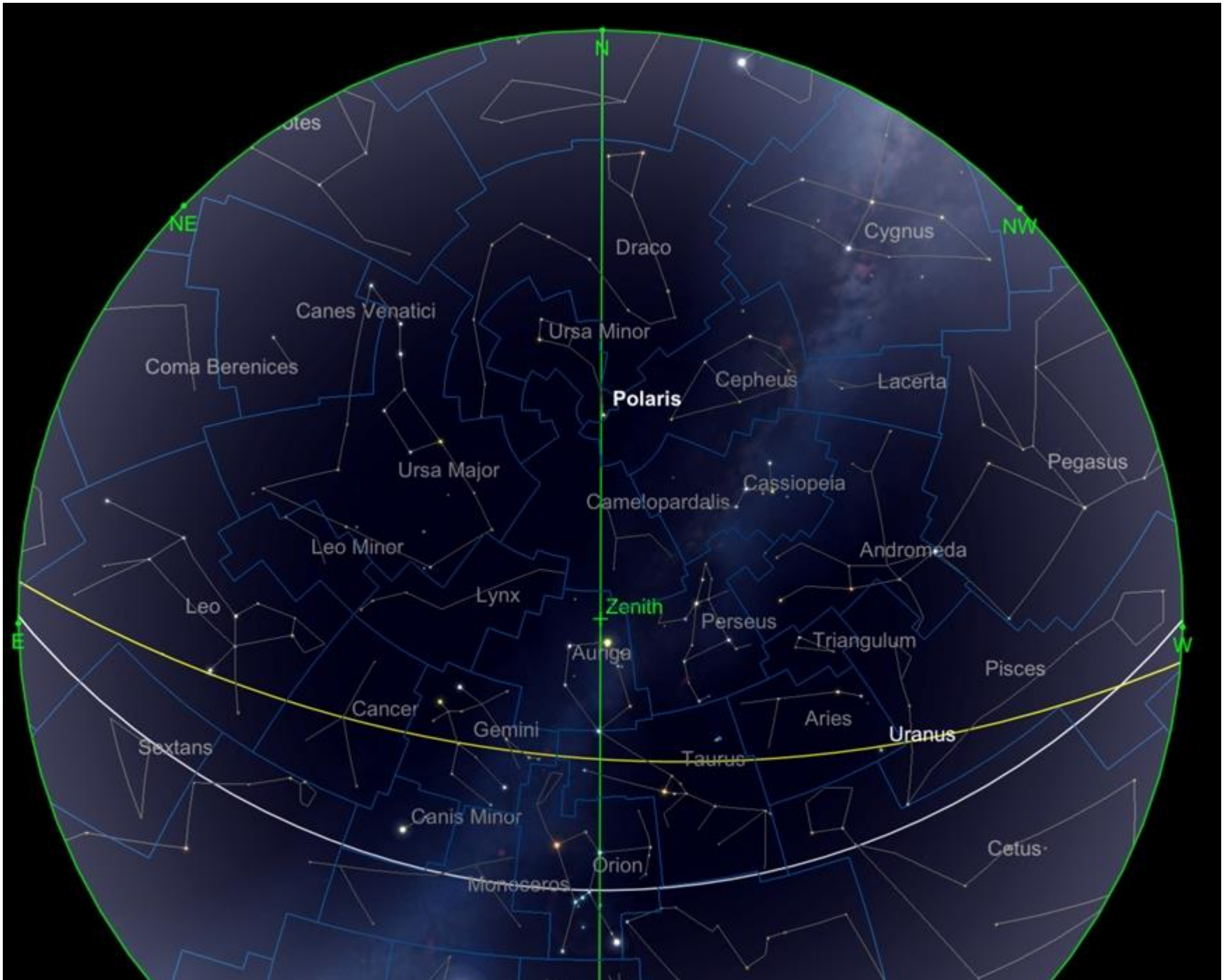
Telescope House January Sky Guide

The most up-to-date guide to Planetary and Lunar activity,
Comet News, plus Deep Sky Delights...


N
NE
NW
E
W
Draco
Cygnus
Canes Venatici
Ursa Minor
Coma Berenices
Cepheus
Lacerta
Polaris
Pegasus
Ursa Major
Cassiopeia
Camelopardalis
Leo Minor
Andromeda
Lynx
Leo
Zenith
Perseus
Triangulum
Auriga
Pisces
Cancer
Aries
Gemini
Uranus
Sextans
Taurus
Canis Minor
Cetus
Orion
Monoceros

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January 2020 Sky Guide

We are now past the winter solstice in the northern hemisphere, so nights are gradually getting shorter. This certainly won't be especially noticeable for much of January though. Of course, conversely, readers in the southern hemisphere are now beginning the long glide towards winter, with gradually lengthening nights. Although weather in the temperate northern hemisphere at this time of year can be challenging, from an observer's point of view, the cold conditions often bring us some of the best seeing conditions - especially when it is very cold outside. Readers experiencing winter are encouraged to get outside and see what January has to offer them - but wrap up warm while doing so. Wherever you find yourself in the world, we wish you a happy new year and all the best for 2019 - keep looking up, as there's going to be plenty to see in the skies above us this year.

The Solar System

The Moon

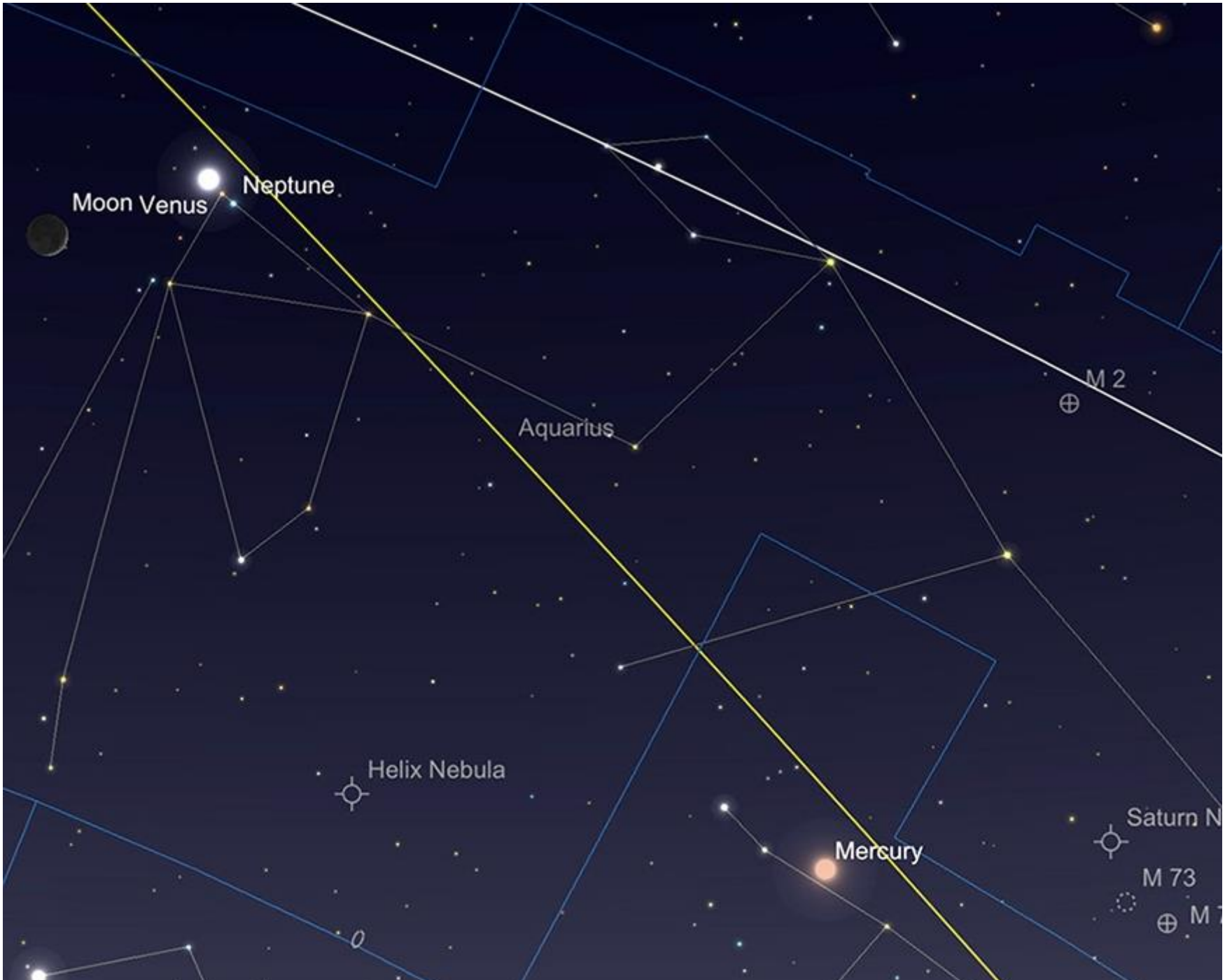
Our natural satellite begins 2020 in Aquarius, as a six day old waxing crescent, hanging in the evening sky after sunset. On the evening of the 1st, the Moon will sit around 30 degrees above the horizon (from 51 degrees N) and will set at just before 11pm (GMT).

The Moon will reach First Quarter phase on the 3th, when it will be found on the Cetus-Pisces borders. The following evening it will be found to the south of the planet Uranus, just under 5 3/4 degrees away, over the borders in Aries. It will then continue its journey up the Ecliptic until it reaches Full on the morning of the 10th, while in Gemini. This is one of the furthest north Full Moons of the year, when it will stand just over 62 degrees high in the sky as it transits (from 51 degrees N) in the very early hours of the 11th.

After this point the Moon will gently slide down the descending side of the Ecliptic (from a northern hemisphere perspective), until it reaches Last Quarter in Virgo on the 17th, having risen a few minutes before midnight. The Moon will reach New on 24th January, which will occur when it joins the Sun on the

Sagittarius-Capricornus borders. As the Moon is at New at this part of the month, this is going to be the most useful period for deep sky observations - so the latter part of the month is the most opportune for imaging or looking for the sky's more challenging targets.

Beyond this, the Moon becomes an evening object again. On the evening of the 28th, a slim 13% illuminated Waxing Crescent Moon is to be found in the same part of the sky as Venus - sitting just under 5 degrees to the SE of the planet in the sky. Both bodies will sit around 27 degrees high in the SSW (from 51 degrees N) at sunset and will make for a pretty pairing in the early evening sky. The much fainter Neptune joins the pairing, sitting just over a degree to the west of Venus in the sky, though the chance of being able to catch the +7.9 magnitude planet in the early evening sky is minimal. By the time Astronomical twilight is over, the three bodies will sit around 13 degrees above the horizon, so atmospheric extinction will definitely have a part to play in any attempt to observe the outer planet.


Moon Venus
Neptune
Aquarius
M 2
Helix Nebula
Mercury
Saturn N
M 73
M 7
0

The Moon, Venus and Neptune, sunset, 28th January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

January ends with the 37% illuminated Moon back in Pisces, nicely positioned for observing in the early evening sky at around 44 degrees elevation (again, from 51 degrees N) , almost due south, as the Sun sets.

Mercury

The 1st finds the planet very poorly-placed for morning observations, being just over a week from Superior Conjunction. Mercury will stand just over 1 degree above the horizon Mercury (from 51 degrees N) at sunrise, shining at -0.9 magnitude and presenting a 99% illuminated, 4.7 arc second diameter disk. At just 5 degrees from the Sun the planet will be invisible in the morning glare, even if you found a very flat horizon to observe it over…

Superior Conjunction takes place on the 10th, as Mercury slides south of the Sun by around 2 degrees, after which it will re-emerge as an evening target, but it will be a little while before it is observable. By the end of the month, Mercury has increased its angular size to 5.6 arc seconds diameter and is now shining at -1.0 mag, showing an 85% illuminated phase. At sunset, the planet will be just 10 degrees high from the horizon, making it a much more straightforward to locate. Mercury is now swinging around on a path that will take it up over the Sun from a northern hemispherical perspective and will keep improving into the early part of February, when it will reach greatest eastern elongation and stand over 14 degrees high at sunset.


Mercury
Satu
M
0

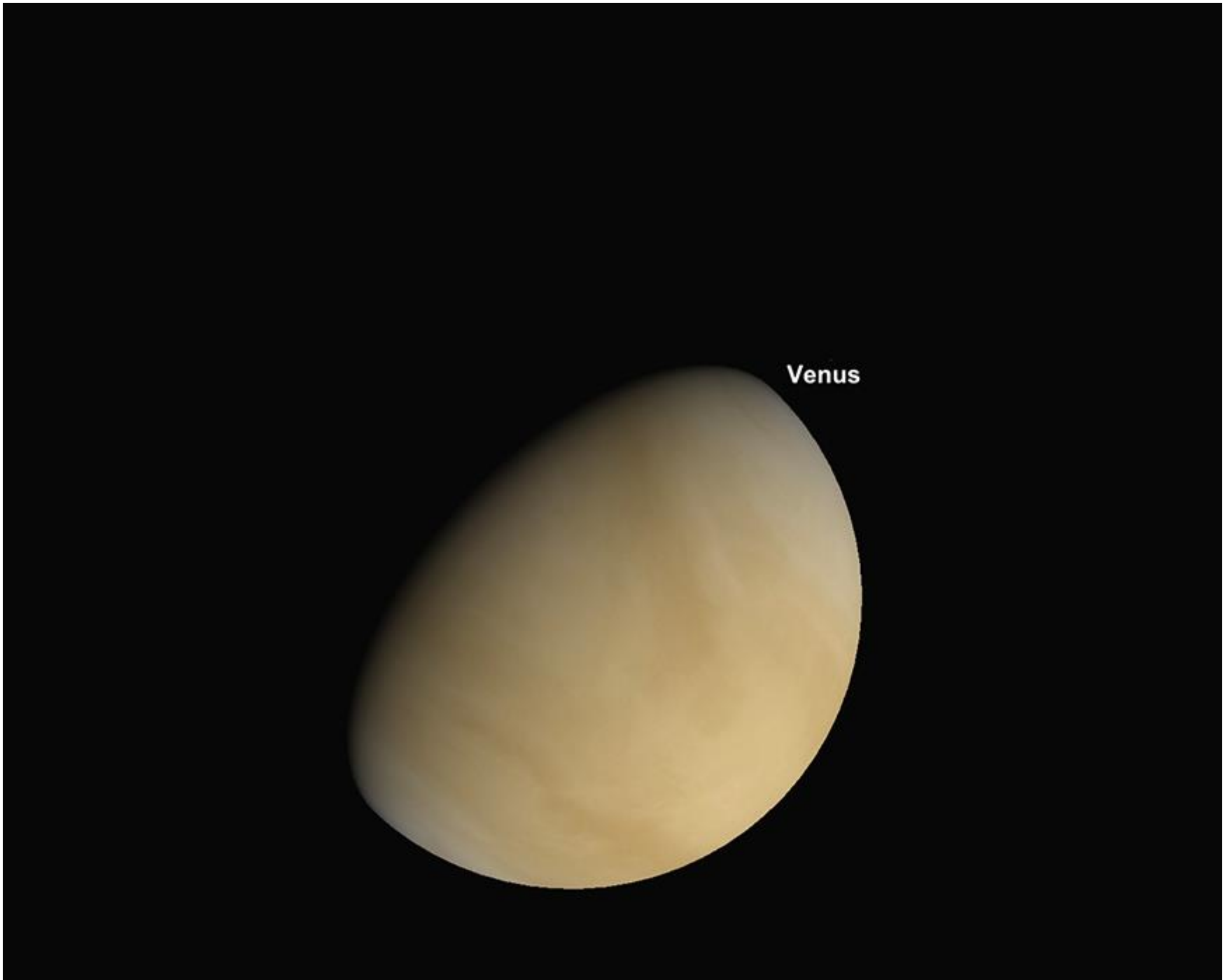
Mercury at sunset, 31st January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Venus

Venus continues to improve during January. Attaining a height of just under 18 1/4 degrees as the Sun sets, Venus is at a separation of just under 34 1/2 degrees from the Sun on the 1st, the planet will show an 82% phase telescopically. At -4.0 and 13 arc seconds across, it will be very prominent for those with a reasonable southwesterly horizon.

By mid-month, Venus' situation hasn't changed dramatically: it remains at -4.0 mag and is now 14 arc seconds diameter, displaying an 78% phase. Solar separation has increased to 37 degrees and the planet now sits 23 1/2 degrees high in the SSW at sunset.

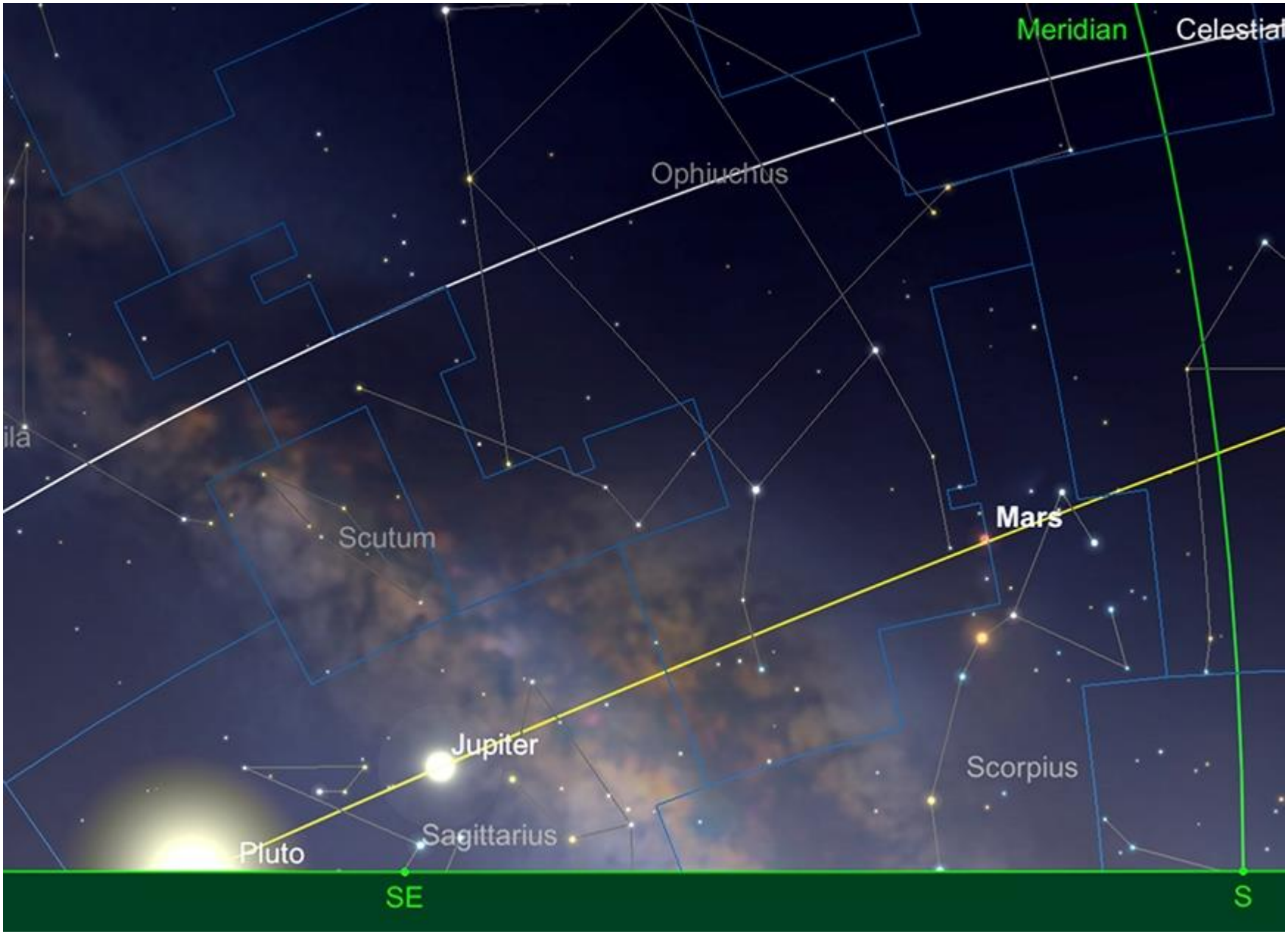
At the month's end Venus is fractionally brighter at -4.1 mag and has increased diameter to 15.3 seconds of arc. The planet now sits at just under 29 1/2 degrees high from the horizon at sunset (from 51 degrees N), having increased its solar separation to over 40 degrees. As previously mentioned in former Sky Guides, those of us in the northern hemisphere are in the midst of a very favourable evening apparition of Venus, which will peak in late March 2020. From now until then, Venus will keep getting better and better to observe and image. Those with telescopes wanting to take advantage of this apparition are encouraged to try filtration to cut down the inevitable glare from such a brilliant target. The no. 80a filter is great for this, as is the classic Neutral Density filter - particularly for those with larger telescopes. Those wanting to try to observe cloud formations on Venus are directed towards the No. 47 violet filter as this gives a serious cut to everything bar the violet part of the spectrum, which makes the reflective clouds of Venus' upper atmosphere stand out from the darker lower parts of the atmosphere. It's only really when Venus is well-placed (as it is currently), that it's worthwhile those with more modest telescopes attempting atmospheric contrast observations of the planet - but Violet filter can really help with this.


Venus

Phase of Venus, 31st January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Mars

The Red Planet starts 2020 in Libra. At +1.6 mag and just over 4 arc seconds diameter, it is found in the morning sky rising over 3 hours before thesn. While it is separated from the Sun by just under 42 degrees, Mars is still a long way from us here in Earth - over 2 Astronomical Units (twice the distance of the Earth from the Sun) . Slowly Mars will increase its separation from the Sun as we catch the planet up on our faster interior orbit. However, it will be October 2020 before Mars is next at Opposition and will then be brighter than any planet, apart from Venus.


Meridian
Celestial
Ophiuchus
Scutum
Mars
Jupiter
Scorpius
Sagittarius
Pluto
SE
S

Mars at sunrise 15th January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

By the end of the month, Mars will have brightened a little to +1.4 magnitude and is now displaying a 4.8 arc second diameter disk. Its separation from the Sun is now just under 52 degrees.

Jupiter

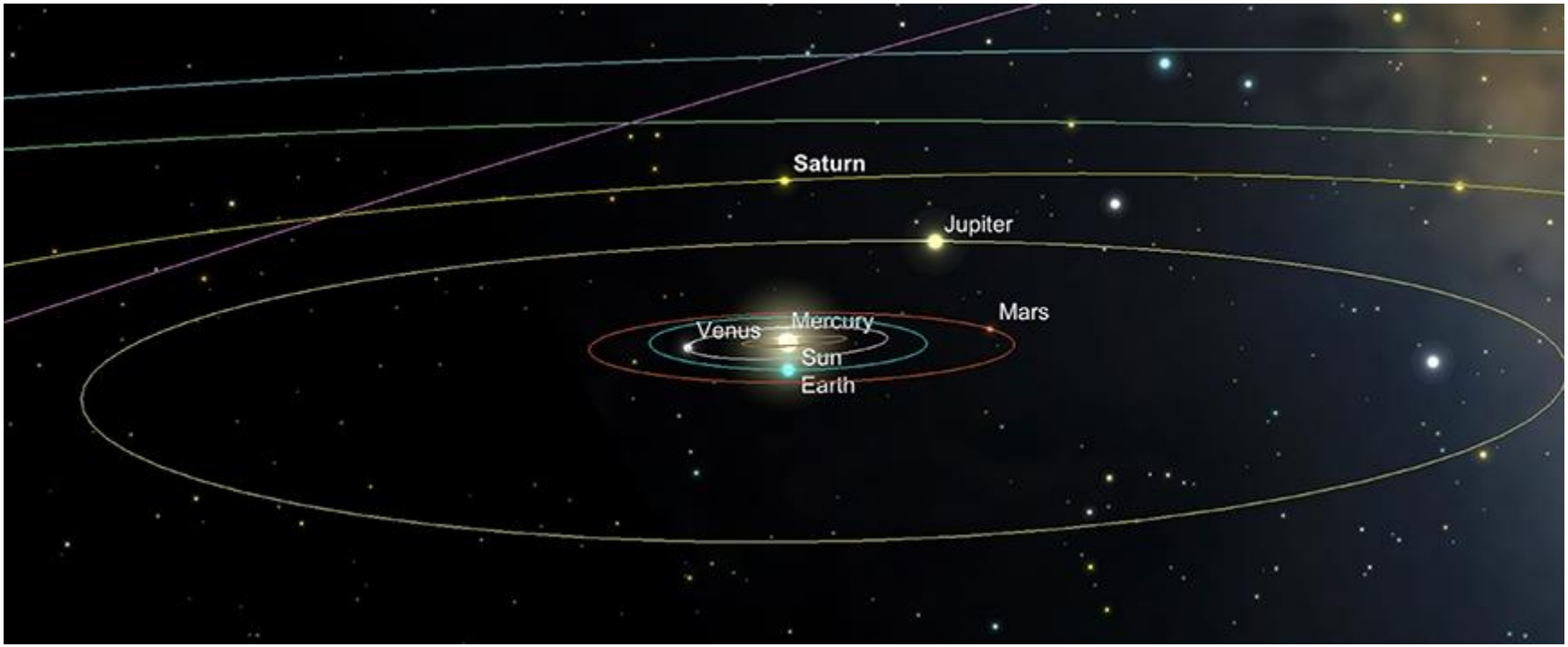
Jupiter is emerging from Superior Conjunction, which occurred on the 27th December 2019 and subsequently won't be visible in the early part of January. By the middle of the month Jupiter will be found a little over 14 1/2 degrees from the Sun on the western side — having attained an altitude of just under 6 degrees at sunrise. At -1.8 magnitude, it won't be impossible to pick out in the dawn sky (if you have reasonable easterly horizons), but it will be the end of the month before it has risen to an altitude of just over 8 1/2 degrees at sunrise (from 51 degrees N) and increased its angular separation from the Sun to 27 degrees, which will make for an easier spot.

Jupiter, sunrise, 31st January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Jupiter has passed the most southerly point in the Ecliptic, which it reached in early December 2019 and as such will now begin to slowly increase its altitude. 2020 won't be a vintage one for northern hemisphere observation of Jupiter, as it will still remain low in the south for us, subject to greater atmospheric interference. It will be 2022 before Jupiter crosses back into the northern hemisphere of the sky and will become better placed for observations from northern climes.

Saturn

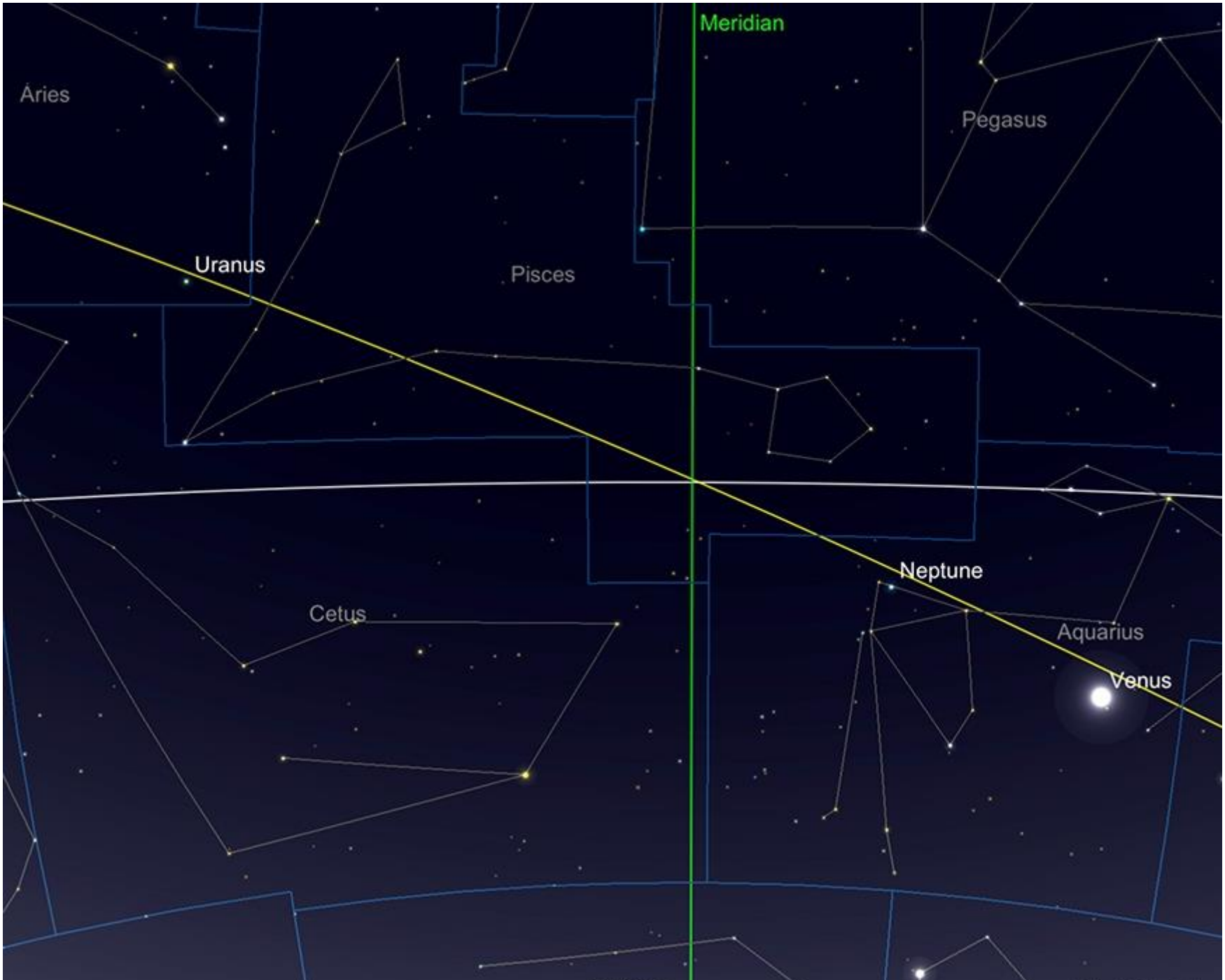
Saturn comes to Superior Conjunction on the 13th, so is not observable for the lion's share of the month. By the time it re-emerges as a morning target in late January it will still be very low in the sky before sunrise and extremely difficult to observe. It will be another month before Saturn begins to achieve a little more separation from both Sun and horizon, making it easier for the early riser to catch.



Saturn at Superior Conjunction, 13th January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Uranus and Neptune

The Outer Giants are still well-positioned in the evening sky during early January. While they are nowhere near as easy to find as the brighter planets, they can be found using binoculars and smaller telescopes. Both Uranus and Neptune present tiny disks in telescopes, which are similar to Planetary Nebulae in size and brightness. Careful astrophotography of either of the outer planets will reveal brighter albedo features and the more prominent moons of both planets.


Meridian
Aries
Pegasus
Uranus
Pisces
Neptune
Cetus
Aquarius
Venus

Uranus and Neptune relative positions, mid January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Neptune is found further to the west in the Ecliptic in Aquarius and at =7.9 mag and 2.3 arc seconds across is the more demanding of the two to find. It can be found within the bounds of the triangle of stars Psi, Phi and Lambda Aquarii in the eastern part of the constellation. If you have dark skies, it's possible to find Neptune with reasonable binoculars, though ready identification its disk can only really be judged in telescopes at more powerful magnification. On the 1st, the Crescent Moon can be found 10 degrees to the east of the planet in the sky. While stronger moonlight can wash out fainter targets, such as Neptune, the 35% illuminated Moon is far enough away from the planet and at around -8 mag, won't be bright enough to completely extinguish Neptune in powerful binoculars or a small telescope - as long as the atmosphere is clear and there isn't much in the way of atmospheric moisture about, causing mist (which will definitely affect fainter targets). By the time astronomical twilight has ended (a couple of hours after sunset), both Neptune and the Moon will have passed the meridian from Europe and will be horizontally at the same height in the sky (just under 30 degrees). If you trace a line to the west of the upper part of the Moon by just under 10 degrees, you will find the area of sky the Neptune is in. If conditions are clement, with careful observing, you may find the Solar System's most distant planetary member.

Uranus is the easier object at +5.7 mag and 3.6 arc seconds diameter. You can technically find it from a dark site if you have good eyesight and know exactly where the planet lies in relation to background stars. However, for the less spectacular of us, Binoculars will find the planet much more easily and it is possible to define it as not exactly star-like in a powerful pair. However, more generous telescopic magnification will reveal it as a definite green-grey disk. Uranus is found in Aries at present and although is lacks any brighter stars around it can be found relatively easily by tracing a line between Alrischa, Alpha Piscium and Hamal, Alpha Arietis. Uranus can be found just south of the half way point between these two waypoints.

Comets

Although it now seems that C/2017 T2 PanSTARRS will in all likelihood not reach naked eye brightness as previously hoped for, it should still be an interesting comet to track down in telescopes and larger binoculars. The comet begins the month in the northern reaches of Perseus. It will briefly hop of the border into southern Camelopardalis for a day, before rejoining Perseus in its upper northerly for the rest of the month. The comet will pass to the north of the Double Cluster at the tail end the the month, which may result in a good widefield astrophotographic opportunity. At time of writing, the comet is hovering around the 9th magnitude, but by January is more likely to be around 7th to 8th mag - still reasonable if you've got a telescope or binoculars, but not quite the spectacular it could have been.


Meridian
Soul Nebula
2020 Feb 10
2020 Feb 03
2020 Jan 27
Double Cluster
Double Cluster
2020 Jan 20
2020 Jan 13
2020 Jan 06
C/2017 T2 (PANSTARRS)
2019 Dec 30
2019 Dec 23
Zenith

Comet 2017 T2 PanSTARRS path during January. Comet position shown 1st January. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Meteors

After the Moon-washed Geminids, of December, we are perhaps owed a decent run at a shower. Giving a regular zenith hourly rate of in excess of 100 meteors (though in practise much less are actually seen from any given location), the is shower is a reliable one, thought to be fed by the mysterious body 2003 EH1. The shower is expected to be visible for a few days either side of its peak on the 3rd/4th January.

Although this shower is reasonably populous, individual meteors tend on the fainter side - being less spectacular than those of other major showers. Despite this, the Moon will be out of the way for the peak, so this is a good year to wrap up warmly and see if you can catch a few.

Normally, the shower presents reasonable opportunities for astrophotographic record - all you need is a solidly mounted camera, capable of timed exposures, with a wide field lens. Once set up - even in a fairly light polluted environment - you will be unlucky not to capture a couple of brighter meteors, given an hour-or-so's multiple exposures.


Zenith
Camelopardalis
Ursa Major
Coma Bereni
Canes Venatici
Ursa Minor
Cepheus
Draco
Quadrantids
Bootes
Arcturus
Corona Borealis
Deneb
Cygnus
Vega
Serpens

Quadrantids Radiant location. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Deep Sky Delights in Orion and Lepus

Last month, we covered two well-known winter constellations, Taurus and neighbouring Auriga, which are home to some of the best-known of this season's deep sky treasures. Almost inevitably, at this time of year, we must cover with the spectacular constellation of Orion. As a constellation, it is perhaps the the most instantaneously recognisable of all those in the sky. It is home to many deep sky wonders, so it won't surprise many readers that we practically we should start with one of the most recognisable of astronomical targets: the Orion Nebula complex - M42, M43 and the outlying NGCs 1973, 1975 and 1977. This remarkable set of objects are the most prominent part of the larger Orion Molecular Cloud, a huge collection of clouds of gas and material that were we to be able to see it all, would take up almost the entirely of the constellation.


Alhena
Lower's Nebula
Hind's Variabl
Cone Nebula
Christmas Tree Cluster
Hubble's Variable Nebula
Betelgeuse
Bellatrix
NGC 2244
Rosette Nebula
Orion
M 78
Mintaka
Epsilon Orionis Nebula
Flame Nebula
noceros
Alnilam
Alnitak

Orion and Lepus. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

M42, the brightest part of the complex and the best know is visible to the naked eye as a misty patch in the "Sword Handle" of Orion, a patch of sky hanging below the three stars in Orion's belt: Alnitak, Alnilam and Mintaka (Zeta, Epslion and Delta, respectively). At +4.00 mag, the Orion Nebula is the brightest of all the nebulous regions in the sky and can be easily seen well in binoculars and small telescopes. It has a huge area of 85 arc minutes x 60 arc minutes and has a heart-shaped void, amidst two "wings" flying out to either side. This void is often described as resembling a fish mouth, in which nestle the compact cluster of stars, the Trapezium. This cluster was first described by Galileo in 1610, who mysteriously neglected to mention the huge amount of nebulosity surrounding them! The Trapezium stars are very young and are formed out of the nebulosity that surrounds them. Four of these stars, A ,B, C and D are easily resolved with all manner of instruments. The fainter E and F stars are more of a challenge and can be used to test seeing conditions and the resolving power of optics. The A and B stars of the Trapezium are both eclipsing binary stars: A drops in magnitude every 65 days as an unseen companion, most likely a nascent star or large brown dwarf eclipses it; whereas B drops by a magnitude every 6.5 days as it is eclipsed by a star the size of our Sun. Confusingly B is a double double or quadruple star system. Many of the large amount of stars seen around the M42/Trapezium area are also members of this central star cluster. In all there are thought to be 400 stars in close proximity which have been born from the interior of the Nebula. As large globules of superheated gas have been observed within the confines of M42, active star formation is still very much ongoing. The "Fish Mouth" feature is thought to be caused by the young stars pushing away gas and dust with their solar wind.

M42, M43 and the Running Man. Image Credit: Mark Blundell

Adjacent to M42 is M43, a very bright globular-shaped ball of gas and dust of +9 mag., which is separated from M42 by a large dust lane. This nebula, though not as prominent as M42, is easy in small telescopes and has its own associated small cluster of stars imbedded within it. Larger telescopes of 8-inch+ will show much of the dark striation of the border lane with M42. This nebula was first identified by Jean-Jaques Dortous de Marian in 1731. It lies around 1400 light years from us.

To the north of both M42 and M43 lies the complex and beautiful reflection nebulae of NGC 1973, 1975 and 1977. Otherwise known are The Running Man Nebula, due to the impression of a running stick figure which is easily visible in long duration photographs of the area. This feature is much less easily seen visually as filtration rarely aids visual observation. With a large scope and good skies, it is possible to see the striation of the running figure with averted vision, but it is a challenge. The nebulosity of this area is clear enough with a medium-sized scope. However, the distance to this collection of objects is disputed. Many sources list it as part of the Orion complex at around 1500 light years away, though others put them at a closer 650 light years away.

Moving NE of the M42/43 and Running Man Complex, we come to the most easterly star in Orion's belt, Alnitak, Zeta Orionis. This star is flanked by two well known, beautiful, but challenging nebulae - NGC 2024, the Flame Nebula and the IC434/Barnard 33 the famous Horsehead Nebula.

Of the two, the Flame Nebula is technically the fainter at +10.0 mag and is about half a degree by half a degree (30 arc minutes) in area. With a small scope and less than optimal skies, it is a challenge, but with an 8-10-inch class scope and a UHC filter, this nebula can be quite easily observed from a reasonable location and photographs well too. It does, both visually and photographically, resemble the shape, if not the exact hue of a flame. Photographically NGC2024 can appear as a yellowy-brown nebula, though some more detailed images do reveal a pinkish tinge too. The Flame is an emission nebula and its glow is caused by the Ultraviolet radiation of nearby Alnitak exciting the Hydrogen gas of the Flame and stripping electrons from their atomic bonds. These electrons then combine with ionised Hydrogen which causes a glow. William Herschel is credited with the discovery of The Flame in 1786. Again, sources differ as to the Flame's distance from Earth, some put it some 1400 light years away, while others put it at a more modest 750-850 light years away - roughly the same as Alnitak.


IC 434 Horehead Nebula
NGC 2024 Flame Nebula
Const: Orion
By Mark Blundell
17th January 2017

The Flame and Horsehead Nebulae. Image Credit: Mark Blundell

The Flame's neighbour, the Horsehead Nebula, is one of the most stunning objects in the sky, yet one of the most challenging to observe well. Lying under half a degree to the west of Alnitak, it is really two objects - the backdrop is the +7.30 mag emission nebula IC434, which is nearly a degree long yet only around 10 arc minutes wide, against which lies the dark lane nebula Barnard 33. This is the famous Horsehead silhouette, know form countless images and a perennial target for astrophotographers. Visually however, observation of the Horsehead requires aperture, a really dark sky and/or proper filtration. Observers have reported seeing the Horsehead feature against IC434 with medium aperture telescopes, though these have tended to be from a very dark location. The Hydrogen Beta filter is the best aid to any attempt to observe the Horsehead with any telescope, as it is one of the relatively few objects that really responds well to the wavelength. Experienced observers have reported observations in smaller scopes, but this must be down to exceptional conditions. Those with 12-inch+ telescopes, the H-Beta filter and reasonable skies stand a good chance of locating it.

A little further to the north of Alnitak and the Flame Nebula lurks an often overlooked, but very interesting object - or series of objects - M78. Discovered by Pierre Mechain in 1780, this reflection nebula is a group of objects (NgCs 2065, 2067 and 2071), clustered around two minor 10th magnitude stars. The light from these stars reflected from the nebula is the reason we can see this part of the Orion Molecular Cloud. M78 isn't as bright as its illustrious neighbours, but can be relatively easily observed with a reasonable-sized telescope. M78's visual magnitude is about +8.3 and its area is about 8x6 arc minutes. Interesting internal structure is visible in large telescopes and in images - though it's a trick object to catch as most of the nebulosity is so dark.

M78. Image Credit: Mark Blundell

More challenging still - and by far the largest of the nebulous objects in the Orion area - is Barnard's Loop or Sharpless 2-276. Reputedly (though rather controversially) discovered and described by William Herschel in the 1786 - he mentions faint nebulosity in the area of Barnard's Loop - it is E. E. Barnard who in 1896 photographically definitively discovered this large, expansive and extremely illusive nebula, which is an amazing 14 degrees arc at its widest point. Though technically listed as being a +10 mag object, it is so diffuse that it seems almost impossible to see from all but the darkest areas on Earth. Yet some observers have even reported seeing it without the aid of a telescope. Rigging up "goggles" of two H-Beta filters appears to be an inventive way of attempting observations of this kind, as does binoculars with these filters attached to the objectives. Telescopically, one has a greater chance of seeing some of the brighter parts of Barnard's Loop, but dark skies are of paramount importance whatever the method used. The rule is: if you don't have them - don't bother!

Barnard's loop shows up very well in long-duration ultra-widefield astrophotography, but again, this will require very good sky conditions, patience and multiple, stacked exposures to get the nebula to stand out from the sky background.

Barnard's Loop. Image Credit: Hunter Wilson, Creative Commons

It is thought that Barnard's Loop is a supernova remnant that has been expanded by further supernovae and subsequent star forming over many millions of years, forming a "bubble" of gas, part of which is visible as the loop. This awe-inspiring piece of stellar architecture is thought to be around 300 light years in diameter and lie around 1600 light years from our Solar System.

Lepus, the constellation representing the Hare, sits to the south of Orion and is much less spectacular to the naked eye. From light polluted environments it is often difficult to see at all. The only major object of interest in this particular constellation is M79. This object is an unusual globular cluster, situated so far from the usual "Halo" of globulars which surround the centre of our Milky Way galaxy. It could well be an inherited object from the adjacent Canis Minor dwarf galaxy, a satellite of our Milky Way which is located not too far away from this point in the sky. M79 is a fine globular of +7.73 mag and 1.3 arc minutes diameter. Discovered by Pierre Mechain - Messier’s fellow in observation and responsible for many discoveries in the Messier list - in 1780 and added to Messier's list in the same year, this globular can easily be resolved into stars in a medium-sized 6-8 inch telescope. Lying some 40,000 light years hence, M79 is a reasonably tricky object to observe from a northern hemispherical perspective as it rises a mere 14 degrees high at transit point from latitude 51 degrees N. It is better seen by readers in the southern hemisphere, who will have to battle considerably less with atmospherics to resolve individual members. Still, compared to the likes of the Messier globulars in southern Ophiuchius, Scorpius and Sagittarius, M79 is best seen during the evening in the northern hemisphere at a time of the year when the atmosphere tends to be steadier and more settled. Due to its location in the sky, M79 is better imaged by astrophotographers in more southerly climes - though observers worldwide are encouraged to seek it out.

M79. Image Credit: Siding Spring Observatory, Public Domain.

Text: Kerin Smith