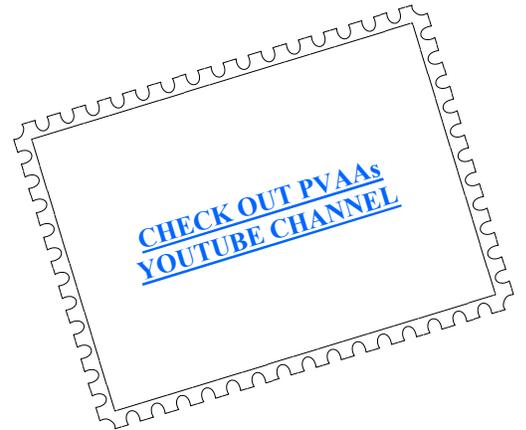




Newsletter of the Pomona Valley Amateur Astronomers

“I am in a charming state of confusion.”
Ada Lovelace



Volume 43 Number 12

nightwatch

December 2023

Club Events Calendar

Jan 13	Star Party – Cahuilla Park	July 10	Board Meeting 6:15 PM
Jan 17	Board Meeting 6:15 PM	July 19	General Meeting 7:30 PM
Jan 26	General Meeting 7:30 PM	July 27	Star Party – TBD
Feb 10	Star Party – Salton Sea	Aug 7	Board Meeting
Feb 14	Board Meeting 6:15 PM	Aug 16	General Meeting 7:30 PM
Feb 23	General Meeting 7:30 PM	Aug 31	Star Party – TBD
Mar 9	Star Party – Anza-Borrego	Sept 11	Board Meeting
Mar 13	Board Meeting 6:15 PM	Sept 20	General Meeting 7:30 PM
Mar 22	General Meeting 7:30 PM	Sept 28	Star Party – TBD
Apr 6	Star Party–GMARS	Oct 9	Board Meeting 6:15 PM
Apr 17	Board Meeting 6:15 PM	Oct 12	Star Party – Cahuilla Park
Apr 26	General Meeting 7:30 PM	Oct 18	General Meeting 7:30 PM
May 4	Star Party – Cow Canyon	Nov 2	Star Party – TBD
May 8	Board Meeting 6:15 PM	Nov 6	Board Meeting 6:15 PM
May 17	General Meeting 7:30 PM	Nov 15	General Meeting 7:30 PM
Jun 8	Star Party – TBD	Nov 27	Board Meeting 6:15 PM
Jun 12	Board Meeting 6:15 PM	Dec 7	Holiday Party
Jun 21	General Meeting 7:30 PM		



PVAA General Meeting 11/17/23

We had our November meeting of the Pomona Valley Amateur Astronomers in room B460 of the Shanahan building, which is part of Harvey Mudd College, one of the Claremont Colleges. Our speaker for the night was Robert Reeves and the title of his presentation was "Postcards From The Moon." The presentation was on his efforts to preserve the 'old' pictures taken by the lunar orbiter that NASA decided they no longer needed. These were 16x20 inch prints that were archived in a storeroom near the NASA headquarters. The Corpus Christi Astronomical Society stepped in and took the pictures off of NASA's hands, preventing the destruction of the photographs. Robert now has several hundred pounds of the giant Lunar Orbiter photographs. These are the same photographs used to plot the Apollo program. Many of the photographs have scribbles and coffee stains from the researchers pouring over them. Robert calls himself a 'selenophile' which is a person who loves the moon.

Robert published the book '*Wide-Field Astrophotography*' in 2000, just before the transition to digital photography. In 2005 he published '*Introduction to Digital Astrophotography*' which was the first book written about astrophotography with a DSLR. In 2006 he published '*Introduction to Webcam Astrophotography*' His pictures of the moon have appeared in magazines, science fiction books, astronomy books, and technical publications.

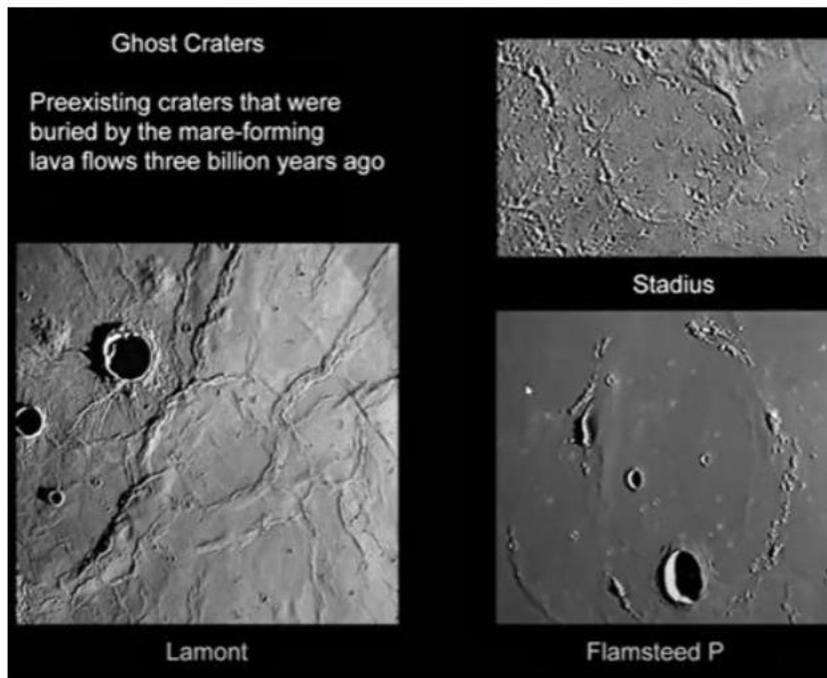
When he was young, the Moon was a "big deal." The Moon was a dream, a goal, a destination, a place of mystery to be explored by brave heroes who dared to set foot on another world. In the mid-1970's there was a fundamental shift in amateur astronomy. The introduction of the 8-inch SCT opened up the deep sky to amateur astronomers and the Moon faded from our dreams.

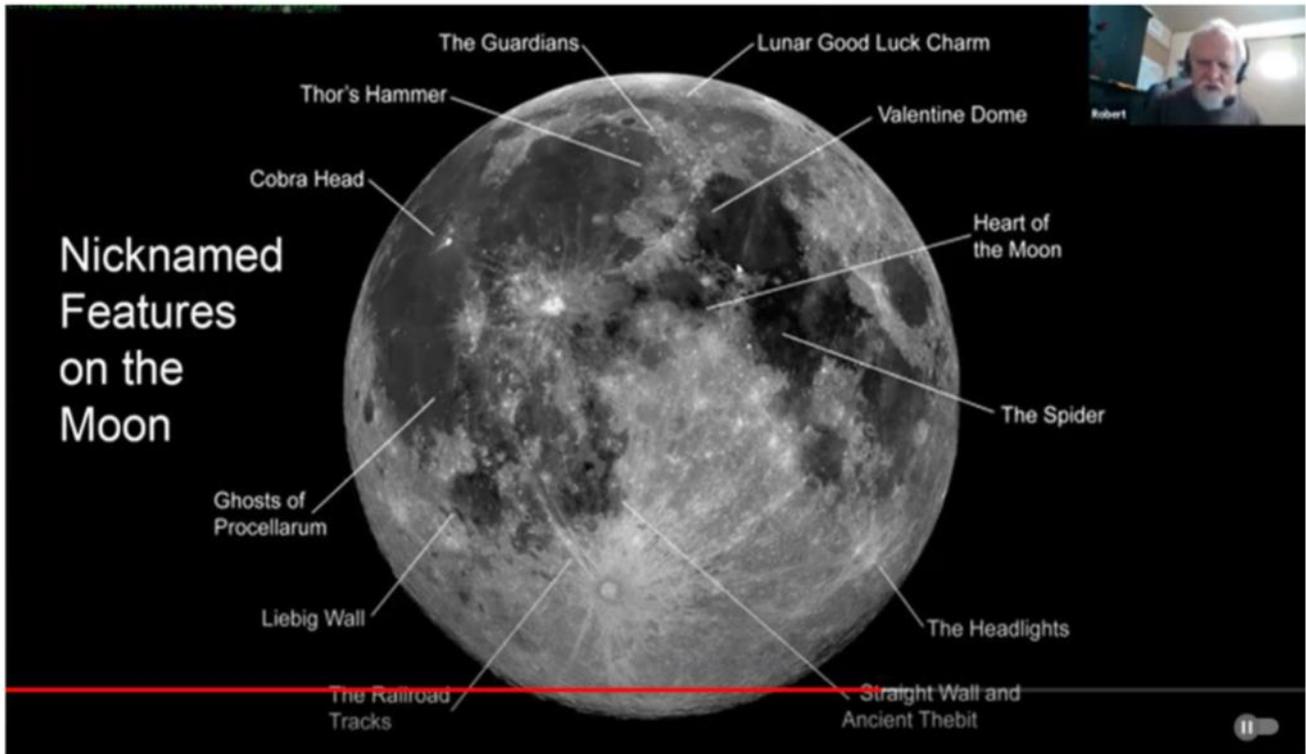
Our current belief is that the Moon formed when a Mars-sized planet called Theia collided with the proto-Earth. The history of the Moon has been divided into 5 Epochs: Pre-Nectarian: before 3.92 billion years ago – which is the formation of the Moon. The Nectarian: 3.85 – 3.92 billion years ago – Late Heavy Bombardment by asteroids. The Imbrian: 3.1 – 3.85 billion years ago – the mare formation. The Eratosthenian: 1 – 3.1 billion years ago – post-mare cratering. The Copernican: present – 1 billion years ago – modern Moon. If a crater has rays, that means the crater was created in the Copernican Era, as the rays will fade after about a billion years. The mountain ranges on the Moon are actually crater rims.

Robert displayed several types of craters and how they were formed. He then went into several unofficial names of Moon features like 'Thor's Hammer' and 'Railroad Tracks.' Mr. Reeves wants to impress upon us that the Moon is ever-changing - the shadows moving, giving us a new view hour-by-hour. We will soon be going back to the Moon with the Artemis program. You can see the full presentation here: <https://www.youtube.com/watch?v=nntOdbX02Ao>

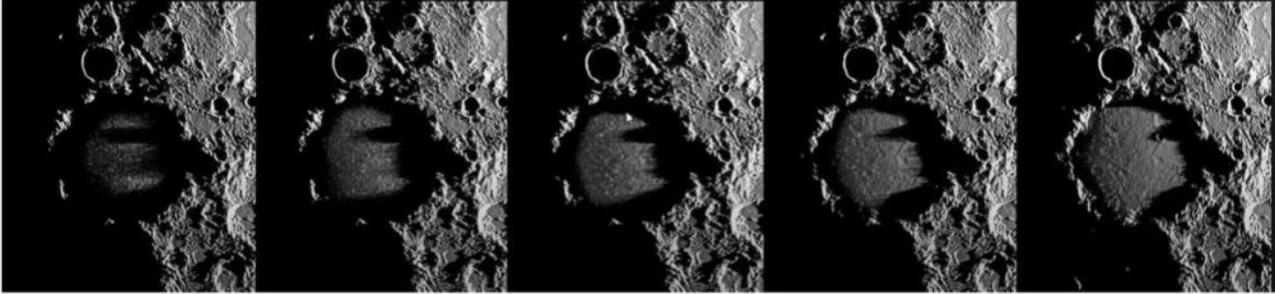


The image on the right is a plate from the famous Kuiper Lunar Atlas. It was the best professional astronomers could do from Earth in the 1960s. The image on the left was taken by Robert Reeves (holding the pictures) from his backyard with a Celestron 11-inch telescope and a Skyris planetary camera.





*The Moon is ever-changing
The phases grow and shrink day by day
The shadows change hour by hour
The Moon is geologic wonderground
The Moon is accessible from your own back yard*



Gary Thompson

Another Look
January 2024

The new moon in January is on the 11th at 0657. The Full Moon is on Thursday, January 25, at 1254. January's Full Moon is the Wolf Moon. Other Native American names are the Goose Moon, Center Moon, Cold Moon, Freeze Up Moon, Hard Moon and Spirit Moon. Anglo Saxon names are Moon after Yule and Snow Moon. In Spanish its Luna Nueva de Enero, in Greek its Νέα Σελήνη Ιανουαρίου – Néa Selini Ianouariou, in French its Nouvelle Lune de Janvier, in Ukrainian its Січневий Молодик – Richness Molodyk.

The 8th, 9th and 10th of January are big days. Mercury is highest in the sky. There is a conjunction of the Moon and Venus and Antares will be occulted, on the 9th the moon and Mercury are conjoined and on the 10th, its the Moon and Mars. The Moon has a conjunction with Saturn on the 14th and Jupiter on the 18th. On January 20, the Moon will be less than a degree from the Pleiades.

Perseus - seek for by her feet Which ever at his shoulder are revolving.
Tallest of all his compeers at the North
He towers. His right hand stretches toward the chair
Of his bride's mother.

Frothingham's Aratos

Perseus the champion, the French Persee, the Italian Perseo, and the German Perseus, formerly was cataloged as Perseus et Caput Medusae.



Berehyhia

Perseus is, a member of the Cepheus/Cassiopeia family, whose members are Cepheus, Cassiopeia, Andromeda, Perseus, Pegasus and Cetus. Perseus is also a member of a different group of constellations, not often identified as such.

In prehistory, men and woman began to combine the stars into individual groupings and give those groupings identity and meaning. There is Sirius the Dog star rising at the beginning of summer heat. Water carriers and wheat carriers rising as the rivers begin to flood and bring back life. Many of these myths abound from the era of Gilgamesh and even earlier, from Homer and the later Greeks and finally to Ptolemy who codified the star shapes for the cartographers and globe makers that followed.

If we go back even before the "modern" civilizations of the Nile, Jordan, Tigris, Ganges, Mekong, and Yangtze, there are mud walled civilizations growing around these river banks determined to understand their place in the world.

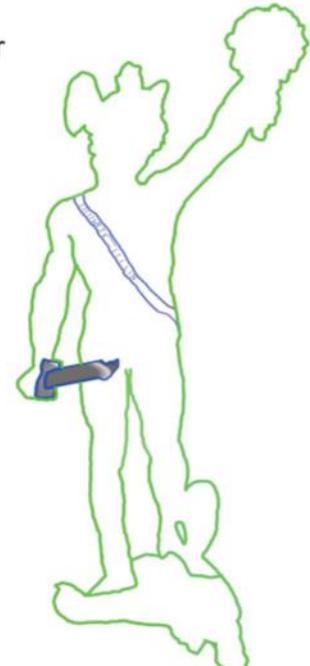


These civilizations looked at the stars for meaning, help and understanding.

Andromeda is one story in the chapter of human sacrifice, one saved by a hero who killed not only the Sea Monster but also a Gorgon whose gaze turned men to stone.

The story of Andromeda and Perseus marked the end of an eon where the sacrifice of a child could abate the humor of a god.

Perseus is also member of a different community of constellations. Constellations that portrayed winning against the direst adversaries. Hercules against the fetid swamp, portrayed by Hydra, Ophiuchus fighting death, represented by a snake's bite, Sagittarius, a



man and a horse, aiming his arrow at the Scorpion. There is Orion, fearless against the stampeding bull and Sagitta, the arrow that killed the Eagle tormenting Prometheus and maybe of most important is Centaurus, the Centaur Chiron, whose weapon was education – to kill ignorance.

Seven constellations that show a Man's and a Woman's indomitable spirit, alive in the unfathomable, though consigned to a short, brutal, sad and ugly life.

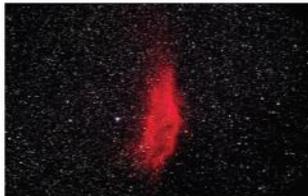
Perseus was the son of Jupiter and Danae. Danae was imprisoned by Jupiter who then turned himself into a shower of gold and landed in her lap. So begot Perseus.

Then they were crammed into a box and thrown into the Aegean, rescued and raised as a fisherman's son. The stories vary at this point, ending when he agreed to kill Medusa. He got some help from the gods: wings, a diamond sword, an invisibility helmet and a copper shield that shown like a mirror. You know the story from here. He takes the head, turns a bunch of people, a giant who became a mountain range and a sea monster into stone, marries a girl named Andromeda, has many kids and lives happily ever after. There are several intriguing postscripts to the story, however. One is of their sons was named Perses, taken 4000 years ago by Persian astrologers and made there own. Another recalls Medusa's head as it rolled to the ground. From her blood the winged horse Pegasus was born fully formed as was the armed warrior Chrysaor. These children, born of a Gorgon, were fathered by none other than Poseidon. Since Medusa is a Gorgon, her hair are snakes, her hands brass, her body scaled and growing from her back, yellow wings. Imagine the tryst between those two?

Perseus next,
Brandishes high in heaven his sword of flame,
And holds triumphant the dire Gorgon's head,
Flashing with fiery snakes! the stars he counts
Are sixty-seven; and two of these he boasts,
Nobly refulgent in the second rank —
One in his vest, one in Medusa's head."



I have always seen a waterfall.
Curving across from Cassiopeia to Capella is
this beautiful waterfall of stars spilling across
the night sky. That's been Perseus for me.
That and the Double Cluster (Caldwell 14,
NGC 869 & NGC 884, η & χ). Then the
California Nebula. (NGC 1499) Back then it was faint and hard to
see, easier with today's filters. Also in Perseus was the reason I went
up to Lone Pine each August to watch my favorite meteor shower.



No less a person than Serviss, in his "Astronomy with an Opera Glass" said: "*With a telescope of medium power, it is one of the most marvelously beautiful object in the sky – a double swarm of stars, bright enough to be clearly distinguishable from one another and yet so numerous as to dazzle the eye with their lively beams.*" Wow, there's some writing for you.

Don Lynn double cluster https://locastronomers.org/wp-content/uploads/2018/12/2.34557.1_00466-7-8_LRGB_90secPCrsm.jpg

<https://locastronomers.org/wp-content/uploads/2019/01/calif01.jpg>

Perseus is packed. A significant portion of its 615 square degrees lies in the Milky Way. There are 20 exoplanets and Burnham lists 126 double and multiple stars, 73 variable stars, 10 star clusters, 6 diffuse nebula, 2 planetary nebula and 7 galaxies brighter than 14th magnitude; and this is just the easy stuff.

Out of 20 exoplanets in Perseus are two that are named. One HAT-P-15, called Berehynia, is a 12th magnitude star with a Jupiter sized planet named Tryzub.

Berehynia is the Ukrainian goddess of nature, representing the strength, resilience and wisdom of Ukrainian women. The painting at the top is by Pollypop92, trade name for Ukrainian

artist *Polina Skurykhina*. The planet Tryzub, is Ukrainian for Trident. It comes from the coat of arms of a Ukrainian royal house and its image is still prevalent across Ukraine today.

The other named exoplanet comes from Denmark. HAT-P-29, named Muspelheim, is 11th magnitude. Muspelheim is guarded by its hot Jupiter sized planet named Surt. Muspelheim is a land of fire, home to the giants and guarded by Surt, the fire giant.

In the midst of this clash and din the heavens are rent in twain,
and the sons of Muspell come riding through the opening.
Surt rides first, and before him and after him flames burning fire.
He as a very good sword, which shines brighter than the sun.
As they ride over Bifrost it breaks to pieces, as has before been stated.
The sons of Muspel direct their course to the plain which is called Vigrid...
The sons of Muspel have there effulgent bands alone by themselves. Ragnarok "Edda"

Alpha α Persei is Mirfak, meaning elbow, Atik, \omicron Omicron – shoulder, Menkhib, ξ Xi – shoulder and Miram η eta, Misam κ kappa Persei – his wrist and Seif ϕ Phi Persei - sword. Of some interest are the stars of Medusa's head. ρ Rho Persei is Gorgonia Tertia, ω Omega Persei is Gorgonia Quarta and π Pi Persei is Gorgonia Secunda. Not named as such, also in the head is 2nd magnitude Algol, β Beta Persei, the demon star.

"Its horror and its beauty are divine.
Upon its lips and eyelids seem to lie
Loveliness like a shadow, from which shine,
Fiery and lurid, struggling underneath,
The agonies of anguish and of death.." Shelly

Other stars in Perseus with a Bayer designation are ζ Persei, ν Persei and δ Persei. An interesting star is X Persei, near ζ , at the foot. X Per is a 6th magnitude main-sequence(?) star with a neutron star companion. X Per is slightly variable, probably because of the rise and fall of expelled material.

A Persei is a 1st magnitude star and noticeable as the brightest member of open cluster, Melotte 20. Melotte 20 has about a dozen members 6th magnitude and brighter and includes α , σ , ψ and δ . Melotte 20 also goes by the name " α Perseus" cluster and Collinder 39. Volker Wiedhoff [https://www.astrobin.com/us7wq1/?q=melotte 20](https://www.astrobin.com/us7wq1/?q=melotte%20)



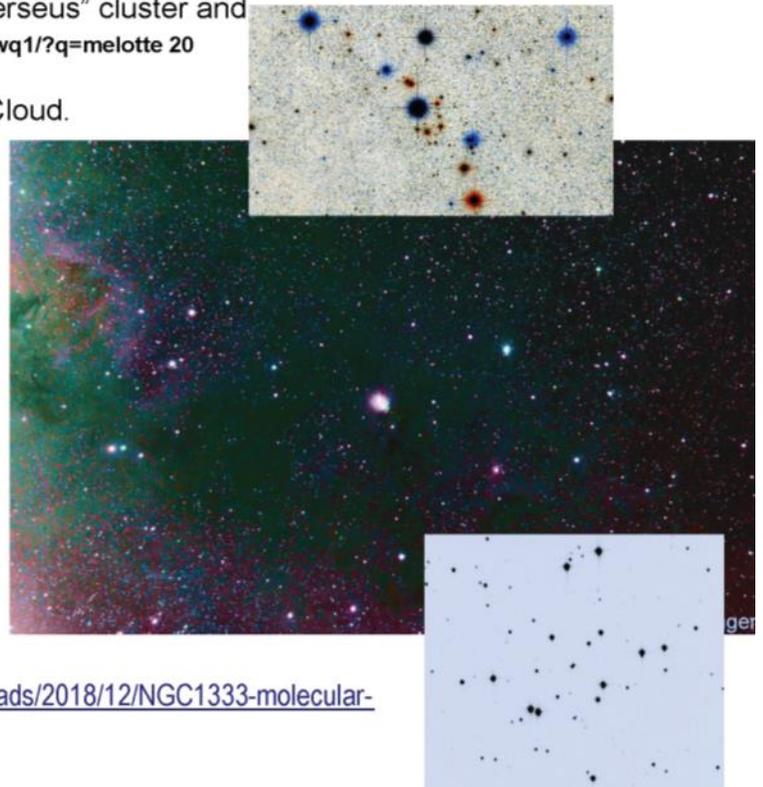
The Perseus Molecular Cloud.
[Bernd Gooßmann](#)

has Barnard's dark nebula 1 thru 5, IC 333 and IC 348 and is home to our neutron star X Persei.

[https://www.astrobin.com/g6msx3/?q=ic 348 & NGC1333](https://www.astrobin.com/g6msx3/?q=ic%20348%20&NGC1333)

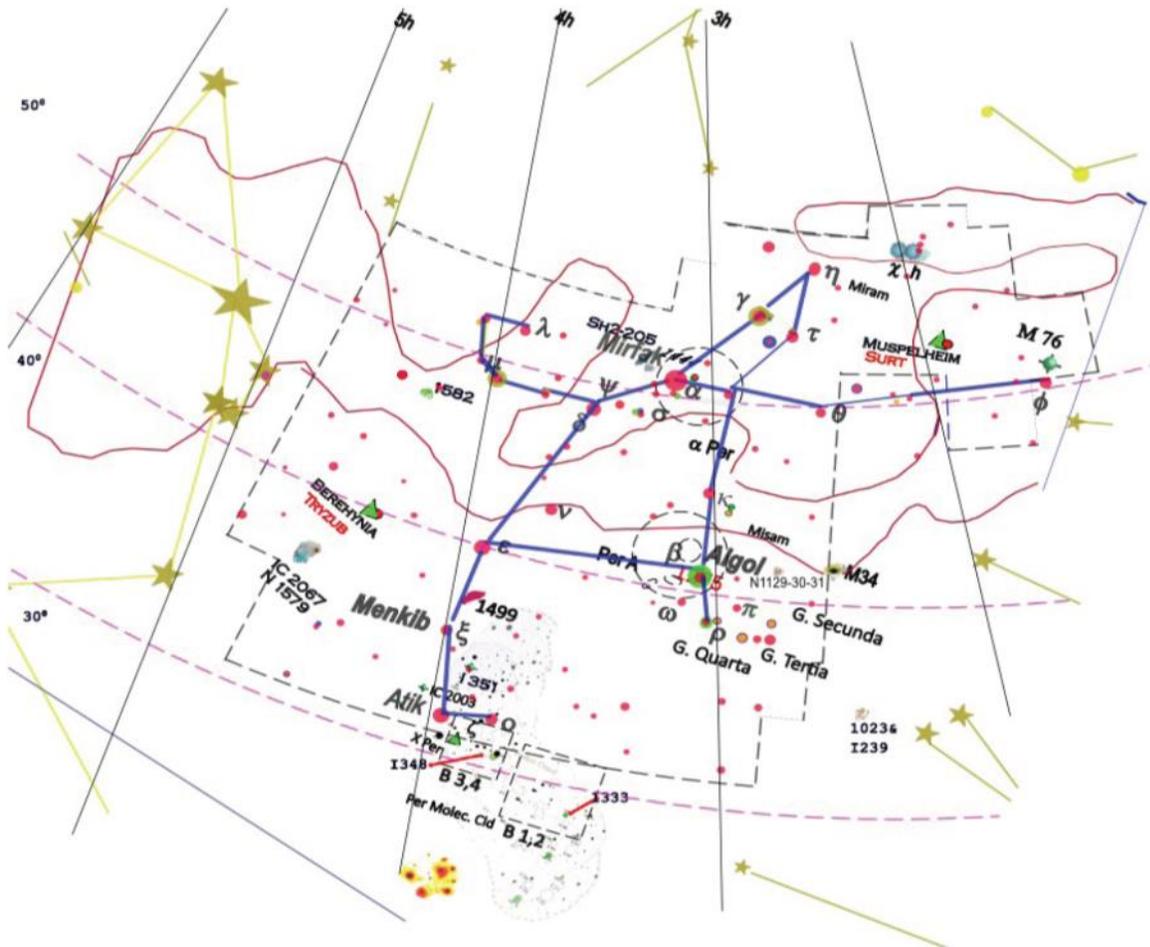
It is an invisible M42, a stellar birthplace with a mass of 10,000 stars. The image to the right was taken by Jim Windlinger of the OCA. It is centered on NGC 1333 with IC 348 off to the left.

Jim Windlinger.2006 <https://ocaastronomers.org/wp-content/uploads/2018/12/NGC1333-molecular-cloud-1000-2.jpg>



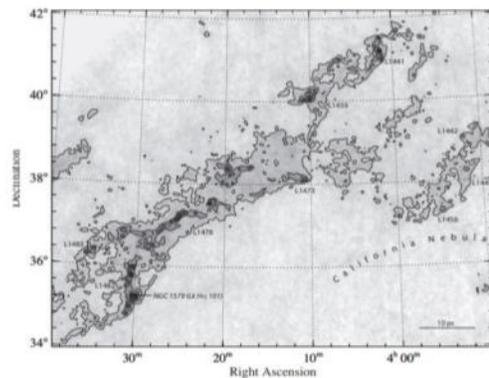
The two Messier's in Perseus are M76 and M34. M76 is 10th mag., a fuzzy spot in your binoculars. Of the two, M34 is the brighter at 5th magnitude. Once you look at M76 in your telescope, however, you will understand some of the issues with which early astronomers had to deal. M76 has two NGC #'s, 650 and 651. You will easily see the double lobe of the planetary that confused our earlier brethren.

Dave Radosevich & Don Lynn ,
M76 <https://ocastronomers.org/wp-content/uploads/2018/12/M76.2-6LRGBP2sm.jpg>
M34 <https://ocastronomers.org/wp-content/uploads/2019/01/m034>



A fun little nebula is over on the west side of Perseus near the Auriga border. NGC 1579 is a H II region and IC 2067 is a bright nebula nearby. They are a part of the California Molecular Cloud, the image is from a series of professional papers. You gotta figure, however, that if we can pick up the wisps in M57 and NGC 6960 et. al., we will be looking at it visually the next really dark, really clear night.

https://lweb.cfa.harvard.edu/~clada/pubs_html/pubs/california.pdf



There are eight planetary nebula potentially visible in Perseus, one Messier (M76), two IC objects, (IC's 351 and 2003, in the 12th magnitude range), two Abell planetaries, (A's 4 & 5, in the 16th magnitude range), two Minkowski planetaries, (M1 2 & 4), only one potentially findable in the 13th magnitude range, and one Böhm-Vitense, (BV 3) in the 14th magnitude.

IC 351 is 12th magnitude and near ξ in the molecular cloud. IC 2003 is a little closer to the boot, on the edge of the cloud.

Another huge stellar association in Perseus is Abell 426, the Perseus Cluster and part of the Perseus-Pisces super-cluster. Abell 426 is one of the most massive objects we've found. It has millions of galaxies floating in a medium of superheated gas. Perseus A, a 12th magnitude spiral, is also Caldwell 24. Abell 426 is anchored by NGC 1275, Perseus A1. Not in the image is NGC 1265, an elliptical brilliant in the radio frequencies.

Perseus Cluster – Abell 426

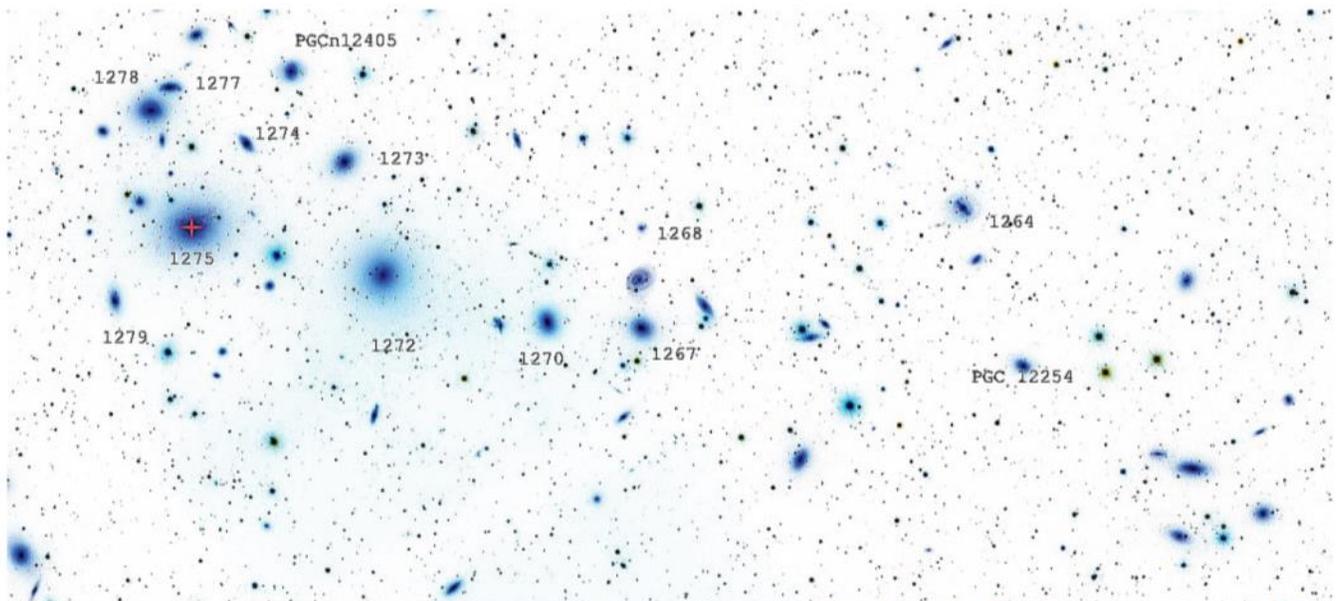
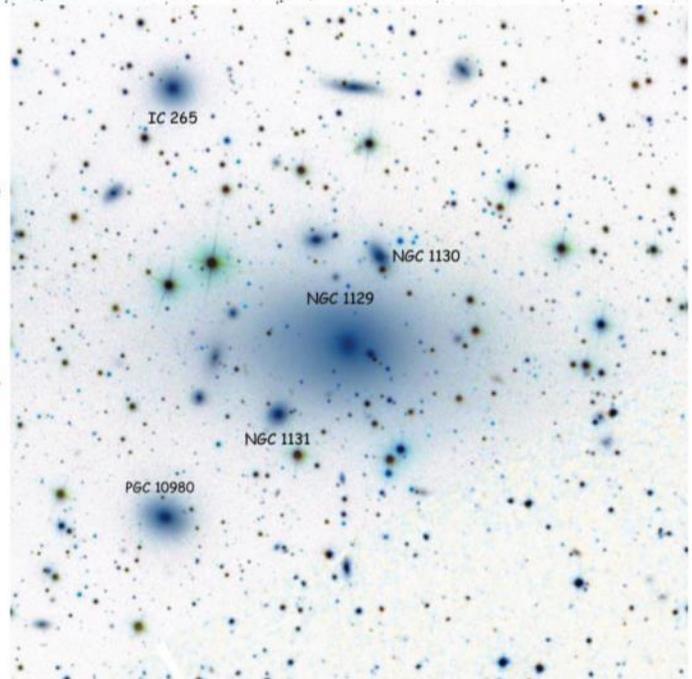


Image composite

A decent challenge would be the triple galaxy cluster NGC's 1129-30-31, between Algol and M34. 1129 is the brightest at 12th magnitude, the others a mag or two dimmer. You will notice the similarity in the images to the Andromeda triplet. I could not find any amateur work on these galaxies, the photo is from the NGC catalog.

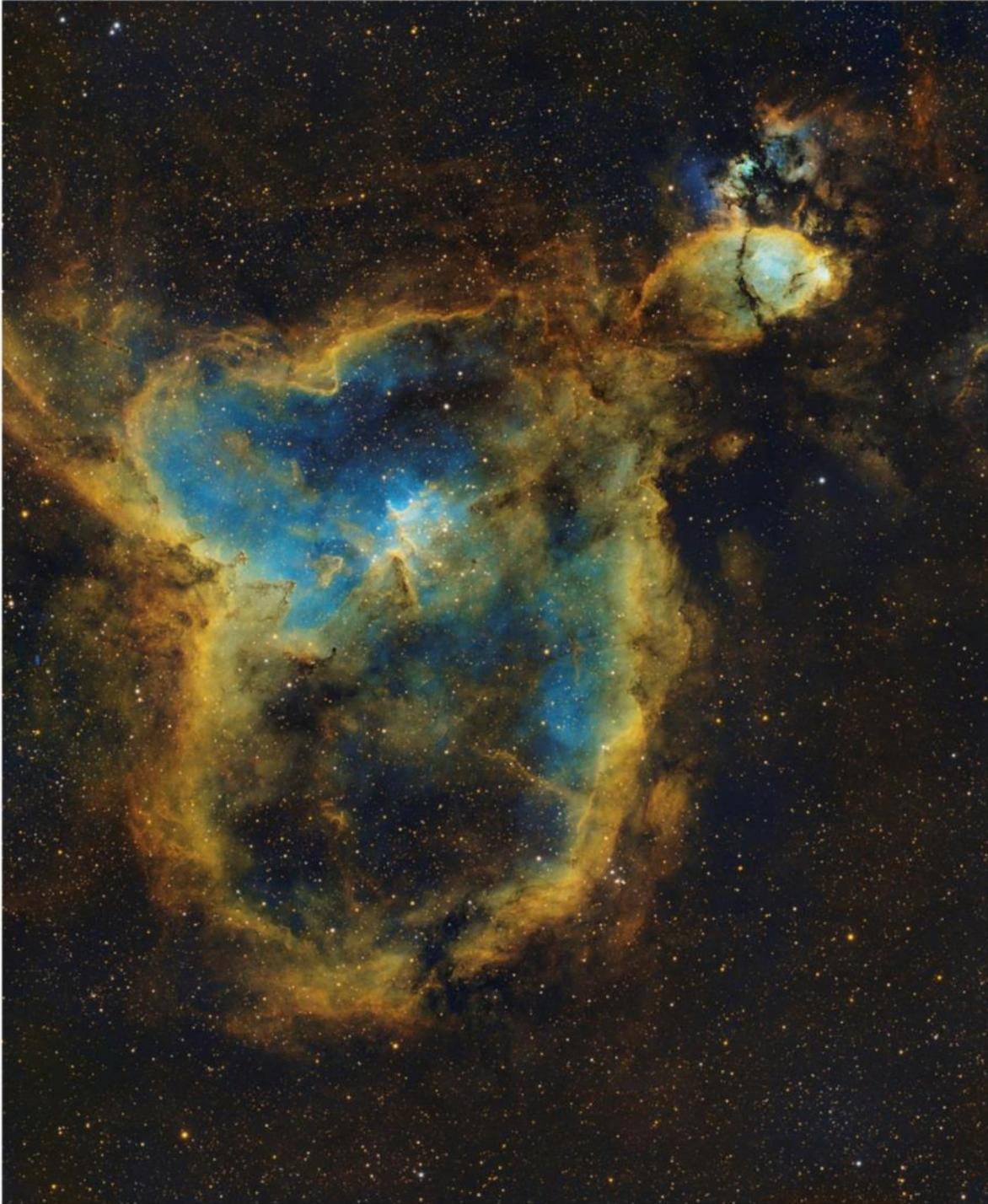
NGC1129-30-31

Dark Skies Dave Phelps

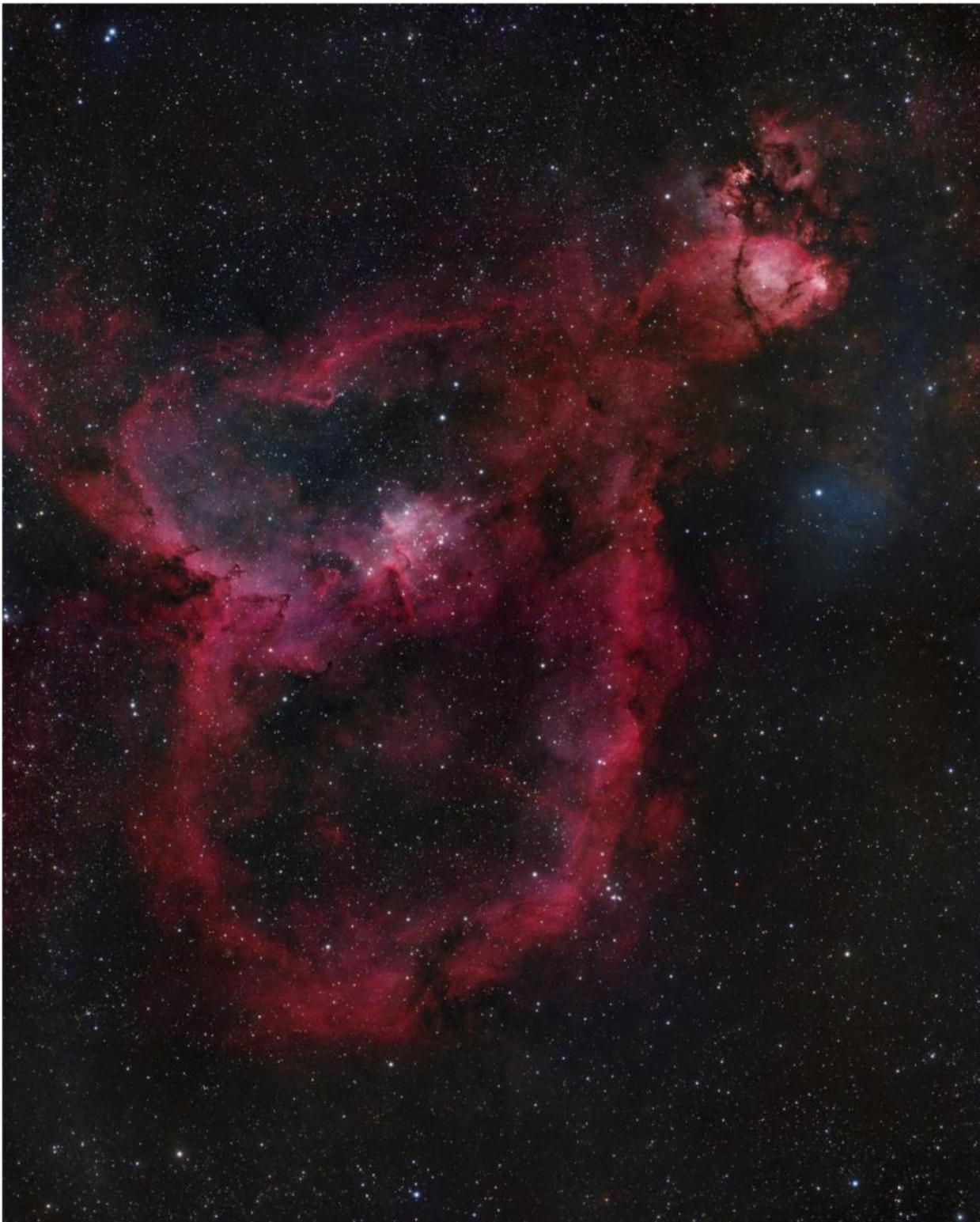


Hearts and Embryo

No camping in November due to home football games, so all the images this month are from home. I need to talk to the athletic department and get them to stop scheduling home games on new moon weekends! While not quite as busy as last month, there was quite a bit to do and of course I needed targets. Since getting a new camera and running the scope wirelessly, I need to spend time configuring set ups and acquisition sequences, so some of these images were taken to verify that I have everything dialed in correctly.



Inspired by last month's 2-panel mosaic of the Andromeda Galaxy, I decided to try the Heart Nebula, also known as IC 1805 and SH2-190. The nebula covers about 2° of the sky, or about the area of 4 full moons. At that size, it's too large for the 90 mm StellarVue but will nicely fit in a 2-panel mosaic. The Heart is located in Cassiopeia at a distance of about 7,500 light years and spans about 165 light years across. It is a very large emission nebula consisting mostly of hydrogen with a good amount of oxygen and sulfur. The center of the Heart Nebula includes an open cluster of stars that drive the ionization of the gases. In the upper right region of the image, at the tip of the heart-shape, is known as the Fish Head Nebula or NGC 896. It was this part of the nebula that was first discovered in 1787 since it is the brightest region.



I've included two images of the Heart Nebula, one imaged through narrow-band filters and one through broadband filters. The yellow/blue version is the narrow-band image with sulfur showing up as red, hydrogen, while mapped to green, has been shifted toward yellow, and oxygen glows in blue. Being able to see where various elements are in the nebula is an advantage of narrow-band. On the other hand, the broadband RGB image is overwhelmed with emission from hydrogen, consequently, it's almost entirely red. To illustrate just how profound the difference is, look along the left edge of the narrow-band image. Zoom in and you will see a small blue oval that is clearly the glow of oxygen. I've not been able to identify this object, but it shows up in other narrow-band versions of the Heart that I've seen, so it's real. Now look in the same location of the broadband image, and if you can find the same spot, you will only see a faint gray smudge. Because of this, some people combine narrow-band and broadband images to get the best of both forms of imaging.



After the two versions of the Heart Nebula, I changed to the Sky-Watcher 120ED scope. It has a longer focal length than the StellarVue, so I can get a closer look, not to mention the larger aperture gathers more light and provides higher resolution. Once the scope was on the mount and tuning for the change in weight distribution was done, I thought I'd take a closer look at the Heart Nebula. Melotte 15 is the cluster of stars sometimes called the Heart of the Heart. This image is narrow-band in the familiar Hubble palette that highlights the emissions of the gases in the nebula. But in this close-up, the "stars" of the image are the dust clouds and the interesting shapes they take. Personally, I really like the bright spires in the center lit by reflected starlight and the dark blotches of the left side that block out the starlight.



The final image for this posting is NGC 1333, sometimes called the Embryo Nebula. Located in Perseus, near its borders with Taurus and Aries, it's an interesting reflection nebula that has eluded me for years. This nebula is located in a very active, star-forming molecular cloud and itself has many newly born stars, well over 100. Even though many of the stars are still buried deep in the cloud and aren't visible, they light up parts of the dust while highlighting other regions of dust. More of the dust clouds would be visible if I had time to get more data before the skies clouded up for several days, yet I still managed to get a slight peek at them. This nebula lies about 1,000 light years away with varying distances being reported.

And now the details for those of you that just have to know! As mentioned, the Heart Nebula was shot using the StellarVue 90mm at focal length of 488mm. The narrow-band image is made from stacks of 105, 205, and 104 frames of 5-minute exposures through H-alpha, O-III, and S-II filters, respectively. The broadband image is from stacks of 232, 232, and 251 2-minute exposures through red, green, and blue filters, respectively, and 505 1-minute stacked exposures through the luminance filter. All frames were calibrated with 21 dark, flat, and flat dark frames. Total exposure for narrow-band is 34 hours, 35 minutes and for broadband 32 hours, 15 minutes. Processing was done in PixInsight with some noise reduction done using Photoshop.

The Heart of the Heart and the Embryo were taken through the 120mm SkyWatcher refractor operating at about 860mm focal length (the reported focal length should be 840mm, but image plate solves report a slightly longer length). The Heart of the Heart is a combination of 16, 30, and 16 5-minute stacked images taken through the H-alpha, O-III, and S-II, respectively, on one night, totaling only 5 hours, 10 minutes. The Embryo image combines 78, 75, and 74 5-minute stacked exposures through red, green, and blue filters, respectively, and 229 2-minute exposures through the luminance filter. Total exposure time was 26 hours, 33 minutes. The usual 21 dark, flat, and flat dark calibration frames were used to correct the light frames. Processing was done in PixInsight with some additional noise reduction done in Photoshop for the Heart of the Heart image.

For all images, stacked color frames were combined and processed without stars before adding the slightly stretched stars back. Luminance stacks were also processed without stars in a similar manner as the combined color stacks. Processing generally consisted of noise reduction, stretching using GHS in PixInsight, increasing color saturation in the color frames, and adding the stars back. In the cases of LRGB images, the processed luminance image was combined with the RGB image. Final images were then made by adjusting black, white, and mid-tone points as needed.

Hope you enjoy the images and write-up. Until next month, clear skies!

Ron Ugolick

<https://www.astrobin.com/users/rucdud/>

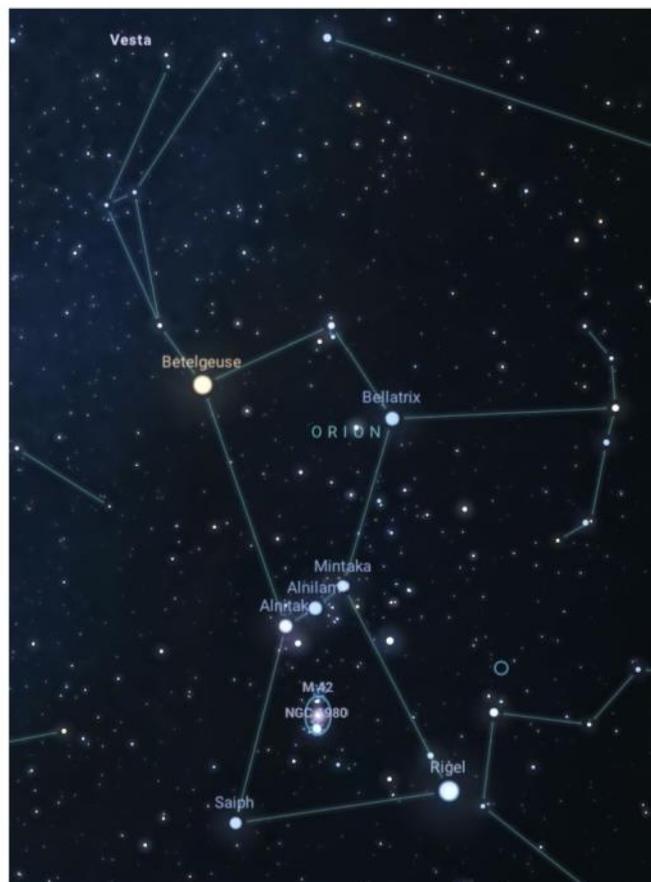


This article is distributed by NASA's Night Sky Network (NSN). The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

A Flame in the Sky – the Orion Nebula

By Kat Troche

It's that time of year again: winter! Here in the Northern Hemisphere, the cold, crisp sky offers spectacular views of various objects, the most famous of all being [Orion the Hunter](#).

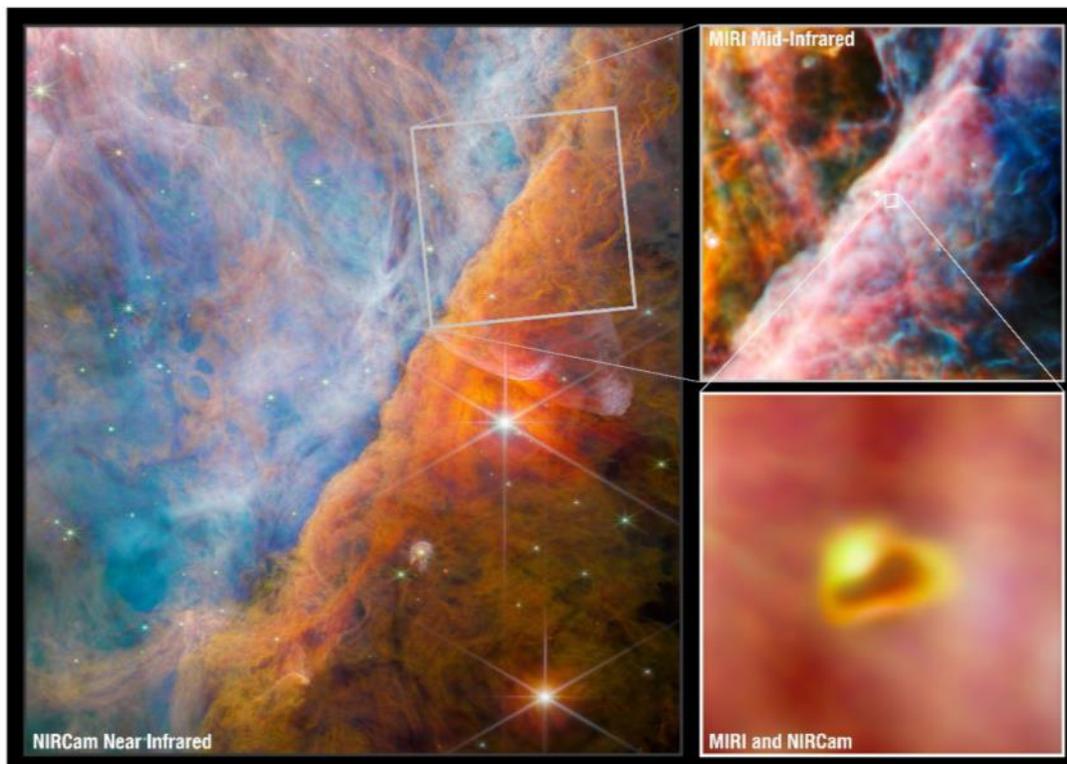


Credit: Stellarium Web

As we've previously mentioned, Orion is a great way to [test your sky darkness](#). With your naked eye, you can easily spot this hourglass-shaped constellation. Known as an epic hunter in Greco-Roman, Orion and all its parts have had many names and meanings across many cultures. In Egyptian mythology, this constellation represented the god *Sah*. The Babylonians referred to it as *The Heavenly Shepard*. In most cultures, it is Orion's Belt that has many stories: [Shen](#) in Chinese folklore, or [Tayamnicankhu](#) in Lakota storytelling. But the Maya of Mesoamerica believed that part of Orion contained [The Cosmic Hearth](#) – the fire of creation.

1,500 light years away from Earth sits the star-forming region and crown jewel of Orion – Messier 42 (M42), the Orion Nebula. Part of the “sword” of Orion, this cloud of dust and gas sits below the first star in Orion’s Belt, Alnitak, and can easily be spotted with the naked eye under moderate dark skies. You may also use binoculars or a telescope to resolve even more details, like the Trapezium: four stars in the shape of a baseball diamond. These young stars make up the core of this magnificent object.

Of course, it’s not just for looking at! M42 is easily one of the most photographed nebulae around, by astrophotographers here on the ground, large ground-based observatories, and space telescopes alike. It has long been a place of interest for the Hubble, Spitzer, and Chandra X-ray Space Telescopes, with James Webb Space Telescope joining the list in February 2023. Earlier this year, NASA and the European Space Agency released [a new photo](#) of the Orion Nebula taken from JWST’s NIRCам (Near-Infrared Camera), allowing scientists to image this early star forming region in both short and long wavelengths.



ESA/Webb, NASA, CSA, M. Zamani (ESA/Webb), PDRs4ALL ERS Team

But stars aren't the only items photographed here. In June 2023, JWST's NIRCам and MIRI (mid-infrared instrument) imaged a developing star system with a planetary disk forming around it. That's right – a solar system happening in real time – located within the edges of a section called the [Orion Bar](#). Scientists have named this planet-forming disk **d203-506**, and you can learn more about the chemistry found [here](#). By capturing these objects in multiple wavelengths

of light, we now have even greater insight into what other objects may be hiding within these hazy hydrogen regions of our night sky.

In addition to our Dark Sky Wheel, a fun presentation you can share with your astronomy club would be our [Universe Discovery Guide: Orion Nebula, Nursery of Newborn Stars](#) activity. This will allow you to explain to audiences how infrared astronomy, like JWST, helps to reveal the secrets of nebulae. Or, you can use public projects like the NASA-funded [MicroObservatory](#) to capture M42 and other objects.

Learn more about what to spy in the winter sky with our upcoming mid-month article on the [Night Sky Network page](#) through NASA's website!
