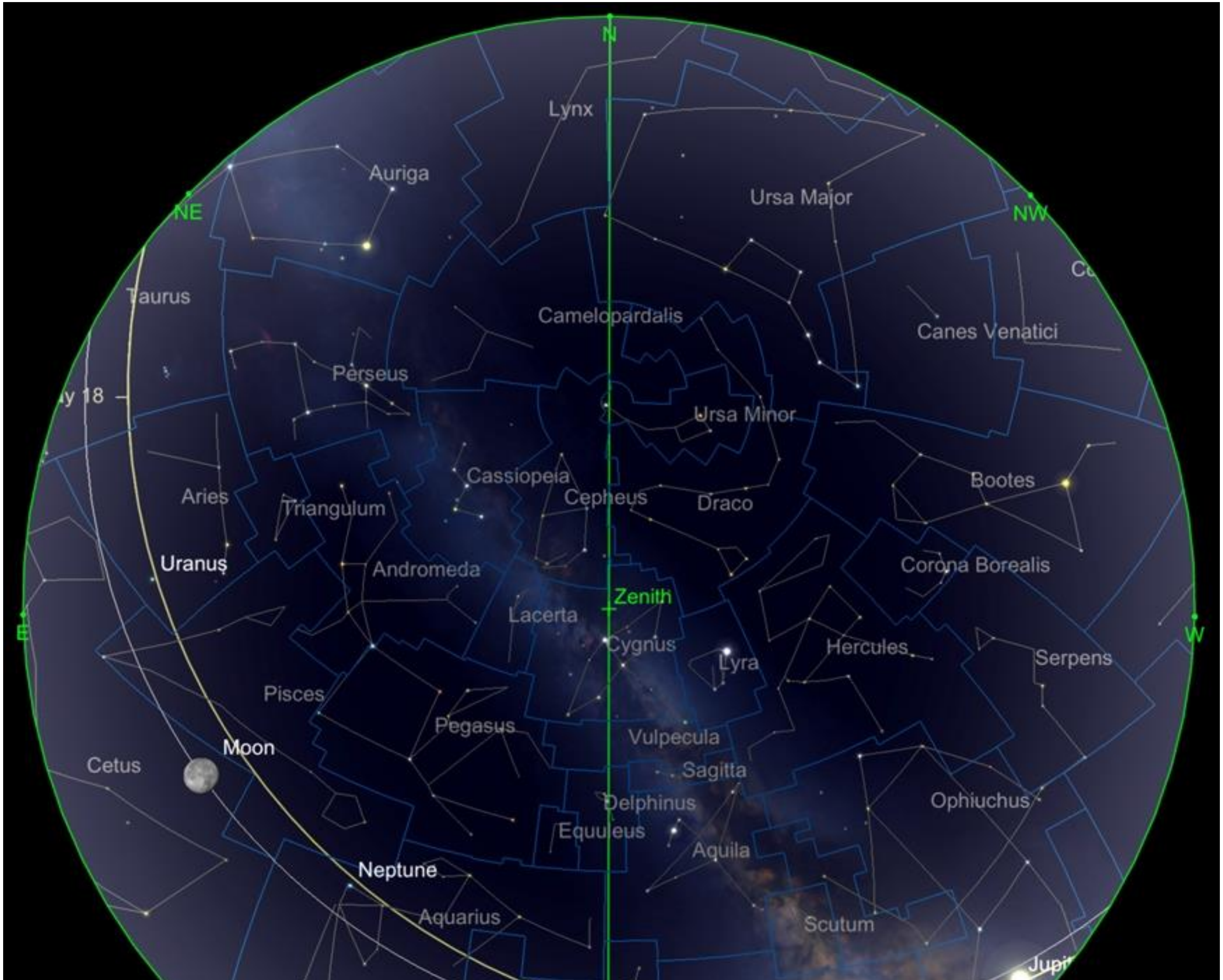

Telescope House September Sky Guide
The most up-to-date guide to Planetary and Lunar activity,
Comet News, plus Deep Sky Delights...


N
Lynx
Auriga
NE
Ursa Major
NW
Taurus
Camelopardalis
Canes Venatici
Perseus
Ursa Minor
Cassiopeia
Cepheus
Draco
Bootes
Aries
Triangulum
Uranus
Andromeda
Corona Borealis
Zenith
Lacerta
E
W
Cygnus
Lyra
Hercules
Serpens
Pisces
Pegasus
Vulpecula
Moon
Cetus
Sagitta
Delphinus
Ophiuchus
Equuleus
Aquila
Neptune
Aquarius
Scutum

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September brings the Autumnal Equinox for the Northern Hemisphere and the Vernal, or Spring Equinox for this in the Southern Hemisphere. This year these events occur on 23rd of September, where for a brief period for day and night are of nearly equal length. This equality of dark and light really depends on where you find yourself, as there are few places on Earth on the 23rd September where day and night are *truly* equal. However, crucially, the 23rd marks the point where the Sun crosses into the southern celestial hemisphere - which results in increasingly greater hours of darkness than light for those of us in the Northern Hemisphere; and of course increasingly less darkness for those in the Southern reaches of our planet, who concurrently experience their Vernal (Spring) Equinox. Many people for whom astronomy is of no more than at most a passing interest will bemoan the lack of daylight in the Northern Hemisphere - the same cannot (in all probability) be said of the many readers of this Sky Guide. For us astronomers, the dive towards Winter does have its perks.
As ever, there's a lot to see in skies above us this month...

The Solar System

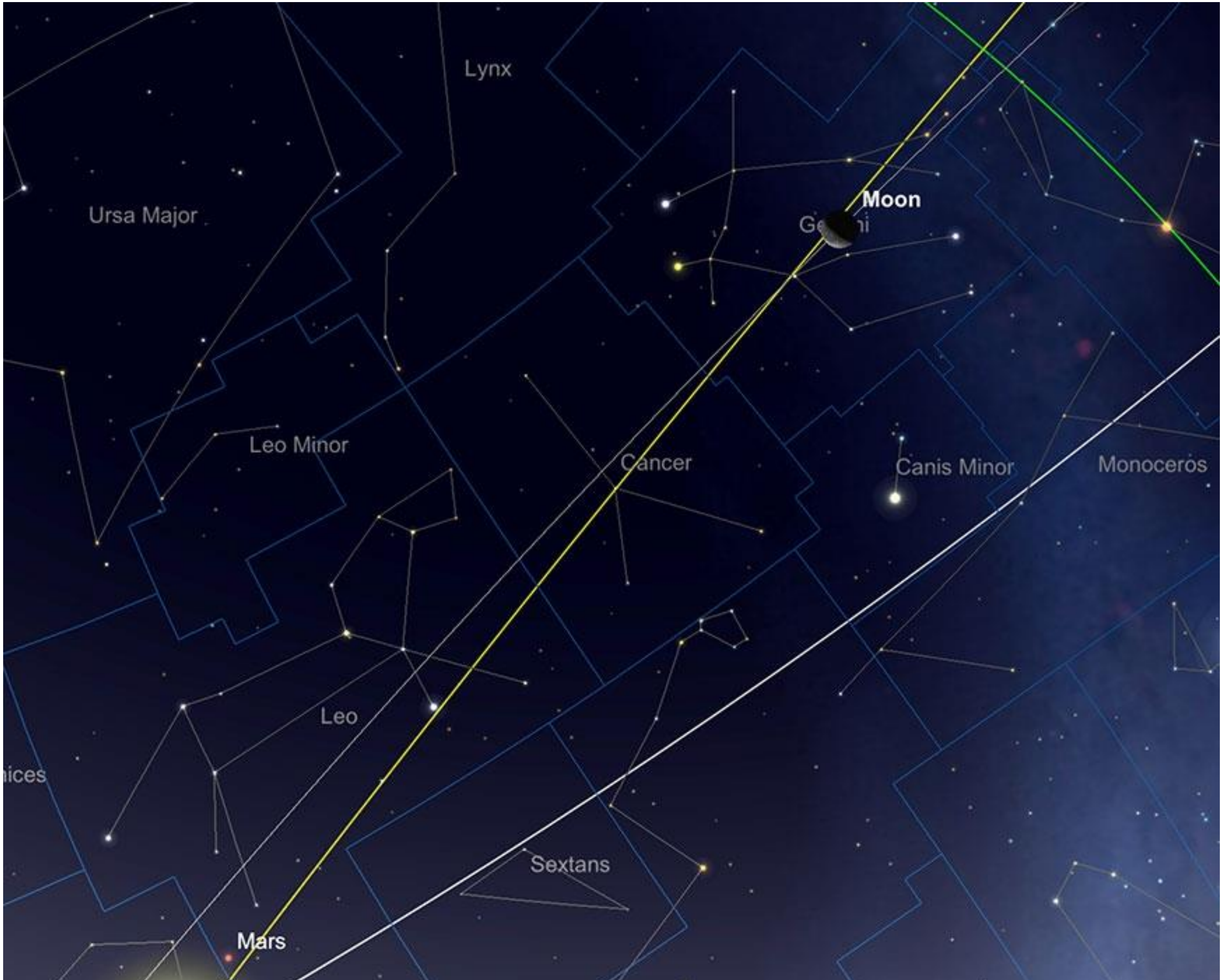
The Moon

The Moon begins September in Virgo as a Waxing Crescent of just under 8.8% illumination. At three days after New, you'll catch the thin crescent of the Moon in the evening sky this evening if you've got a clear westerly horizon. The Moon will set just under an hour and a half after the Sun on the evening of the 1st.

The Moon reaches First Quarter in the 6th while in Ophiuchus, rising in line with neighbouring Jupiter, found just over 5 degrees to the west, both bodies sitting fairly low in the south as the Sun sets from temperate northern parts.

The Moon then gently continues its slide south through the ecliptic, then up the northern ascent on the other side until it reaches Full in Aquarius on the 14th, rising at around 8pm from Europe. Naturally, this mid-month period is not the best time for observation or imaging of deep sky targets (apart from with narrowband filtration).

The Moon comes to Last Quarter on the Orion/Taurus borders on 22nd September, before becoming New, on the 28th in Virgo. The Old Crescent phase of the Moon is particularly high in the sky from a northern hemisphere perspective in the morning skies for the next few months. This is the autumnal morning equivalent of the evening sky’s High Spring Crescent phases. Our natural satellite ends September as an evening object, at a couple of days old. It should be just possible to glimpse the very thin crescent in the west after sundown, if sky conditions allow.

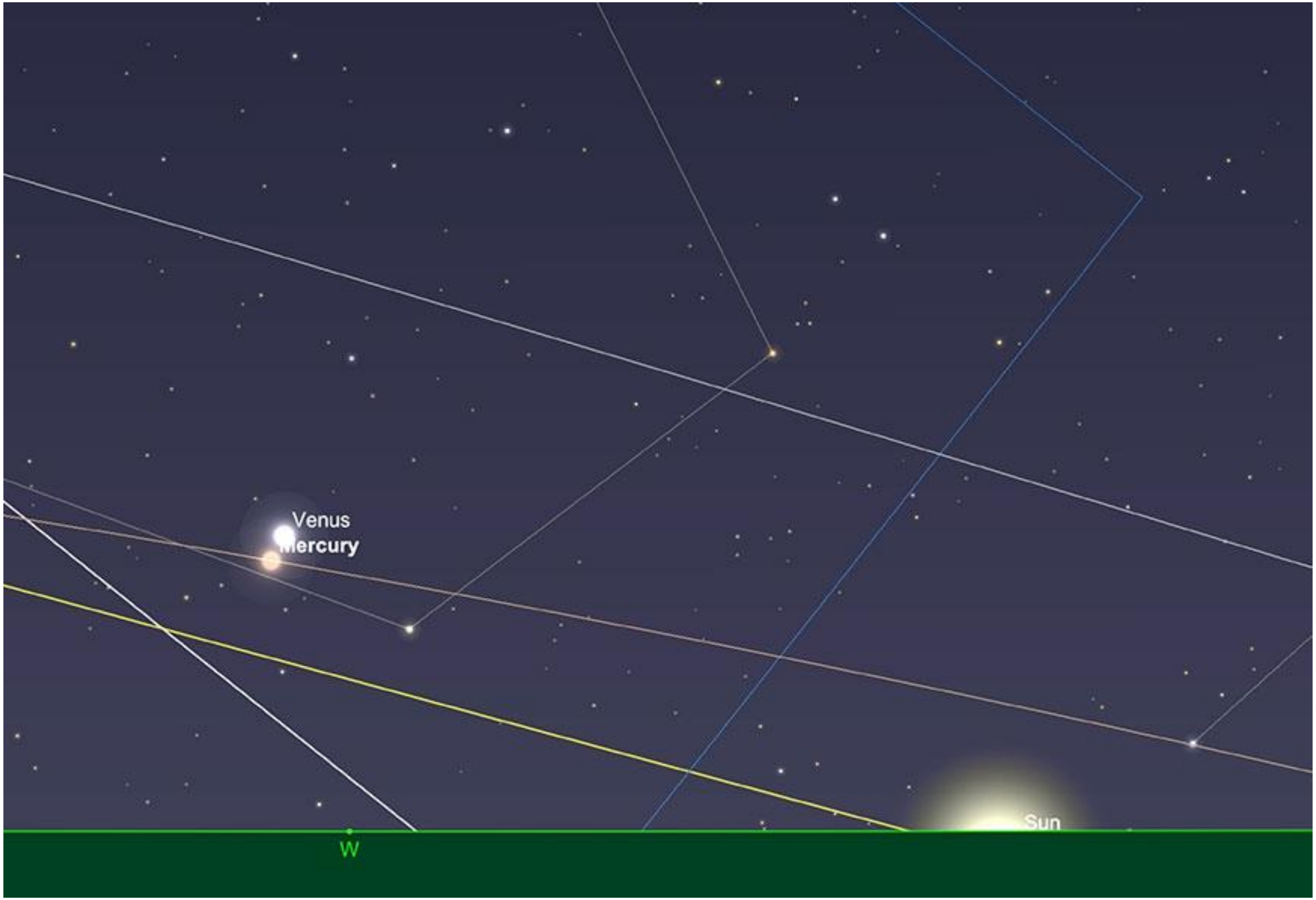

Lynx
Ursa Major
Moon
Leo Minor
Cancer
Canis Minor
Monoceros
Leo
Sextans
Mars

The Moon at High Morning Crescent Phase in Gemini, sunrise 23rd September. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

Mercury

Mercury starts September just shy of Superior Conjunction, which it reaches on the 4th, so will not be readily observable until later in the month, when it emerges as an evening object.

On the evening of the 13th, Mercury will come into very close conjunction with its neighbour, Venus - the two being separated by just 18 minutes of arc. Sadly, as both planets are just 8 degrees from the Sun and sit at a hardly neck breaking 2 1/2 degrees high at sunset (from 51 degrees N), the spectacle of this close encounter will be unobservable.



Venus
Mercury
Sun
W

Mercury and Venus in close conjunction, sunset, 13th February. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

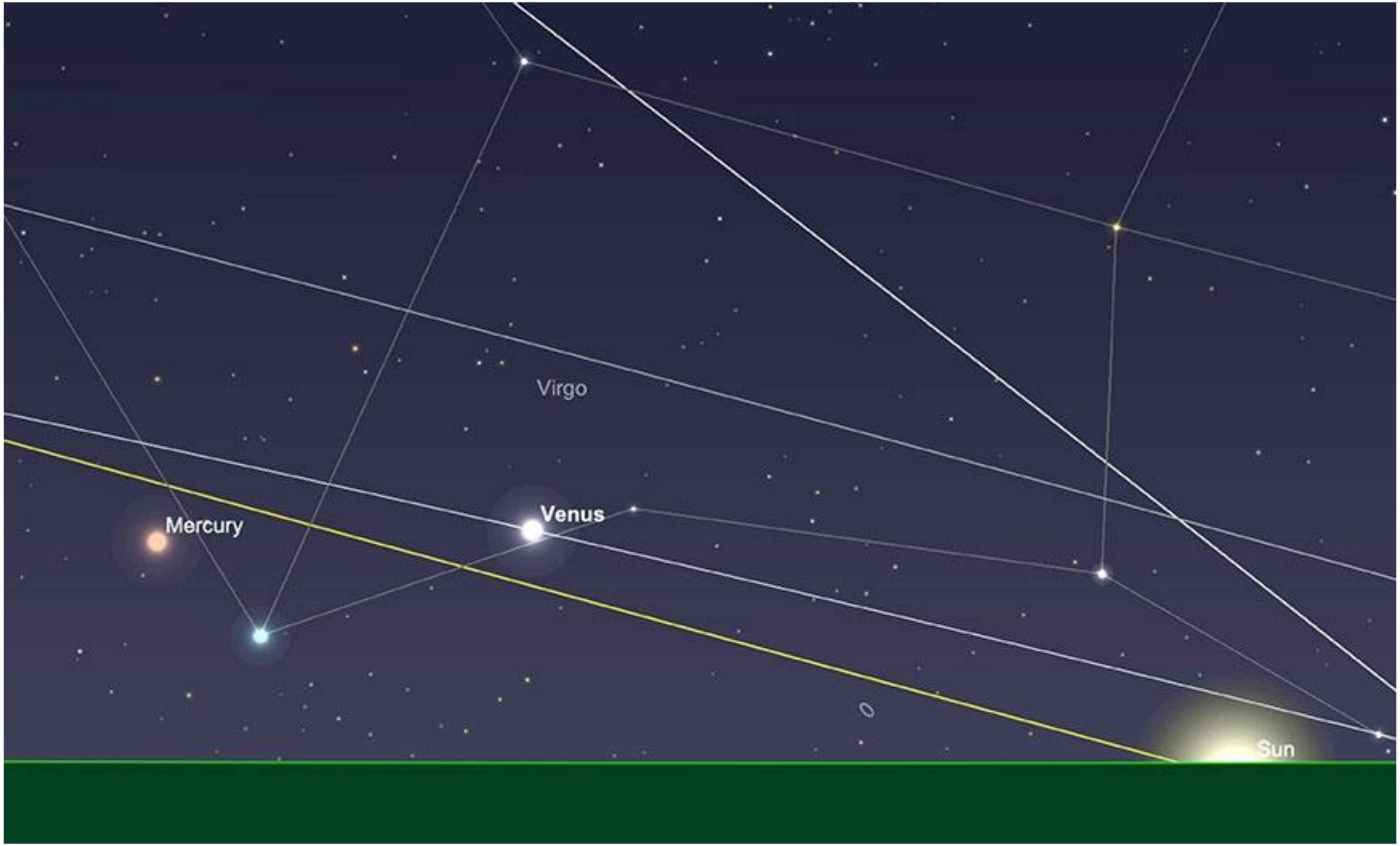
Although Mercury increases its separation from the Sun as the month progresses, it is currently in a very shallow-setting part of the ecliptic (from a temperate northern hemisphere perspective), which doesn’t allow for much separation from the horizon.

By the end of the month, while the planet is of reasonable brightness at -0.1 mag and a separation from the Sun of 19 degrees, Mercury will be just under 3 1/2 degrees high from the horizon at sunset, which will make observations extremely challenging at best (and more realistically) impossible for most.

Mercury is in the last evening/eastern cycle before Mercury’s transit of the Sun on 11th November. We’ll have more details of how to observe this rare event in the next two sky guides.

Venus

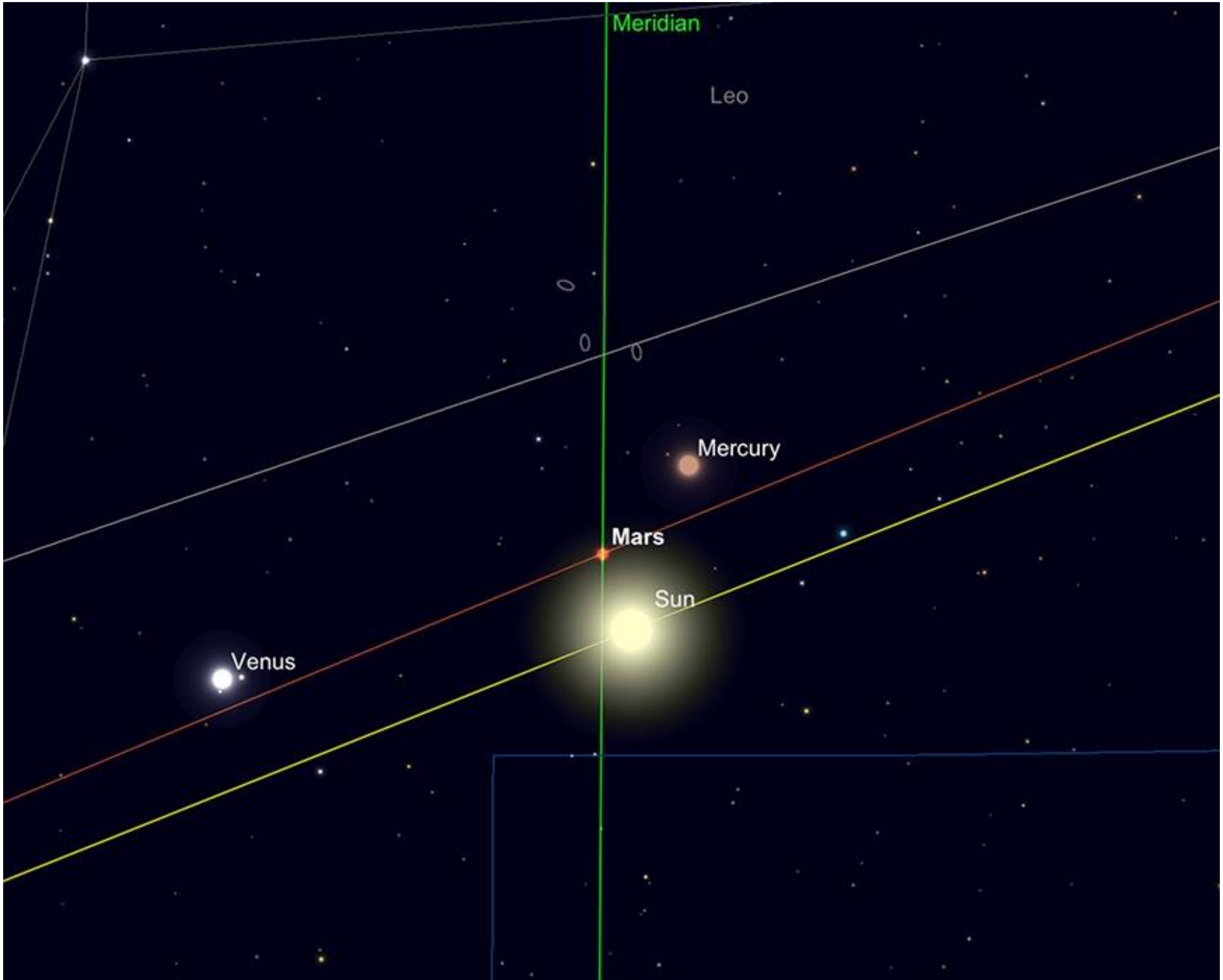
Venus starts September as a evening object, very close to the Sun after Superior Conjunction in mid-August. Still a little too close to the Sun and as we have covered with Mercury, very low for meaningful observations. However, while Venus’ position in the sky currently disappoints us in the temperate northern hemisphere, it is headed for a pretty spectacular evening cycle in the latter part of the year, but especially in the first half of 2020. Better is to come.



Venus low in the west after sunset, 30th September. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

Mars

The Red Planet reaches Superior Conjunction on 2nd September. After this, it emerges as a morning target and it’s the long trek towards Opposition in the latter part of next year. Even at the end of the month, Mars presents a 3.5 arc second, +1.8 mag disk, which has a separation from the Sun of 9 1/2 degrees. Mars will be very difficult, if not impossible, for many to locate at this time and very disappointing if you happened to do so. Look elsewhere for planetary excitement this month - you won’t find it with Mars.


Meridian
Leo
Mercury
Mars
Sun
Venus

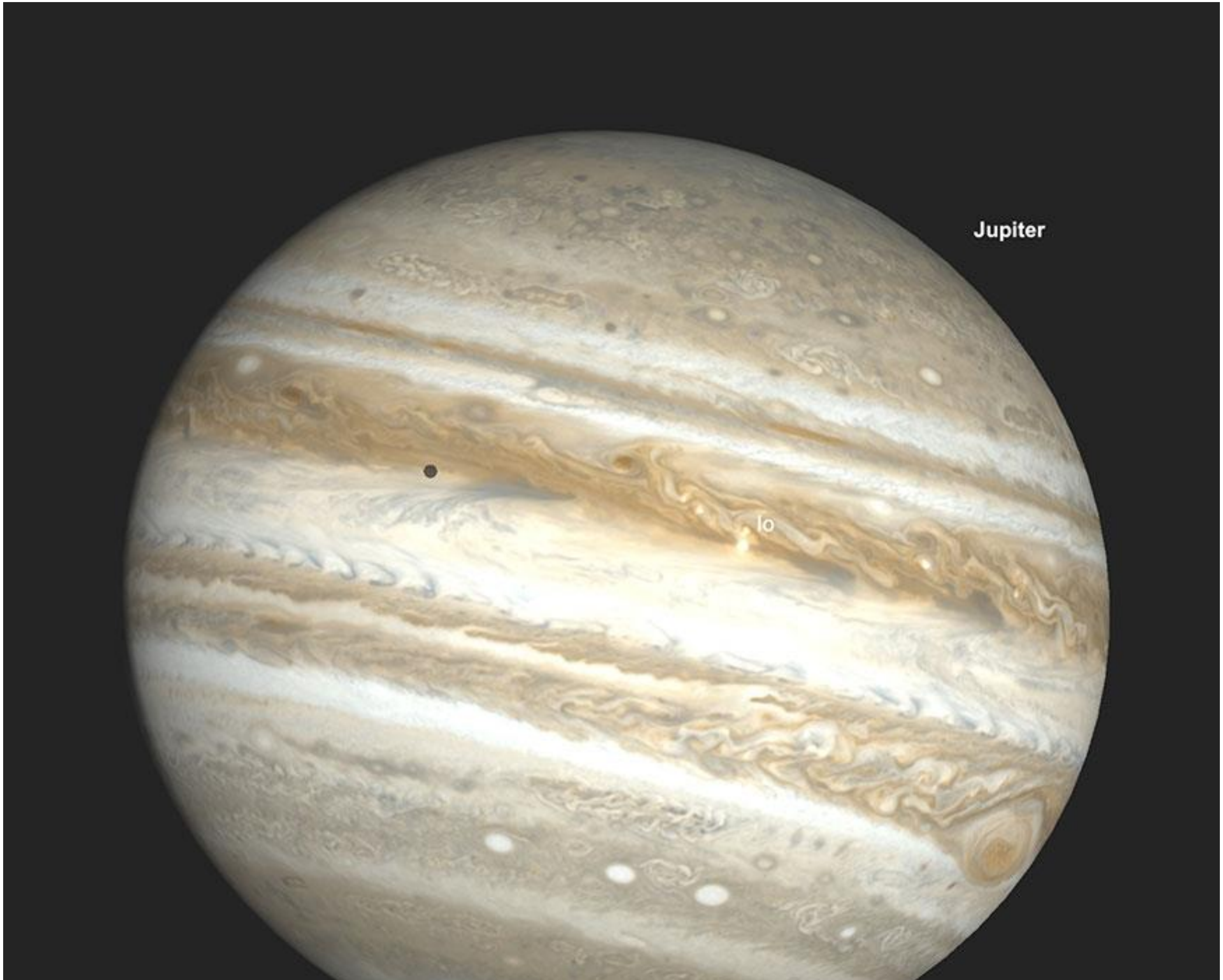
Mars at Superior Conjunction, 2nd September. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

Jupiter

Unlike Mars, the giant planet Jupiter is still well-placed for evening observing. However, now Summer is on the wane for us in the northern hemisphere, the window of opportunity for Jovian observations is slowly shutting. On the 1st, Jupiter transits a little before sunset and sets at around 11.15pm (from 51 degrees N).

The King of the Planets is never poor in a telescope, but caution must be advised for those of us in the observing it in the northern hemisphere, as the planet is low in the south of the ecliptic and subject to much more in the way of potential atmospheric disturbance. Keeping magnification sensible will help combat poor seeing conditions to a certain extent. It's pointless making any planetary target bigger and consequently appear lower in brightness and contrast detail. The 80A Filter is a light blue and is regularly recommended for Jovian observations. While it can't help with atmospheric seeing, it can help isolate cloud belt detail and is useful in observing and isolate transits and shadow transits.

In terms of Jovian events, there's a Great Red Spot transit in the early evening of the 1st and one a little later at 9.36pm on the 3rd, a Europa Transit/Shadow Transit on the early evening of 4th September that's visible from Europe. This is followed on the early evening of the 6th by a dual GRS and Io Transit/Shadow Transit in the early evening, which continues until Jupiter sets from Europe. GRS transits on the 8th at 8.45pm, at on the 10th at 10.45. There's a dual GRS/Europe Transit on the 11th, starting before sunset, but visible for some time after. Similar dual events occur for the GRS and Io on the evening of the 13th. The GRS transits in the evening of the 15th around 9.30pm and on the 20th at 8.45 and again on the 25th at 7.55pm. There's an Io transit at 7.50pm on the 27th and another observable GRS transit at 7.05pm on the 30th.

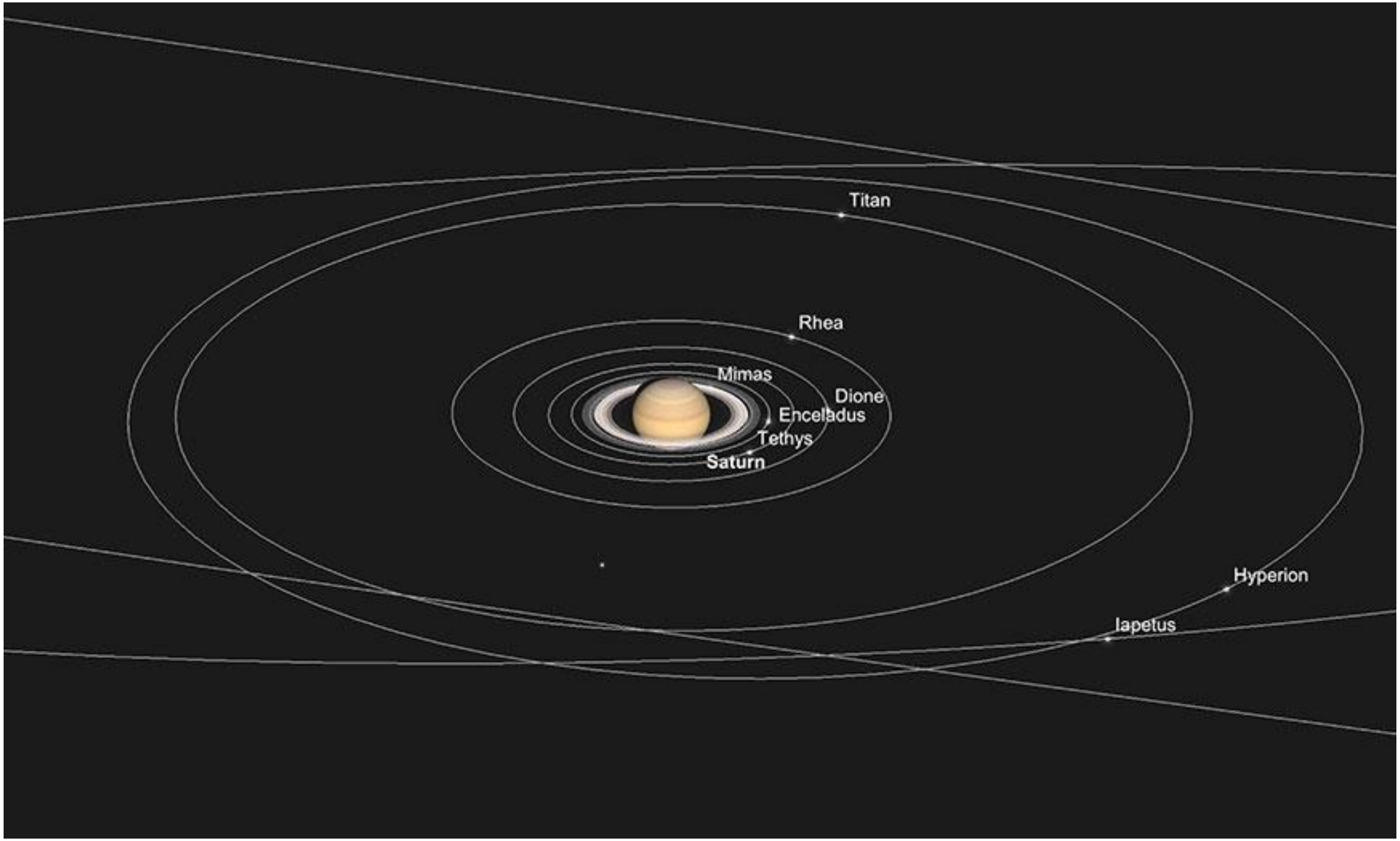

Jupiter
Io

Jupiter with Great Red Spot Io and Io Shadow Transit, 9pm, 6th September. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

By the end of the month, Jupiter sets at around 9.30 from the UK. This is countered somewhat by the steady encroachment of earlier darkness, but make the most of our time with Jupiter in the early evenings during September.

Saturn

Again, like Jupiter, Saturn is very well seen in the evening. Again, like Jupiter, it's low for observers in the temperate northern hemisphere, but is always worth seeking out, no matter where in the world you find yourself. At the beginning of the month, now being a little past Opposition, Saturn has dropped from its peak angular size, to a slightly smaller 17.6 arc seconds diameter and its brightness at +0.3 mag has faded very slightly from July and August's peak. Saturn of course will present a wonderful view in any telescope, with its glorious rings, while just past their point of maximum opening, very well presented for observation.



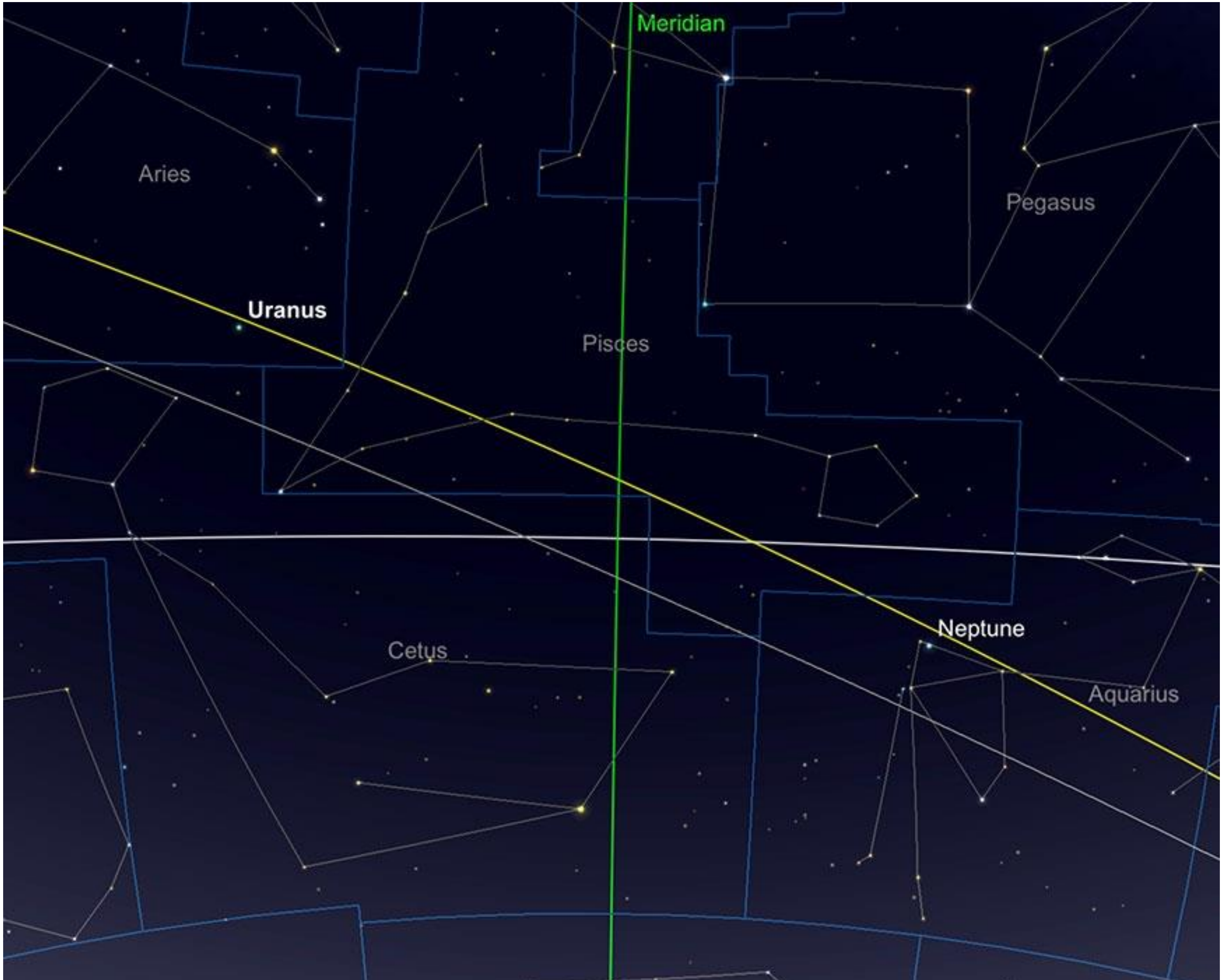
Saturn and Inner Moons, 15th September. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

Saturn reaches transit point on the 1st at a little before 9.30pm from Europe. This means it is at its peak height in the sky and offers the best potential for viewing at its furthest point from the horizon. Saturn tends to appear slightly less affected by atmospherics that Jupiter is. But this is more of a perceptual difference -

Jupiter being that much brighter, disturbances are easier to see. If you have a telescope, check this phenomenon out, as Saturn and Jupiter are at much the same altitude during the mid-to-late evenings in the early part of the month.   The planet will set at a little before 1.30am at the beginning of September. By mid-month, transit point occurs and hour earlier than it did on the 1st, with roughly the same being the case for setting times. By the end of September, Saturn will transit at a little before 7.30pm, when it sits around 16 degrees high in the south (from 51 degrees N) and sets around four hours later. Just as with Jupiter, the window for evening observations of Saturn is closing, so get out and enjoy it at a sociable hour of the night.

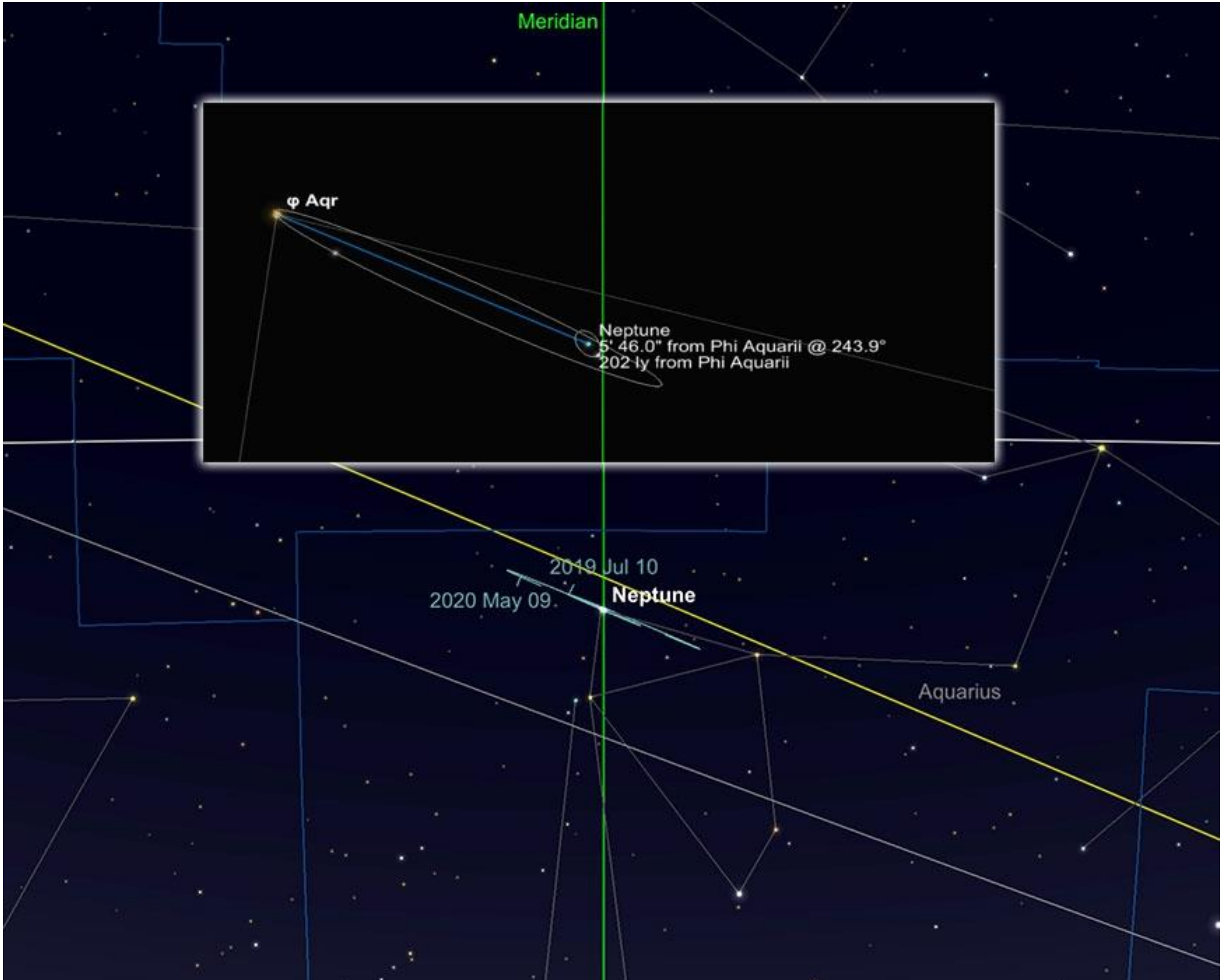
Uranus and Neptune

The outer planets are still visible largely as morning objects, but both Uranus and Neptune rise in the the evening during September. The brighter Uranus rises in Aries a little before 8.30pm on the 15th, but Neptune being further west in the ecliptic in Aquarius, rises earlier at just past 7pm. Neither planet attains significant altitude until the small hours of the morning, with Neptune transiting at 12.40am and Uranus later at a little after 3.30am during mid-September.


Meridian
Aries
Pegasus
Uranus
Pisces
Cetus
Neptune
Aquarius

Uranus and Neptune relative positions, September 2019. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

This month, Neptune steals the limelight somewhat, as the planet is headed for Opposition on 10th September. While this is significant, it doesn't lead to the large increases in brightness and angular size as it does with some more interior solar system inhabitants. This is simply down to the fact that Neptune is a *very* long way from Earth. On the evening of Opposition, Neptune will lie 4.3275 billion km from Earth, with the light travel time between the two worlds of just under 241 minutes. Neptune will be +7.8 magnitude and 2.4 seconds of arc across at this point - hardly a large or brilliant target. Still, with a small telescope, or a reasonable-sized pair of binoculars, the planet will be relatively easy to find form a dark site on opposition evening, as it sits not too far (just over 6 arc minutes) from Phi Aquarii - the 4th magnitude star right at the top of the roughly pentagonal asterism of stars in the east of Aquarius. You won't see this star with the naked eye from really light polluted environments, but binoculars should still pick it up relatively easily. Neptune can be found just to the west of Phi during the night. While Neptune is hardly a striking sight, it is an achievement to find it and it's often commented quite how blue it appears in telescopes. Given Pluto's demotion from true planetary status by the IAU, Neptune is now the furthest "planet" from the Sun.

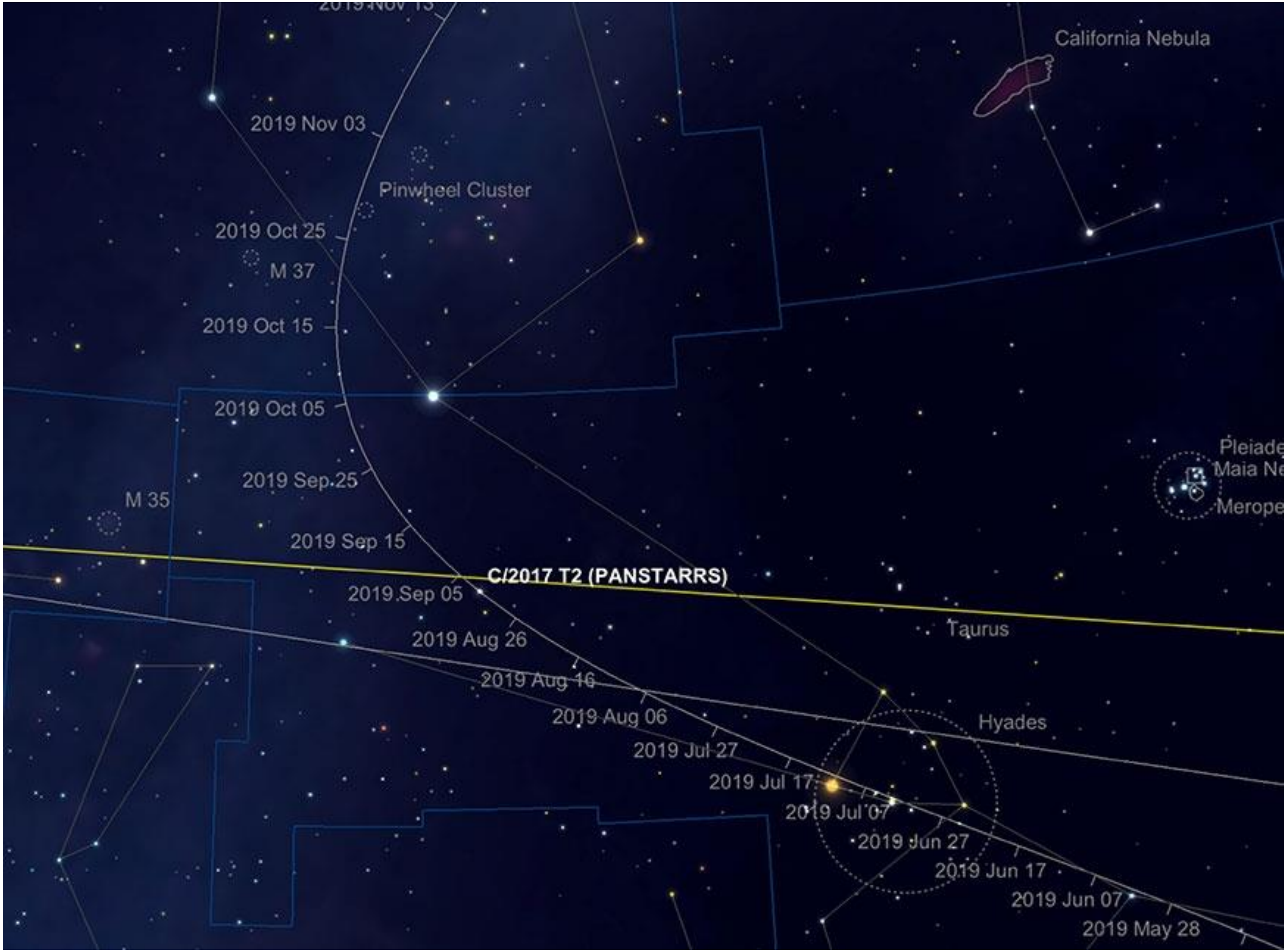

Meridian
φ Aqr
Neptune
5' 46.0" from Phi Aquarii @ 243.9°
202 ly from Phi Aquarii
2019 Jul 10
2020 May 09
Neptune
Aquarius

Neptune's position next to Phi Aquarii, Opposition night, 10th September. *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

Uranus, by contrast, will be significantly brighter that Neptune, at +5.7 magnitude and 3.7 arc seconds across during much of September, as it makes its own way towards opposition in late October. Sitting higher in the sky in Aries, it is possible to make out the planet with the naked eye from very dark locations, but binoculars and telescopes will reveal its pale green-grey disk.

Comets

As reported in previous sky guides, we have the prospect of C/2017 T2 PanSTARRS to look forward to. This comet was discovered back in 2017, by the panSTARRS automated survey. It emerged from conjunction with the Sun at the end of July/early August will be observable in the constellation of Taurus during September. Found between the horns of the Bull for the entirety of the month, it is shouldn't be too difficult, but you will need a telescope or powerful binoculars to pick it up. Proximity to the “Winter” Milky Way through Taurus may make the comet a more difficult spot, as will its surface brightness, which will still be quite low. However, observations made recently suggest the comet's brightness is rising slightly faster than predicted and looks as if it continues on this course, it should be technically a naked eye object - but quite how naked eye, remains to be seen. Brightness prediction of comets is a rather dark art and in this sky guide we are always cautious not to ramp up excitement too high. However, the median of C/2017 T2 PanSTARRS' predicted brightness puts it around the +0 magnitude. The upper range of brightness prediction goes up to -5 to -6 magnitudes - brighter than Venus. However, more sobering are the lower estimates which put it around +5-6 at best. The comet is predicted to reach peak brightness in March to May of 2020, so there is still some way to go before then. The good news for Northern Hemisphere observation is that the comet will be circumpolar for most of its peak in 2020 - though this will obviously disadvantage those in the Southern Hemisphere somewhat.



California Nebula
2019 Nov 03
Pinwheel Cluster
2019 Oct 25
M 37
2019 Oct 15
2019 Oct 05
2019 Sep 25
M 35
2019 Sep 15
C/2017 T2 (PANSTARRS)
2019 Sep 05
2019 Aug 26
2019 Aug 16
2019 Aug 06
2019 Jul 27
2019 Jul 17
2019 Jul 07
2019 Jun 27
2019 Jun 17
2019 Jun 07
2019 May 28
Taurus
Hyades

Comet PanSTARRS 2017 T2 path during September (comet position shown 1st Sept). *mage created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.*

Meteors

After the disappointing wash out of the Moon's influence over the peak of August's Perseids, September is pretty quiet as meteors go, though the shower can persist into September, albeit at a much reduced rate.

Two other minor showers reach their maxima during the month: the Aurigids (which peak on September 1st), and the September Epsilon Perseids (which peak on September 9th). These showers are very sparse, with Zenithal Hourly Rates of around 5 meteors per hour. The sometimes-mentioned Piscids (which peak on 21st September) are also supposedly active during this period, but opinions seem to differ as to whether or not this shower is truly active any longer. There are another couple of minor showers associated with Pisces - the Delta and Pi Piscids, which are active (if that's the right word) during June and July, but these have ZHRs of less than 2 meteors. Certainly not worth braving the wee small hours looking out for. The Southern Taurid shower also begins in September - but will be anything but - dribbling out a miserable two meteors an hour for much of the month. This is clearly not a major meteor event and barely distinguishable from the average amount of sporadic meteors that you'd regularly see from a dark site. However, if you do see a meteor during September and trace its path back towards Taurus, then the chances are you've seen an illusive Southern Taurid. Don't stay up for one especially though!
The positive identification of the source of a particular meteor can be tricky with minor showers, especially at this time of year when the Perseids are still reasonably active until late August (and occasionally beyond) and the next major shower to peak, the Orionids (more of which in next month's Sky Guide) run from late August to mid-November. Taking photos or sketching the direction of meteors is the only reliable way of estimating which shower they belong to. Tracing the direction of the meteor back to a radiant will allow an observer to make an educated assumption. Of course, there's always the possibility of catching a sporadic meteor, which can come from any direction at any moment.

Deep Sky Delights in Cepheus

Cepheus is a large, though rather sparse (from a stellar magnitude point of view) circumpolar constellation which borders Ursa Minor, Draco, Cassiopeia and Cygnus. In sky lore Cepheus represents the King to Cassiopeia's Queen and the two of them were supposedly parents to adjacent Andromeda. All of the brighter stars of this particular constellation are located to in the southern part of Cepheus, the brightest of which is Alderamin, Alpha Cephei, Alderamin is a notable star, due to the fact that it is one of the closest bright stars to the northern celestial pole - in fact it will come within 3 degrees of the pole in 5,500 years time, due to Earth's axis' precessional "wobble". Allthough not especially bright at around +2.47 mag, Alderamin is quite a nearby star, thought to lie around 49 light years from our solar system. Although sharing some main sequence characteristics with stars like the Sun, Alderamin may be on the cusp of becoming a red giant, much as our Sun will after it runs out of Hydrogen as its primary nuclear fuel. It is a mysterious star which emits much more X-ray radiation than it should. The process behind this is not well understood, but may be down to an unseen companion star whipping up the upper layers of the primary star. Alderamin appears to rotate very quickly for its size - whereas our Sun will take around 40 days to revolve once, Alderamin rotates once every day!

Although Cepheus is not an especially prominent constellation in terms of bright stars, it is littered with nebulousity. Just under 6 degrees to the north of Alderamin lurks a wonderful object - NGC7023, otherwise known as the Iris Nebula. Despite its nickname, the Iris Nebula is actually a collection of stars bounded by a reflection nebula. The NGC7032 catalogue number actually refers to the cluster of stars, rather than the nebulosity that surrounds it. The main central star of the cluster, V380 Cephei, is responsible for the main illumination of the nebula, despite its reasonably low brightness of +7.36 mag.

Visually, the central, brighter part of the nebula is visible in reasonably small telescopes - and although none of the colour revealed in long duration astrophotos is visible, the central nebulosity takes on a delicate, layered quality. UHC filters and OIII filters will isolate some areas of visual nebulosity, though as this is a reflection nebula, rather than an emission object, the less harsh Skyglow and CLS filters are probably better for this particular target. As previously eluded to, imaging really reveals the iris-like nature of this nebula in all its glory - as shown by Mark Blundell's picture below.

This object is a tricky one to image as the darker parts of the nebula really require quite a long exposure time in order to be shown at all.

3 1/3rd degrees to the NE of the Iris Nebula is the star Beta Cephei, which is a variable star - though not the archetypal Cepheid Variable. For this, we must look towards Delta Cephei, which is the opposite corner of the "Square of Cepheus" to Beta. Delta Cephei's variability was discovered in 1784 by John Goodriche - a remarkable Dutch-born English Astronomer. Goodriche was born to a fairly wealthy family, but became profoundly deaf after an early childhood illness. In an age where disability was not viewed in the more enlightened way it is today, Goodriche was fortunate enough to be educated at the groundbreaking Thomas Braidwood Academy for the Deaf in Edinburgh and later at the dissenter's college Warrington Academy. After completing his education, he returned to his parents in York, where he was befriended by their neighbour and distant cousin, Edward Pigott. Nathaniel Pigott, the father of Edward had a great interest in Astronomy and sensing Goodriche's enthusiasm, Edward gave him a series of stars to observe. The Pigott's observatory was quite advanced for the time and gave Goodriche the opportunity to study numerous variable stars, one of which was Delta Cephei. Although many variable stars had been noted in the sky from classical times - the most notable of which being the classic eclipsing binary Algol, in nearby Perseus - variable star research was still really in its infancy.

Edward Pigott was the first to observe what we now know as a Cepheid Variable, Eta Aquilae, but it was Goodriche that presented his theory on eclipsing variables (based largely on his observations of nearby Algol, in Perseus), to the Royal Society in May 1783. On the merit of this presentation, Goodriche was awarded the prestigious Royal Society's Copely Medal for "outstanding achievements in research in any branch of science" in the same year. He was elected a Fellow of the Royal Society in April 1786, but tragically died of pneumonia just a few days after this honour was awarded.

Although Godriche got the eclipsing model of Algol correct, he could not have known at the time how different the mechanism of Delta Cephei's variability was - nor the far-reaching influence (no pun intended) that the greater knowledge of the class of what would become known as Cepheid Variables would have. The classical eclipsing variable is caused by a dimmer star passing in front of a brighter companion, dimming its light down somewhat. Cepheid Variables are very different: these are pulsating stars, which vary their brightness with their radial pulsation. The key to the usefulness of Cepheid variables is that their pulsation period is linked quite precisely - certainly in the case of classical Cepheids. So bright are Cepheids that by studying the variations in these pulses, it is possible to calculate with very reasonable precision the luminance of these stars - even over vast distances. The longer the period of the lighter stage of their variability, the more luminous they tend to be. It is by observations of these "standard candles" of the Universe that it was first possible to accurately estimate the distance of objects not only within the Milky Way, but much further afield. Cepheid Variables became the way in which the distance between galaxies and the vast scale of our immediate Universe was first calculated by Edwin Hubble in 1924, when after observing the Cepheid Variables within the Andromeda Galaxy, M31, he managed to work out that it was not an object within our galaxy, but considerably further away.

Standard Cepheid Variables are ordinarily yellow supergiant stars which are typically 4-30 times the mass of our Sun and up to a staggering 100,000 times as bright. They are of spectral class F6-K2, which vary their radius by around 25% over a period of days to months. This variability is caused by layers of ionised Helium building up in the outside layers of these stars. This Ionised Helium becomes opaque, masking radiation from the interior of the star, which in turn builds up, expanding the opaque ionised layer until it cools, de-ionising the layer, which then becomes transparent, revealing the light from within, causing a dramatic increase in brightness. This transparent layer then collapses back towards the star's surface under gravity, after which it is heated and ionised again, thus refreshing the ionisation layer and starting the process off again. It is thought that this build up of Helium is indicative of the fact that Cepheids are running out of Hydrogen as their primary fuel and are thus entering into the last phases of their lives. There are also fainter Cepheid Variable II stars, which tend to be yet older and less energetic and also Anomalous Cepheids, which are rapidly pulsing stars and may well be younger than both type I and II populations. The relationship between type I and II Cepheid Variables was defined by the work of Water Baade in the 1940s, leading to a four-fold upwards revision of the distance from our galaxy to M31.

Delta Cepheus itself varies in brightness in terms of magnitude from +3.6 to +4.2, over the space of just over 5 days. This variability is not slowly uniform - its decay is much longer than its subsequent increase in brightness. After refinement of its distance by observations over 200 years, it is now thought Delta Cepheus is around 870 light years away it truly is a remarkable star. Delta Cephei also has a companion star of around +6.3 mag, separated by about 41 arc seconds.

Just over 5° to the north of Delta Cepheus lies the Cave Nebula, otherwise known as Sharpless 2-155. A difficult visual object in all but the largest amateur telescopes,
The Cave Nebula really comes alive in long duration exposures -particularly those photographs which are taken with hydrogen alpha filtration. The Cave Nebula has an apparent size 50 x 30 arc minutes and an apparent visual magnitude of +7.69 magnitude. It is so called because its red hydrogen gas cloud is bisected by a curving dark area giving rise to a perceived similarity to the entrance to a cave - and who are we to argue? Lying around 2400 light years away, The Cave is thought to be around 70 light years across.

Just over 12° to the north of the Cave Nebula lies very different nebula. This particular target is a planetary nebula, NGC 40, otherwise known as the Bow Tie. The Bow Tie Nebula, although apparently much fainter than its neighbour is in actual fact an easier target in telescopes. Although +10.6 magnitude, the Bow Tie Nebula has a tiny apparent size 0.6 x 0.6 arc minutes dimensions. This means that its surface brightness is comparatively high, a common trait for planetary nebula. Sir William Herschel discovered in NGC 40 in November 1788. A moderate-sized telescope will pick out the Bow Tie reasonably easily, a 10 inch + reflecting telescope of moderate power will show NGC 40 very well, and a UHC Filter will provide a higher contrast view of the nebula, picking out some of the delicate structure within and really showing the "Bow Tie" shape off well. Lying around 2700 to 3500 light years away NGC 40 is thought to be around one light years across. This is well worth finding in a telescope - especially if the Cave Nebula proves elusive!
Back South through the Cave Nebula, we arrive at the dual Star Cluster and nebulousity of NGC7380, otherwise known as the Wizard Nebula. This object is around the 7th magnitude in brightness and part of the nebulosity does appear in long duration images, like a figire in a pointed wizard's hat standing with their back to the viewer. Se Mark Blundell's image below and see if you can pick the "wizard" out yourself.


NGC 7380 Wizard Nebula
Const: Cepheus
By Mark Blundell
19th August 2017

This object is around 100 light years in diameter and lies over 7200 light years from Earth. While this object photographs extremely well, it is perilously difficult to observe visually and requires large apertures, very favourable observing conditions and OIII filters to stand a chance of seeign the nebulosity.
Nine degrees to the west of NGC7380, we come to the last of Cepheus' rewarding deep sky objects, the fabulous nebula IC 1396, also known as the Elephant's Trunk, within whose borders lies the richly red Mu Cephei, otherwise known as the Garnet Star. IC 1396 is a massive cloud of nebulosity, some 170 x 140 arc minutes across and although it is listed as "bright" at +5.59 mag, though is very diffuse. A UHC filter will enhance the visual view of the Elephant's Trunk and an OIII filter will help to isolate the dark lanes in the nebula, the most major of which does resemble the prehensile trunk of an elephant - as displayed in Mark Blundell's image below.


IC 1396 Elephant Trunk Nebula
Const Cepheus
By Mark Blundell
11/19th September 2015

As with other diffuse nebulae, IC 1396 does really come into its own in terms of imaging - though those attempting to record IC 1396 photographically will need a fairly short focal telescope - preferably a wide angle lens in order to cram this 170 x 140 arc minute object in! A blue star, HD 206267 lies near the centre of this massive object and is responsible for the ionisation of the entire nebula. The outward pressure from the radiation of this huge star has compressed the interior of the nebula, forming globules of gas and dust that are in the process of forming stars. There are several very young stars which have just (cosmically speaking) started life within IC 1396 - they are under 100,000 years of age. It is unsure quite how large IC 1396 actually is - it is hundreds of light years in diameter and is thought to lie around 3000 light years from Earth.

Another well-photographed area of nebulosity in Cepheus is NGC7822 and the star cluster Berkley 59. Around 3000 light years away, this young cluster and the nebulosity surrounding it show similar structures to IC1396, as aptly demonstrated in Mark Blundell's image below:


NGC 7822 & Berkley 59
Const: Cepheus
By Mark Blundell
19th January 2017

Mu Cephei, otherwise known as the Garnet Star, as mentioned previously, appears to lie within the nebula, but is now thought to be around 2000 light years further away. It is a massive and very red star, which is in the last stages of its life and is a prime candidate for Supernova at some point "soon" - though this could be in hundreds of thousands, if not millions of years time. If placed within out solar system, in place of our Sun, the outer edges of Mu Cephei would lie somewhere between Jupiter and Saturn's orbit and fit a staggering 1 billion stars the volume of the Sun inside its sphere. The star is ejecting its outer layers, which are drifting off and forming radial nebulosity around the system. Mu Cephei is yet another of Cepheus' variable stars, which varies from between +3.6 mag to around +5 mag every 2 to 2 1/2 years. It is also phenomenally luminous - some 100,000 times brighter than our Sun. We are fortunate that Mu Cephei is so far away from us, as when this star does eventually die, it will be problematic, to put it mildly, for any system within a 50-100 light years radius of the resulting Supernova.

Text: Kerin Smith