Events: General Meeting, Monday, July 1, 2024, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.

- **IFI & Gallery by Clark Williams**
- **Refreshments by Chuck Dyson**
- **Speaker: From Archytas To LC-14 by Clark Williams**
- **For upcoming school Star Parties check the Calendar on the web page.**

WHAT'S INSIDE THIS MONTH:

Send newsletter submissions to Sharon Smith <sas19502000@yahoo.com> by the 20th of the month for the next month's issue.

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

Address renewals or other correspondence to:
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Members' Mailing List:
<tvastronomers@googlegroups.com>
Website:
http://www.temeculavalleyastronomers.com/

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Cosmic Comments – July 2024
By Mark Baker

I was never one to indulge in "addictive" behaviors and managed to avoid the common practices of our day such as smoking, drinking, drugs, etc. Yes, I did Rock n Roll but I didn't "inhale" to quote a famous person… I was easily able to set it aside and walk away clean… a season in a symphonic orchestra will do that!!! However, I vicariously experienced nasty withdrawals while supporting friends and family that endured the throes of such. I could therefore sympathize, but not empathize…

At least until 2024 that is… I honestly have to stand up and admit to you all that "I Am an Outreach Addict!!!" The withdrawal I am experiencing is not to be taken lightly as it has a deleterious effect on all aspects of my Life…halfway through the year and TVA was only able to enjoy four total events out of at least thirty on the books. Even P60 looksee events up at Palomar Observatory have fallen flat!!! I used to quote from Firefly that "You Can't Take the Sky from Me", but no longer… 2024 has done just that!!!

Here's to hoping my withdrawal soon ends, and my recovery will often employ the right and privilege to Look Up… oh what joy I will have!!!

But it goes way beyond just me, as getting people to Look Up with awe and wonder is more than a fun activity for me… I thrive on the principles of Outreach and can only hope TVA garners more opportunities to do so, the sooner the better!!!

Again, I encourage one and all to take on the mantle and talk Outreach up at every chance…you just never know who you might inspire to raise their sights, both diurnal and nocturnal!!! There's so much to wonder about that almost everyone can find a niche of interest…

So keep the faith, TVA, and Look Up … it's the only way to beat your own withdrawal!!!

Clear, Dark Skies my Friends…

Looking Up Redux – July 2024

Compiled by Clark Williams
from these sources:
SeaSky.org
Wikipedia.com
in-the-sky.org
The American Meteor Society, Ltd.
cometwatch.co.uk
NASA.gov
TVA App (2.0.1296)
FullAndNewMoon App (2.0)
Starry Night Pro Plus 7 (7.6.3.1373)
SkySafari 6 Pro (6.8.2)
Stellarium (23.1)
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:

Friday	**the 21st**	**@1809 FULL in SAGITTARIUS**
Friday	**the 28th**	**@1454 THIRD QTR in PISCES**
Thursday	**the 6th**	**@0538 NEW in TAURUS**
Thursday	**the 13th**	**@2219 First QTR in LEO**

Perigee comes on 2024-06-02 @ **0724** – **368,107 km (228,731 mi)**
Apogee comes on 2024-06-14 @ **1337** – **404,077 km (251,082 mi)**
Perigee comes on 2024-06-27 @ **1146** – **369,291 km (229,467 mi)**

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

Daylight Savings: Starts: 2024-Mar-12 : Ends: 2024-Nov-05 (CA does not keep PDT year-round)

Luna: Luna is a waning crescent on the first of the month, headed for First Quarter on the 13th; rising at **0155**, transiting at **0900** and setting by **1613**. Luna by mid-month is waxing gibbous at 61% illumination. Rising

at **1356**- and transiting at **1923**- setting at **0049**. By the-end-of-the-month Luna is again a waning crescent, 12% illuminated, rising at **0204** transiting at **0943** and setting by **1504**.

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

July 5 - New Moon. The Moon will located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 22:59 UTC. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

July 21 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at 10:18 UTC. 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.

July 22 - Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 26.9 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

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. The second quarter moon will block many of the fainter meteors this year. But if you are patient, you should still be able to catch a few good ones. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

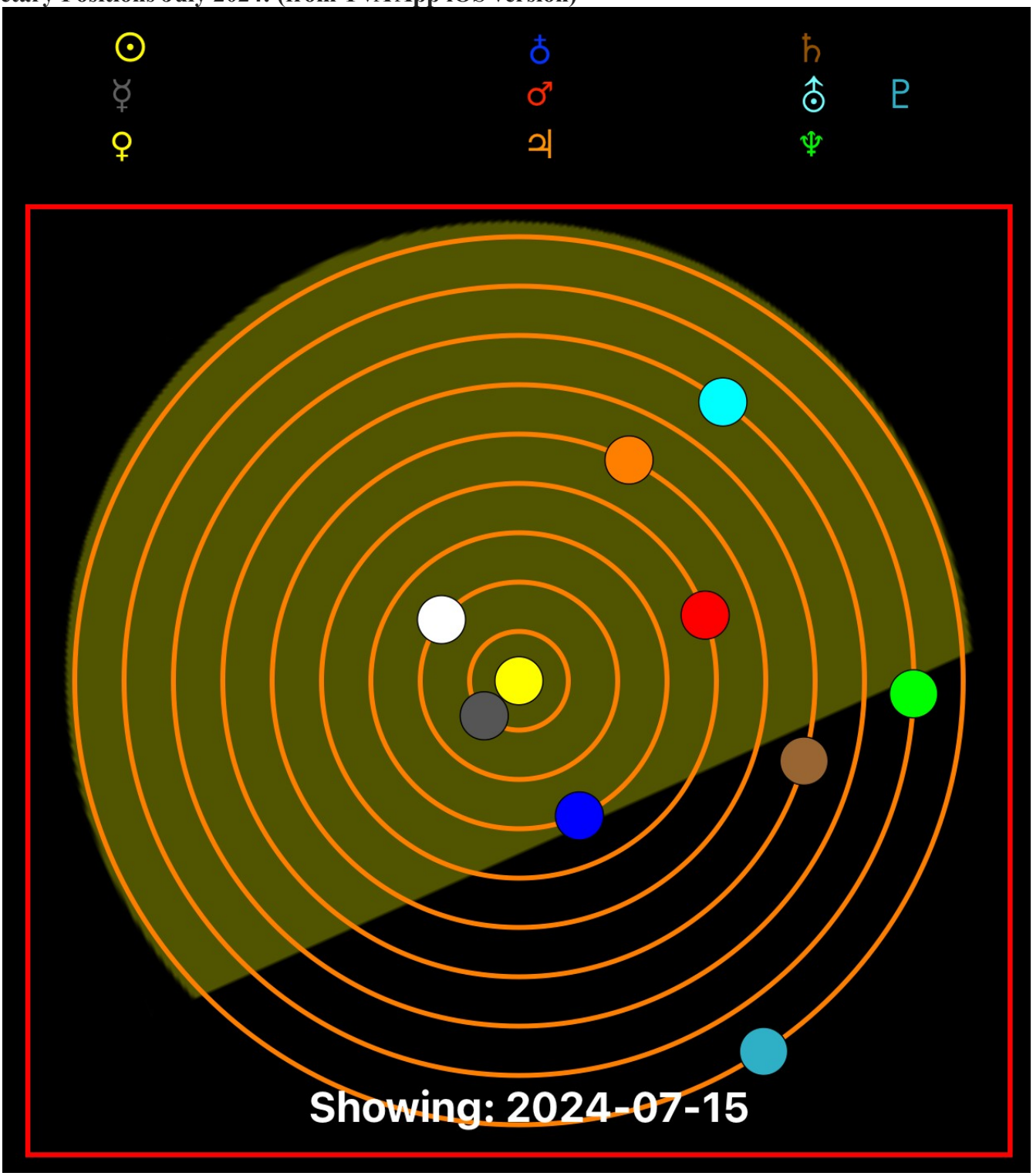
Algol minima: (All times Pacific Time)

07/02/2024	**1249**
07/05/2024	**0937**
07/08/2024	**0626**
07/11/2024	**0315**
07/14/2024	**0004**
07/16/2024	**2052**
07/19/2024	**1741**
07/22/2024	**1430**
07/25/2024	**1118**
07/28/2024	**0807**
07/31/2024	**0455**


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

Planets:

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



- **Mercury:** Mercury is an evening object in the beginning of the month rising at **0705**, transiting at **1412** and setting at **2119**. Mercury by mid-month remains an evening object rising at **0756**, transitioning at **1441** and setting at **2125**. By the 31st Mercury remains an evening object. Mercury rises at **0803**, transits at **1425** and sets st **2047**.
- **Venus:** On the first of the month is the Evening Star rising at **0615**, transiting at **1325** and setting by **2035**. By mid-month Venus as the Evening Star is rising at **0643**, transiting at **1343** and setting at **2043**. By end of month The Evening Star is rising at **0716**, transiting at **1359** and setting at **2042**.
- **Mars:** Mars is a morning object on the first of the month. Mars rises at **0219**, transits at **0905** and sets by **1551**. By mid-month Mars is rising at **0155**, transits at **0850** and doesn't set until **1544**. End-of-month finds the Warrior rising at **0131** transiting at **0832** and setting at **1534**.
- **Jupiter:** Jupiter is a morning object on the first of the month. Rising at **0333**, transitioning at **1034** and setting by **1736**. By mid-month Jove as a morning object is rising at **0249**, Jupiter transits at **0952** and sets at **1655**. Come the end-of-month Jupiter rises at **0158** and transits at **0902**, setting by **1606**.
- **Saturn:** Saturn is an evening object on the first of the month rising at **2347**-, transiting at **0533** and setting at **1118**. Saturn by mid month rises by **2247**, transiting at **0433**+ and setting at **1018**+. By the end-of-the-month Saturn is rising by **2143**, transits at **0328**+ and sets at **0912**+.
- **Uranus:** On the first of the month Uranus is a morning object rising at **0247**, transiting at **0942** and setting at **1636**. By the ides Uranus is rising at **0154**, transiting at **0849** and setting by **1544**. End-of-month finds Uranus as a morning object rising at **0053** transiting at **0748** and setting at **1443**.
- **Neptune:** Neptune in the beginning of the month is a morning object. Neptune rises at **0011**, transits at **0610** and sets by **1209**. By the 15th Neptune rise at **2316**-, transits at **0515** and sets by **1113**. By the end of the month Neptune is rising at **2209**-, transiting at **0407** and sets by **1005**.
- **Pluto:** Pluto on the first of the month is an evening object rising at **2125**, transiting at **0222**+. and setting at **0719**+. By mid-month Pluto is rising by **2029**, transiting by **0126**+ and sets by **0622**+. Pluto's apparent magnitude is 14.38 so good luck if you're looking. By the 31st Pluto is rising at **1925** transits at **0021**+ and sets at **0517**+.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2024 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.asteroids near.com/year?year=2024

Meteors:

- See above under Highlights: Delta Aquarids Meteor Shower.

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believe to come from the Kuiper Belt and have periods in excess of 20-years.
  - Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
  - Short period comets 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.

Name 13P/Olbers

Description: Comet in Leo Minor
Visual Magnitude: +7.6
Apparent Size: 0.0 arcsec
94.0% illuminated
Distance: 1.897169 AU
283.8 million km
15.78 light min
Rises{ 06:45:51 AM
Transits: 03:08:56 PM
Sets: 11:31:03 PM
Maximum: Fri Aug 23, 2024
Elongation: 05:26:29 AM
039° 46' 06.4" from Sun
Superior: Thu Dec 05, 2024
Conjunction: 07:58:01 AM
010° 14' 00.0" from Sun
Azimuth: 304° 25' 21.5" in the northwest
Altitude: +22° 36' 54.3" above horizon
Right Ascension: 09h 58m 07.74s
Declination: +40° 19' 53.5"
Hour Angle: 05h 50m 42.38s W
Ecliptic Longitude: 137° 01' 46.1"
Ecliptic Latitude: +26° 06' 27.2"
Galactic Longitude: 181° 05' 27.3"
Galactic Latitude +51° 45' 46.8"
R.A.: (2024.5) +322.7291 s/day
Dec.: (2024.5) -911.660 "/day
Total: (2024.5) 3801.247 "/day @ 103.90
Azimuth: +5.349 "/sec
Altitude: -10.301 "/sec
Radial Velocity: -1.337 km/sec

Deep Sky:
Notes:

L/Z abbreviation for ALT/AZ
R/D abbreviation for Right Ascension/Declination
α is right ascension
δ is declination
In each case, unless otherwise noted, you should look for the following on or about the 15th Day of July 2024 at 2100 PDT and you will have about 20 minutes of viewing time total.

Lets take a punny look at one object for July:

- **NGC 6946:**

Figure 1: The Fireworks Galaxy By Renseb at English Wikipedia -- Public Domain

NGC 6946, sometimes referred to as the *Fireworks Galaxy*, is a face-on intermediate spiral galaxy with a small bright nucleus, whose location in the sky straddles the boundary between the northern constellations of Cepheus and Cygnus. Its distance from Earth is about 25.2 million light-years or 7.72 megaparsecs, similar to the distance of M101 (NGC 5457) in the constellation Ursa Major. Both were once considered to be part of the Local Group, but are now known to be among the dozen bright spiral galaxies near the Milky Way but beyond the confines of the Local Group. NGC 6946 lies within the Virgo Supercluster.

The galaxy was discovered by William Herschel on 9 September 1798. Based on an estimation by the Third Reference Catalogue of Bright Galaxies (RC3) in 1991, the galaxy has a D25 B-band isophotal diameter of 26.77 kiloparsecs (87,300 light-years). It is heavily obscured by interstellar matter due to its location close to the galactic plane of the Milky Way.[9] Due to its prodigious star formation it has been classified as an active starburst galaxy. NGC 6946 has also been classified as a double-barred spiral galaxy, with the inner, smaller bar presumably responsible for funneling gas into its center.

Various unusual celestial objects have been observed within NGC 6946. This includes the so-called 'Red Ellipse' along one of the northern arms that looks like a super-bubble or very large supernova remnant, and which may have been formed by an open cluster containing massive stars. There are also two regions of unusual dark lanes of nebulosity, while within the spiral arms several regions appear devoid of stars and gaseous hydrogen, some spanning up to two kiloparsecs across. A third peculiar object, discovered in 1967, is now known as "Hodge's Complex". This was once thought to be a young supergiant cluster, but in 2017 it was conjectured to be an interacting dwarf galaxy superimposed on NGC 6946. (Wikipedia)

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 July 2024
By Chuck Dyson

MAKING AN AURORA

Where did you come from, where did you go?
Where did you come from Cotton-eye Joe?

These lines from a famous Country & Western song (If you are into line dancing) could well describe the basic questions about the aurora. Where does the energy that produces the aurora come from and just how does it make the sky glow?

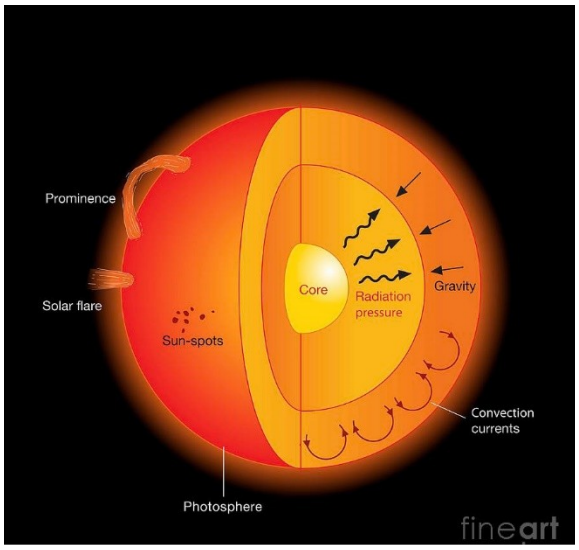


Figure #1

First we need to generate the energy and particles that produce the aurora and for that we have to look at the basic design of our Sun. We will also touch on the interior designs of other suns but will focus on our Sun as it produces the only auroras that we can see.

In the beginning there is a free proton and a free electron in the core of our Sun **(fig. #1).** In the core of the Sun temperatures and pressures are so high that no atoms can exist only the main parts of atoms, the nuclei and the electrons are in a so called plasma soup. Occasionally, because of the particle density and speed in the core, two protons will hit each other with enough energy to cause them to fuse. When two protons form a single nucleus one of them almost instantly converts into a neutron by emitting it's positive charge as a positron, this is the anti-particle of an electron. When the positron and an electron meet, and there are a lot of electrons in our plasma soup, they annihilate themselves into a pair of gamma ray photons. Although we now have the photons for our aurora we do not want them as gamma ray photons. Before our gamma ray photons can stream to the Earth they need to get out of the Sun. Because both the core and the radiative zones of the Sun **(fig. #2)** are in a plasma state every time our photons bump into something they are absorbed and then readmitted in a random direction.

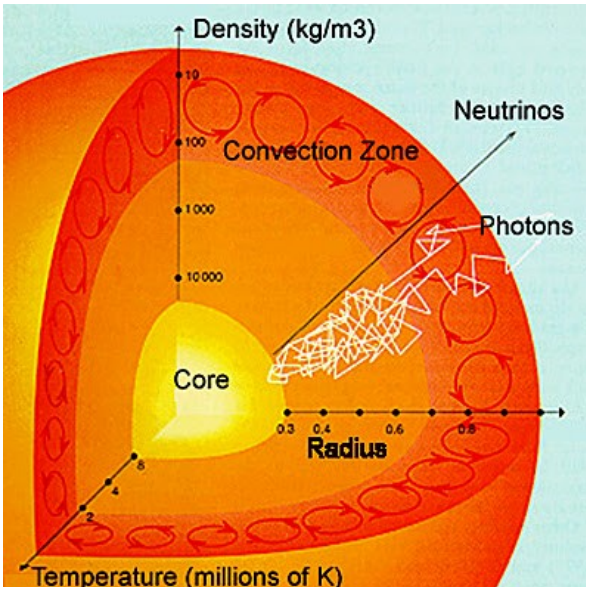


Figure #2

This process means that it will take our photons from 10,000 to 1,000,000 years just to reach the convection zone of the Sun and they will have lost enough of their initial energy to now be Xray, UV, or visible light photons.
Unlike the core and radiative zone the convective zone is the area in the Sun where the temperature and pressure permit some atoms to exist usually in an ionized state. Our photons are able to transverse the 200,000 kilometers of the convection zone in

"only" about three months. At the top of the convective zone our photons shoot through the photosphere and in eight minutes and twenty seconds are on the surface of Earth. When photons escape the Sun they take energy with them so the top of the convection zone is cooler than bottom and because the convection zone behaves like a liquid this sets up convection currents where the hotter and thus less dense material at the bottom rises to the top and the cooler denser material at the top sinks to the bottom, a convection current.

It is this rising and falling of both ionized atoms with electrons and protons in a plasma state that starts to create the Sun's powerful magneto sphere. Finally unlike the Sun's core and radiation zones which rotate as solid bodies the convection zone behaves as a gas and has a slow rotation rate at the poles, 35 days, and a faster rate at the equator,25 days. The Sun's differential rotation does two things. First with an active dynamo inside a sun or planet the speed of spin at the equator influences the strength of the electric field (some examples compared to Earth; Earth 1,037mph field strength 1X, Sun 4,633mph field strength 2X, Jupiter 27,851mph field strength 19,519X, Venus 5.4mph field strength 0X, despite having a very active core). Note: Despite the fact that the Sun's magnetic field is only 2X the strength of Earth's it is still bigger than Jupiter's overall because the Sun has so much more surface area to generate the field **(fig. #3).** Second with the Sun having different rotational speeds from the equator to the poles the lines of magnet force get twisted up into magnetic loops and these loops interact with the charged particles in the Sun's photosphere, chromosphere, and corona causing the particles to be accelerated by the magnetic loops. The accelerated particles can and do get enough kinetic energy to escape the Sun's gravity and stream out into the solar system as the solar wind or in clumps of particles such as a Coronal Mass Ejections (CME).

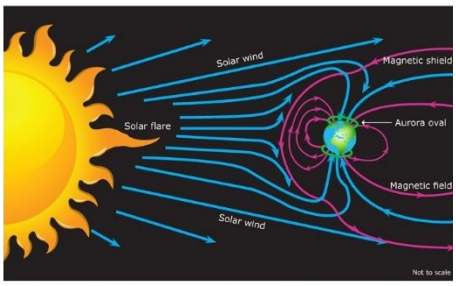


Figure #3

Now that we have the "stuff" to make an aurora, how do we actually make one on Earth?

First just a little bit about how the Sun works. Every second the Sun converts 600 million tons of Hydrogen into 596 million tons of Helium and 4 million tons of energy; so, over the Sun's 4.5 billion years on the main sequence it has converted the equivalent of 100 Earth masses into energy but because the Sun is 338,000 times the mass of the Earth this only 0.05% of its original mass. Additionally the Sun pushes out 1.5 million tons of charged particles (this is the solar wind) every second. As the Sun's solar wind is usually pushed out from the Sun in all directions and in a more or less uniform fashion only 150 pounds of those charged particles hit the Earth per second.

There are four basic ways the Sun creates aurora on earth.
The first is the solar wind but with only 150 pounds of charged particles trying to light up both poles it is so dim you never see it with your eyes.

The second and third way we get aurora are from solar flares and coronal mass ejections (CME). Both flares and CME's originate in sunspots **(fig. #4).** Sunspots are areas where the twisted magnet lines of the Sun form loops and poke through the surface. If the magnetic lines just poke up and then go back below the Sun's surface they only form solar prominences and we can see them through our solar protected telescopes using H-Alpha filters. But, if the magnetic lines of the loop are really strong and connect with each other then a

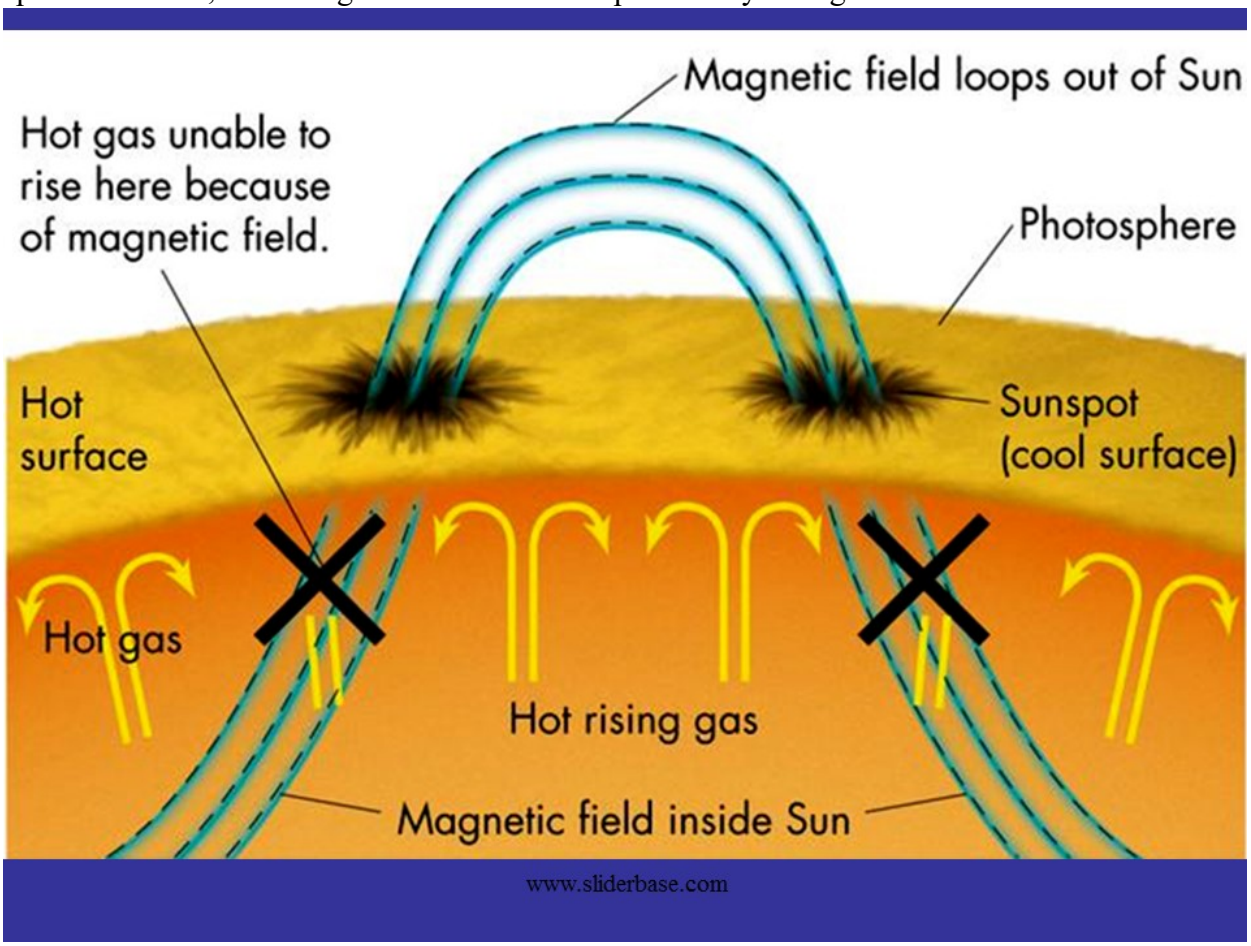


Figure 4

massive amount of electrical energy is let loose in the Sun's corona and two things happen. First there is a brilliant flash of light, the solar flare, that is seen 8 minutes and 20 seconds later on Earth. Second this bubble of electrical energy accelerates particles in the Sun's corona to around 1/3 of the speed of light. If the axis of particle acceleration is aimed at Earth then 20 to 30 minutes later the particles will hit the Earth's magnetic field and be channeled down into our atmosphere around the poles and we will get an auroral display and perhaps some disrupted cell phone calls. A CME can occur with a solar flare or without but the same electrical phenomenon for power the only difference being a solar flare is a solar burp and a CME is a large belch. Even though more particles are headed to Earth from the CME than the solar flare because they travel slower, they take 3 to 4 days, we have more time to prepare for the event. The 1859 Carrington event and the 1989 Canadian event are two examples of solar belches that had significant impact on telegraph lines,1859, the Canadian electrical grid,1989.

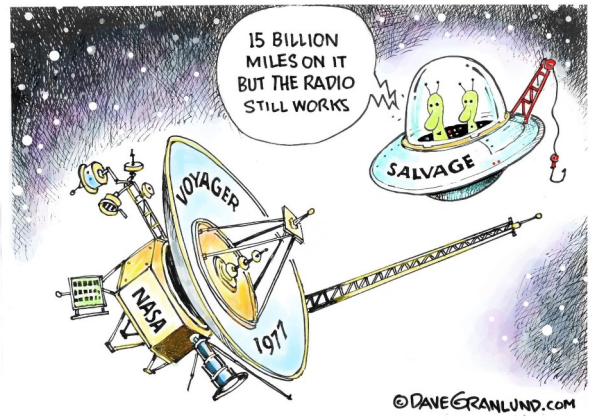
The fourth way aurora are created is by coronal holes. Unlike solar flares and CME's that originate from tangled magnetic field lines and are most often associated with sunspots and solar maximum periods the coronal hole is associated with field lines that stream out into space and connect far away from the Sun and are associated with solar minimum periods. These magnetic field lines that stream out to space instead of going from solar pole to solar pole create a magnetic hole that allows charged solar particles to stream out into space and occasionally hit Earth. Another difference between coronal holes and the flares & CME is the flares last for minutes to hours, the CME lasts for hours to days, and the coronal hole can and do last for months. If the CME lasts for more than 27 days, that is one solar day as seen from Earth, then we get more than one "gift" of particles from that particular coronal hole.

How do the charged particles of the solar wind create the aurora that we see?
As seen in fig. #3 when the solar wind (made really strong by flares, CME's, and coronal holes) hits the Earth's magneto sphere some of the wind's electrons and protons are captured and channeled to both of the Earth's poles. Once our solar charged particle is in the Earth's atmosphere it can and will hit atoms. If the solar particle transfers just the right amount of energy to an atmospheric atom, usually an oxygen or nitrogen, then one of its electrons can jump to a higher orbital level for a short period of time and then drops back to its original orbital level. The atom's electron gives off the energy as a photon that we see as the northern lights.

Astronomers are not just interested in the aurora because it is fun to look at pretty lights in the night sky. It was clear that not only are some stars variable in their output but some stars can and do have large erratic violent outbursts of energy. Flaring stars have been identified and studied since 1945 but large data bases to draw general conclusions were just not there. Then along came KEPLER, from 2009 to 2013 KEPLER studied 160,000 stars 80,000 were G type (our sun) and observed 365 super flares on 148 of them. TESS in its first two months of operation logged 8695 flares one was 10X to 1,000X larger than the Carrington event. The KEPLER and TESS data put a new spin on how important it is to study how the Sun operates and creates those electrical events the give us auroras. We are also starting to understand what the chances are of our star will produce a super flare 100 times bigger than the Carrington Event.

CHEERS CHUCK

July 2024 Another Look
by Dave Phelps



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

Cepheus

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.

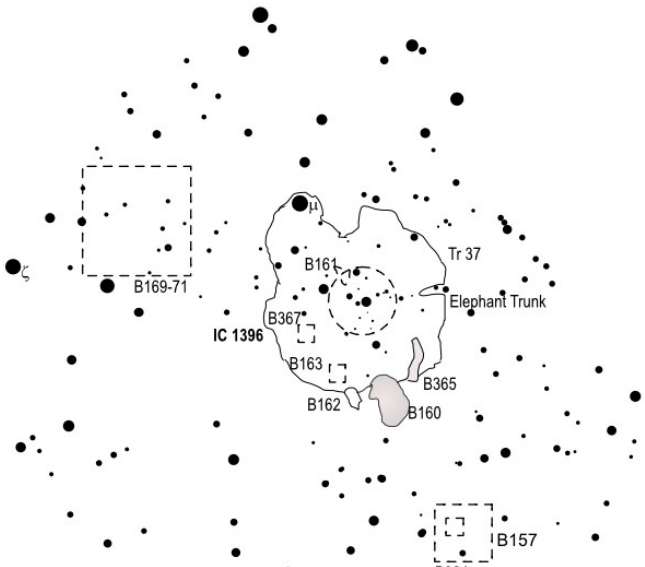
> "Asking him," he says, "to show me in the heavens the constellation of Antarmada, he immediately pointed to Andromeda, though I had not given him any information about it beforehand. He afterwards brought me a very rare and curious work in Sanskrit, which contained a chapter devoted to Upanacchatras, 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."

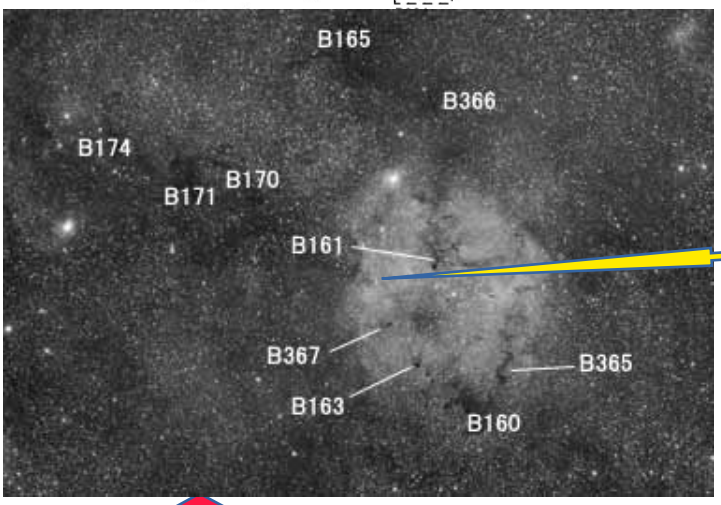
Later He becomes the French Céphée, the Italian Cefeo and our Achilles Tatios, probably during our 5th century, It is claimed that the constellation was known in Chaldaea twenty-three centuries before our era, when the earthly King was recognized in that country's myths as the son of Belos, of whom Pliny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

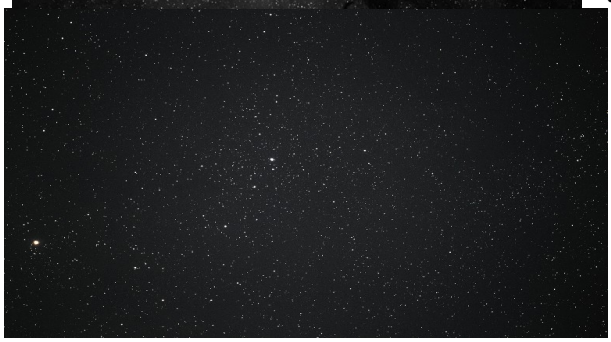
IC 1396 Mosaic in Ha Light
https://ocastronomers.org/wp-content/uploads/2018/12/IC1396_2x2-Mosaic.jpgs





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

https://



stellarscenes.net/
This is closer to what

object_e/ic1396wide.htm
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?

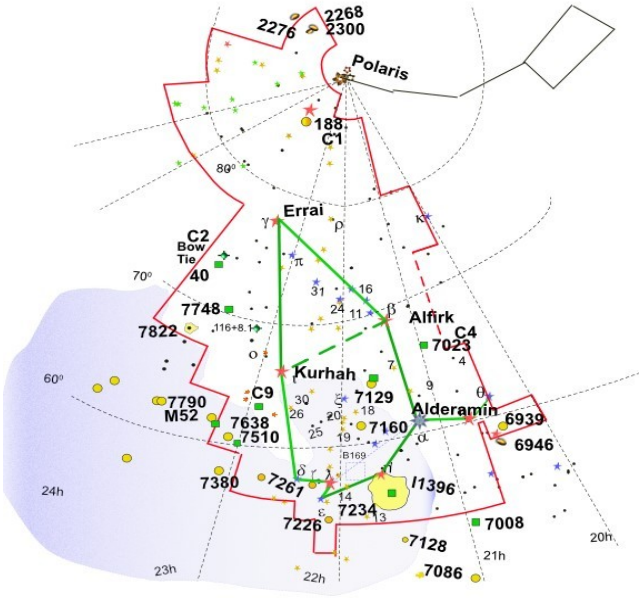
NGC 7354 is over half the size of the full moon and at 12th magnitude should be visible in you 8" telescopes under pretty dark skies. It is an obvious blue, but like I said, spread out. It will be interesting if you can resolve the shell or even the central star. This image by Gary Imm was taken with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

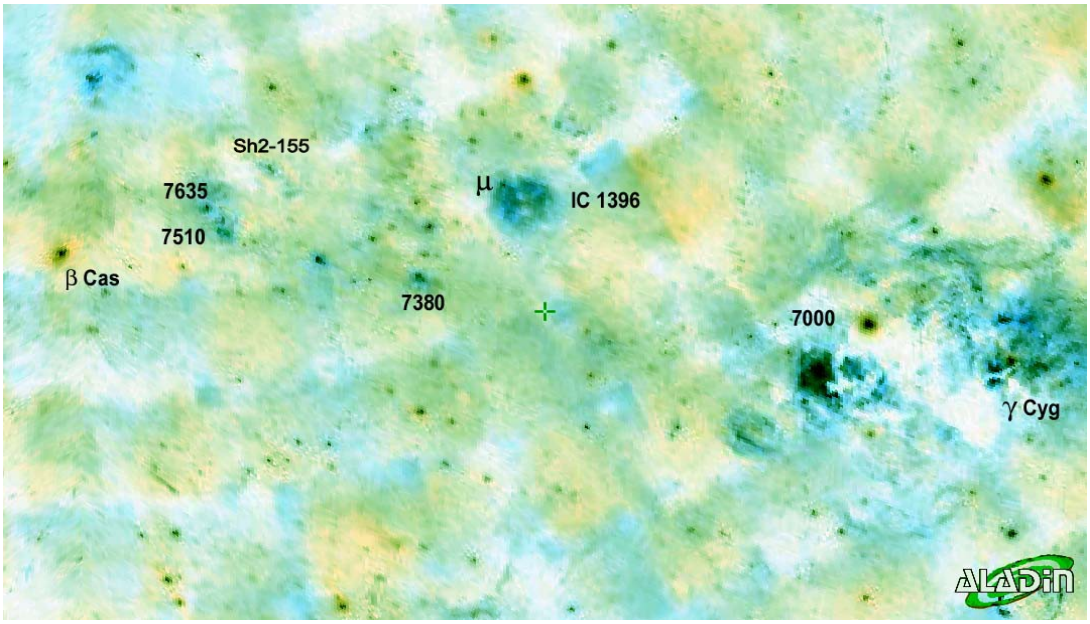


In December 2015, the IAU gave the nod to the Syrian Astronomical Association and it was announced that γ Cephei Ab was formally given the name Tadmor. Tadmor is the ancient Semitic name and the modern Arabic name for the city of Palmyra.

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

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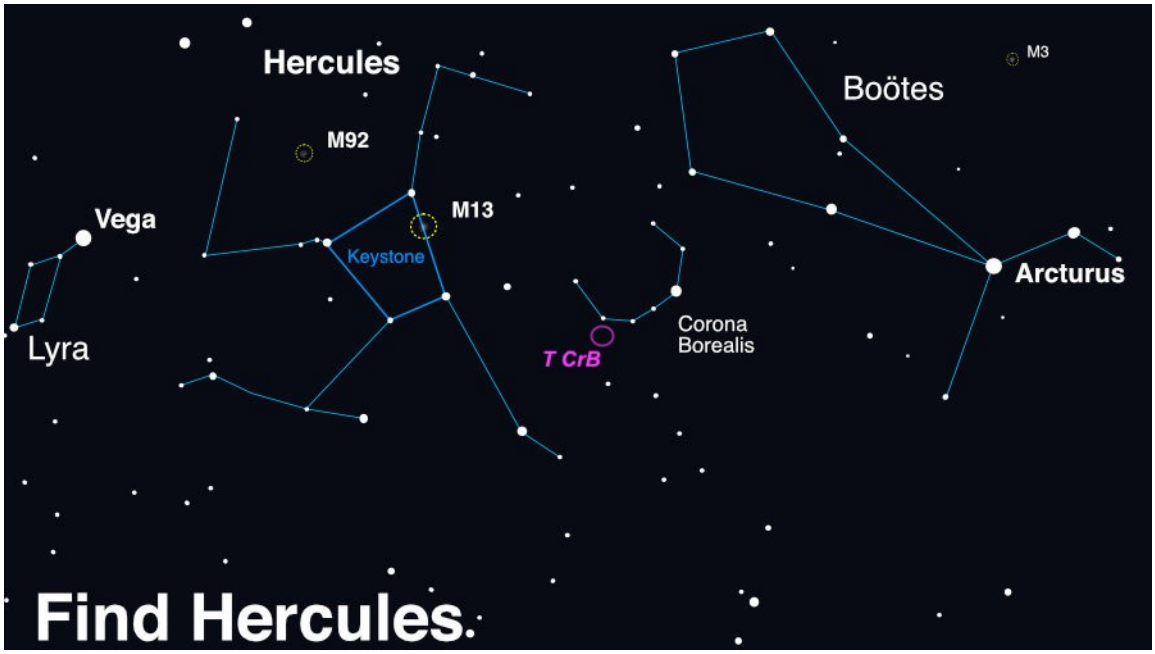
July's Night Sky Notes: A Hero, a Crown, and Possibly a Nova!

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!

The TVA is a member club of The Astronomical League