IO - December 2023

Eugene Astronomical Society, PO Box 591, Lowell, OR 97452
www.eugeneastro.org
Annual Club Dues $25
President: Robert Asumendi 541-743-5877
Secretary: Randy Beiderwell 541-342-4686
Additional Board members:
Dan Beacham, Amy Baker, Sylvia Collazo.
EAS is a proud member of The Astronomical League

Next Meeting Thursday, December 21st, 7:00 p.m.

22 Ways to Find Objects to Observe

By Lauren Wingert

The night sky is vast. Often it's hard to find a particular object among all the stars up there. For our December meeting, Lauren Wingert will talk about how to aim your optics at your intended target.

Lauren writes: "Having attended many star parties in recent years, I have seen many budding astronomers struggle with how to find celestial objects to observe. I have also witnessed 20-year veteran observers fail to align their equipment, and even fail to find objects for the night. 'I can't figure out how to point my scope' is one of the biggest reasons the hobby falls by the wayside and telescopes end up in the closet unused. Recently I saw a beginner who posted a question on the Cloudy Nights message board, asking how to find objects and how many ways were there to go about it. I began making a list of ways to find objects, intending to respond to the post. My list grew so large that I never answered the post, but I came up with a fun long list and decided to share that information with the club.

"If you're a new astronomer, this talk could help to understand how to point and find objects with various techniques and equipment. Because I'm talking about finding objects, the discussion will include an overview of types of 'finders' and the differences between them. It should be interesting even to experienced observers, to see all the ways to find objects presented together at the same time."

This should be a lively discussion. Don't miss it! 7:00 on December 21st at the planetarium.

Dues are Past Due!

EAS membership runs from October thru September. If you haven't renewed already, please mail your dues to the Eugene Astronomical Society, PO Box 591, Lowell, OR 97452. Dues are still the same low $25 they've been for years. Make your checks payable to Eugene Astronomical Society. You may also pay dues via PayPal to j.oltion@gmail.com. Send $26 to cover PayPal fees. Note that joining the email list does not make you a member of the club. You must fill out an application and pay your dues in order to be an active club member.

November Meeting Report

by Sylvia Collazo

What's Up

By Aneesa Haq

Apollo 11

By Jeff Phillips

Our November meeting kicked off with another "What's Up" presentation by Aneesa Haq. She offered a glimpse into what we sadly missed earlier in the month (thanks to the clouds!) but also shared a bit about the expected views of Jupiter and Saturn, including the upcoming "disappearance" of Saturn's rings due to the changing orientation of its axis. Aneesa also told us about the Leonid meteor shower and where to look in the sky to find them.

Jeff Phillips then followed with a presentation on the Apollo 11 mission. He shared photographs and extended clips from the 2019 documentary of the mission which included impressive footage — from the preparation stage to the Moon landing and finally, the team's return to Earth. Jeff also shared personal anecdotes throughout his talk on his early interest in astronomy, greatly due to his father's work with the Chrysler Missile Division. Thank you to our presenters for reminding us to keep our eyes on the sky, whether in gratitude for our first space explorers or anticipation of what's to come!

Welcome New Members!

EAS welcomes two new members this month: Bradley Cook and Sneh Ringwalla. Welcome to the club! We hope to get to know you and help you enjoy the night sky with us.

Speakers Needed

We need volunteers to do more "What's Up" presentations and main-event presentations in upcoming months. Please consider doing one! The idea is to give everyone a chance to contribute to the meetings and get us all used to speaking to the group, with the hope that more of us will feel comfortable contributing to the club. So please give it some thought. Previous speakers will be happy to help you out. Contact Amy, Robert, or Jerry to get on the schedule.

EAS T-Shirts

EAS has a new logo, and you can have it put on your very own T-shirt or sweatshirt. Coaches Athletic Supply, 3990 Roosevelt Blvd, Unit C (corner of Roosevelt and Bertelsen) has the logo on file. You can buy a shirt from them or provide your own and they'll print the logo on it for about $5. The standard size for a T-shirt is about 7 inches, but Coaches can enlarge or reduce the size and price accordingly. The logo can be in a variety of colors depending on the color of your clothing item.

Providing your own shirt could save you some money. Michaels on Gateway sells good quality shirts for under $5.
(Note that Baseball caps are currently not something Coaches can print on.)

Solar Sunday November 26th

The Sunday after Thanksgiving dawned clear and cold, but it dawned, unlike most days this past month, so Robert Asumendi and Jerry Oltion took their solar viewing equipment to Alton Baker Park for a Solar Sunday. Robert brought his home-built 50mm solar-filtered "Sunny" binoculars and Jerry brought his 60mm H-Alpha scope. Jerry also brought an experimental "Eclipsinator," which is basically a pair of binoculars on a long pole (an 8-foot 2 x 2) that projects an image of the Sun on a white screen at the other end of the pole.

Robert Asumendi explains what we're doing in the park on a sunny Sunday.

The Eclipsinator showed three nice clusters of sunspots. Robert's "Sunny" split each of the clusters into dozens of spots, while the H-alpha scope showed several nice prominences, filaments, surface granulation, and faculae around the sunspots.

Solar Sunday attracted several guests despite the chilly temperature.

Despite the chilly temperature (just above freezing even at mid-day), we had plenty of visitors. Several other EAS members helped people-wrangle, so we had a pretty smooth operation going. Several people said that this was their first time ever looking through a telescope at all, much less at the Sun.

KEZI TV sent a reporter out to cover the event, and they did two great news segments about it, airing at 5:00 and 6:00 and repeating the second one again at 11:00. We got two new people joining the email list that night and one the next day (Welcome!), so either our outreach or the news program generated some interest in our club.

Solar Sundays are sporadic events that happen when all the conditions are right: We need a clear Sunday afternoon (from noon to 2:00) plus availability of club members with solar-filtered telescopes. It's usually Dan and Jerry and Robert who put on these star parties, but any club members with solar scopes can do so, and the more the merrier! It's also great to have club members show up without scopes to help manage crowds and provide information. Next clear Sunday, come join the fun!

Bob Andersen checks out the Sun through an H-alpha telescope.

Next First Quarter Friday: December 22nd

Our November 17th star party was fogged out, as was our Saturday backup. Ah, autumn.

Our next First Quarter Friday star party will be December 22nd, just one day into Winter. Will the Fates be friendly or fickle? Only time (and the Clear Sky Chart) will tell.

First Quarter Fridays are laid-back opportunities to do some observing and promote astronomy at the same time. Mark your calendar and bring your scope to the College Hill Reservoir (24th and Lawrence in Eugene) and share the view with whoever shows up. The reservoir won't be around much longer, so come enjoy it while you can.

Here's the schedule for the remainder of 2023 and 2024. Star parties start at dusk or 6:00, whichever is later. (6:00 on 12/22). 2024's schedule is tentative, given the upcoming closure of the College Hill Reservoir and the uncertainty of where we'll be holding our star parties next year.

December 22 (Moon 84% lit)
January 19 (71% lit)
February 16 (55% lit)
March 15 (39% lit)
April 12 (23% lit)
May 17 (74% lit)
June 14 (59% lit)
July 12 (42% lit)
August 9 (27% lit)
September 13 (79% lit)
October 11 (64% lit)
November 8 (48% lit)
December 6 (33% lit)

The most likely date for our Dexter dark-sky star party is July 27th

Remember Calendars!

Remember that club members can purchase *Astronomy* magazine's Deep Space Mysteries calendars at a 50% discount. Go to https://mysciencesshop.com/product/calendar/68209. On checkout enter the code CAL50 to receive the 50% discount. ($6.50 this year, with free shipping)

Telescope Lending Library

The EAS has several telescopes available for members to borrow. Check out the telescope lending page on our website to see the many scopes in our lending program, and contact Dan Beacham, our lending coordinator, to arrange to check out one of these excellent scopes.

Dan can be reached via email at beachamd (at) yahoo.com or by phone at 541-232-3584.

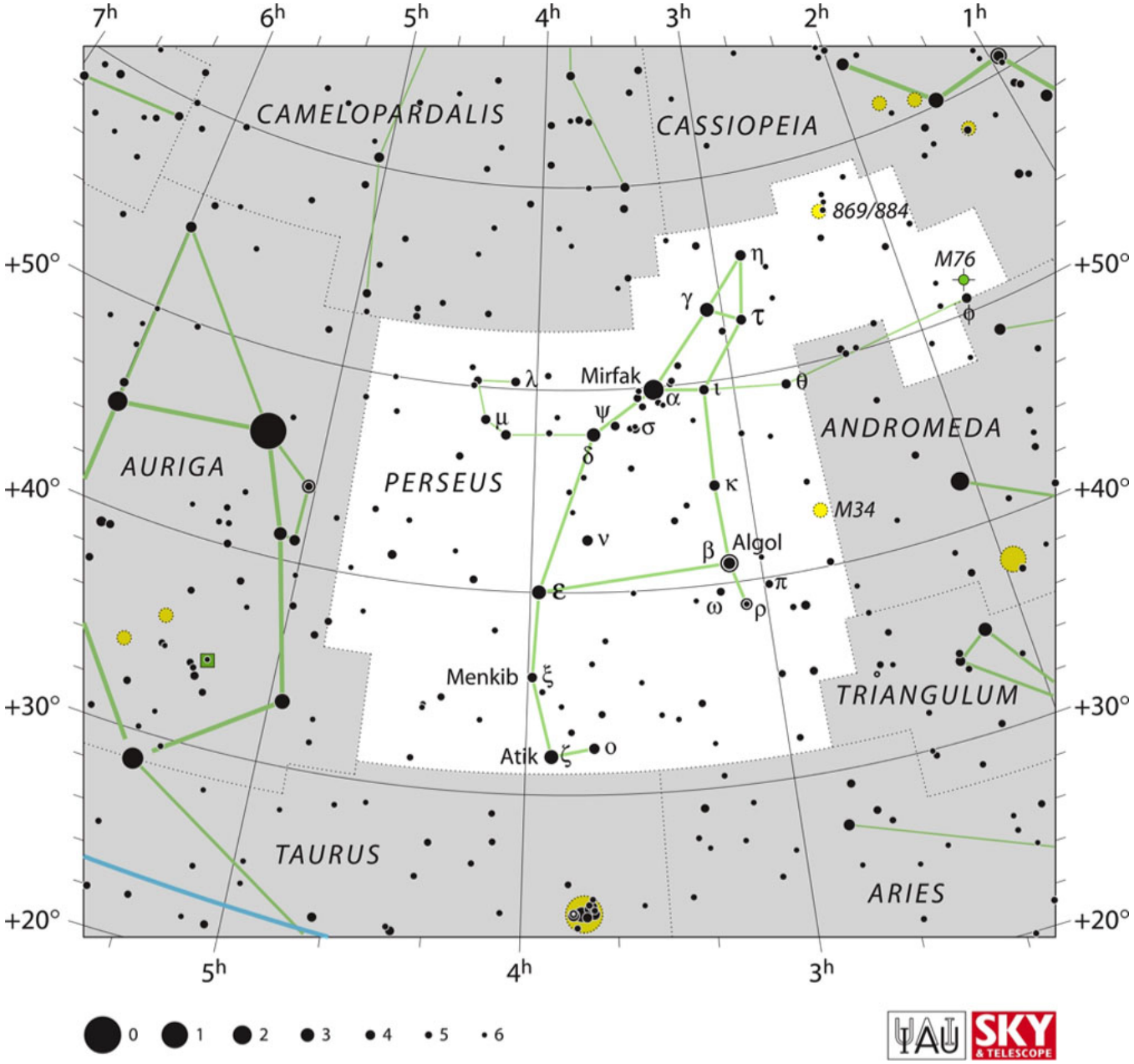
Still Happily Accepting Dues

EAS membership runs from October 1 through September 31, so it's past time to renew if you haven't already. Please send your $25 dues to the Eugene Astronomical Society, PO Box 591, Lowell, OR 97452. Make checks payable to Eugene Astronomical Society. If you prefer to use PayPal, send your dues to Jerry Oltion at j.oltion@gmail.com and he'll pass them along to Randy Beiderwell, our secretary. (Send $26 to cover PayPal fees.) Please provide any updated contact information along with your dues!

Constellation of the Month: Perseus

by Andy Edelen

High in the east at 8 PM on a mid-December evening is the wishbone-shaped constellation Perseus, the Hero. One of the most-familiar constellations in the sky, due in part to its close proximity to Cassiopeia, its being the source of the Perseid meteor shower, and its role in the Andromeda myth (as popularized in the *Clash of the Titans* films), Perseus stands astride the Milky Way; the hero has his head in the clouds of star clusters and nebulae, his feet dangling into the waters of the autumn ocean of galaxies.



Perseus, as seen on modern star charts. Courtesy IAU and *Sky & Telescope.*

Perseus ranks 24th among the 88 constellations in area, but has five stars brighter than 3rd magnitude and 65 stars with Flamsteed numbers (i.e. brighter than 8th magnitude). It also contains two Messier objects, both of which we discuss below, and is the home of the Double Cluster, NGCs 869 and 884, one

(two?) of the most astounding sights a small telescope can provide and one of the showpiece objects of any season. The constellation's central region, including 1.8-magnitude Alpha Persei, is largely comprised of the Alpha Persei Cluster — a cluster of some five hundred blue and white stars, of which a dozen can be visible to the naked eye from a dark rural site; the cluster is better seen in binoculars. Because of Perseus's proximity to the North Celestial Pole, at least part of the constellation is visible on any night of the year.

The (western) story of Perseus hardly needs retelling: one of the many products of Zeus's dalliances with mortal women, he grew up to slay the Gorgon, rescue Andromeda from the sea monster, and father the founder of Persia. (Other constellations involved with Perseus's story include Andromeda and Cassiopeia [of course], Cepheus, Pegasus, and Cetus.)

To the ancient Chinese, the arc of stars from Eta (η) Per (the hero's head) through Alpha and eastward to Mu (μ) Persei represented the boat known as *Tianchuan*, which sailed upon the waters of the Milky Way; it might be the military ship of the Great General of Heaven, *Tianda jiangjun*, represented by Gamma Andromedae. The arc on the constellation's west side, from Tau (τ) through Rho (ρ) Persei, comprised the mausoleum *Daling*, with Pi (π) Persei, off the southwestern end of that arc, representing the corpses within the mausoleum.

Perhaps the most-famous denizen of Perseus is the star Beta (β) Persei, better known as ***Algol*** (from Arabic *r'as al-ghul*, "the head of the demon"). Algol marks the head of Medusa, the Gorgon whose appearance turned living things to stone on sight; along with Omega, Rho, and Pi Persei, Algol once comprised the (now obsolete) constellation *Caput Medusae*, since reduced merely to Algol itself.

Algol is the prototype (and first-identified) of the eclipsing variable stars, stars whose brightness regularly decreases due to their eclipse by much-dimmer companions. In Algol's case, the bright star in the pair is eclipsed for ten hours every 2.87 days, falling from magnitude 2.1 to magnitude 3.4; sometimes this entire cycle can be observed in the course of a single night. There is also a very minor dimming in the system as the dark companion passes behind the bright star. This dimming makes Algol an ideal object to observe with the naked eye, even under less-optimum conditions. (Note that *Sky & Telescope* magazine publishes the dates and times of Algol's minimum brightnesses every month, and this information can also be found elsewhere.)

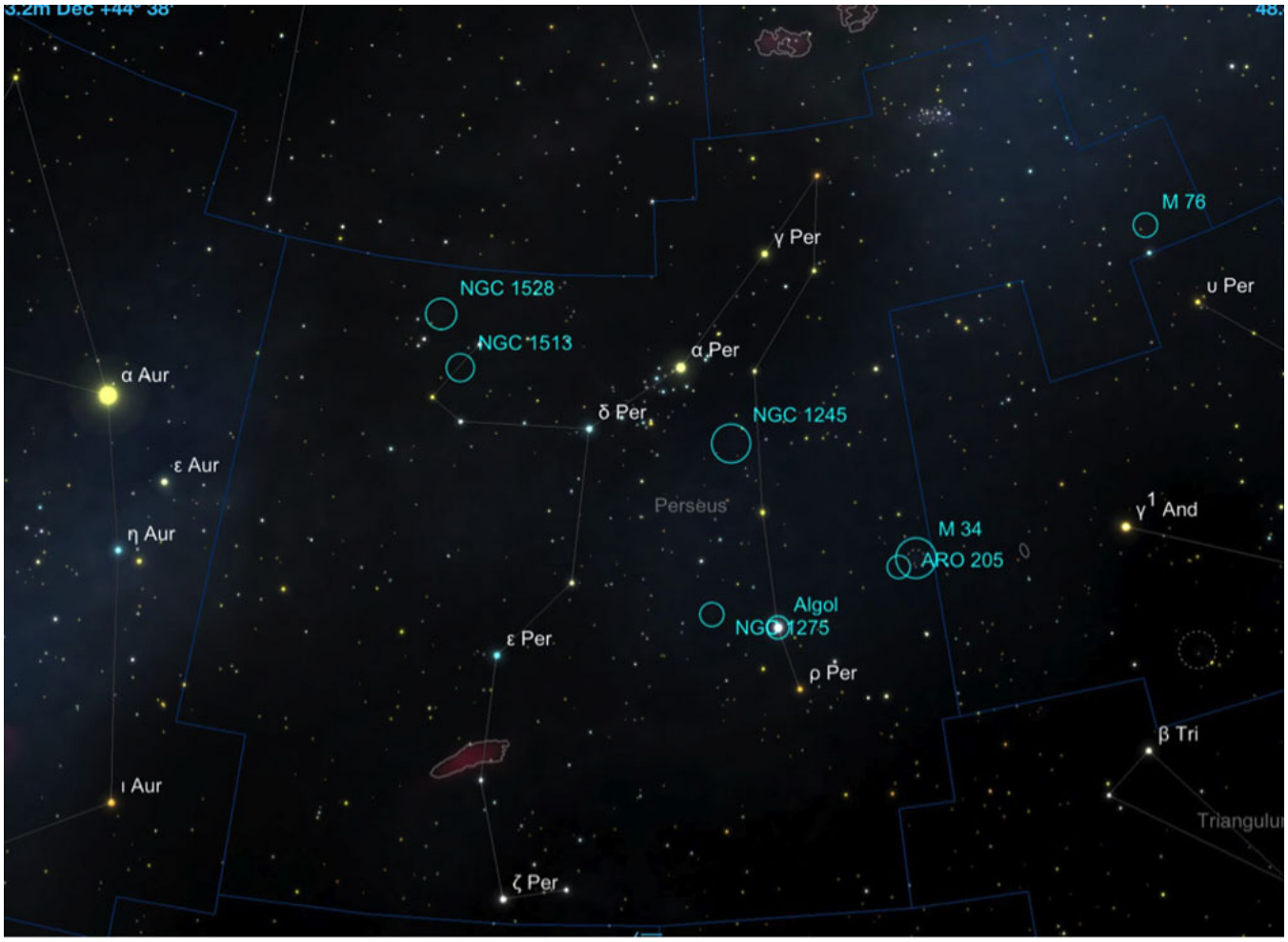
Algol is actually a triple system, at the very least: the bright primary is a white subgiant of spectral class B8, the fainter star a class G or K star orbiting the primary star at an estimated distance of six million miles. The third component of the system, of type A or F, orbits the A-B pair every 680 days. Recent observations have identified five more possible members of the Algol system, although little is known about these as yet.

Algol's nature and fame have made it a popular name-drop in fiction, from H.P. Lovecraft to Douglas Adams' Hitchhiker novels ("Aldebaran's great, OK / Algol's pretty neat / Betelgeuse's pretty girls / will knock you off your feet…") to the silent-era German science-fiction film *Algol* and the video game series *Payday*.

Just over five degrees WNW of Algol is our binocular target for this month and the easier of Perseus's Messier objects, **M34**. A large (36'), bright, triangular cluster with a dozen stars of 8th magnitude and many of 9th and 10th magnitude, M34 is considered one of the "easy" Messiers in the Astronomical League's Binocular Messier Observing Program; almost any optical aid will show it, and some keen-eyed stargazers have reported seeing the cluster with the naked eye under excellent conditions.

M34 was a pre-Messier discovery, most likely first observed by the Italian astronomer and entomologist Giovanni Hodierna before the year 1654, and independently observed by Messier in August of 1764. Hodierna was credited with the discovery of several of the objects commonly thought to have been discovered by Messier — in fact, Hodierna had created a catalogue of some forty nebulous objects "not to be confused with comets" well before Messier had the thought of doing so himself.

M34 is unlikely to be confused for a comet by users of modern optics. The cluster contains about 400 solar masses' worth of stars and star-making material, including some 80-100 visible stars. The cluster's



This month's objects in Perseus. Image rendered in *Sky Safari 6*.

brightest star is of magnitude 7.9. Many of the cluster's members are double stars; six pairs or doubles are among the central core of M34, and several slightly-fainter pairs lie on the periphery. The cluster lies about 1400 light-years away; at that distance, it can be estimated to span some 15 light years.

The majority of M34's stars are white or blue subgiants. 11' southeast of the cluster's core lies a striking yellow or orange star of magnitude 7.3; 31' ESE of that star (and 39' from the center of M34) lies the small, ghostly planetary nebula **Abell 4**, our target for 12-inch scopes this month.

The name "Abell" strikes fear in the heart of many observers; Abell's planetary nebula catalogue (whose members were mostly discovered photographically on the Palomar Observatory Sky Survey plates in the 1950s) and his catalogue of large galaxy clusters are two of the favorite observing lists for the stereotypical "hardcore" amateur astronomer. Abell 4 is a very difficult object to observe, yet has been seen in telescopes as small as four inches with a nebula filter (and ten inches without). Generally, however, Abell 4 is the province of the plus-sized optics, and of those observers looking for a challenge.

My own observation of Abell 4 was first accomplished with a 12.5-inch telescope and no nebula filter; it required averted vision (looking slightly away from the object in order for its light to fall on the more light-sensitive rods on the periphery of one's field of vision) in order to first see the nebula's dim 0.3' disk. With an O-III (oxygen-III) filter in the eyepiece, the nebula was considerably easier to hold visible, and appeared very slightly brighter along its north edge. No central star (the star which birthed the nebula) was visible, but with higher magnification, the nebula could be held steadily with no filter in the eyepiece.

A word about nebula filters. These are different than the color filters that sometimes come with telescopes; nebula filters are used primarily to enhance the appearance of a nebula by eliminating all but

the frequencies of light emitted by gaseous and planetary nebulae. These filters come in four basic kinds: broadband "light pollution" filters that eliminate a few of the more-prevalent types of light pollution; narrowband filters (often called Ultra High Contrast [UHC] or Narrow Pass Band [NPB]), which eliminate all but the frequencies in which nebulae shine; O-III filters, which only allow the passage of light at the 495.9 and 500.7 nanometer wavelengths (at which most planetary nebulae shine the strongest); and the H-Beta (hydrogen-Beta) filter, which only allows the 486 nm wavelength to pass.

What does this all mean for amateur astronomers? Well, these filters will often mean the difference between seeing a faint nebula or missing it completely, even under excellent sky darkness and conditions. Of the four kinds of filter, the UHC/NPB type is perhaps the most useful, as it will generally show at least *some* improvement on most nebulae (such as the Orion and Lagoon Nebulae). The O-III is most useful on planetary nebulae, which glow primarily at the O-III wavelengths; the O-III is usually also useful on most of the famous bright nebulae (e.g. the aforementioned Orion and Lagoon), although the UHC/NPB may actually be the better filter for non-planetary nebulae. The H-Beta filter is usually considered the least useful of the nebula filters, as it is useful on the smallest number of nebulae — although the Horsehead Nebula and California Nebula (two of amateur astronomers' favorite targets) are the two objects it's commonly used on. Note that these filters are useful *only* on nebulae; galaxies and star clusters usually are seriously diminished when observing with a nebula filter.

Nebula filters enhance contrast, making a nebula appear brighter against a darker background. To many less-experienced stargazers, this contrast boost can make the field *too* dark to comfortably observe an object, and the filter will also suppress the light of stars within the field (a planetary's central star, or the stars in a nebulous star cluster). These filters may also cause reflections in an eyepiece if the observer looks through at the wrong angle. As with any astronomy equipment, a nebula filter requires some practice to use and get accustomed to; a bright object like the Ring Nebula or the Orion Nebula is a good subject on which to practice. And be sure to try different filters on the same object, in order to see different details; the Orion Nebula (for example) shows slightly differently in a UHC than in an O-III.

Another planetary nebula in Perseus provides further opportunities for testing out a nebula filter or two — this is **M76**, Perseus's other Messier object and our target for 2-inch telescopes this month. M76 lies well up in the northwest of the constellation, near the end of the northern of the two star-chains that make up the pattern of Andromeda, and about an arcminute north of the 4th-magnitude double star Phi (φ) Persei.

M76 is often said to be one of the two faintest Messier objects, but this is based purely on magnitude numbers (which can be very misleading). I've always found M76 to be one of the easier Messiers, especially given the aid of a filter; the nebula's peanut-shaped inner region is small but unmistakable. (It's sometimes been called "the Cork Nebula" or "Little Dumbbell Nebula" due to this shape; I sometimes call it "the Circus Peanut.") Don't use too low a magnification; the nebula is only 2' long — bigger than the Ring Nebula, but not as bright. As always with smaller objects, start with a medium-power magnification and work your way up. The nebula is oriented SW-NE and "pinched"across the middle; this pinching is why the nebula has two discrete NGC numbers (NGCs 650 and 651). In larger telescopes, you may start to see the "iron filings" pattern that the nebula reveals in longer-exposure photographs. No central star can be seen in the nebula, but a 6.7-magnitude red-giant star lies 12' to the ESE.

As with Cassiopeia last month, Perseus is thoroughly populated with open star clusters. Even aside from the Double Cluster, there are numerous showpiece clusters here; three of these lie at the end of the figure's "sword arm," and two of these are among our objects of the month. Just over 1.5 degrees northeast of 4.3-magnitude Lambda (λ) Persei — and forming a roughly isosceles triangle with the naked-eye stars b^1 and b^2 Persei — is the bright and obvious cluster **NGC 1528**, our target for 4-inch telescopes. NGC 1528 spans 19' in diameter, with most of its bright (9th- and 10th-magnitude) stars on the west and south sides of the cluster; most of the fainter stars run in a band from northwest to southeast, and a strip of dark nebulosity runs parallel to the north of this band. There are 25-30 stars visible here in a 4-inch scope at medium power,

and this number doubles in an 8-inch. With my 12.5-inch scope, I noted that many of the cluster's stars are arranged in "clumps" throughout the cluster, but this may not be as obvious in a smaller telescope.

From NGC 1528, head two degrees SSW, to a point just over halfway between Mu (μ) and Lambda Persei. This will bring you to **NGC 1513**, another of the showy clusters populating this side of Perseus, and our target for 6-inch telescopes. NGC 1513 is easily notable in smaller scopes, but really needs the extra aperture to draw out the many fainter stars that make this cluster "pop" in the eyepiece. NGC 1513 packs about 30 stars of magnitudes 11 and fainter into a 9' span; Kepple and Sanner's *Night Sky Observer's Guide* describes the cluster as resembling a "figure 9." In my own observation, I noted a single 9.5-magnitude star, the cluster's lucida (brightest star), just on the north edge, and a background haze of many stars just outside the edge of resolution. As with NGC 1528, NGC 1513 shows an increasing number of stars with each increase in aperture; I counted perhaps fifty stars with the 12.5-inch scope, but many were still too faint to resolve. This is one of the underappreciated gems of Perseus, so be sure to check it out!

Speaking of underappreciated gems, **NGC 1245** is among the showpiece objects of the autumn sky, although it gets nowhere near the attention it deserves. Located just under halfway between Kappa (κ) and Alpha Persei, NGC 1245 is bright enough for smaller telescopes but — as with NGC 1513 — contains so many faint stars that it really needs bigger scope to give a sense of its true glory (in this case, perhaps an 8-inch). Kepple and Sanner note that the cluster contains "fifty faint stars in a 10' diameter area" as viewed in an 8-inch scope, but seventy-five 12.5 to 14th-magnitude stars" as viewed through a 12-inch. I described it in my notes " a beautiful blast of star-powder, unmistakable as a cluster and well detached from the Milky Way… doesn't have much of a magnitude range, but it's exceedingly rich, with probably more than 100 stars in a 7' area." (The cluster is listed as 8' in diameter in Mike Swan's *Atlas of Open Star Clusters*; different sources often give different dimensions.)

Perseus isn't just the realm of galactic objects like planetary nebulae and star clusters; it's also teeming with galaxies. While there are some particularly bright individual galaxies (e.g. NGC 1023, NGC 1003) in the constellation, our target for 12-inch and larger telescopes is even more impressive: the **Perseus Galaxy Cluster**, also known as **AGC** (Abell Galaxy Cluster) **426**.

AGC 426 is the northernmost "large" segment of the vast Perseus-Pisces Supercluster. In our skies, this supercluster stretches from Perseus all the way down past the southwestern corner of the Great Square of Pegasus — a distance of over 40 degrees! Within it are three major galaxy clusters (Abell clusters 426, 347, and 262, the latter two in Andromeda) and numerous smaller galactic associations. This supercluster is itself part of the billion-light-year-long Perseus-Pegasus Filament, one of the most-massive concentrations of matter in the known universe. The Perseus-Pisces Supercluster is roughly analogous to the Virgo Supercluster of which our Milky Way is a part; the Virgo Supercluster is, however, a part of an entirely-different filament (the Pisces-Cetus Filament). The galaxies in AGC 426 are, on average, about 240,000,000 light-years away from us.

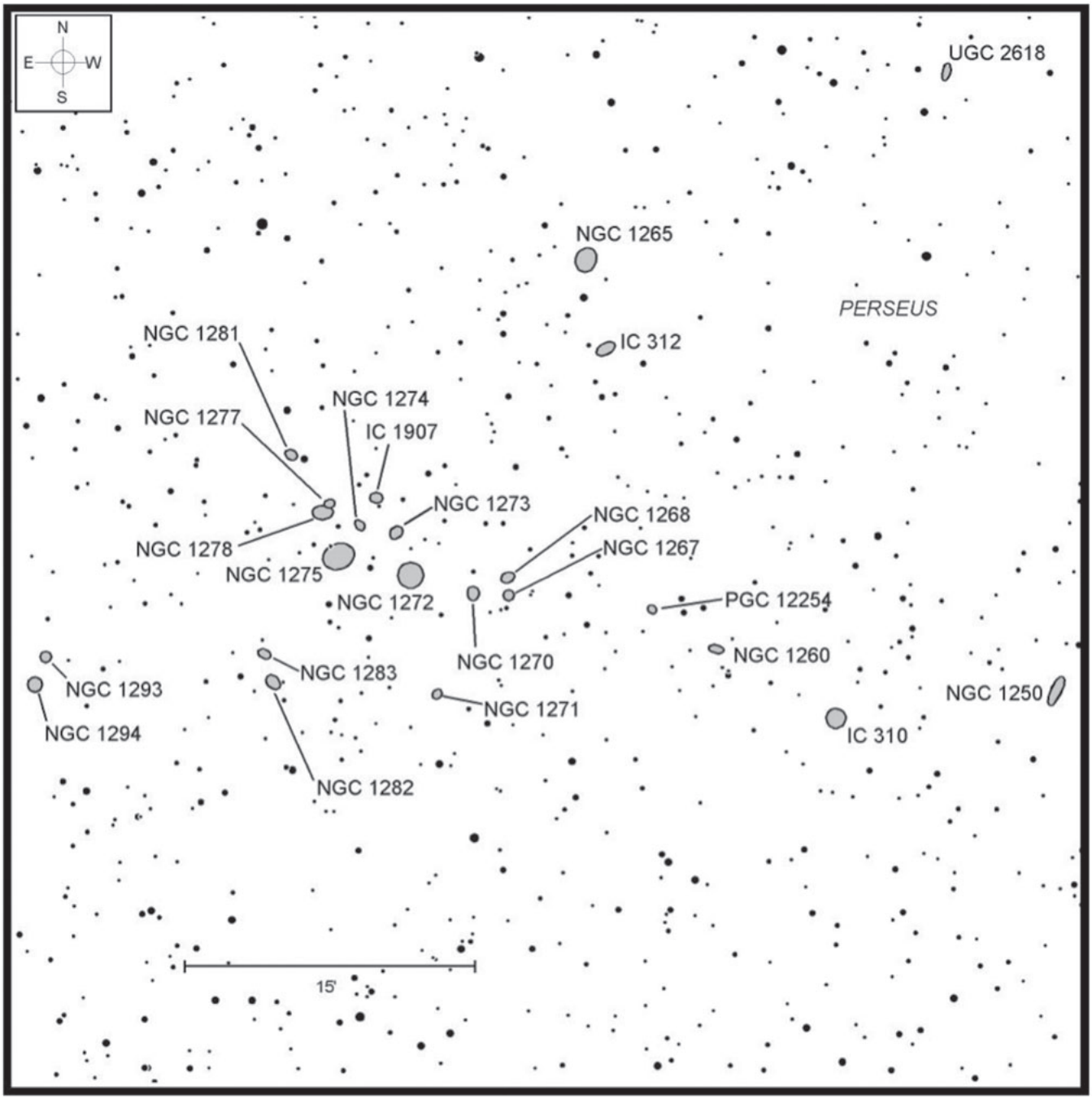
Several members of AGC 426 are visible in more-modest telescopes, but galaxy clusters like this one really shine in large apertures. The "anchor" galaxy is NGC 1275, the cluster's largest member. This galaxy is also known as Perseus A, denoting its nature as a source of high-energy radio waves; the only brighter radio source in the entire sky is NGC 5128, the famous Centaurus A galaxy. In photographs, the reason for this is apparent: the galaxy is actually *two* galaxies on a collision course with each other, the smaller galaxy beginning to be cannibalized by the larger. The larger galaxy, a massive elliptical, is also the host of a supermassive black hole (which is also a high-energy radio source).

In the eyepiece of a 12-inch telescope, NGC 1275 has a bright core and stellar nucleus within a 1.75' x 1.25' halo that extends east-west and fades imperceptibly into the background sky. 5.25' WSW of NGC 1275 lies the second-brightest member of AGC 426, NGC 1272, which is ever-so-slightly larger (but slightly fainter) than NGC 1275; this galaxy has a faint round halo that contains a large, brightish core region but no visible nucleus.

At least a dozen other members of AGC 426 lie within 5.5' of NGC 1275, most requiring significant

(18-inch or greater) aperture to identify. The entire cluster contains over a thousand galaxies, of which 36 are brighter than magnitude 14.5; an observer equipped with a large telescope could spend several evenings tracking these down. And those 36 are only the tip of the iceberg — AGC 426 contains well over 10,000 galaxies, and enough mass to make at least 1,200,000,000,000,000,000 (1.2 *quintillion!*) Sun-like stars.

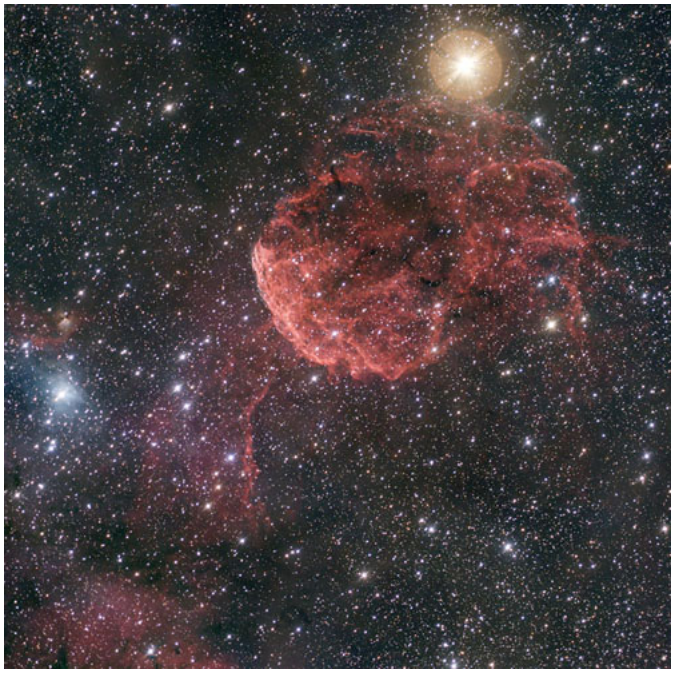
From naked-eye variable stars to incomprehensibly-vast clusters of galaxies, Perseus has something to offer nearly every stargazer. For those wondering where to start in the autumn-winter sky, or those looking for more than just the same few showpiece objects of every winter season, these few objects listed here can be leaping-off points into the wider expanse of a December night. Take advantage of the dark Oregon skies and put your optics — whatever type and size — to use within the Hero's borders!



Map of Abell Galaxy Cluster 426. Map is 1˚ square, centered on the physical center of the cluster. Map adapted from https://www.cloudynights.com/articles/cat/column/phil-harrington-s/cosmic-challenge-abell-galaxy-cluster-426-r3124; created by Phil Harrington.

Gallery

November clouds put a damper on club members' astrophotography, but some of us still got several great shots. Wes Magyar does long-distance trucking based out of Florida, so our weather didn't affect him much. Here are four great shots from Wes, and on the followign pages are several more from more local sources. Robert Asumendi has been sketching the Sun again (when it peeks out), Jeff Phillips has been photographing Jupiter, Alan Gillespie caught the Moon next to the Pleiades, Andy Nowlen gave us the Eastern Veil Nebula, and new club member Bradley Cook shared a few of his great photos as well. Enjoy!

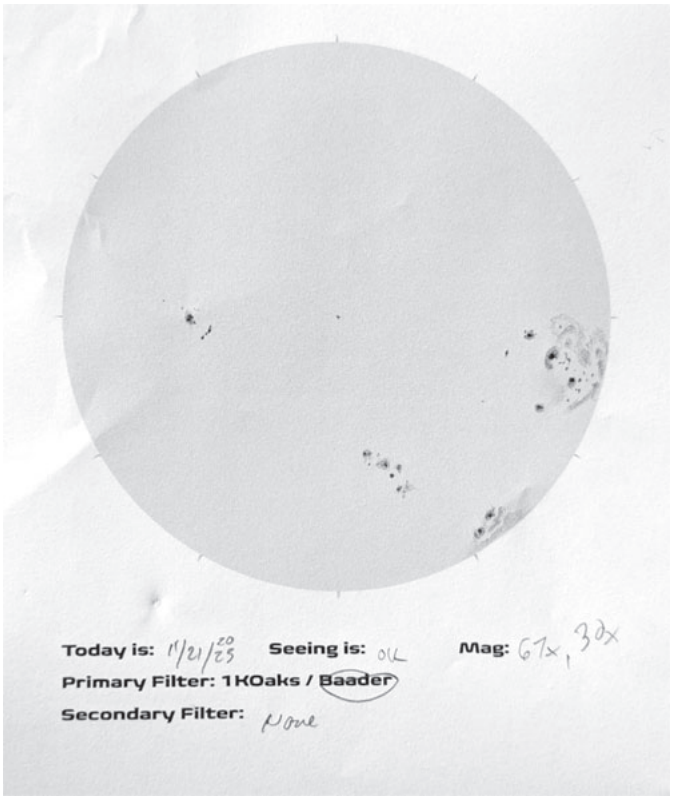


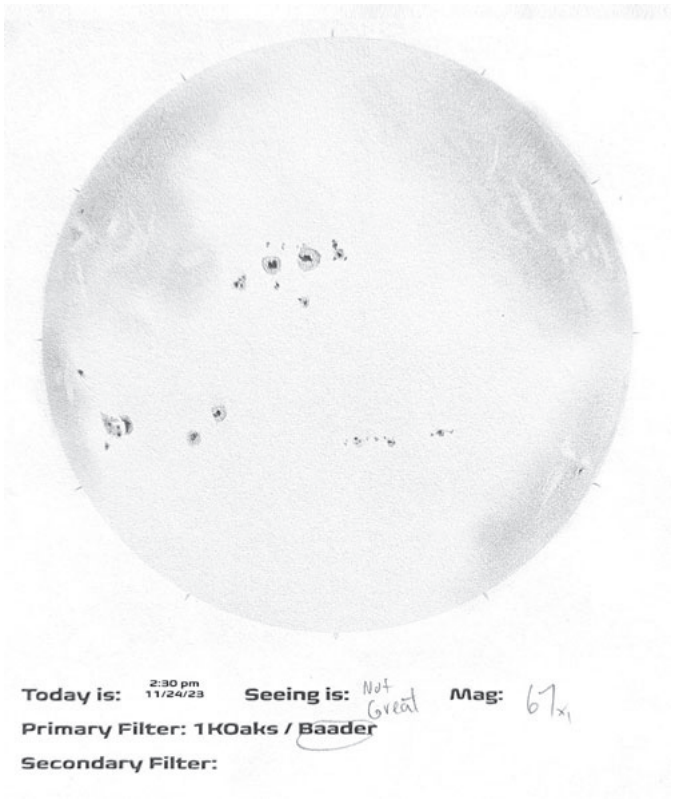
IC 443, the Jellyfish Nebula. © by Wesley Magyar

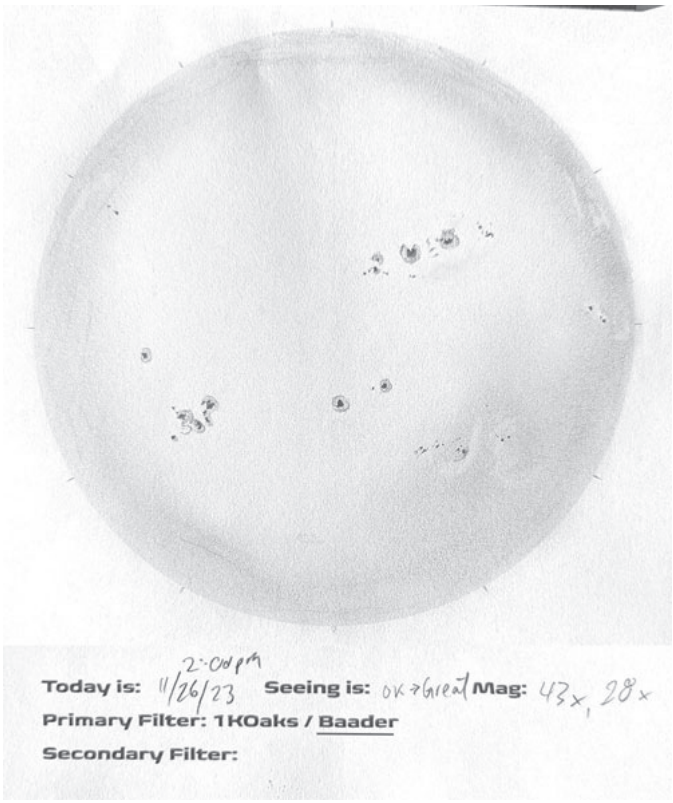
M45, the Pleiades. © by Wesley Magyar

M81 and M82. © by Wesley Magyar

The Rosette Nebula. © by Wesley Magyar





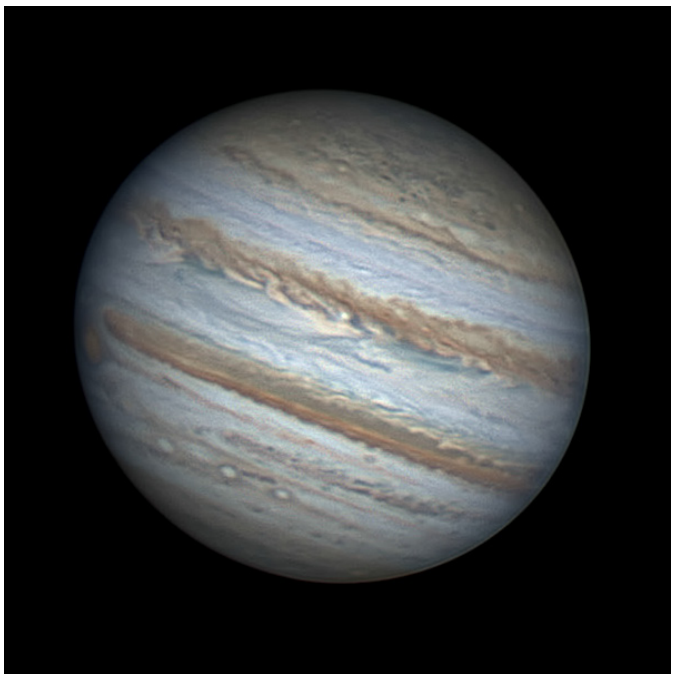


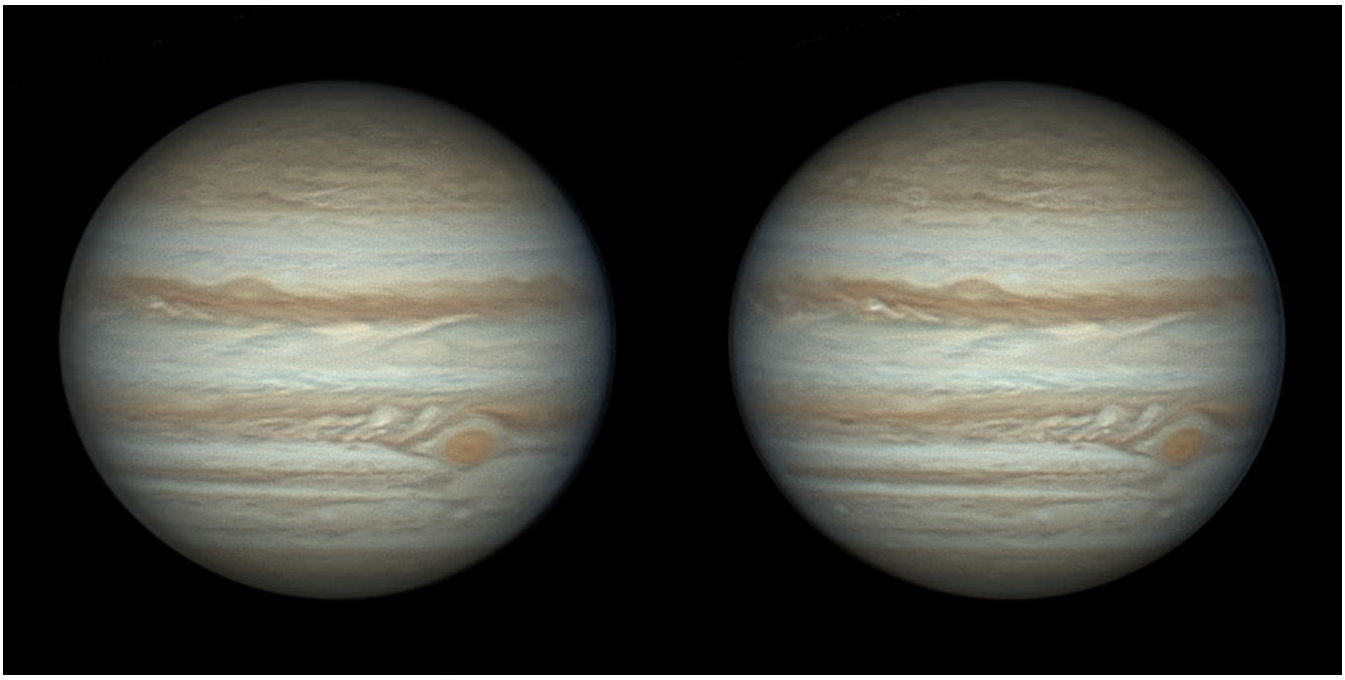
Above: The Sun on three separate days, showing the evolution of sunspot groups. © by Robert Asumendi

Right: The gibbous Moon. © by Bradley Cook

The Orion Nebula. © by Bradley Cook

The October 14th Annular eclipse. © by Bradley Cook





Top left: Jupiter on 11/26/23. © by Jeff Phillips

Top Right: The Eastern Veil Nebula. © by Andy Nowelen

Middle: A stereo image of Jupiter taken on 10/31/23. To see this in 3D, cross your eyes until you see three Jupiters. The middle one will be in 3D.

Right: The Full Beaver Moon on 11/26/23. © by Alan Gillespie.

The Full Moon near the Pleiades on 11/26/23. © by Alan Gillespie

Observing in December 2023

Dec 4, 9:49 PM	Dec 12, 3:32 PM	Dec 19, 10:39 AM	Dec 26, 4:33 PM
Mercury Set: 5:49 PM	Mercury Set: 5:45 PM	Mercury Set: 5:09 PM	Mercury lost in Sun
Venus Rise: 3:47 AM	Venus Rise: 4:04 AM	Venus Rise: 4:20 AM	Venus Rise: 4:36 AM
Mars Rise: 7:09 AM	Mars Rise: 7:07 AM	Mars Rise: 7:04 AM	Mars Rise: 7:01 AM
Jupiter Set: 4:33 AM	Jupiter Set: 3:58 AM	Jupiter Set: 3:29 AM	Jupiter Set: 3:00 AM
Saturn Set: 10:47 PM	Saturn Set: 10:18 PM	Saturn Set: 9:53 PM	Saturn Set: 9:28 PM
Uranus Set: 5:46 AM	Uranus Set: 5:13 AM	Uranus Set: 4:44 AM	Uranus Set: 4:16 AM
Neptune Set: 00:55 AM	Neptune Set: 00:23 AM	Neptune Set: 11:52 PM	Neptune Set: 11:25 PM
Pluto Set: 7:49 PM	Pluto Set: 7:19 PM	Pluto Set: 6:52 PM	Pluto Set: 6:26 PM

All times Pacific Standard Time (November 5, 2023 – March 9, 2024 = UT -8 hours) or Pacific Daylight Time (March 10 – Nov 3, 2024 = UT -7 hours)

Date	Moon Rise	Moon Set	Twilight Begin	Sun Rise	Sun Set	Twilight End
12/1/2023	20:31	11:37	05:44	07:27	16:35	18:19
12/2/2023	21:37	12:07	05:45	07:28	16:35	18:18
12/3/2023	22:42	12:31	05:46	07:29	16:35	18:18
12/4/2023	23:46	12:51	05:47	07:30	16:35	18:18
12/5/2023		13:08	05:48	07:31	16:34	18:18
12/6/2023	00:49	13:25	05:49	07:32	16:34	18:18
12/7/2023	01:52	13:42	05:49	07:33	16:34	18:18
12/8/2023	02:56	14:00	05:50	07:34	16:34	18:18
12/9/2023	04:04	14:21	05:51	07:35	16:34	18:18
12/10/2023	05:15	14:47	05:52	07:36	16:34	18:18
12/11/2023	06:29	15:21	05:53	07:37	16:34	18:19
12/12/2023	07:44	16:05	05:53	07:38	16:34	18:19
12/13/2023	08:53	17:02	05:54	07:39	16:34	18:19
12/14/2023	09:52	18:12	05:55	07:40	16:35	18:19
12/15/2023	10:39	19:31	05:56	07:40	16:35	18:19
12/16/2023	11:15	20:52	05:56	07:41	16:35	18:20
12/17/2023	11:44	22:12	05:57	07:42	16:35	18:20
12/18/2023	12:07	23:29	05:57	07:42	16:36	18:21
12/19/2023	12:28		05:58	07:43	16:36	18:21
12/20/2023	12:48	00:44	05:59	07:44	16:37	18:21
12/21/2023	13:09	01:59	05:59	07:44	16:37	18:22
12/22/2023	13:33	03:13	06:00	07:45	16:37	18:22
12/23/2023	14:00	04:29	06:00	07:45	16:38	18:23
12/24/2023	14:34	05:43	06:01	07:45	16:39	18:24
12/25/2023	15:17	06:55	06:01	07:46	16:39	18:24
12/26/2023	16:09	07:58	06:01	07:46	16:40	18:25
12/27/2023	17:10	08:51	06:02	07:46	16:41	18:25
12/28/2023	18:15	09:33	06:02	07:47	16:41	18:26
12/29/2023	19:22	10:06	06:02	07:47	16:42	18:27
12/30/2023	20:29	10:32	06:02	07:47	16:43	18:28
12/31/2023	21:33	10:54	06:03	07:47	16:44	18:28

All times are for Eugene, Oregon Latitude 44º 3' Longitude 123º 06'

Items of Interest This Month

12/1 Ganymede shadow transit 10:07–11:49 PM. Red Spot transits 7:18 PM.
12/3 Red spot transits 8:56 PM.
12/4 Mercury at greatest eastern elongation (visible after sunset). Io shadow transit 10:08 PM–00:19 AM.
12/8 Red spot transits 8:04 PM.
12/10 Red spot transits 9:42 PM
12/12 Europa shadow transit 7:31–9:51 PM.
12/13 Io shadow transit 6:33–8:43 PM.
12/14-15 Geminid meteor shower.
12/15 Red spot transits 8:50 PM.
12//17 Moon within 2° of Saturn.Red spot transits 10:29 PM.
12/19 Europa shadow transit 10:07–00:27.
12/20 Io shadow transit 8:28–10:39 PM. Red spot transits 7:59 PM.
12/21 Winter solstice 7:27 PM.
12/22 First Quarter Friday star party. Red spot transits 9:37 PM.
12/27 Io shadow transit 10:24 PM–00:35 AM. Red spot transits 8:46 PM.
12/29 Io shadow transit 4:53–7:04 PM. Red spot transits 10:24 PM.