SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

October 2023 Free to members, subscriptions $12 for 12 issues **Volume 50, Number 10**

Here are NGC7331 and some smaller galaxies sharing the field of view which are sometimes called the Deer Lick group. This was taken by Seungjun Kim in Sept 2023 He used a Skywatcher 10" F/4 and RisingCam IMX571 One Shot Color camera

Upcoming Events - free and open to the public

Beginner's class	Friday,3 November at 7:30 to 9:30 PM **ONLINE** This is session 3 of the class: It covers methods of finding objects in the night sky with specific attention to constellations.
Club Meeting	Friday, 13 October at 7:30 to 9:30 PM **In person** at Chapman University and **ONLINE** "What's Up?": Chris Butler from OCA Main speaker: Kevin Schindler from Lowell Observatory whose topic will be: "The Discovery of Pluto".
Open Spiral Bar	Saturday, 14 October at 10:00 to 11:30 PM **ONLINE** Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face.
Star Parties	Saturday, 14 October 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

Well, by the time you see this, we'll be past the autumnal equinox on September 22, halfway to the winter solstice on December 21. Although it's probably hard to tell at this stage, the hours of darkness are now longer than the hours of daylight; that becomes clearer as we get further from the equinox. The most practical effects for an astronomer are that night viewing can start earlier in the evening (particularly after Daylight Savings ends on November 5), and the winter constellations are coming into view a bit earlier each night, confirmation that winter is on its way.

But, while we welcome cooler weather, I don't think I'm alone in not wanting it to get too terribly cold…

Eclipse in October

Many of us are looking forward to the annular eclipse of the sun on Saturday, October 14, 2023. Its center line will cut across the western United States, crossing Oregon, Nevada, Utah, New Mexico and Texas, and corners of California, Arizona and Colorado. It should be quite a show, and a number of club members are planning to view it with appropriate imaging equipment, so there should be some good images coming…

If you are in Southern California during this event, you should be able to see a partial eclipse with at least 70% of the sun's disk covered at maximum, from soon after 9:00 a.m. through around noon, Pacific Daylight Time. You can watch it on the sun directly if you have proper filters or eclipse glasses, or you can observe it indirectly by having the sun's rays shine through a pinhole (just a tiny hole in a piece of paper works fine) and onto another surface – the ground, your hand, another piece of paper or cardboard, whatever's available. You may also notice that the shadows under a tree look strange during the eclipse, as the spaces between leaves act as pinholes so the ground where the shadows from the tree fall is dappled with images of the sun as it goes through different stages of the eclipse.

That will be an eventful weekend – the club's general meeting is the evening before the eclipse, and, as the eclipse itself marks New Moon, the Anza star party will be that evening. So, even if you don't go anywhere to see the full eclipse, there will be plenty of astronomical activities to keep you busy.

Total Eclipse on April 8, 2024

For many of us, the annular eclipse is kind of a warm-up for the total solar eclipse on April 8, 2024, when the center line will cut across Mexico and the eastern United States. We don't often get full eclipses that are so conveniently placed for North American viewing, and I know many club members already have plans in place for where they're going to view it, with reservations already made.

If you are planning to see this eclipse and haven't made arrangements yet, you should get moving on it as options are closing – interest in this eclipse is likely to be even greater as we get closer to April than it was for the Great American Eclipse of 2017. Our club itself doesn't have the resources to arrange tours for events like this, but there are a lot of tours out there, organized by people who know what's needed to give the best chance of a good viewing experience. One company that many of our members have gone on eclipse tours with over the years is Twilight Tours, owned by OCA member Joel Harris. He has been planning for this eclipse for more than two years – it takes a lot of hard work and good organizing skills to organize one of these tours. He has given us many talks on different aspects of planning for and enjoying eclipses, and I am happy to say that he is scheduled to give us a talk on the April eclipse later this year.

If you're planning on just heading out somewhere along the center line of the eclipse and setting up to view it beside the road or maybe in a field or parking lot somewhere, be sure to check on local laws and practices before finalizing your plans. Craig Bobchin, a long-time club member who now lives in Texas (one of the states on the center line), recently advised us that setting up beside the road isn't allowed there, as all the land is privately owned. I don't know about other states on the center line, but it would be a sad end to a fun event to wind up having legal problems over where you chose to view it.

Fire Is Still a Concern…

If you're interested in wildfire history in California, the Cal Fire website (fire.ca.gov) has an easily accessed archive of statistics going back to 2016. Although we lived through the events of those years, they do tend to blend over time, and seeing information on particular fires helps put them in perspective. Seeing the figures for the number of fires and size of the areas burned each year is sobering, particularly the totals burned for 2017 through 2021 (1.6 million acres in 2017, 1.9 million in 2018, 2.8 million in 2019, 4.3 million in 2020 and 2.6 million in 2021).

Particularly when compared with those years, 2023 looks pretty good so far. As of mid-September, the state had 5280 wildfires with 255,468 acres burned, though the numbers are likely to go up in the remaining three months of the year. The last three months of the year can be brutal: the Camp fire that destroyed the City of Paradise in 2018 was in November, the Thomas fire that burned a big section of Ventura County in 2017 was in December, and the Kincaide fire that burned through Sonoma County in 2019 was in mid-October.

The rains we had last winter can be a two-edged sword, as more water causes more vegetation growth, which can increase fuel for fires. Fortunately, conditions over the summer haven't been as dry as in most other years, and vegetation with more moisture doesn't burn as easily as when it's totally dry. However, our vegetation could dry out fast if we get a strong Santa Ana wind season.

So, we need to be vigilant about fire hazards around our Anza site, and it wouldn't hurt to check the areas around our homes, also. And, for astronomical activities, checking for forecasts of smoke and haze (particularly if you're planning to travel somewhere for viewing) is likely to continue to be as important as checking for clouds and other unhelpful weather.

That said, I hope your skies stay clear of smoke and anything else that might interfere with your view whenever you are planning to catch some photons, and, if you're heading out to view the annular eclipse, that you get a good, clear view in pleasant surroundings!

OCA Election Season Starts!

We'll be taking nominations for the 2024 OCA Board through the end of the day of the November General Meeting, November 10, 2023. If you want to be on the ballot, please contact our current Secretary, Alan Smallbone, at alan@ocastronomers.org.

Any member in good standing who has been a member for at least a year can run for one of the 7 Trustee positions, or the positions of Secretary or Treasurer. Any member in good standing who has served at least one year on the Board at any time can run for President or Vice President.

If you have any questions about the duties of any of these positions, please contact any member of the current Board.

We look forward to hearing from you!

Advertisements

Buy, Sell or Trade some of your gear? This is where club members can place advertisements. Please contact the editor at newsletter@ocastronomers.org to place an advertisement or to learn more about placing one. There is no cost to club members for non-commercial advertisements in the newsletter.

For Sale contact Ron Choi rchoi1983@gmail.com

- Orion StarShoot AutoGuider further reduced price $ 200
- Tele Vue 8mm plossl 1.25" eyepiece $ 80

For Sale contact Michael Newman mnewman2112@gmail.com

- Pad lease for LP-12 in Lower Pads section and the pier upon it $ 1000

It includes a pier that is very nicely aligned and can support a C-8 up to a C-14 I believe although the new owner may need to drill new holes. For questions and to express your interest in the pad, please contact me via email.

For Sale contact Bill Prats b.bill.p@gmail.com

- QHYCCD PoleMaster Camera Adapter for Losmandy GM811xx Mount, IEQ30/IEQ45 # 020038 $ 30
  3 Pieces, Bright red finish, no scratches
- Losmandy Servo motor/Gemini 2 cables (pair) recent & hardly used Make offer
- Losmandy Gemini 2 Hand Controller, recent & hardly used Make offer

Contact Bill Prats b.bill.p@gmail.com Shipping is extra. All items can be picked up in Huntington Beach.

For Sale contact Eric Mjolsness emj@uci.edu

- Mars Hill Pad # MH-05 OCA license is up for sale. Includes solid equatorial pier. $ 2300 obo
  Price in 2010 was $2300. I am seeking that amount back or best offer.

For Sale contact Val Akins akins7821@gmail.com 949-301-5956

- Telescope: Orion's Sirius 8" Go-To Reflector, Focal Length: F6, 1200 mm, Case: for 8 x 6 OTA $ 852 reduced
  Mount: Sirius EQ-G Go-To Equatorial with tripod
  Controller: Synscan 42,000 Celestial object database
  Lens: Siriusplossl 26 mm
  Viewfinder: 8 x 50 mm Rt. Angle
  Note: Equipment is used, but all functional

For Sale contact Ami Dvir amiaddvir@gmail.com 949-294-1073

- Eyepiece Celestron X-CEL : 12mm,9mm,7mm, with boxes and all $ 170
- Eyepiece Meade 5000 PWA 28mm [like new in the box], list price is $330 $ 220
- Eyepiece Meade 5000 PWA 16mm [like new in the box], list price is $190 $ 120

For Sale contact David W. Pearson p.davidw@yahoo.com

- Star Splitter 20 inch Dobsonian telescope with servo-cat go-to capability $ 8000 obo
  Includes 8 eyepieces, laser collimator, telerad, plus more.
  If the equivalent was bought today from Obsession, it would be $15,385+shipping without extra accessories
- Intes MK66 6" f/12 Maksutov-Cassegrain OTA includes rings/dovetail, case, finderscope, and diagonal $ 800 obo

These items are local pickup only. If interested, please send me email requesting a complete description.

For Sale contact Nick McMillan wforacer@rocketmail.com

- Technical Innovations Pro-Dome Ten-Foot (PD10), includes three Wall-Ring-PD10 (WR10) $ 5000
  which add ~48" height to the walls and making it 10' tall and 10" wide.
- Digital Dome Works controller (DDW), hardware and software.
- Electric Dome Motors 10 (ED10), Electric Shutter Motor 10 (ES10), Shutter Auto Stop (SS1).
- Power Supply 10 (PS2E), ES Pulley upgrade (ESP), Wind Restraint System, Anti Sag Brace.

Pictures are on Flicker here: https://www.flickr.com/photos/123906448@N08/albums/72177720309596327/.
The dome and components must be picked up in Costa Mesa.

For Sale contact Bill Frank 949-254-4662 cell

- LX200 Maksutov-Cassegrain telescope with cover, Meade mount, base controller, $ 500 OBO
  power and control cables, carrying cases.
- Accessories in case #1: Meade Dew Shield MFR#07284, main scope cap, guide scope caps,
  2 green laser sights with controller
- Accessories in case #2: Televiewy eyepieces: 19mm Wide Field, 74 mm Plossl, 10.5 mm Plossl,
  Meade Super 26 mm Plossl, setup eyepiece, assorted locking rings and covers, adapter sleeve,
  power supply 10 (PS2E), ES pulley upgrade (ESP), wind restraint system, anti-sag brace,
  2 Starlite red reading lights, lens cleaning brush, laminated list of Messier objects and bright stars
- Camera: SBIG ST-5C with CPU, P/S, cables
- Software: CCDOPS Version 4.0, SkyX Professional Edition User Guide

Photos are available here: https://tinyurl.com/h3e6hxcn . Please call me to arrange inspection / pickup / delivery.

Help Wanted (Volunteering Opportunities)

- Communications Coordinator doing social media presence and announcements to members

- Coordinator for Adopt a Scope Program

We are in need of a new Coordinator for this program, which has been very successful in uniting people with donated telescopes under John Hoot's leadership. If you are interested in taking on that program, please send an email to our Secretary, Alan Smallbone, at alan@ocastronomers.org. If you have any questions about what's involved, please contact John Hoot at scopes@ssccorp.com. We look forward to hearing from you!

AstroSpace Update

October 2023

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

Lunar Landers – Both Russia and India had launched spacecraft scheduled to land near the Moon's south pole in August. Russia's Luna-25 was the first lunar spacecraft from that country (and Soviet predecessor) in 47 years. Unfortunately, it crashed rather than soft-landing. An investigation has begun to find the cause of the crash, but initial indications are that the firing of the rocket engine to lower the spacecraft to prepare for landing lasted too long. The Lunar Reconnaissance has imaged a new crater about 10 yards across that is likely the Luna-25 crash location. However, India's Chandrayaan-3 landed successfully and included a rover that explored the landing area for a lunar day, which lasts two weeks. These craft were not designed to withstand the extreme cold of lunar night. Instruments on the lander and rover measured moonquakes, plasma, surface composition by minerals and by elements, and surface heat conductivity. India became the fourth country to land a spacecraft on the Moon, and the first country to land anywhere near its south pole. Water ice has been detected in shadowed areas near the lunar south pole, so it will be interesting to see what surface composition the Indian rover finds.

Some Moonquakes Explained – About 50 years ago, the Apollo 17 mission left seismometers to measure moonquakes. Every lunar morning and evening, tiny moonquakes occur. They have been attributed to thermal expansion (morning) and contraction (afternoon) of the lunar surface. A new analysis of old seismometer data showed that the morning (but not afternoon) moonquakes originated at the location of the Apollo 17 rocket landing stage. So thermal expansion of the rocket stage caused the morning tiny moonquakes. The quakes occurred every 5 to 6 minutes for a period of 5 to 7 hours. The seismometers left by Apollo missions other than 17 were not sensitive to the same frequencies, and similar tiny moonquakes have not been seen from them.

Martian Landslides – New images taken by the European Mars Express spacecraft of Olympus Mons, the largest known volcano, showed how landslides that occurred several hundred million years ago formed a skirt of cliffs near the base of the volcano. The landslides were triggered by lava flowing down the slopes until they hit a layer of rock containing much ice. This ice melted, weakening the rock, which then slid downslope.

Supernova Structures – Astronomers used the James Webb Space Telescope (JWST) to observe the remnant of supernova 1987A, which was seen to explode in the Large Magellanic Cloud more than 36 years ago. Due to JWST's superior resolution, crescent shaped structures were found in the new observations that had not been seen by other telescopes. The crescents are believed to be clouds of gas blown out by the explosion. Other known remnant features, such as the keyhole dark cloud and an equatorial ring were seen in greater detail than previously.

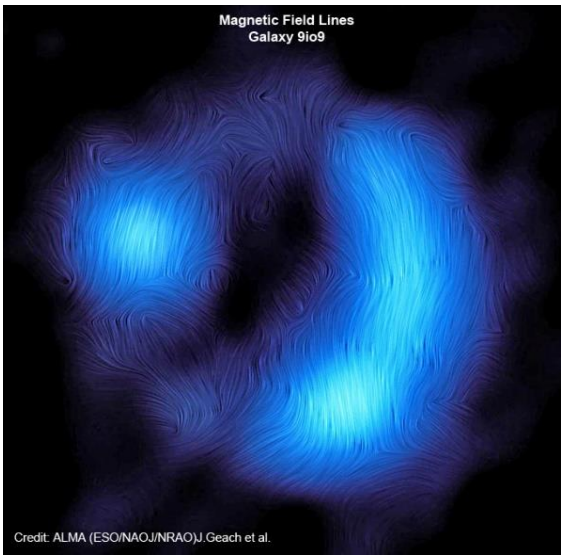
Double Explosion – Supernova 2022joj has exhibited unusual behavior. Normally Type Ia supernovas peak in brightness once, but this one peaked twice and was not as bright as normal supernovas. It is proposed that this supernova is therefore a member of a somewhat rare class known as subluminous supernovas. These occur when a large amount of helium is dumped onto a white dwarf star by its closely orbiting companion star. When the helium ignites in nuclear fusion, it throws out a shock wave that causes a second explosion deeper in the star. More observation is needed to confirm the subluminous diagnosis.

Distant Individual Star – JWST has imaged and taken a spectrum of an individual star at one of the greatest distances any star has ever been seen. The observation was made possible by rather strong gravitational lensing caused by a massive galaxy cluster that happened to lie in front of the star. The lensing substantially brightened that star. It is so distant that its light took 12.5 billion years to reach us. The star was determined to be a type B supergiant.

Possible Magnetar Progenitor – The star known as HD 45166 is a member of the class Wolf-Rayet (WR) stars but is unusual for that class. WR stars have up to 25 times the mass of the Sun, have completely converted their cores from hydrogen to helium, and have extreme stellar winds. HD 45166 has a smaller mass than any other WR star. New observations show that it has a stronger magnetic field than expected. This means that when it reaches end-of-life and explodes as a supernova, it may become a magnetar, that is, a neutron star with an extreme magnetic field. Astronomers have long debated what type of star will produce a magnetar at the end of its life, and this star may be the answer. It lies about 3000 light-years away in the constellation Monoceros.

Polar Rings – A group of astronomers examining data from the ASKAP radiotelescope array has found what appear to be two polar ring galaxies. This type has a ring perpendicular to the disk. Such galaxies are somewhat unusual, but finding these two new ones in a small sample of the sky implies they may be more common than thought, perhaps as much as 3% of galaxies. The radiotelescope observations are sensitive to gas, and so it was actually the gas in the polar rings that was seen. The known polar ring galaxies were typically found in visible light rather than radio light.

Galaxy Magnetic Field – Scientists using polarization data from the ALMA radiotelescope array in Chile have observed the most distant known magnetic field of a galaxy. That galaxy, known as 9io9, is so distant that its light takes 11 billion years to reach Earth. This and other similar observations will help astronomers understand how long it takes for a galaxy to build a magnetic field. This observation is possible only because another galaxy happens to be in front of it, causing gravitational lensing that brightens the distant galaxy.



Unusual Pulsar – Observations from a dozen ground- and space-based telescopes have found strange behavior in a pulsar (spinning neutron star) known as PSR J1023+0038. It switches between two brightness modes. The new observations show that it switches into the brighter mode when brief ejections of large amounts of material occur. The material comes from its closely orbiting companion star. It settles into an accretion disk about the pulsar, but is occasionally spit out by a jet. The system is about 4500 light-years away in the constellation Sextans.

TDE – When a star approaches a black hole too closely, tidal forces pull the star apart, as a result of the side of the star nearer the black hole being pulled by gravity more strongly than the far side of the star. This is known as a tidal disruption event or TDE. An event known as ASASSN-14li was determined to be a TDE. In this event most of the star was not pulled into the black hole, but instead was flung outward. Spectra of the event were observed in X-ray and ultraviolet light by various telescopes. The star's mass was determined to be about 3 times that of the Sun. This is the largest confirmed mass of a TDE, though estimates of TDE masses unconfirmed by spectra have been larger.

Repeating TDE – Sometimes TDEs do not occur all at once, but instead in repeating episodes. The Neil Gehrels Swift Gamma-ray space telescope, which also includes X-ray capabilities, has seen in X-rays such events in a galaxy over 500 million light-years away. The episodes occur every few weeks. The black hole has over 200,000 times the mass of our Sun. The star loses an estimated 3 times the mass of the Earth every time it passes close to the black hole. The episodes were found by an automated search method analyzing Swift data. Although the episodes are seen in X-rays, they have not been found in visible or ultraviolet light.

Possible Hyades Black Holes – New simulations of the motions of the stars in the Hyades open cluster best match observations if there are 2 or 3 stellar size black holes in the cluster. If those black holes can be verified, they would be the closest known black holes to Earth. The Hyades are about 150 light-years away. The current record holder for near black holes is more than 1500 light-years away.

Exoplanet Atmosphere – JWST observations have detected carbon dioxide and methane in the atmosphere of an exoplanet known as K2-18 b. These observations were made of the starlight passing through the planet's atmosphere as it transited (passed in front of) its star. Astronomers have theorized a class of exoplanets called hycean, which would have hydrogen atmospheres and very deep water oceans below. No hycean planet is yet known, but K2-18 b observations so far fit what is expected of one. K2-18 b has 8.6 times the mass of Earth and 2.6 times our planet's diameter. It lies in the habitable zone of its star, that is, the distance and therefore temperature at which water could be in the liquid state. The planet is 120 light-years away in Leo. Also seen in the new observations is a spectral line that may be from dimethyl sulfide, a chemical that on Earth is produced only by life.

Europa Carbon Dioxide – JWST observations have detected carbon dioxide on the surface of Jupiter's moon Europa. It has long been known that Europa has a salty ocean beneath its frozen surface. Evidence from the new observations indicates that the carbon dioxide came from the ocean and froze onto the surface in geologically recently times. Having a carbon compound in the ocean is one more reason to search for simple life forms at Europa. And because matter from the ocean is apparently escaping, we may find evidence of life on the surface, not just in the more-difficult-to-reach ocean. The JWST observations also looked for a plume of water vapor, which has been seen by the Hubble Space Telescope occasionally, but JWST did not find a plume. This means either the plume is very weak and difficult to detect or that the plume is sporadic and not erupting when JWST looked.

Brown Dwarfs – Astronomers examining two JWST surveys of very distant galaxies have found 21 objects that are brown dwarf candidates. Further observations are needed to confirm these. Brown dwarfs are objects too massive to be planets but without enough mass to sustain nuclear fusion that would make them stars. JWST was designed to be extremely sensitive to the infrared wavelengths that distant galaxies emit, but brown dwarfs are also most easily found with these wavelengths. Most of the new discoveries are less than 14,000 light-years away and are in the Milky Way's thick disk or its halo.

Long Period Exoplanets – The TESS planet-finding space telescope continuously observes each of its target areas in the sky for a lunar month, and then moves to the next area. This is because its orbit is synchronized with that of the Moon in order to keep the Moon out of its field of view. The result is that it mostly finds only short-period planets, those that transit their stars 2 or 3 times during an observing session. A pair of planets has been discovered in TESS data orbiting the star TOI-4600 with long orbital periods of 82 days and 482 days. The latter is the longest period planet found by TESS. Each was seen transiting only once during any observing session, but because of overlaps in session fields of view, more transits were found. They were confirmed with ground-based observations. Both are probably gas giants. The system is 815 light-years away.

Dense Exoplanet – The density of exoplanet GJ 367 b was measured and found to be extremely high, implying it consists mostly of iron. Two theories have been proposed to explain this: 1) it formed as an ordinary rocky planet and later its rocky mantle was destroyed, leaving the iron core; 2) it formed in a place within a protoplanetary disk that was rich in iron. The planet was found with the transit method in TESS data, and its mass and density then determined by the radial velocity method. It orbits its star quite closely, causing its year to be only 7.7 hours long. This proximity to its star makes the dayside temperature about 2000°F. The observations also found two other planets orbiting the same star with orbital periods of 11.5 and 34 Earth days. They do not appear to be as dense as GJ 367 b.

Solar Spacecraft – India launched a spacecraft named Aditya-L1 to study the outer atmosphere of the Sun in early September. It will observe from the Sun-Earth L1 Lagrange point. It has 7 scientific instruments and is named for the Hindi word for Sun.

STEREO – A pair of spacecraft named STEREO-A and STEREO-B were launched about 17 years ago to study the Sun from two different viewpoints. Both approximately shared Earth's orbit about the Sun, with A drifting ahead of us and B behind. B failed in 2014, though occasional radio contact was made over the next 4 years. But A is still functional, and has now drifted a full lap ahead of Earth, passing near us in August.

Astronaut Record – Frank Rubio set the record for the longest American mission in space at 371 days. He signed up for only a 6 month mission, but a leak (caused by a micrometeorite strike) in the Soyuz craft that he was to return in caused mission planners to extend his stay and return him to Earth in the next scheduled Soyuz. The two Russian cosmonauts who shared the spacecraft ride up to and back from the International Space station also spent 371 days in space, but that is short of the Russian/Soviet record of 437 days, set in 1994 by Valeri Polyakov.

From the Editor

Due dates for submission of articles, pictures and advertisements

Issue	**Due date**
November	21 October
December	18 November
January 2024	**21 December** (early due date because of holidays)

Another Look - Cygnus

October 2023
Dave Phelps

October's New Moon is on Saturday the 14th. The Full Moon will be Saturday the 28th. Fridays the 6th and the 13th have smallish moons and will contribute to dark skies for your star party. Also on Saturday, the 14th an annular solar eclipse will travel from Oregon through Texas. Maximum in Southern California will be 70% at 0924 PDT and 77% at 0931 in southern Arizona.

October's Full Moon has been traditionally called the Hunter's Moon. When the October Full Moon is closest to the Autumnal Equinox in August, it is then called the Harvest Moon. Native American names for the October Full Moon include Drying Rice Moon, Falling Leaves Moon, Freezing Moon, Ice Moon and Migrating Moon. The Kelts also named it the Seed Fall Moon, the Pagan Blood Moon or the Sanguine Moon.

In French Pleine Lune d'Octobre, in German Oktober Vollmond, in Spanish Luna Llena de Octubre, In Greek Οκτώβριος Πανσέληνος, Októvrios Pansélinos

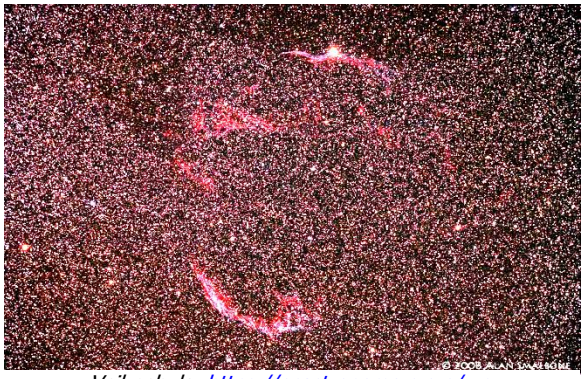
This year Antares α Scorpii and Alniyat σ Scorpii will be occulted by the moon several times at different locations across the world. In October the occultations occur from Europe to the far East but we should have an interesting close approach in the western US. Of particular interest is the fact that M4 sits between the two and would certainly be an interesting view. The occultations begin around 0200 and end in daylight. The moon is a waxing crescent.

* * *

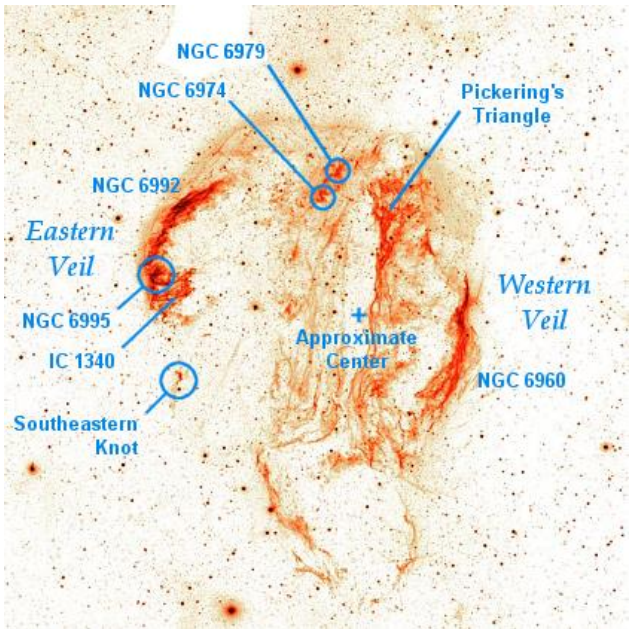
Cygnus is big. While not the biggest, it is withing the top 20% of constellations in size at over 800 square degrees and sits above the Milky Way, bisecting it along the great rift. Because of its location, it is the home to 70 open clusters, 2 Messier open clusters, 7 Caldwell, 23 Sharpless HII regions, 38!? planetaries, as a start 17 NGC and IC galaxies, over 2800 extra-solar planetary system and 31 Barnard dark regions.

We could concentrate on Cygnus from summer evening to winter evening and never learn all there is to know. Just the bright stuff rewards hours of study: Deneb, Albireo, M29 and M31, 6946 the Fireworks Galaxy, I5146 the Cocoon, 7027 the Jewel Bug, 5070 and 7000 the Pelican and North American Nebulae, 6888 the Crescent, 6960 to 6995 the Veil and IC 1318 the Sadr region. Finally add to that for curiosity's sake Cygnus X-1, X-3 and the Sadr OB region.

> *" Thee, silver Swan, who, silent, can o'erpass?*
> *A hundred with seven radiant stars compose*
> *Thy graceful form: amid the lucid stream*
> *Of the fair Milky-Way distinguished: one*
> *Adorns the second order, where she cuts*
> *The waves that follow in her utmost track;*
> *This never hides its fire throughout the night,*
> *And of the rest, the more conspicuous mark*
> *Her snowy pinions and refulgent neck."*
> *— Eudosia*



Veil nebula https://ocastronomers.org/wp-content/uploads/2019/01/veil_b_36x360_sig_oca.jpg



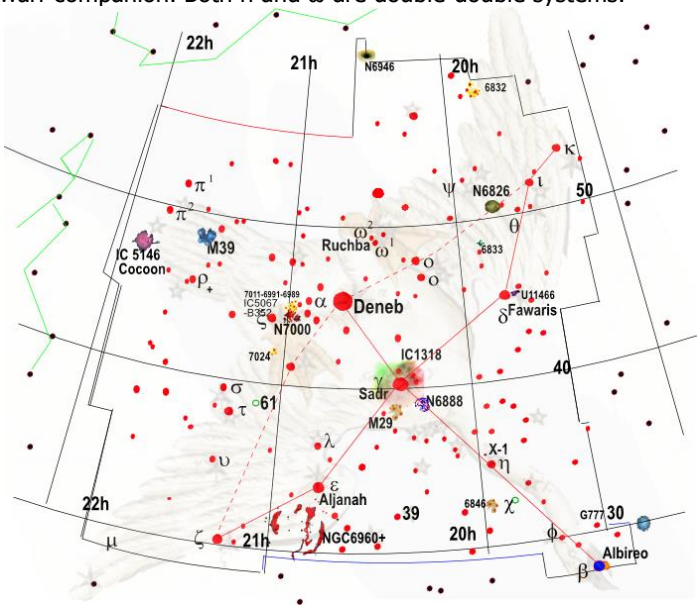
https://en.wikipedia.org/wiki/Veil_Nebula#/media/File:Cygnus_Loop_Labeled.png

Cygnus is old, but not as old as some. Before the Romans called it Swan, it was a Hen or even just a bird. We look to the Greeks for much of our lore, but they dropped the ball on Cygnus. What we do know was probably not firmed up until Ptolemy in his Almagest. In their inimical style, the Greeks turned the legend of Cygnus into porn. If you want to refresh your memory find a copy of "Star Tales" by Ridpath. You will find, however, according to Ovid, the constellation took its name from the Greek proper name Cycnus, while another story says it's Orpheus, changed into a Swan, and placed near his beloved Harp in the sky.

In Arabia, Cygnus was the Flying Eagle. In about 300 BC in Egypt she was called the Hen. On the Euphrates' star list, Cygnus is the Bird of the Forest, but that may be just an interpretation and may also be the forerunner of the Roc of Sinbad. Before Eratosthenes in the 3rd century BC, to the Greeks she was simply "the Bird". We can also add the Arab's Rider to some of its stars and the legend of the Herdsman and for the Chinese - the Spinster includes some of Cygnus' stars. History is silent of any Hebrew, Assyrian, or Phoenician names for Cygnus.

Cygnus has six named stars: β Albireo, ε Aljanah, π1 Azelfafage, α Deneb, δ Fawaris, and Y Sadr. In addition ω2 is Ruchba and π2 is Pennae Caudalis. As a bit of a side note, δ Fawaris is a triple star system and scheduled to be the north star in 9,000 years.

β Albireo is famous for its colors. Back in the day, a buddy painted the base of his Dob gold and the tube blue and named his telescope Albireo. It was a good telescope. An original Coulter from Idyllwild, figured by the man himself. 61 Cygni is called Piazzi's falling star. It's a double dwarf system and one of the closest stars to earth. Gliese 777 has two confirmed planets and a dwarf companion. Both π and ω are double-double systems.



https://ocastronomers.org/wp-content/uploads/2018/12/20.92344.61_00211-3_Clear_300secA_SDMPsm.jpg

Along with the North American Nebula (NGC 7000), the Veil Nebula is one of the most photographed objects in Cygnus today. When all we had to work with visually were UHC, HII and OIII filters and photographically with ASA 400 Kodachrome those objects were more challenging.

Although the Veil is big, around 3 degrees across, and portions can be glimpsed naked eye with only a filter, its overall surface brightness is very low, making it very hard to see. With a filter and a large telescope you can trace the circumference of the Veil and perhaps, with the longer focal length of the SCT's you may get better contrast. Likewise with NGC7000, the North American Nebula and its partner the Pelican, a UHC filter is needed for any real visual work. Unlike the reflection of the SN remnant that is the Veil, the NAM is an emission nebula. The dark lane between the two is Lynds 935.

NGC6888 Curtis Croulet - TVA

Much like the last two, NGC 6888, the Crescent Nebula, is difficult to see visually and needs a UHC or OIII filter to have much success. Even then, not much more than the bright edge is visible. It took a calm, freezing winter night and a mile elevation before I was able to trace any of the inner nebulosity.

There are a ton of open clusters in Cygnus. M29 and M39 are our two Messier's and some of the other clusters are Cr 419, Cr 420, Cr 421, Do 6, Do 2, Do 8, Do 9, Do 10, Do 11, Do 36, Do 44 and NGC6910. Right near γ, Sadr, in the center of the constellation, we find M29 (**https://www.flickr.com/photos/celfosc79/**). It is somewhat condensed, a little hard to pick out from the background and quite a pretty little cluster. M39 is up by η, a little easier to see, a few more stars and also quite pretty up against the background stars. You will find an image of M39 at
https://ocastronomers.org/wp-content/uploads/2018/12/m39.jpg

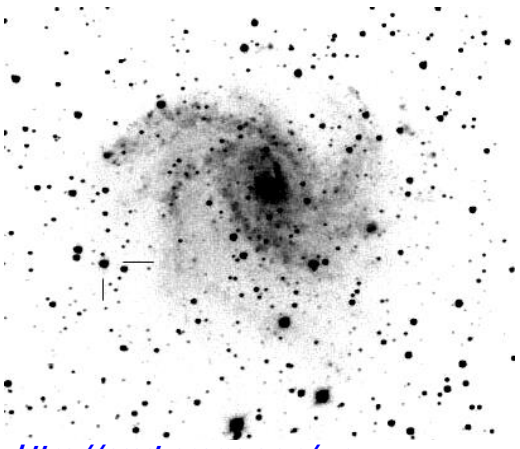
M29

The Collinder catalog (Cr) was compiled in the 1930's and is composed mostly of difficult to see stellar associations. The Dolidze (Do) catalog was compiled in the Republic of Georgia at the Abastumani Astrophysical Observatory. This catalog has 57 open clusters listed. An additional 11 were added when astronomer G. N. Dzimselejsvili joined Dolidze later. A number of amateur astronomers have made a study of open clusters. A good place to start would be the Astronomical League's Guide to Open Star Clusters. You can find it at https://cfas.org/data/uploads/astronomy-ebooks/openclusters_manual.pdf**.**

There are 7 Caldwell's in Cygnus, all associated with named objects. C12 is the Fireworks Galaxy, NGC 6946. It's a 6th magnitude face on spiral, at $+60^0$, the furthest north deep sky object in Cygnus and the target of a number of very good astrophotos on the Orange County Astronomers website, at **https://ocastronomers.org/**.

Attached to C19 is Barnard 168, a dark lane I used in the past to follow to and from the Cocoon. Very familiar to us all, C20 is the North American Nebula, C27 is the Crescent Nebula and C33 and C34 are the eastern and western loops of the Veil.

The Blinking Planetary, Caldwell 15, NGC 6826 is bright, 9th magnitude and easy to see as a featureless blue blob. It will take power, however, and with telescope inches and a decent sky you will see the central star. The planetary gets its name because the central star, HD186924, is variable.



https://ocastronomers.org/wp-content/uploads/2018/12/SN2004etabcd-copy.jpg

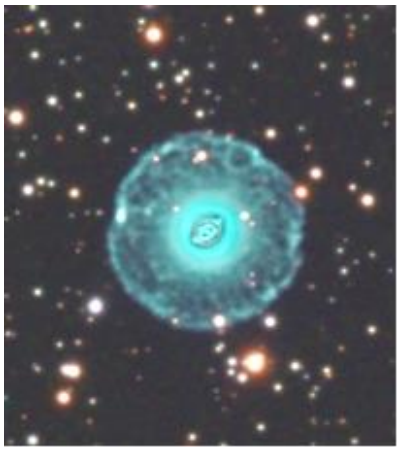
Caldwell 19 is one of those gifts that just keep coming. Also known as IC 5146 and Collinder 470, C19 is an emission/reflection nebula with an open cluster embedded. Newer studies have also shown it to be a stellar nursery.

Cygnus X-1, HDE226868, is a black hole orbiting a supergiant star about a 5th of the distance as the earth is from the sun. It is near Sharpless 2-101 and emission nebula now called the Tulip, mag 9. Using the image as a finder chart you will be able to find the visible star part of X-1.

There is so much content in Cygnus, I decided, as an exercise, to choose a random piece of sky at and see what I could find. So I picked an area 40 minutes by 5 degrees centered on the area between Sadr and Deneb and then went searching for open clusters and dark nebula. I also found IC 1318, The Butterfly. IC 1318 is a massive area of nebulosity surrounding Sadr. Look for Open Clusters IC 1311, Cr421, DO2, DO 6, DO8, DO9, DO10, N6914, N6910.

Planetary Nebula PK 79+5.1 was discovered in 1948 by Rudolf Minkowski and Patchnik 6 discovered more recently.
PK 79+5.1 or M 4-17 should be easy enough to find. It's 12th magnitude but 23' across, whereas Patchnik 6 will be a fascinating challenge.

Years ago, when scanning Cygnus, the Sadr complex was not a target. Its low surface brightness and contrast with Milky Way stars made anything hard to identify. I still remember some years ago when a black and white image, made by an amateur with the Phoenix club, showed this area north and east of Sadr. It was a massive complex of nebulosity with no coherency. https://commons.wikimedia.org/w/index.php?curid=12100647.

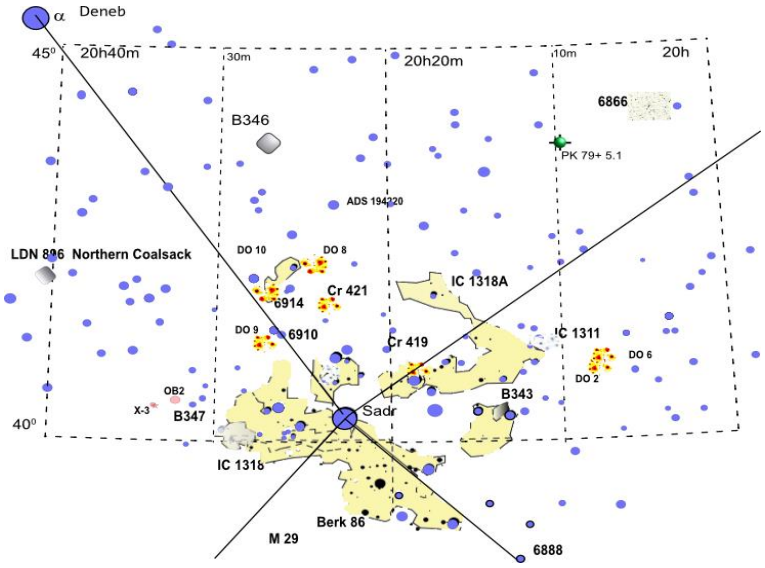


NGC 6826 from Peter Goodhew

https://ocastronomers.org/wp-content/uploads/2018/12/Cocoon4_crop.jpg

SH2-101 "Tulip"
https://www.flickr.com/search/?text=cygnus x-1

https://jthommes.com/Astro/IC1311.htm



There are four dark nebulae of note in this area. LDN 896 is nicknamed the Northern Coalsack. B343 is a very dark hole into the side of the gamma Cygni complex close to a couple of 7th mag. Stars. B347 is on the other side of Sadr. It's a dark streak into one of the wings of the butterfly. B346 will be tougher. It's in an area of lower contrast, but it has a few finder stars nearby.

NGC 6910 is a nice open cluster near to Collinder 421 and NGC 6914 which is not an open cluster but a reflection nebula. You will be able to see their contrast by comparing foreground to background variations in color. Different filters will make one than the other pop out.

Near each other and close to the west wing of the Butterfly are two binary systems consisting of huge blue O and B type stars https://www.perseus.gr/Astro-DSO-Nebulae-Dark-B346.htm interacting and creating X rays. OB2's main star is 6th magnitude but hidden in Milky Way dust. X-3 is fainter at about 15th magnitude. The science surrounding these objects is amazing, including huge X ray collisions, trailing solar winds and star creation.

So, go ahead. Let's start a book on Cygnus and see what we can see.

Dark Skys

This edition of Another Look was abbreviated to fit within space available. – the editor.

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