



Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers May 2022

Events: General Meeting, Monday, May 2, 2022, at the Ronald H. Roberts Temecula Library, Room B, 30600 Pauba Rd, and/or ZOOM, at 6:00 PM.

- IFI & Gallery by Clark Williams
- update on the Boeing CST-100 Starliner by Tom Mulder
- Near Earth Objects and Planetary Defense - part 3 by Mark Baker
- Refreshments by Paul Kreitz

Star Parties at South Coast Winery every Friday evening in May.

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

Sunspot Activity Picking Up-

Sunspot Cycle 25 seems to be exceeding expectations in number of sunspots early in the cycle. NASA's Solar Dynamics Observatory captured a moderate-sized solar flare erupting on April 20, 2022. (Image credit: SDO/NASA)



WHAT'S INSIDE THIS MONTH:

Cosmic Comments
by President Mark Baker

Looking Up Redux
compiled by Clark Williams

Random Thought – GRAB-AND-GO PERFECTION by Chuck Dyson

Another Look
by Dave Phelps

Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light
by David Prosper (NASA/JPL)

Send newsletter submissions to Paul Kreitz <pkreitz@sbcglobal.net> by the 20th of the month for the next month's issue.

General information:

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

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Cosmic Comments – May 2022

By Mark Baker

This is a repeat from last year as the sentiment is still the same, BUT it is now: **Ingenuity 25, Mars atmosphere 0...!!! Go Ginny...!!! Ingenuity 1, Mars atmosphere 0...**

Whenever Humanity manages to eke out a victory over Nature, it's worth noting and yes, celebrating...!!!

But what do such accomplishments have to do with Astronomy?? Simply put, it's BECAUSE people have Looked Up through the ages and wondered that we are pursuing the understanding of what's out there...

Can you imagine the absolute joy the ancient giants upon whose shoulders we now stand would experience if they could see what their work has wrought?? And just think, through our Outreach efforts, we may be instrumental in inspiring the next giants that come along...

That is why I am such a huge proponent of Star Parties... TVA provides an opportunity for so many that they normally wouldn't have, or even think about perhaps. There's more to our efforts than Ooh's and Aah's... but I'll take them!!!

Again, as always, I thank TVA for their contributions to promoting such a positive and healthy desire to take on Nature and eke out small wins that become huge Victories in the long run...

You may be tiny, but you are not insignificant!!! You do make a difference...

Clear, Dark Skies my Friends...



Looking Up Redux – May 2022

Compiled by Clark Williams
from these sources:

SeaSky.org

Wikipedia.com

in-the-sky.org

The American Meteor Society, Ltd.

cometwatch.co.uk

NASA.gov

TVA App (2.0.1296)

FullAndNewMoon App (2.0)

Starry Night Pro Plus 7 (7.6.3.1373)

SkySafari 6 Pro (6.1.1)

Stellarium (0.18.2)

timeanddate.com/astronomy

<https://www.fourmilab.ch/earthview/pacalc.html>

ALL TIMES ARE LOCAL PACIFIC TIME (PST / PDT) UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is hours, mm minutes, ss seconds)

hh:mm:ss or hhmmss

hhmm+ (time of the next day)

hhmm- (time of the previous day)

hhmm (seconds not shown)

yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

Moon Phases for the month by date:

Sunday	the 15 th	@ 2115 FULL in LIBRA
Sunday	the 22 rd	@ 1144 THIRD QTR in AQUARIUS
Monday	the 30 th	@ 0431 NEW in TAURUS
Sunday	the 8 th	@ 1722 First QTR in LEO

Apogee comes on 2022-05-05 @ 0547 – 405,286 km (251,834 mi)

Perigee comes on 2022-05-17 @ 08244 – 360,297 km (223,879 mi)

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

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

Luna: Luna is waxing crescent on the first of the month, headed for 1st quarter on the 8th rising at 0629, transiting at 1332 and setting by 2041. Luna by mid-month is 99% illuminated. Rising at 1933 and transiting at 0550+ setting at 0607+. By the-end-of-the-month Luna is 1 day past new. 2.4% illuminated rising at 0620 transiting at 1352 and setting by 2126.



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

May 6, 7 - Eta Aquarids Meteor Shower. The Eta Aquarids is an above average shower, capable of producing up to 60 meteors per hour at its peak. Most of the activity is seen in the Southern Hemisphere. In the Northern Hemisphere, the rate can reach about 30 meteors per hour. It is produced by dust particles left behind by comet Halley, which has been observed since ancient times. The shower runs annually from April 19 to May 28. It peaks this year on the night of May 6 and the morning of the May 7. The waxing crescent moon will set early in the evening, leaving dark skies for what should be an excellent show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

May 15 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at **2115**. This full moon was known by early Native American tribes as the Flower Moon because this was the time of year when spring flowers appeared in abundance. This moon has also been known as the Corn Planting Moon and the Milk Moon.

May 16 - Total Lunar Eclipse. A total lunar eclipse occurs when the Moon passes completely through the Earth's dark shadow, or umbra. During this type of eclipse, the Moon will gradually get darker and then take on a rusty or blood red color. The eclipse will be visible throughout all of North America, Greenland, the Atlantic Ocean, and parts of western Europe and western Africa. (NASA Map and Eclipse Information).

May 30 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at **0432**. 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.

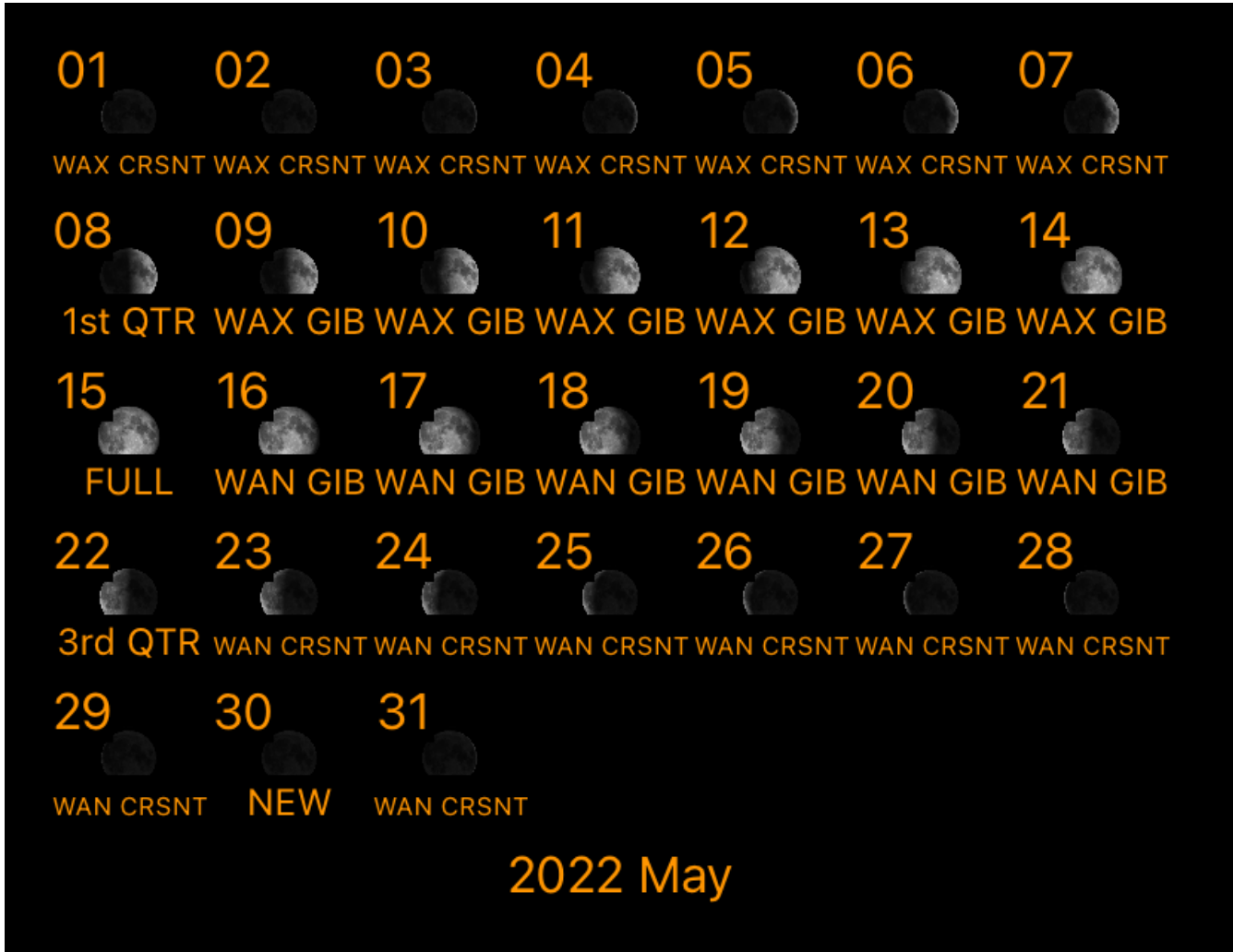
Algol minima: (All times Pacific Time)

05/03/2022	0331
05/06/2022	0020
05/08/2022	2109
05/11/2022	1758
05/14/2022	1447
05/17/2022	1136
05/20/2022	0825
05/23/2022	0514
05/26/2022	0203
05/28/2022	2252
05/31/2022	1941



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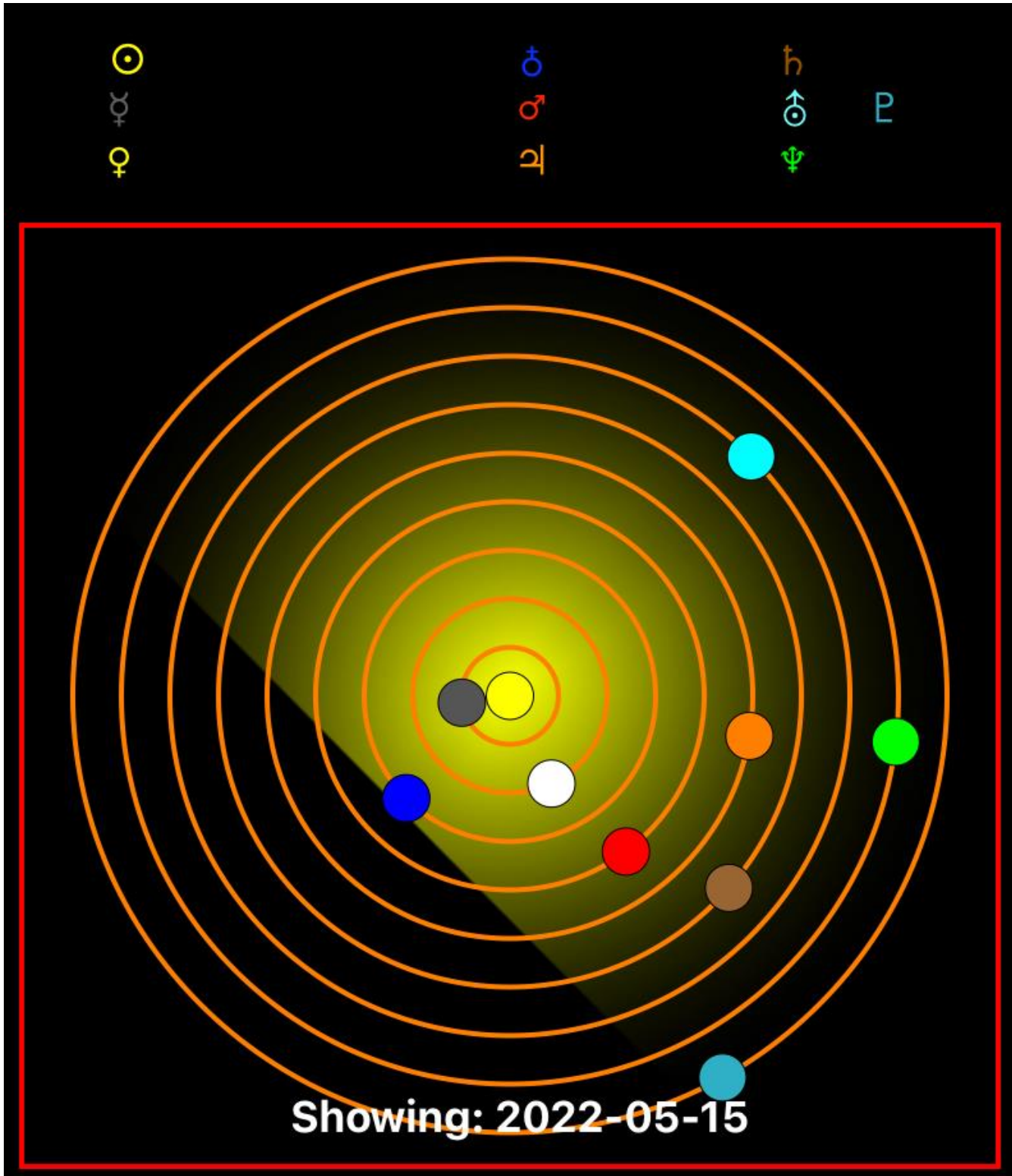




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Planets:



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



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- **Mercury:** Mercury is an evening object in the beginning of the month. It is illuminated at 30% and 0.72 apparent magnitude. Mercury rises at **0655** with the sun preceding at **0558**. Mercury transits at **1405** and set at **2116**. A 1-day old moon is just lower on the horizon setting at **2041**. If you have a clear western horizon and go out at about **2030** you can see Mercury sitting on the Moon as they both set in the west. Mercury by mid-month is an evening object very close to the Sun. Mercury sets at **2024**. Mercury is only $8^{\circ} 22'$ above the Sun. **DO NOT LOOK DIRECTLY AT THE SUN!** By the 31st Mercury has barely become an evening object. Mercury is still visible rising at **0504** followed by sunrise at **0538**.
- **Venus:** Is the morning star on the first of the month, rising by **0409**, with sunrise at **0558**. By mid-month Venus is rising at **0358** followed by sunrise at **0546**. By the 31st Venus is rising at **0347** followed by sunrise at **0538**.
- **Mars:** Mars is back in the sky as a morning object; on the first rising at **0327**. Sunrise follows at **0558**. By mid-month Mars is rising at **0300**. End-of-month finds the Warrior rising at **0228**.
- **Jupiter:** Jupiter is a morning object on the first of the month rising at **0406** and preceding sunrise at **0558**. By mid-month Jove is rising at **0319** the sun follows at **0546**. If you have a good view of the eastern horizon by 0500 on the 15th you should have a nice a view of Jupiter and Venus within $1^{\circ} 21''$ of each other. Come the end-of-month Jupiter is peaking above the horizon by **0351** with sunrise at **0541**.
- **Saturn:** Saturn should be visible by **2000** on the 1st. Saturn transits at **2314**.and doesn't set until **0527+**. The only problem will be the full moon rising at **1850**. Saturn by mid month is visible by **2030** and transits at **2216**. By the end-of-the-month Saturn is easily visible by **2045** and transits by **2111**. There is a Full moon obscuring the view.
- **Uranus:** On the first of the month Uranus is a morning object rising at **0307**. By the ides Uranus has moved slightly ahead of the sun rising at **0213**, followed by sunrise at **0557**. End-of-month finds Uranus rising at **0111** followed by sunrise at **0541**.
- **Neptune:** Neptune is visible by **2000** in the beginning of the month. Neptune sets by **0132+**. By the 15th Neptune should be visible by **2030**. Neptune sets at **0037+**. By the end of the month Neptune is setting at **2336**.

Pluto: Pluto on the first of the month is only at mag 15.14 so finding it is problematical. By mid-month Pluto has brightened to +15.13. By the 31st Pluto is lost to the Sun.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2022 with a reasonable magnitude; say less than or equal to +10 in May there is nothing except the regulars: Juno, Vesta, Hebe, Eros and Herculina. So consult your local planetarium software or try:
<https://www.asteroidsnear.com/year?year=2022>

Meteors:

- Eta Aquarids Meteor Shower. (see Highlights May 6-7 above)

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
 - Halley Type: The Halley Types are believed to come from the Kuiper Belt and have periods in excess of 20-years.



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- Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
- Short period comets may have a near circular orbit or an elliptical orbit. The latter being far more common.
- 2) Long Period comets – thought to originate from the Oort cloud these comets have periods of over 200 years and have random inclinations around the celestial sphere.

One comet of interest this month. Comet **C/2021 O3.**, a comet in Camelopardalis 50% illuminated, visual magnitude +8.5 on the 15th of May 2022 at **2100**. It is always up so you should have a shot at imaging it if you want the practice.

Deep Sky:

Notes:

L/Z abbreviation for ALT/AZ

R/D abbreviation for Right Ascension/Declination

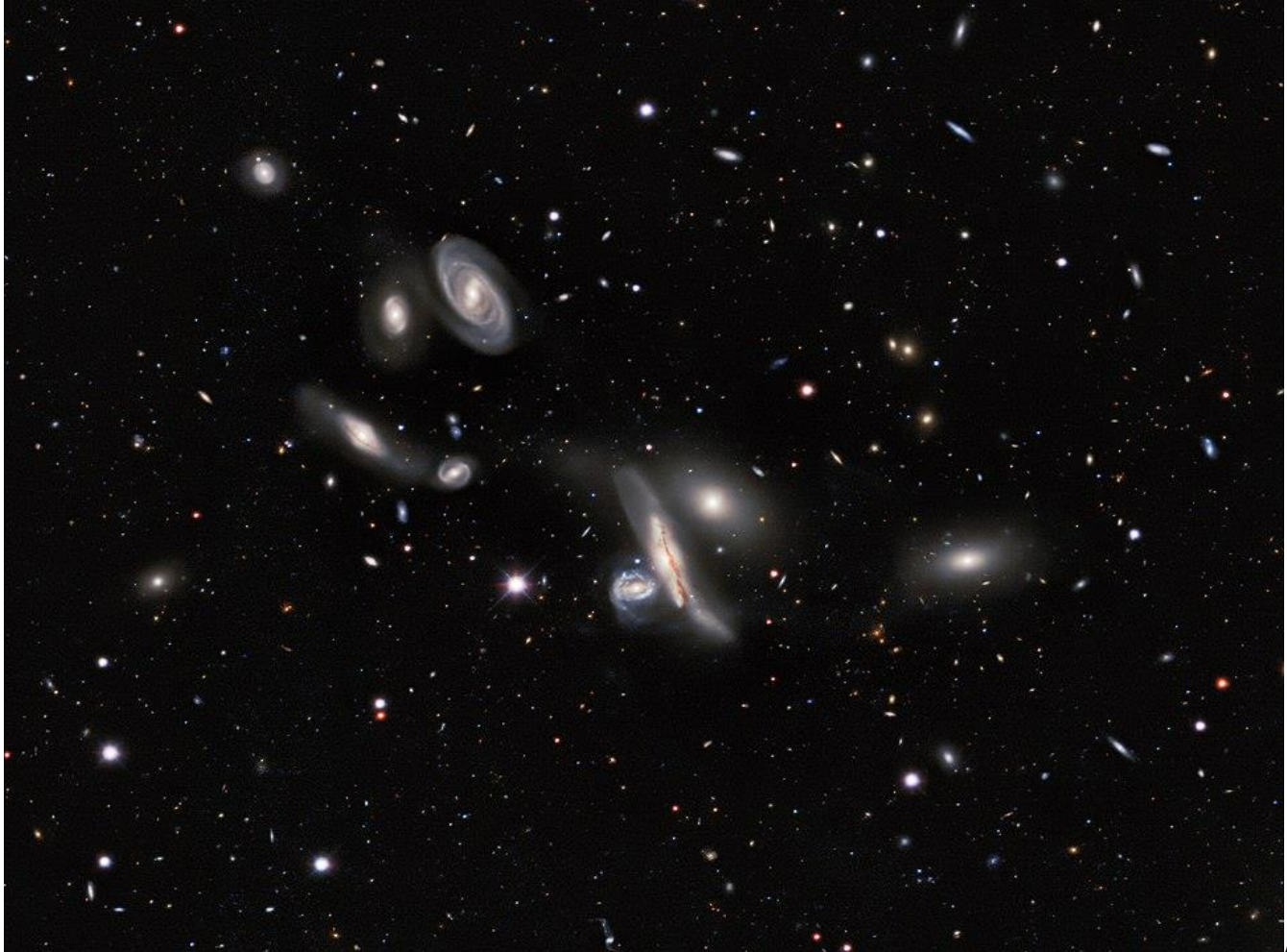
α is right ascension

δ is declination

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

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

- **Copeland Septet:**



ustration 1: By DESI Legacy Imaging Surveys/LBNL/DOE & KPNO/CTIO/NOIRLab/NSF/AURA - <https://noirlab.edu/public/images/noirlab2103a/>, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=99538173>

Copeland Septet (also Copeland's Septet, Hickson Compact Group 57) is a group of galaxies in the constellation Leo that includes NGC 3748, NGC 3754, NGC 3750, NGC 3751, NGC 3745, NGC 3753, and NGC 3746. The group was discovered by British astronomer Ralph Copeland in 1874. The location of Copeland's Septet is R.A. 11h 38m / Decl. +22° (2000.0), about three degrees northwest of third magnitude star 93 Leonis. (Wikipedia)

NGC 4569/NGC 4568:

o



Illustration 2: By Judy Schmidt from USA - NGC 4567 & 4568, CC BY 2.0, <https://commons.wikimedia.org/w/index.php?curid=88931207>

NGC 4567 and NGC 4568 (nicknamed the Butterfly Galaxies or Siamese Twins[NB 1]) are a set of unbarred spiral galaxies about 60 million light-years away in the constellation Virgo. They were both discovered by William Herschel in 1784. They are part of the Virgo Cluster of galaxies.

These galaxies are in the process of colliding and merging with each other, as studies of their distributions of neutral and molecular hydrogen show, with the highest star-formation activity in the part where they overlap. However, the system is still in an early phase of interaction.

Only one supernova (SN 2004cc) was observed in the Butterfly Galaxies until March 31, 2020, when the Zwicky Transient Facility detected the rapidly-rising SN 2020fqv in NGC 4568. (Wikipedia)

May is great for both viewing and imaging. Spend some time outside with your scope. Spring is here. For now – Keep looking up.



RANDOM THOUGHT

By Chuck Dyson

GRAB-AND-GO PERFECTION

This month's article is more of a ramble than a thought. However, it is focused on amateur astronomy. One article that I stumbled across on the internet, opined that 80% of the world's population lived under moderate to severely light polluted skies; except in Europe and the U.S.A. where over 90% of the people live in light polluted areas. This light pollution produces, in the average astronomer, a desire to take one's telescope out into the country for viewing under darker skies even with the price of gasoline at six dollars per gallon. To get the most out of your dark sky trip you would obviously like to take the biggest scope that will fit into your car, but the first law of astronomy tells us "the bigger the scope the bigger the hassle of moving it". The first law holds true even if you're just taking the scope from the house to the backyard. The second law of astronomy states "the smaller the scope the more it struggles". Struggles with what, you ask. Everything is the answer; light pollution, surface detail of planets and galaxies, and detecting low surface brightness objects. So, why use a small scope at all? See the first law of astronomy. If you are outside on a cloudy night and the clouds start to clear and you are afforded a viewing opportunity a small, easy, and quick to setup scope is much more likely to be put into action than a larger twenty minutes to setup scope. As for me, despite the visual challenges of observing with a small scope, I know that I am much more likely to load three pieces of light equipment into the car than five or six pieces of heavy equipment and head for a dirt road in the country for some observing.

What equipment? Let's start at the ground and work up. After years of lugging different mounts around I have decided that no equatorial mount is grab-and-go, just too heavy and bulky and because I am strictly a visual observer I am very happy with an Alt-Az mount and manual controls; although, to get a reasonable viewing time before I need to recenter the object that I am viewing I limit myself to around 100X magnification. In the past I used a Vixen Porta II mount and it worked fine with any refractor up to 4 1/2 inches and any Schmidt Cassegrain up to 6 inches but it was a regular telescopic tripod with an eyepiece tray on the spreader bars held in place by wingnuts, washers, and nuts; this led to some interesting midnight bolt and nut hunts in country fields. The Porta II was great to use but just a little bulky even when collapsed. My final complaint with the Porta II comes from my desire to sometimes observe with binoculars and for this the mount was just not capable.

My next try was a Celestron photo tripod with a photo pan head that just happened to have a C5 spotting scope already on it. How convenient. I get to try out the tripod and the C5 for a grab-and-go setup. The Celestron tripod had the height range that I was looking for and worked well with my 15X70 binoculars, my 80mm refractor, and of course the C5. When fully extended the tripod had a little wiggle in it not ideal but tolerable. Its major failing was the mounting plate was of the fixed type so getting perfect balance on either a scope or a pair of binoculars was just not possible and this led to the binoculars or scope always wanting to pitch up or down depending on whether it was front or back heavy. The tripod does work but keeping it on target and getting wiggle free viewing time is a bit of a struggle.



My next try at using a photo tripod and head was a SLIK Pro 700Dx tripod (max working height 71 inches, max load 6.8 kg) with an ifootage K5 head (max load 5 kg) {my max grab-and-go scope weight is 3 kg}. This tripod provides me with plenty of height for binoculars and is rock steady for my grab-and-go scopes, but the best part is it has a sliding balance /mounting plate and this lets me balance binoculars, Schmidt Cassegrains, and refractors and spend more time viewing and less time readjusting.

Next up what do we want to view through? Personally I prefer refractors and Schmidt Cassegrain scopes as they tend to stay in collimation better than Newtonians and I really hate collimating any telescope. At this time I do have a Schmidt Cassegrain that needs collimation after years on the road. My least favorite scope for grab-and-go is the small compact Dobson because it requires some sort of box, stool, or whatever to bring it up to a reasonable viewing height and, in addition, looking through a Dobson's finder scope at high viewing angles is a real neck breaker. A problem that both Newtonians and Cassegrain's have in common is as the aperture gets smaller and the focal length gets shorter the central obstruction eats a bigger part of the aperture area and that means fewer photons on your retina. Although I like the smaller refractors here also there are some issues and considerations. As refractors get bigger they get heavier at an alarming rate and if you must have an apo refractor with three or four objective lenses the weight gain with size increase is phenomenal. For the visual observer I personally find that a two element ED glass refractor, even at a focal ratio of 5.3, gives very pleasing views with very little color fringing. The older 80mm calcium fluoride doublet that I have puts up amazing views, great for astrophotography but still only an 80mm scope for visual. My current favorite is a simple Fraunhofer achromatic doublet. It has definitely more chromatic aberration than an ED doublet but it grabs more photons than an 80mm, 26% more to be exact, and is still highly portable. The final thing that I look for in refractors and other scopes is the focuser. My old Vixen refractor has a single focuser that is very smooth that comes to focus very easily and then stays in focus. Some of my newer two stage focusers are not so nice to use and this degrades the viewing experience considerably. My second favorite grab-and-go scope is a 125/127 (5 inch) Schmidt Cassegrain because they are small enough and light enough to work on almost any mount. The f/10 focal length is still short enough to allow me to see 1.2 degrees of sky in a 1 1/4 inch eyepiece. The better to see open clusters, my pretty. Maksutov's are just a little too heavy and because of the f12 or f15 focal length and resultant small field of view are definitely better on planets than open clusters for my liking.

The next component of my grab-and-go setup is my eyepieces. Originally, as I wanted to travel light and keep things as simple as possible, I intended to use only three eyepieces, but I found that I was much happier with five. I have a low power eyepiece that gives me the maximum field of view, since my primary scope is also my finder scope. A medium low eyepiece, a medium, a medium high, and a high mag eyepiece complete the set. For the high power eyepiece I max out at 100X because more magnification on a light Alt-AZ mount is just not practical. All of my eyepieces are 60 degree field of view, as this gives me a reasonable actual field of view with minimal field distortion. My favorite eyepieces are the Celestron X-Cel LX series as they seem to give me just a little sharper image than other eyepieces in the \$100 price range.



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My final bit of equipment that I always take with me on a grab-and-go outing is my 12X56 binoculars. I only have 0 power red dot finders on my grab-and-go scopes so my binoculars are my actual finder scope that gets my telescope in the general area of the item that I want to observe. In addition if I really have difficulty in locating objects with the binoculars I know that it is time to forget the telescope and go-and-grab a glass of wine until the seeing improves or it's bedtime.

Cheers, Chuck

Another Look

By Dave Phelps

New moon April 30, May 30

Full moon May 15, Flower moon; also called corn moon or hare moon.

Total Lunar Eclipse visible very low in the East. May be able to see early stage starting 7:40pm 5/15.

Totality begins at 8:59pm and ends 9:53pm but elevation of the moon at totality is only 15 degrees.

Clear evening sky.

For many years, my life paralleled that of Patrick Moore, with a few exceptions. He was bright, erudite, well spoken, a television personality, author, and a genuine Knight while for the most part I didn't do nor was I any of those. We did agree on a few subjects however, we loved to write, though he wrote better, we loved to learn, though he was smarter, and we loved astronomy.

Which brings me, naturally, to Caldwell Objects. The Caldwell catalog, which he named after himself, is a list of 109 readily viewable objects not on Messier's list. You can read the technical details about Caldwell any time you want, but instead I suggest you unpack the C8 from your closet or the old Dob from the shed and look for yourselves.



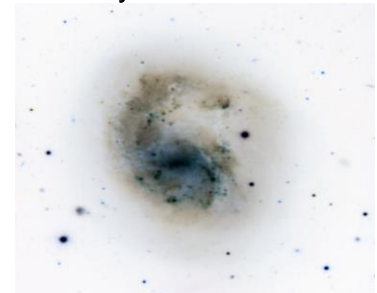
Caldwell 48, NGC 2775, is just off the head of Hydra but actually in Cancer. It's a big, mostly face-on tight spiral at 10th magnitude, so you should be able to see a smudge in even your 7X50's. It's about half the size of the Horsehead, so it will be big in your 10 inch.

The Planets.org

Slipping down Hydra to NGC 3242 is Caldwell 59, the Ghost of Jupiter. It's 7th magnitude so you might be able to see blue/violet color and maybe even what looked like wings in the planetary nebula visible once in a 24 inch.

Okay, take a breath and think back to your first star party. There you are up on Table Mountain with the parking area covered with telescopes of every size. Some guy is booming on about galaxies and tells you to look in the eyepiece, shows you how to focus it, and bang, there is the Sombrero. What a sight. M104, NGC 4594, just beautiful. The pro's have told us all about the dust ring and taken all these great images (check out **APOD**) with the Hubble, still, why not lay back and remember your first time and look at it one more time.

Boy! Was I proud of myself the first time I found the Antenna! Star hopping from Algorab, δ Corvi, the Sail to Gienah, γ Corvi, the Left Wing then about the same distance to the galaxies. The Antenna are Caldwell 60 and Caldwell 61, NGC's 4038 and 4039. They are a little



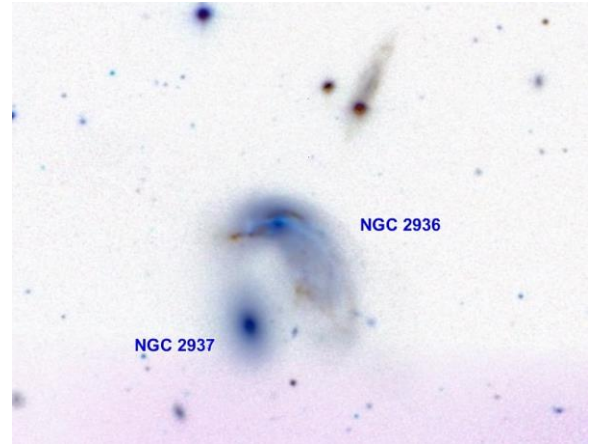
bigger than what you saw of NGC 2775 in Cancer, but you will need some mirror size to see any detail. Averted vision may help you follow the tails out. The Antenna are close to a number of 11th magnitude galaxies worth searching for, especially NGC 4027. It's an odd shaped barred galaxy probably disrupted by a collision.

It took Clyde Tombaugh to determine the actual nature of Caldwell 66, NGC 5694. It's kind of a fuzzy dot halfway between Hydra and Libra at 10th magnitude. It was found way back by William Herschel in 1784 but its actual nature was not determined until Clyde did it in 1932. Caldwell 66 is really far away and faint for a Globular but will be visible in your telescope.

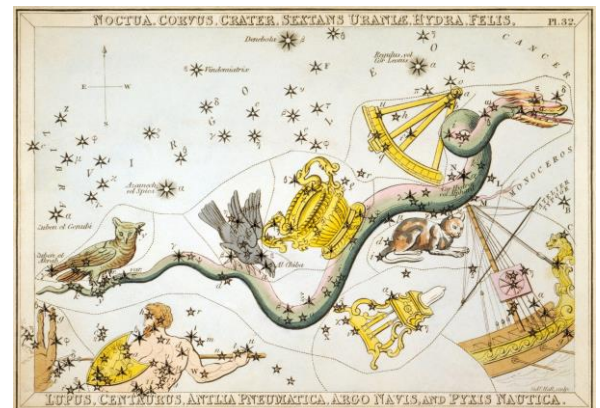
NASA thinks that it might not even be a satellite galaxy to the Milky Way; instead a Globular on a hyperbolic orbit around us. Toss it in your bucket list, it's an intergalactic wanderer.

I mentioned M83, NGC 5236 last month, a beautiful face on spiral nicknamed the Southern Pinwheel. At 7th magnitude you'll see it in your 4 1/2 inch easily. It's a little far south, almost into Centaurus, so you may have to deal with horizon munge, but you'll get it. M48 NGC 2548 and M68 NGC 4590 are also big and bright. M68 is an 8th magnitude Globular easily found not too far from Beta β Corvi, named Kraz, found in the Skalnate Pleso Atlas of the Heavens by Becvar. M48, found under the tail of Hydra, is a 6th

magnitude Open Cluster found by Messier himself. He got his coordinates wrong however, so we can also give credit for finding M48 to Caroline Herschel. You know, considering societal norms in 1782 and there a-bouts, I wonder sometimes about how often the credit given William should rightly belong to Caroline. Wouldn't surprise me. Lastly let's find the Porpoise. It's in Hydra, NGC's 2936 and 2937. Not too bright at almost 13th magnitude, and not a lot of detail in our backyard telescopes; but a fun object to search for nonetheless. Find them about 3 degrees north of Iota ι Hydrae. Iota was part of an Asterism as far back as Ptolemy but is now named Ukdah, the Knot.

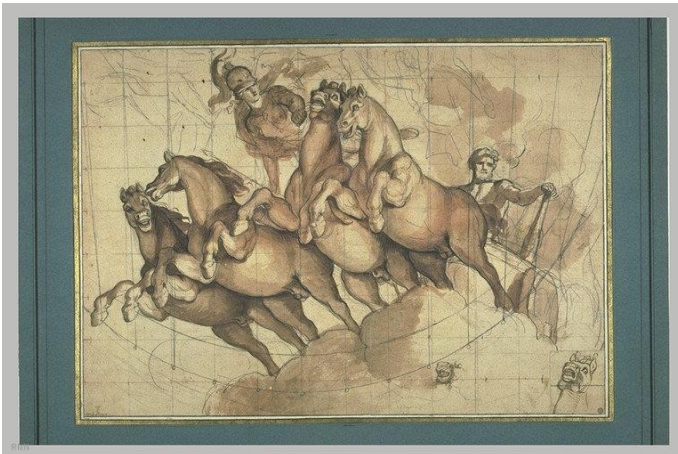


The constellations have a lot of history. In Babylon, Crater, Corvus and Hydra were the gates to the underworld. In Troy, their mythology is brutal and bloody and to the Pacific Islanders it is a whirlpool.



Crater and Corvus are two of Ptolemy's original constellations in his Almagest and the classical myth that is usually associated with the three is the Crow, the Cup and Snake were put into the sky by Apollo as a warning against lying to him, though Hydra has at least one additional history.

Gienah, Algorab, Kraz and Minkar, ϵ Corvi, the Beak, the bottom right star make up an asterism known as Spica's Spanker. The asterism forms a kind of irregular



quadrilateral that mimics the shape of the aft sail on an old timey sailing vessel.

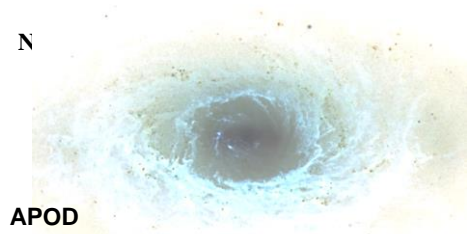
I've never been a big fan of Hercules, the myth. Despite Disney's best efforts he comes off as a teenage doofus or just a thug, though in reality, I believe, he is more the symbol of an ancient engineering marvel. The best explanation of what Hercules may have been turns him into an ancient engineer of sorts. The effort to drain the swamp around lake Lerna was an early engineering feat of enormous difficulty, growing new channels after closing off another. "Behind most of the myths in the ancient Greek Mythology lies the fight of the humankind to survive against the elements of nature, against its wildlife, as well as against extreme events of that era": per **Prof. Yannis A. Mylopoulos School of Civil Engineering, Aristotle University of Thessalokiniki, Greece**

Leo has 16 galaxies magnitude 10 and brighter and 5 of them are Messier objects and one is a Caldwell.

Caldwell 40, NGC 3626 is a big 10th magnitude near face on tight spiral with a big central bulge and lots of dust lanes. If you put your Telrad on C40, at about 4:00 o'clock on the outer ring are NGC 3606, NGC 3607, NGC 3599 and NGC 3608.

I've never seen any definition in the group even with 17 inches except for NGC 3607, 10th magnitude and a prominent member of the Leo 2 group of galaxies. By my count there are over 10 galaxies 11th magnitude and brighter and over 50 at 12th magnitude in Leo 2.

According to the "Atlas of the Universe.com" there are 110 large galaxies associated with Leo 2.



Algieba is Gamma γ Leonis. It sits at the base of the neck, I think it is commonly called the mane. Algieba is derived from the Arabic for forehead. Go figure. We start off here because not only is Algieba a close double with almost identical magnitudes of 2.6 and 3.8 and it is less than a degree from NGC's 3227 and 3226, an 11th magnitude pair of interacting galaxies. Once you put a little power on, you should get some great detail.

Next, slip up the neck to Zeta ζ Leonis, Adhafera, the braid. Halfway there you will find the NGC 3190 group, Leo I. You should be able to find two galaxies easily, NGC 3190 and NGC 3193, both high 10 or low 11 magnitude. With a larger telescope you will be able to pick out NGC 3185 12th mag. and NGC 3187 13th mag.

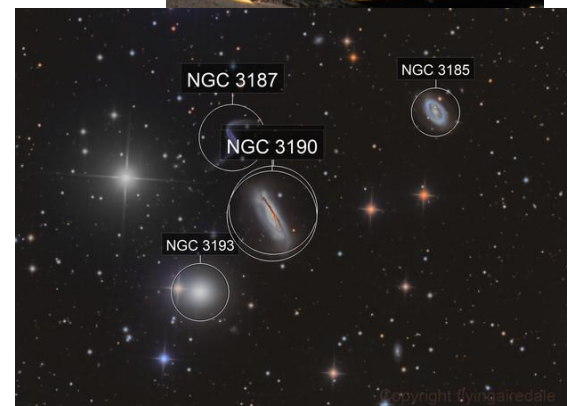
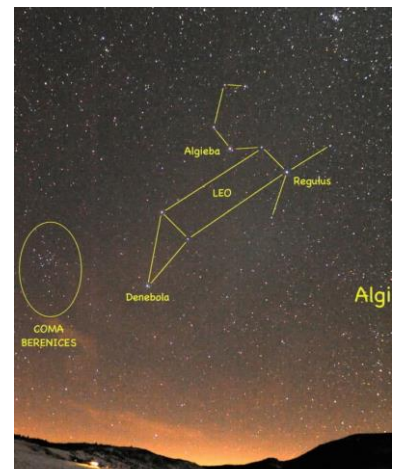
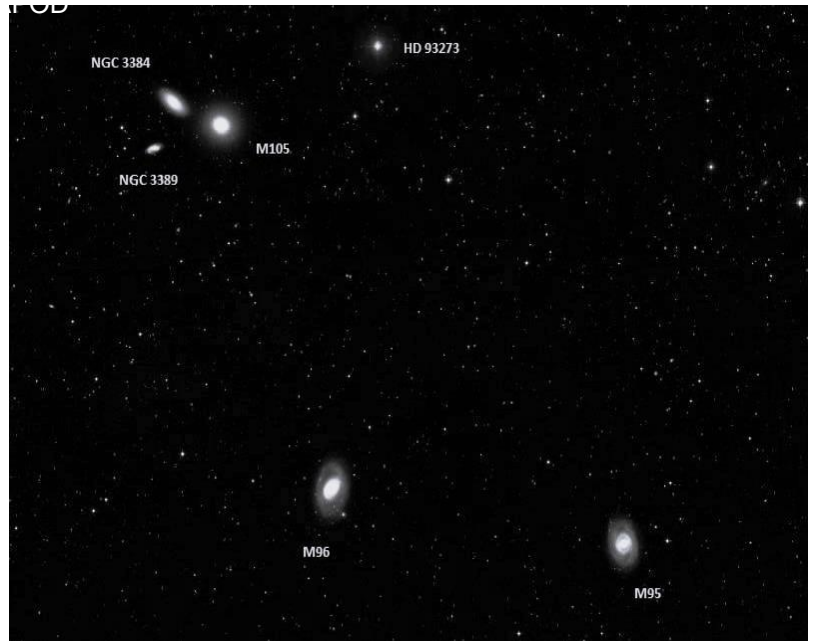


Image capture from Astrometry.net. Thank You

Moving further toward Denebola, β Leonis, the Tail, is the Leo Triplet, M65, M66 and NGC 3628. M66 is 8th magnitude while M65 and NGC 3628 are both 10th. This is an interesting group of galaxies, all interacting with each other, all spirals of a sort and one nearly edge on. This particular **APOD** image from 2007 shows a tidal tail up from NGC 3628. I didn't know about it until recently. Another item for the bucket. M65 is at the bottom of the image, M66 up and to the left.

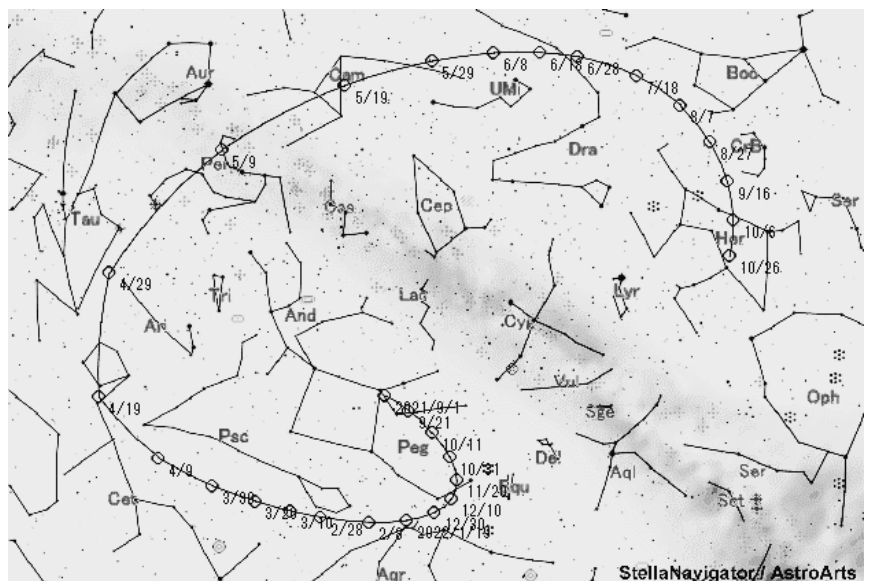
While in the vicinity of the Leo Triplet, slide down to the ecliptic and look for Wolf 359, one of the closest, reddest, fastest and smallest stars we can see visually. It's dim, 13th magnitude, but our third closest star and who doesn't like looking at red stars. The



books tell me it's about the size of Jupiter and because it is so close, it has a speedy proper motion. Sounds like fun, huh. Between Regulas and Chertan, θ Theta Leonis meaning hip or rib is the M105 group. There are lots of interesting galaxies here: M105, M95, M96, NGC 3384 and NGC 3389. M105 is a big elliptical at 9th magnitude. M106 is a 10th magnitude barred and M96 a 9th magnitude spiral. Also included in the M105 group is reasonably bright NGC 3384, 10th magnitude elliptical and fainter NGC 3389, 12th magnitude. **Credit Wikisky**

Per Hind, R Leonis is one of the most "fiery" variables and per the AAVSO, one of the best with which to begin your career in variable star observing. R Leonis has a wide range of variability from 5.8 to 10th magnitude, making it easy to follow its rise and decline in your 4.5 inch.

There are a couple galaxies in Leo that can be found described in Webb but not in Burnham's. NGC's 2903 and 2905 are part of the same galaxy, a nice armed spiral that was resolved by Lord Rosse. The galaxy is listed at 9th magnitude and 11' by 5' so your modern optics should show it well. You will find it just south of Lambda λ Leonis. The second galaxy not usually mentioned is NGC 3521, also 11' by 5' but fainter at 11th magnitude. NGC 3521 is a member of the oddly named class of "Flocculent Spirals" having a "wooly" appearance. Check out the image at <https://esahubble.org/images/potw1538a/>, then compare it to what you see visually. You will find NGC 3521 almost in Sextans at 00 degrees declination south of Sigma ζ Leonis.





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I prefer the Japanese website aerith.net as a starting point for my comet viewing. If you check it out you will find that Comet Panstarrs, C/2021 03 will be visible early this month, maybe even visually.

Panstarrs is a first time visitor to the inner solar system and if it survives the closest approach to the sun in April, we will find it over the western horizon at sunset. The Japanese are listing it as 5th magnitude though none of the other sites I visited were so optimistic. Talking about optimism, we are expecting Comet C/2012 K7 to be visible in your binoculars throughout summer. Look for it on the 1st of May next to the Pleiades. Of interest, Mercury will be on the other side of the Pleiades about the same distance away.

Keep your eyes open at the end of May for Comet Atlas (c/2021 P4) . It's up in Perseus and into Auriga by mid-June, coasting south past Lynx in July and makes a close approach to Regulus near the 1st of August. At 10th magnitude, it will be a great test for one of those new Evsopes.

Dark Skies, Dave Phelps



Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light

By David Prosper – NASA - JPL

Have you spotted any “night lights”? These phenomena brighten dark skies with celestial light ranging from mild to dazzling: the subtle light pyramid of the zodiacal light, the eerie twilight glow of noctilucent clouds, and most famous of all, the wildly unpredictable and mesmerizing aurora.

Aurora, often referred to as the northern lights (aurora borealis) or southern lights (aurora australis), can indeed be a wonderful sight, but the beautiful photos and videos shared online are often misleading. For most observers not near polar latitudes, auroral displays are relatively rare and faint, and without much structure, more gray than colorful, and show up much better in photos. However, geomagnetic storms can create auroras that dance and shift rapidly across the skies with several distinct colors and appear to observers much further away from the poles - on very rare occasions even down to the mid-latitudes of North America! Geomagnetic storms are caused when a magnetic storm on our Sun creates a massive explosion that flings a mass of particles away from its surface, known as a Coronal Mass Ejection (CME). If Earth is in the path of this CME, its particles interact with our planet’s magnetic field and result in auroral displays high up in our ionosphere. As we enter our Sun’s active period of its 11-year solar cycle, CMEs become more common and increase the chance for dazzling displays! If you have seen any aurora, you can report your sighting to the Aurorasaurus citizen science program at aurorasaurus.org

Have you ever seen wispy clouds glowing an eclectic blue after sunset, possibly towards your west or northwest? That wasn’t your imagination; those luminescent clouds are noctilucent clouds (also called Polar Mesospheric Clouds (PMC)). They are thought to form when water vapor condenses around ‘seeds’ of dust from vaporized meteorites - along with other sources that include rocket launches and volcanic eruptions - around 50 miles high in the mesosphere. Their glow is caused by the Sun, whose light still shines at that altitude after sunset from the perspective of ground-based observers. Noctilucent clouds are increasing both in frequency and in how far south they are observed, a development that may be related to climate change. Keeping in mind that observers closer in latitude to the poles have a better chance of spotting them, your best opportunity to spot noctilucent clouds occurs from about half an hour to two hours after sunset during the summer months. NASA’s AIM mission studies these clouds from its orbit high above the North Pole: go.nasa.gov/3uV3Yj1

You may have seen the zodiacal light without even realizing it; there is a reason it’s nicknamed the “false dawn”! Viewers under dark skies have their best chance of spotting this pyramid of ghostly light a couple of hours after sunset around the spring equinox, or a couple of hours before dawn around the autumnal equinox. Unlike our previous two examples of night lights, observers closer to the equator are best positioned to view the zodiacal light! Long known to be reflected sunlight from interplanetary dust orbiting in the plane of our solar system, these fine particles were thought to originate from comets and asteroids. However, scientists from NASA’s Juno mission recently published a fascinating study indicating a possible alternative origin: dust from Mars! Read more about their serendipitous discovery at: go.nasa.gov/3Onf3kN

Curious about the latest research into these night lights? Find news of NASA’s latest discoveries at nasa.gov



Comet NEOWISE flies high above a batch of noctilucent clouds in this photo from Wikimedia contributor Brwynog.

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https://commons.wikimedia.org/wiki/File:Comet_Neowise_and_noctilucent_clouds.jpg



The zodiacal light extends into the Pleiades, as seen in the evening of March 1, 2021 above Skull Valley, Utah. The Pleiades star cluster (M45) is visible near the top.

Credit and source:: NASA/Bill Dunford

<https://www.flickr.com/photos/gsf/51030289967>



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A sampling of some of the various patterns created by aurora, as seen from Iceland in 2014. The top row photos were barely visible to the unaided eye and were exposed for 20-30 seconds; in contrast, the bottom row photos were exposed for just 4 seconds- and were clearly visible to the photographer, Wikimedia contributor Shnuffel2022.

License and source: CC BY-SA 4.0 https://commons.wikimedia.org/wiki/File:Aurora_shapes.jpg



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