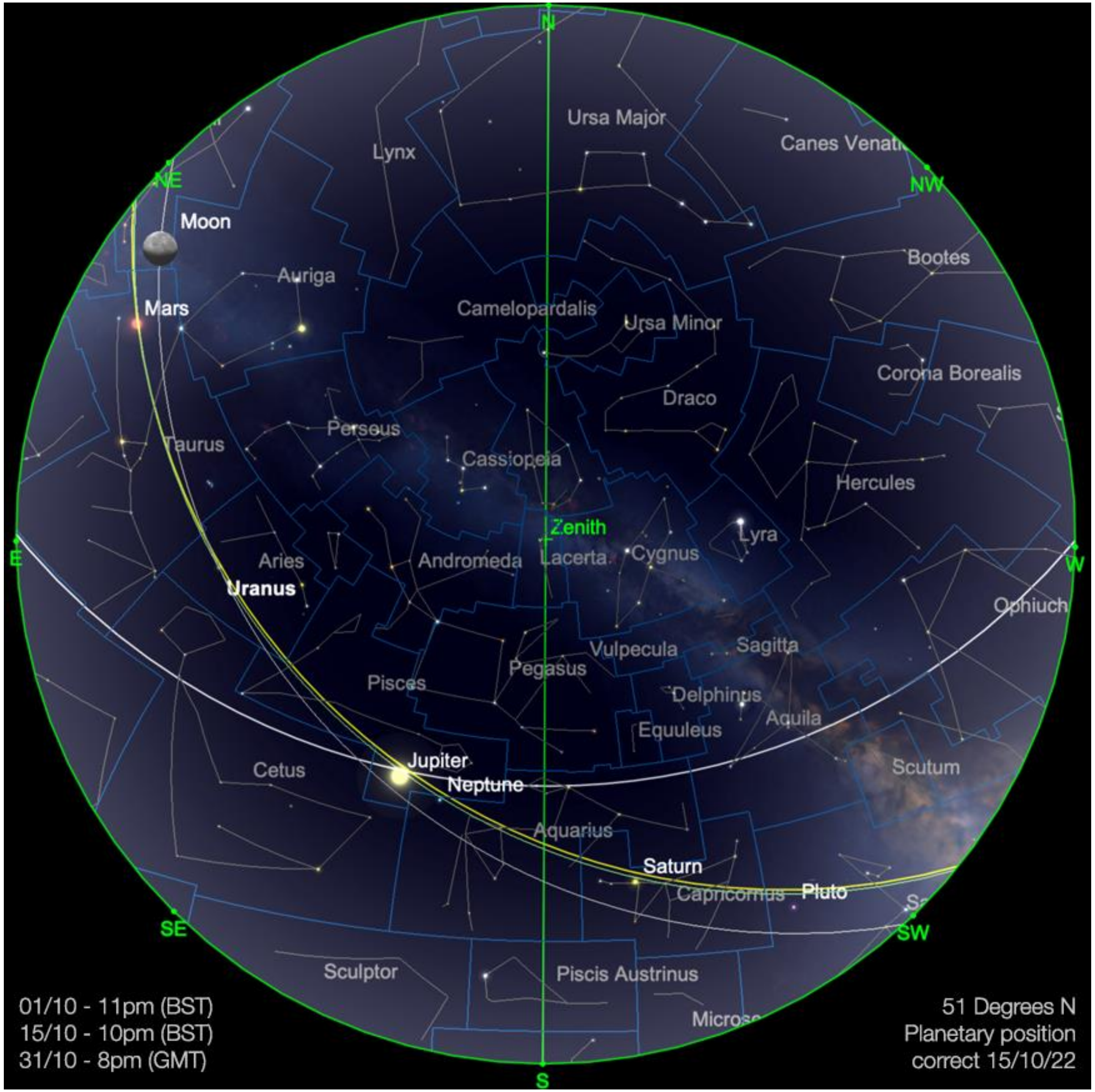

Telescope House October Sky Guide
The most up-to-date guide to Planetary and Lunar activity,
Comet News, plus Deep Sky Delights...


N
NE
NW
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Zenith
Ursa Major
Canes Venati
Lynx
Moon
Auriga
Mars
Camelopardalis
Ursa Minor
Bootes
Corona Borealis
Draco
Perseus
Taurus
Cassiopeia
Hercules
Lyra
Aries
Andromeda
Lacerta
Cygnus
Uranus
Ophiuch
Vulpecula
Sagitta
Pegasus
Pisces
Delphinus
Aquila
Equuleus
Cetus
Jupiter
Neptune
Scutum
Aquarius
Saturn
Capricornus
Pluto
Sculptor
Piscis Austrinus
Micros
01/10 - 11pm (BST)
15/10 - 10pm (BST)
31/10 - 8pm (GMT)
51 Degrees N
Planetary position
correct 15/10/22

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

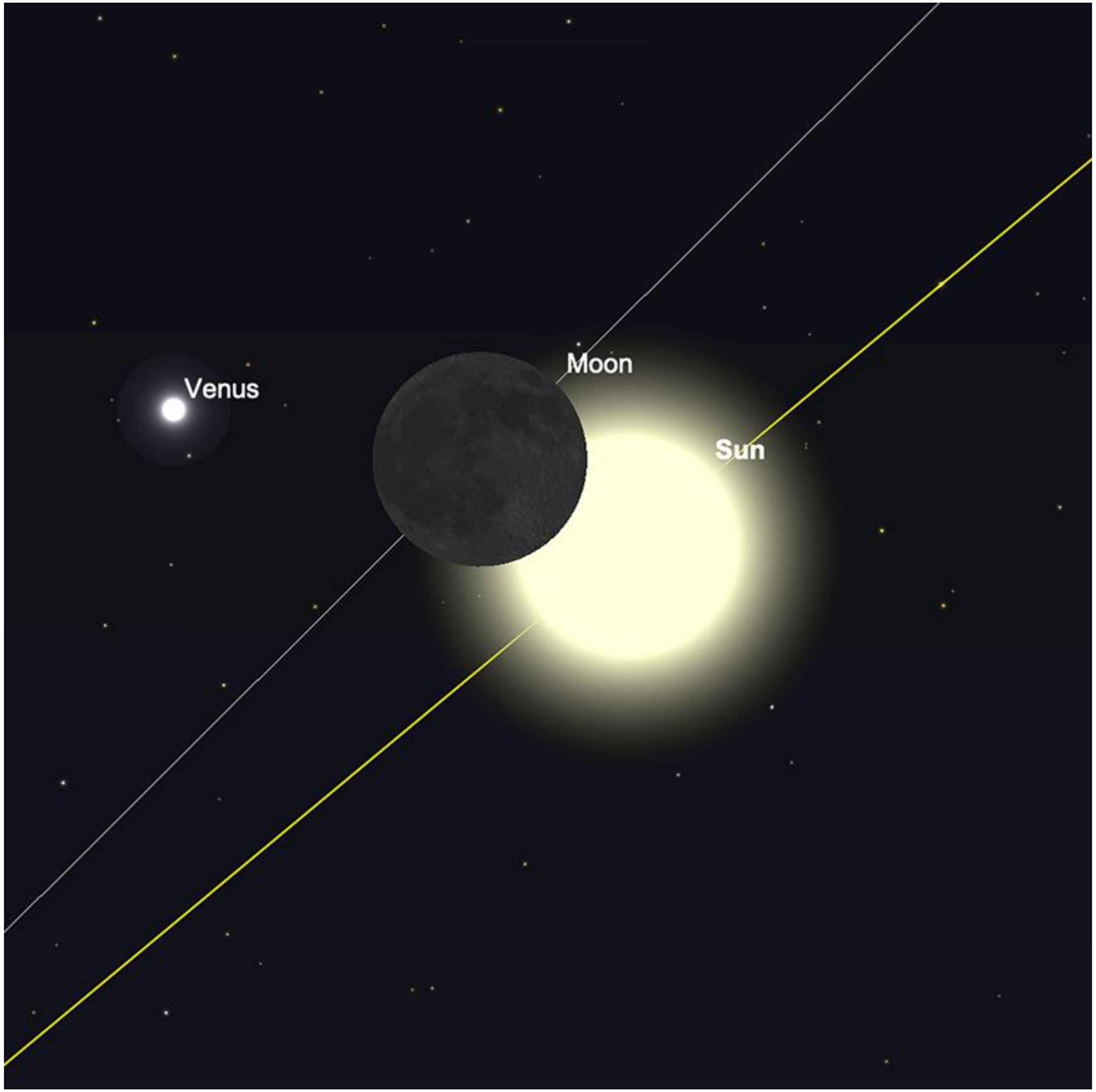
We have now passed the Autumnal Equinox, which means that for those of us in the temperate northern hemisphere, night outweighs day, in terms of length. Another consequence of this is the return to standard time which occurs across Europe on the 30th of October 2022. This has the effect of increasing hours of available daylight in the mornings (for a period, at least). If Summer time, or Daylight Saving Time, was allowed to continue beyond the end of October, those in higher northern latitudes would experience extremely dark mornings, with the attendant safety problems for those travelling to school and work and also a potential increase in energy bills. The knock-on effect of this change for us astronomers is that the evenings get darker earlier, which makes for easier observations at a more sociable time of the night. Those living further south, tend not to notice the extremes of a lighter summer, or a darker winter, as the day and night is much more even the closer to the equator you get.

Wherever you are in the world there's plenty to see in the skies above us this month, so let's see what's in store…

The Solar System

The Sun

There is a Partial Solar Eclipse on the morning of the 25th October. This will start at just after 10am (BST) and peak at a little before 11am, before ending at a little before 11.45am. This will be visible over the entirety of Europe, apart from Portugal and Southern Spain and will appear greater the further North you are located (peaking at around 85% in Northern Russia). Most residents of Central Europe and the British Isles will experience about 25-40% obscuration. As this is the case, proper solar protection for eyesight is absolutely essential and solar glasses, solar film or solar filters should be used, if attempting to observe the eclipse with the naked eye, or optical assistance. Solar Eclipses are reasonably sedate affairs from start to finish, so even if the October weather is not entirely co-operative, there's still a reasonable chance of finding a window in the clouds to see some of it.



Partial Solar Eclipse peak, 10:55am (BST), 25th October. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

The Moon

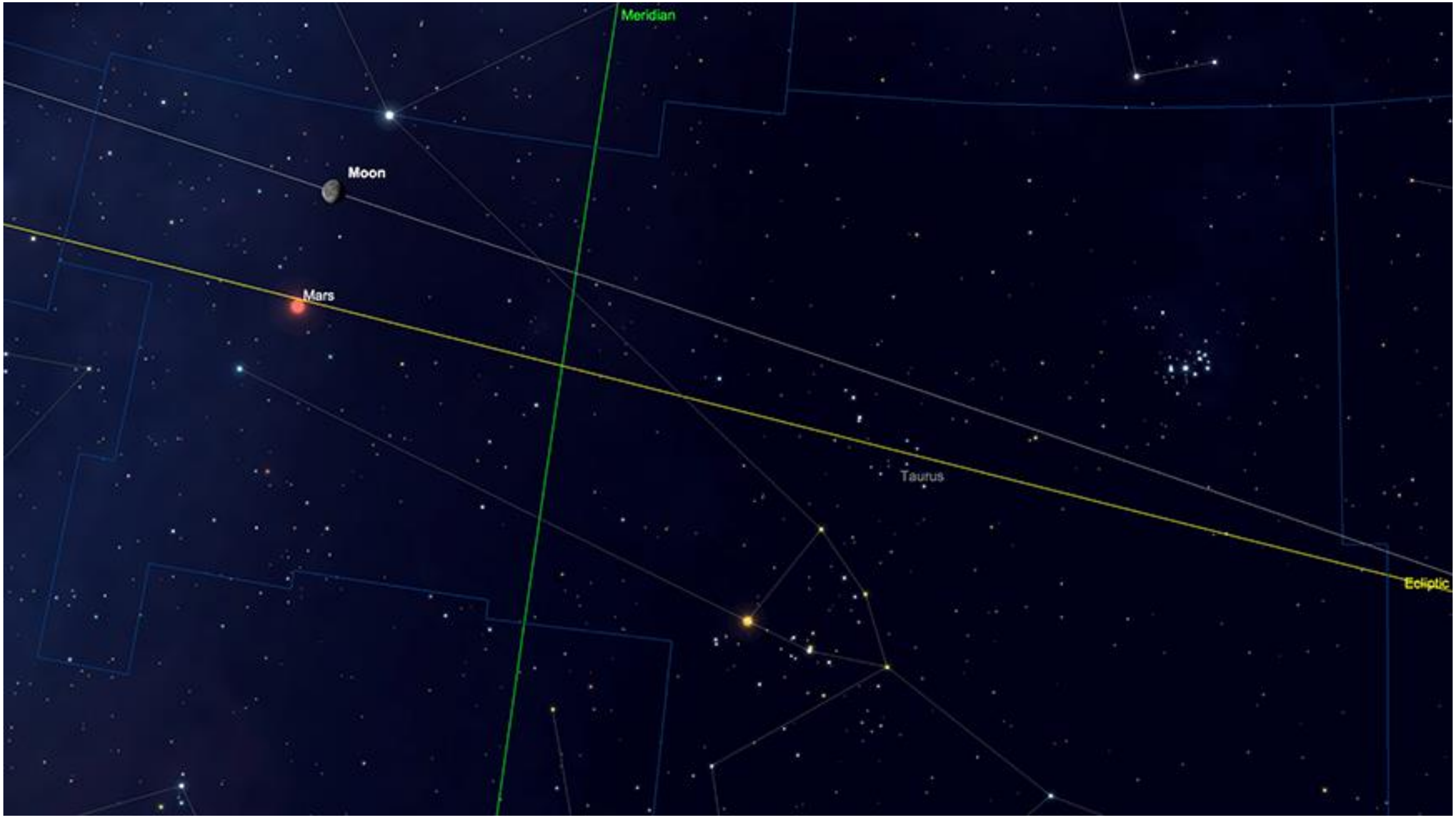
Our natural satellite begins the month of October in the constellation of Ophiuchus, as a Waxing crescent of around 34% illumination. On the 1st the Moon rises at just beyond 2 pm (BST) and transits as a little before 6 pm in the evening.

The first few days of the month sees the Moon pass through Sagittarius, on into Capricornus, where it meets the planet Saturn on the evening of the 5th - the two bodies separated from each other by around 5°. The Moon continues its journey up through Aquarius and into the constellation of Pisces, where it will meet the planet Jupiter on the evening of October 8th. The Moon will slide just over 2 1/2° to the south of the prominent planet.

The next evening, on October 9th, the Moon becomes Full, again, in the constellation of Pisces. At this point we normally remind readers that the early part of the second week of October will be the least favourable part of the month for deep sky observation and imaging, without the use of narrowband filtration.

Over the next couple of days the Moon tracks from Pisces, into the constellation of Aries, where it will meet the planet Uranus. Unlike last month, where the Moon occulted Uranus, this month it will merely pass extremely close to the planet, the two worlds being separated by just under half a degree at the closest separation, which is reached in the early morning hours of October 12th.

Around the middle part of the month the Moon climbs through the highest part of the northern ecliptic, through Taurus and on into Gemini, passing the brightening Mars on the evening of the 15th, until it reaches Last Quarter phase on the evening of October 17th.



The Moon and Mars in Taurus, early morning, 15th October. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

From this point on, the Moon rolls down the other side of the ecliptic, through cancer and into Leo, narrowing its crescent phase as it goes. This is another one of the so-called "High Morning Autumn Crescent phases", which reward the early riser with potentially the best views of the Moon's western limb. Sadly, at this point in time lunar libration does not favour the exposure of further around the Moon's Western limb, making observation of interesting features like the Mare Orientale, much more challenging, than they can be at others.

The latter part of October finds the Moon diving towards the Sun through Leo, on into Virgo, where it will meet up with the planet Mercury on the morning of the 24th, before it becomes new, joining the Sun on the 25th October.

After this point in the month, the Moon becomes an evening object again and spends the last week of October sailing low in the sky (from a temperate northern hemisphere perspective) through the constellations of Libra, Scorpius, Ophiuchus and Sagittarius, until it ends October on the 31st in Capricornus, just shy of First Quarter phase.

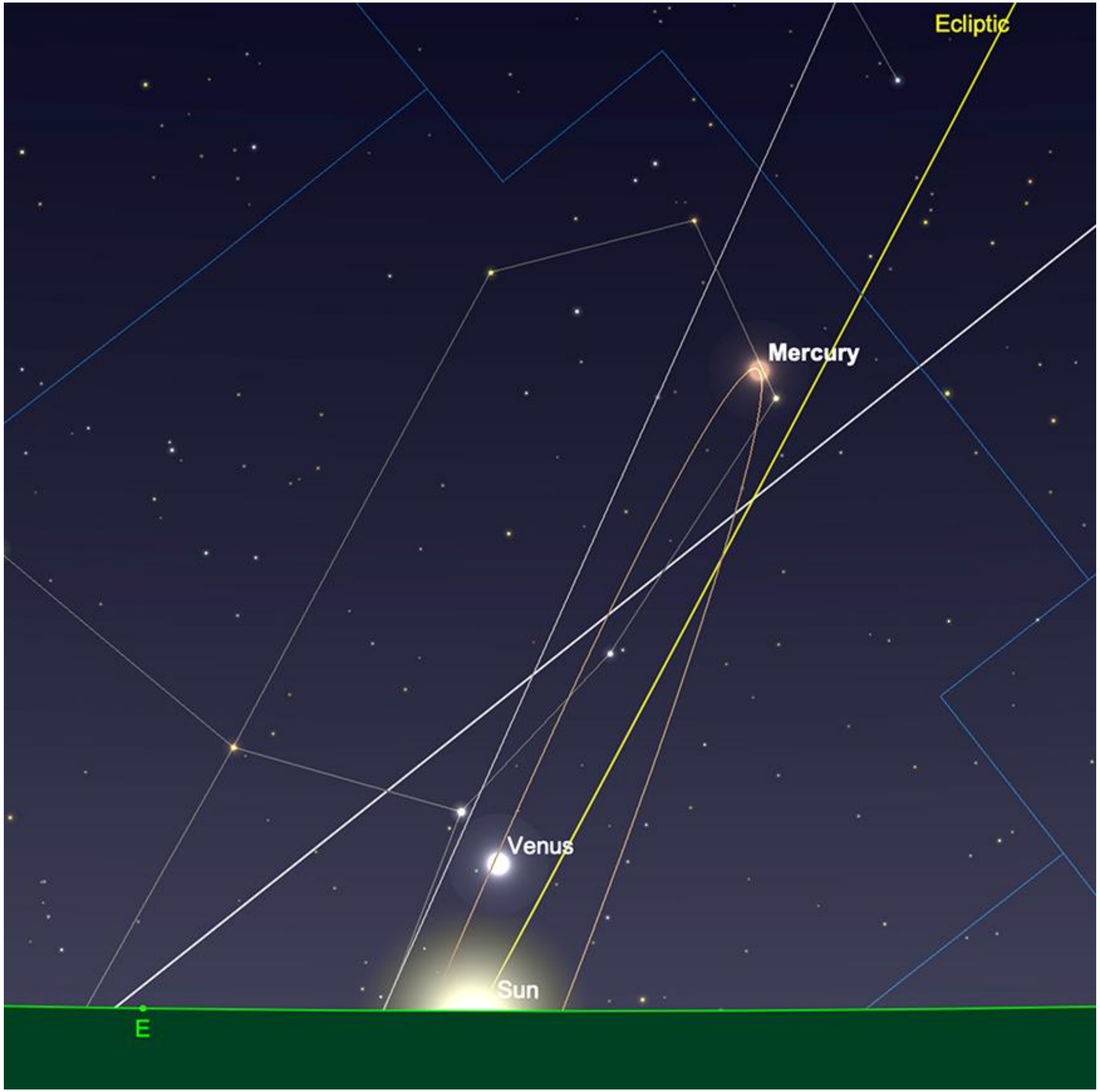
Mercury

Mercury begins October in a pretty favourable position for morning observation. It is ascending in the sky, away from our parent star, as seen from the perspective of earthbound observers, brightening as it increases its separation from the Sun. The first few days of October find Mercury rapidly accelerating from a visual magnitude of +1.3 on the 1st to a much brighter -0.3 a week later.

Mercury reaches maximum western elongation on October 8th, when it will stand around 15 1/2° above the horizon at sunrise (from 51° north). This really represents one of the best opportunities to observe the solar system's innermost planet this year and as such, you are encouraged to get up early and find a clear easterly aspect to make observations from. At this point in time, Mercury appears as a small 7.1 arc second diameter disc, just under 50% illuminated. It should be fairly straightforward to observe the planet's phase, even in small telescopes, but you may find the use of moderate filtration useful (a Wratten no. 21, Orange filter is particularly recommended to deaden the shimmering of the atmosphere) and of course, sky conditions must be as favourable as possible.

Beyond this point in time, Mercury starts to sink back towards the Sun. However, the next week sees the planet brightening yet further, peaking at around -1 magnitude from the 15th onward, until the latter part of the month. The planet will certainly be prominent, but its decreasing separation from the Sun naturally makes it more and more challenging to observe towards the end of October.

We end of the month, with Mercury sitting just 4° above the horizon (from 51° north) at sunrise, separated from the Sun by just under 5 1/2°, shining at -1.2 magnitude. It goes without saying that at this point the planet will be extremely challenging, if not impossible to observe

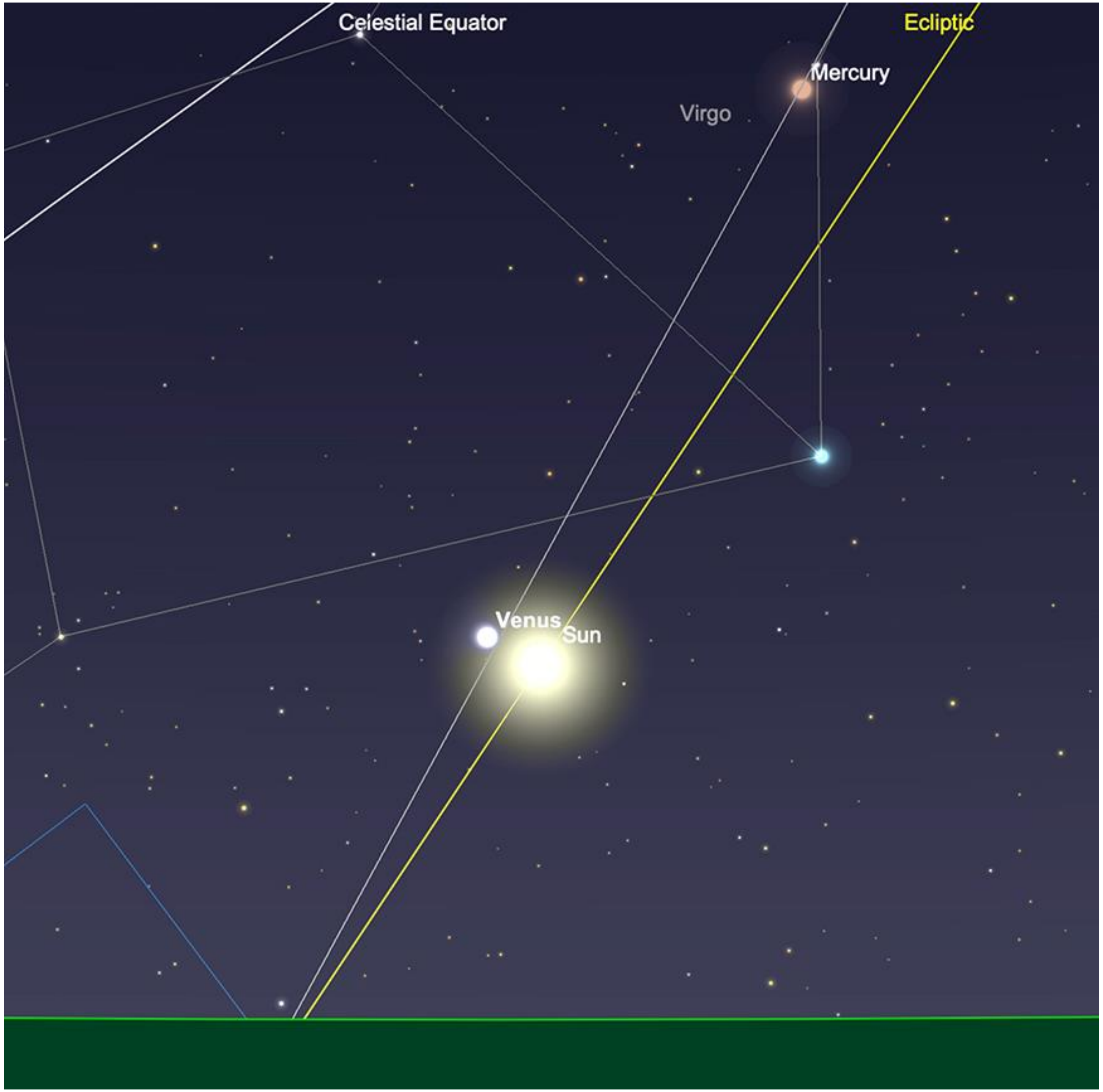

Ecliptic
Mercury
Venus
Sun
E

Mercury at greatest western elongation, sunrise, 8th October. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Venus

Mercury's neighbour Venus, is in a much more challenging position to reserve at the months beginning. At -3.9 magnitude on the first, Venus can be found just below 5° elevation above the horizon (from 51° north), as the Sun rises. The planet's intrinsic brightness means it will be relatively straightforward to see, even in the challenging conditions of morning twilight.

However, as the month progresses, it would be clear to observers that Venus is becoming more and more difficult to make out before sunrise. The reason for this is simple, the planet is heading towards superior conjunction (the opposing side of the Sun from our perspective here on Earth) on October 23 and from much beyond the very early part of the month will be completely unobservable. Venus will slowly emerge on the evening side of the Sun from the very tail end of October, but as the Ecliptic plane sets at a very shallow angle with the Sun at this time of the year, will remain low and very difficult to observe for those in higher northern latitudes. By the time we reach the end of October, Venus is only separated from the Sun by a little under 2 1/2° and as such will remain invisible until later in November.



Celestial Equator
Ecliptic
Mercury
Virgo
Venus
Sun

Venus at superior conjunction, October 23rd. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

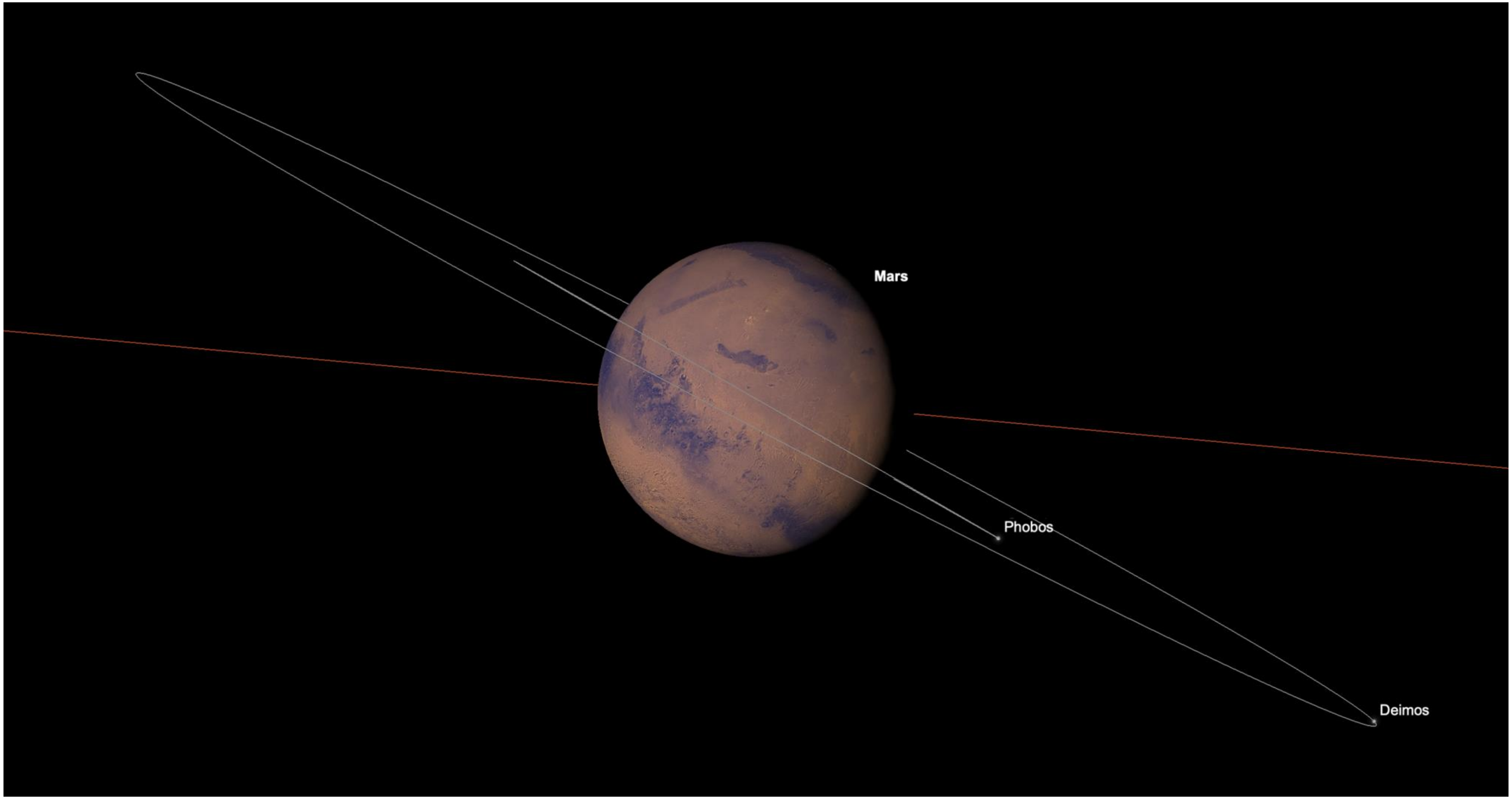
Mars

Where is Venus is disappointing this month, Mars is beginning to come into its own, in anticipation of December's Opposition. We find Mars on the 1st of October, sitting between the "Horns of the Bull", in the constellation of Taurus. At -0.6 magnitude, it is still not spectacularly bright, but is improving and now showing at 12 arc seconds diameter disc to those with telescopes or larger binoculars.

By mid month, Mars has gained in both brightness and angular diameter and on the evening of the 15th, will show 13.3 arc diameter disc, shining at -0.9 magnitude.

By the 31st, Mars will be yet brighter and larger, now -1.2 magnitude and an apparent size of 15 arc seconds diameter. If you have a new telescope to turn towards Mars at this point observations really start to kick in and become inspiring. With moderate to high magnification one can see continental sized features on Mars's surface and if conditions are favourable will be able to pick out the pole of the planet too.

During the next couple of months, Mars continue to grow and brighten spectacularly and by the end of October we are barely over five weeks from opposition. Although Mars is still seen best in the very early hours of the morning when it reaches transit point (around 3 am at the beginning of October), if you are up early enough, Mars will have to be close to the top of your observing list from now this on. As Martian Oppositions only occur once every couple of years, make sure you make the most of the lead up to this one.



Mars at transit point, 3.20am (GMT), 31st October. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

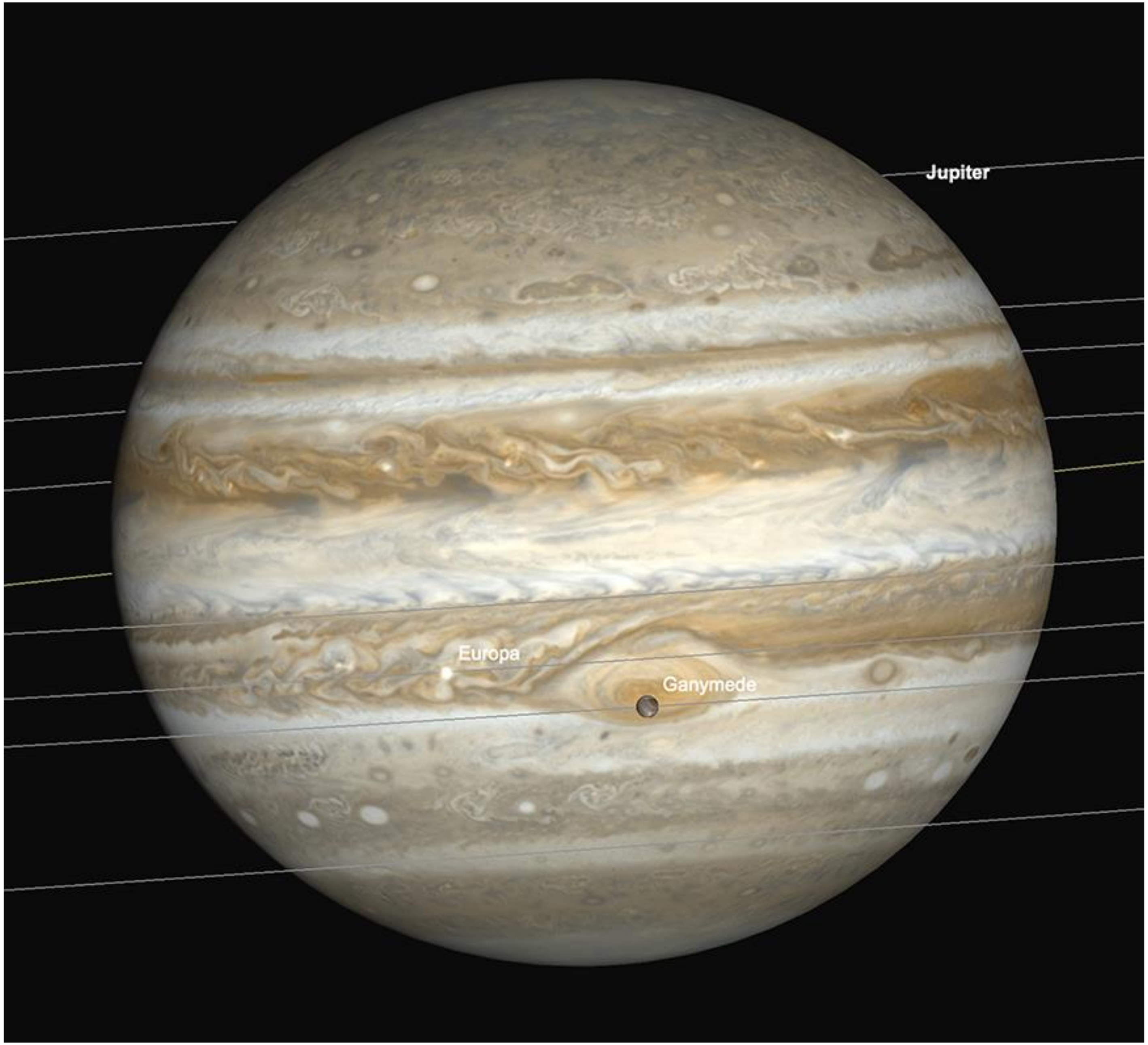
Jupiter

At just past Opposition, Jupiter is still at its peak in terms of brightness. On the 1st October, the planet displays the 49.8 arc second diameter disc, shining at -2.9 magnitude (close to absolute maximum). The planet is a resident of Pisces, meaning that for those in the northern hemisphere it is not badly situated at all - sitting around the celestial equator, it will reach a maximum altitude of just under 40° elevation (from 51° north) at transit point, which it reaches at just before 1am (BST) on the 1st.

By mid month, the planet is still a resident of Pisces and although it has shrunk by a fraction to 49.2 arc seconds diameter, Jupiter is still an incredibly bright -2.9 magnitude. By this point in mid October, Jupiter rises at a little before 5:45 pm and transits at a little before midnight.

By the end of October, Jupiter has faded just a little to -2.8 magnitude but is still displaying an impressive 47.7 arc second diameter disc. By this point the planet will rise at a little before 3:45 pm (GMT) and transit at a little after 9:38 pm(again, GMT).

There are a few easy to observe highlights in terms of Jovian transits during October. The first of these is a mutual transit of Europa and Jupiters Great Red Spot, which starts at a little after 10:30 pm (BST) on the 1st. There is another mutual transit of Io and the GRS on the evening of the fourth peaking at just after 8:15 pm (BST). Io and the GRS come together in mutual transit again on the evening of October 11th at around 9:15 pm (BST). There is yet another Io and GRS transit at around 10:15 pm (BST) on October 18. There is a comparatively rare mutual transit of Callisto and the GRS in the early morning of October 25th (BST), at around 3:15 am, which is followed by a further Io and GRS transit on the evening of the 25th, peaking at around 11pm (BST). Undoubtedly the highlight of October's Jovian transits is a spectacular dual transit of Europa and Ganymede and the GRS, with Ganymede hanging over Jupiter's enormous storm for a significant part of the event. This transit peaks in the early evening, around 8pm, though will be visible for a couple of hours before and after this time. This will be a great opportunity to max out your telescope magnification and see how much detail you can see of it.


Jupiter
Europa
Ganymede

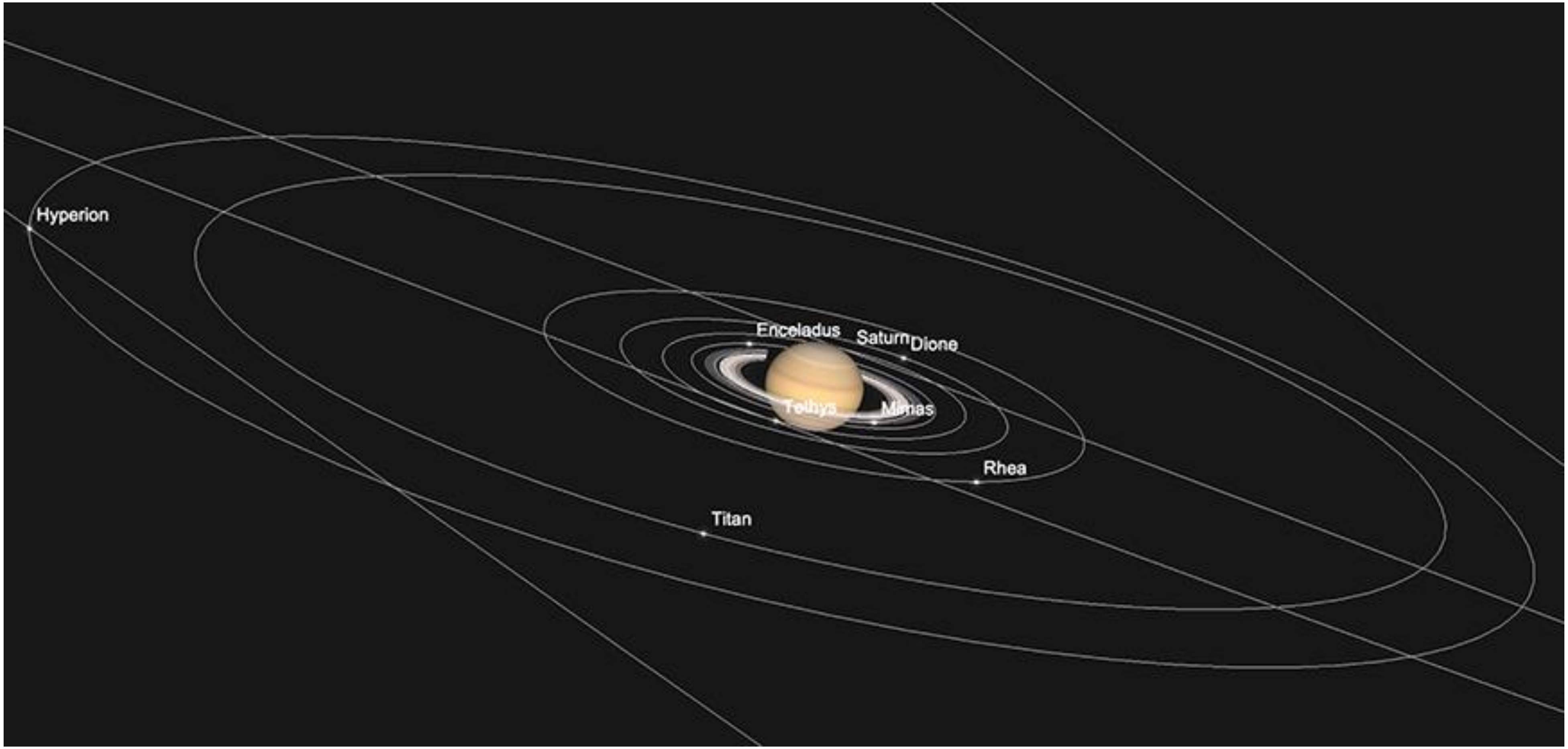
Jupiter, with triple transit of Ganymede, Europa and the Great Red Spot, 8pm (BST), 26th October. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Saturn

Although a little past Opposition now, Saturn is still extremely well placed for observation during the evenings. The 1st sees the planet rising at a little before 5:30 pm (BST) and transiting at just before 10 pm. At this point the planet will be +0.5 magnitude and displaying an 18.1 arc second diameter disc. Saturn will reach an altitude of around 23° elevation above the horizon at transit (from 51° north), meaning that while it is not ideally situated for observers in the higher northern hemisphere, it continues to improve year-on-year from its comparatively recent dip into the extreme part of southern ecliptic.

As the month progresses, not much changes as far as Saturn is concerned. By the time we get to the middle of October Saturn has dimmed fractionally to +0.6 magnitude and now displays 17.7 arc second diameter disc. The planet rises at a little before 4:30 pm (BST) and will transit around 9 pm.

Approaching the end of October, Saturn will have faded again fractionally 2+0.7 magnitude and now displays a 17.3 arc second diameter disc. By this point it rises at a little before 2:30 pm (GMT) and transits at around 7pm, setting at a little after 11.30pm. We must make the most of Saturn's favourable situation in the early evening sky and give it the attention that it deserves, while it is so convenient to observe.



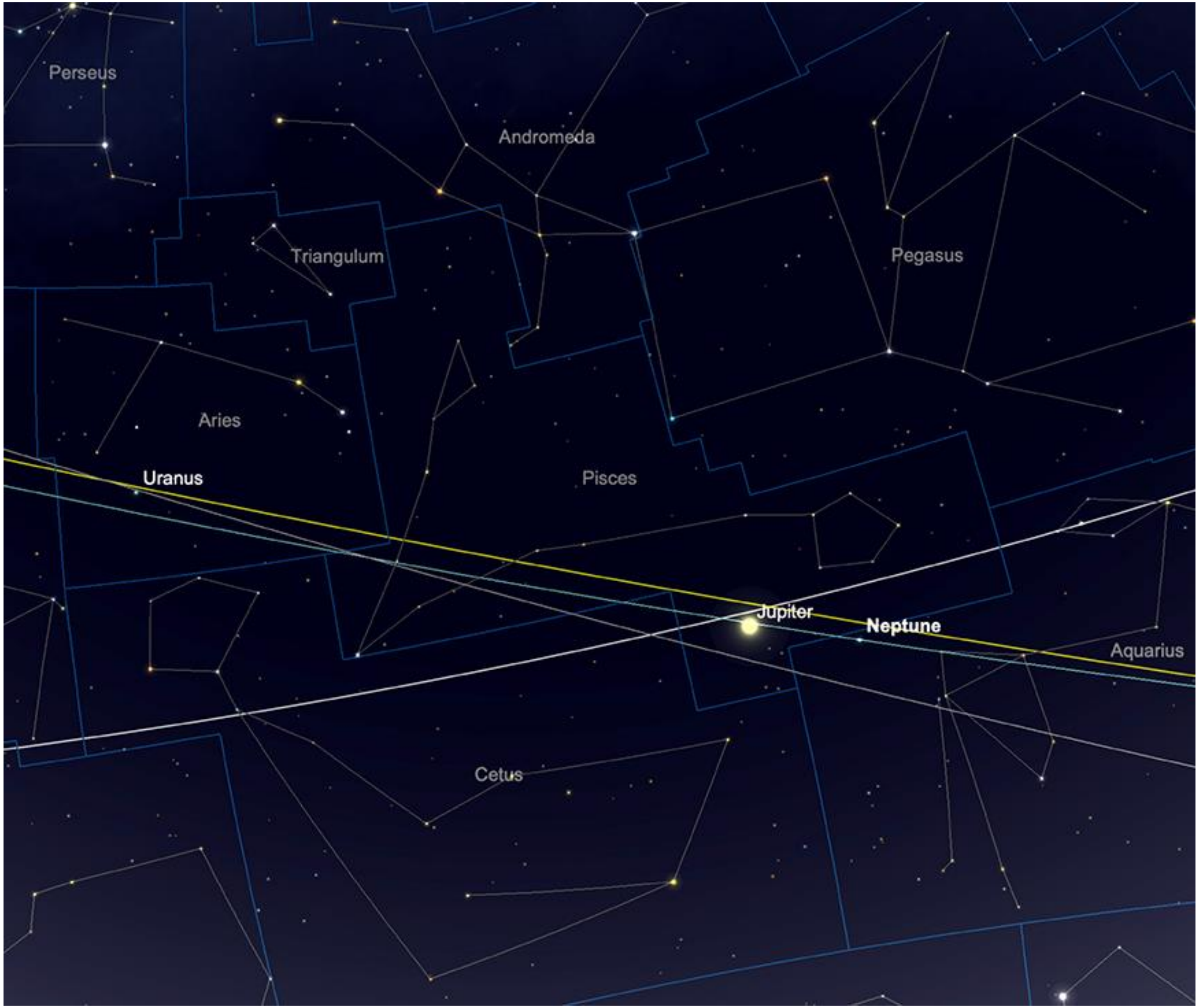
Saturn and inner moons, 31st October. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Uranus and Neptune

The outer planets are both well-situated for observation during October while neither are as prominent as the five “major planets“, they have their own charm and are worth seeking out in telescopes or binoculars. Uranus, is always the brightest of the two and technically naked eye objects from ideal locations. Those of us observing from less than perfect situations will tend to need binoculars at the very least to make positive identification of the planet. Uranus is a resident of Aries and rises at around 7 pm (BST) during the middle part of October transiting at a little before 3 am the following morning.

As we pointed out in previous sky guides, Jupiter (at this point in time) is providing a useful signpost to the location of the nearby planet Neptune. The 31st finds Neptune just under 7° to the east of Jupiter across the border from Pisces into Aquarius. Rising at around 5:30 pm (GMT) on the 31st, Neptune or transit at a little after 11 pm. The planet will display a +7.8 magnitude, 2.4 arc seconds diameter disc, which will definitely need good binoculars if not a telescope to make really positive identification. Once found, as we have commented before, Neptune’s vibrant blue colour is commented on by many observers. Having found the planet, though small and faint, it seems hard to miss.

Naturally, both Uranus and Neptune are comparatively much smaller targets than the major planets are - and as such, it is not expected that a tremendous amount of detail if any can be seen on either world, though those with much larger telescopes can see shading and brighter albedo features on both planets. Though it takes a combination of observing skill, a well set-up telescope and very favourable observing conditions to do so. Those with smaller instruments will content themselves with a positive ID of both worlds.


Perseus
Andromeda
Triangulum
Pegasus
Aries
Uranus
Pisces
Jupiter
Neptune
Aquarius
Cetus

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

Comets

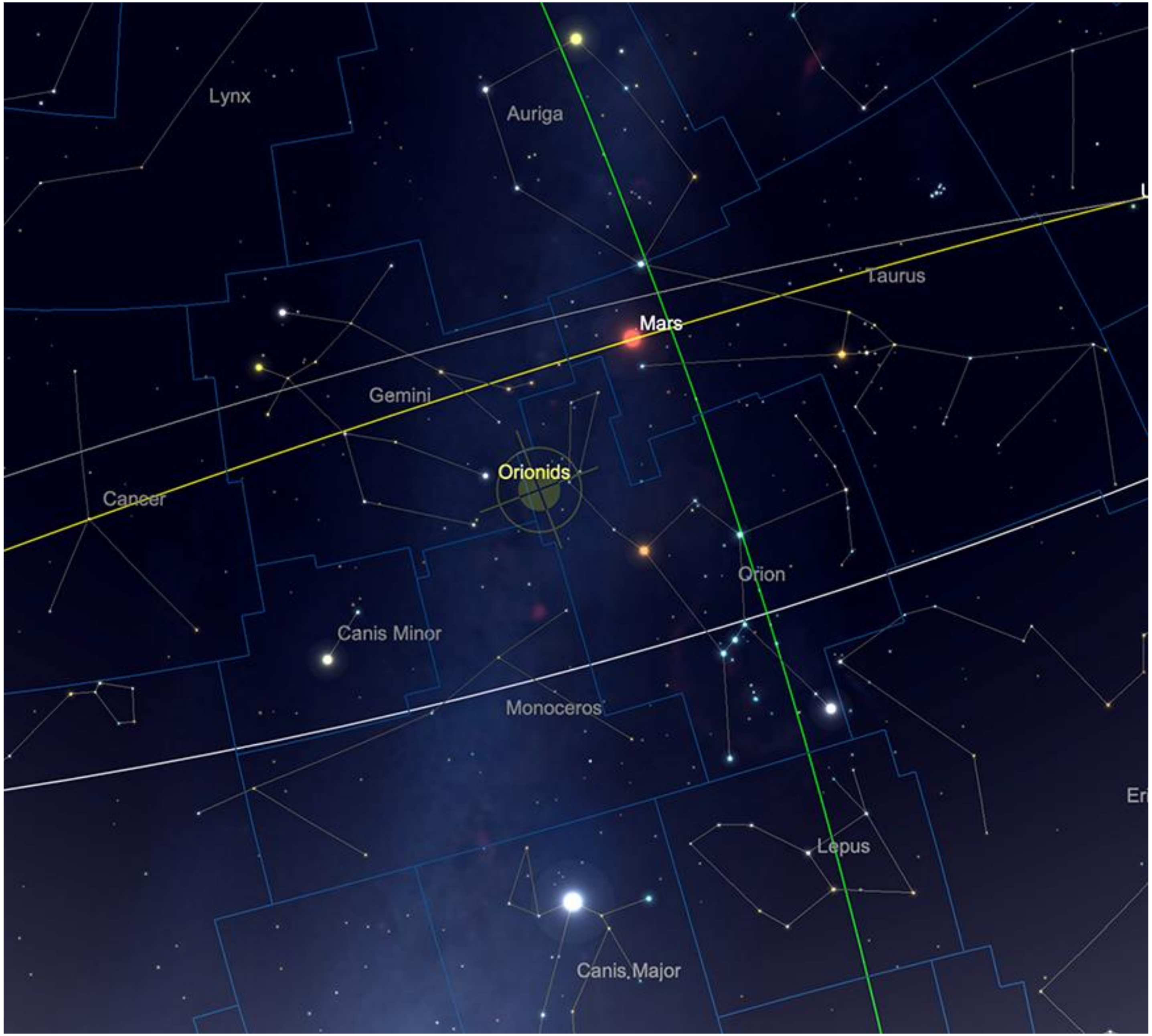
Sadly, comet C/2017 K2 (PanSTARRS) reaches peak brightness just as it disappears below the horizon for observers in the temperate northern hemisphere. Those situated further south will enjoy a good view of the comet at its brightest, though those of us further north will have to content ourselves with reading about it.

Beyond this, we have the potential excitement of 2022 E3 to look forward to, though this will not be at its peak until early next year. All other observable comets are above the 11th magnitude at present and as such, much more difficult targets.

Meteors

The Draconids are a rather poor shower which can be observed in early October and have a zenithal hourly rate of around 10 at maximum. They are associated with comet 21/P Giacobini Zimmer. The shower will “peak” at around the eighth and ninth of October, though is so comparatively weak and coincides with the Full Moon this year, so is hardly worth bothering with.

A meteor shower with much more potential are the Orionids, which run from the beginning of October, until early November, peaking on the 21st and 22nd of October. These are the autumnal equivalent of the Eta Aquariids of Springtime, as both showers are associated with the famous of all comets, Halley. The Orionids peak at around 25 ZHR and tend to be on the rather quick side with long trains. The night of peak display will be fairly unencumbered by the Moon which is very close to New and subsequently will not be around much to spoil the show. As ever, you are encouraged to use a camera with widefield lens to see if you can capture any of the Orionids. Meteor astrophotography is one of the simplest types of astronomical imaging to do and is simply a case of pointing your camera steadily in the right direction for long enough. If you do capture an Orionid or two, please feel free to share your results with us.


Lynx
Auriga
Taurus
Mars
Gemini
Orionids
Cancer
Orion
Canis Minor
Monoceros
Lepus
Canis Major

The Orionids radiant point on the shoulder of Orion. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com

Deep Sky Delights in Perseus, Andromeda & Triangulum

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

We start this month in the southerly part of Perseus, where the open cluster M34 is located. M34 is an original part of Messier's List and was first identifed by Giovanni Battisa Hodierna in the mid-1600s. Hordierna was born in what is now Dubrovnik in Croatia, though did most of his observing from the court of the Duke of Montechiaro in Sicily. Hodierna was a leading telescopic observer of his day and complied a pre-Messier catalogue of Deep Sky objects. M34 was part of this original list, though Messier discovered it independently in 1764. The cluster is easily spotted in smaller binoculars and occupies an area of sky roughly equivalent to the diameter of the Full Moon. At +5.19, M34 is reasonably bright and contains around 80-100 observable stars in medium-sized telescopes (the actual number stands at around 400, but many these are beyond the range of amateur instruments). Precise professional observations of M34's movement have concluded that there is a distinct possibility that M34, the neighbouring Pleiades and a number of other nearby clusters are exhibiting a common angular motion, suggesting a common origin. M34 lies 1400-1500 light years away.

M34. Image Credit: Ole Nielsen - Creative Commons.

East of M34 is a more challenging object, the Perseus A Galaxy, or NGC1275. At +11.89 mag, this is not an intrinsically bright galaxy, though it is quite a compact target and can be seen in medium to larger telescopes. This object is actually a pair of galaxies that have undergone a collision and have formed a larger galaxy strewn with laments of stars and dark material, most likely blasted outwards by the supermassive Black Hole at the heart of the system. Perseus A is a Seyfert Galaxy - strongly emitting on Radio frequencies, suggesting a large amount of star formation. NGC1275, at 235 million light years distance, is one of the most prominent members of the Perseus cluster of galaxies, which occupies this region and is amongst the largest structures in the known Universe.

5 degrees to the west of M34 lies the most famous eclipsing binary star in the sky, Algol, or Beta Persei. Algol represents the eye of the head of the Gorgon Medusa, whose gaze would turn to stone all those unfortunate enough to look at it. According tho the legend, Perseus held Medusa’s severed head up to the sea monster Cetus in the successful rescue of Andromeda. Cetus was turned to stone and Perseus unchained Andromeda from the rock to which she was attached. Algol’s name derives from the Arabic “ra’s al-ghul”, translated as “head of the ghoul” - though it has been know by several equally unfortunate titles. In Hebrew, Algol was known as “Rosh ha Satan” or “Satan’s Head”. A 16th century text labels Algol as “Caput Larvae” or “Spectre’s Head”. But the prize used to go to the now sadly disproved ancient Chinese description, “Tseih She” or “Jishi”, meaning “Piled Up Corpses” - though this is now thought to refer to Pi Persei instead. Regardless, Algol was part of the Anciet Chinese constellation of the Tomb or Mausoleum. No matterwhich culture attempts to define Algol, it always seems to have a sinister undercurrent - quite unfair really, as it is a fascinating object.

Algol’s eclipsing binaries occupy a startlingly small amount of space - just 0.062 Astronomical units, or around 5.76 million miles, separates the two stars. These two stars are Beta Persei A and Beta Persei B (there is a third member of this system, Beta Persei C which plays no part in the eclipse). Beta Persei A is the brightest of these stars and is eclipsed by the dimmer Beta Persei B every 2 days, 20 hours and 49 minutes, for around 10 hours at a time. This eclipse has the effect of dimming the +2.1 mag star to +3.4 mag for the period of the eclipse. There is also a much shallower dimming when A eclipses B, though this is very difficult to detect visually. The main eclipse can easily be detected with the naked eye and is possibly the reason that this star was held in such suspicion by ancient astronomers. Regardless, it is a very clear example of stellar orbital dynamics and Algol, suspicious or not, continues to be of interest as a result. It’s always worth comparing the brightness of Algol with Almach - as they’re normally roughly similar brightness. If this isn’t the case, you can be sure the Algol’s in eclipse.

Nine and a half degrees east of Algol sits the 2.91 mag star Adid Australis, Epsilon Persei, which is a useful is a pointer to those attempting to locate NGC1499 - the California Nebula - which lies along the line between this star and the neighbouring +4.40 mag star Xi Persei, or Menkib. a prime candidate for Supernova (though lying at a distinctly safe distance of 1200 light years). The California Nebula can be found just under a degree to the North of Menkib.


NGC 1499 California Nebula
Const: Perseus
By Mark Blundell
28th November 2016

The California Nebula by Mark Blundell. Image used with kind permission.

Discovered in 1884 by Barnard (he of Barnard Star's fame), the California is a confusing object Technically it is a bright +5 mag object of very large proportions - 145 x 40 arc minutes (just slightly smaller than M31, the Andromeda Galaxy), but due to its size, it has low surface brightness. The California is very easily picked up by cameras with relatively modest exposures, but to see it visually requires two things: a decent sky and a Hydrogen Beta Filter. Many observers consider aperture to be of importance when picking out low surface brightness objects from the background sky, and while this is normally very sound advice, with large objects such as the California, this must be tempered by the amount of sky a telescope can adequately display at low power. It has been suggested than NGC1499 can be seen in some cases better with smaller telescopes, of shorter focal lengths at low power with a Hydrogen Beta Filter. Larger instruments will show the curtain of light of the edge of the nebula well under filtration and can pick out more lament detail within its inner structure, but a smaller wide eld telescope can potentially t the entire nebula into a single eld of view - a potentially superior view from an aesthetic standpoint. Others have observed the nebula with the naked eye from a dark site, simply by holding an H Beta Filter up to its area of sky. The H-Beta filter, unlike the more popular UHC and OIII options is only of great use for this nebula, and the adjacent nebulas the Horsehead in Orion and the North American in Cygnus and a few lesser objects. For those attempting to see these famous objects, it really is a must.
It is thought that the radiation from nearby Xi Persei is responsible for exciting the gas of the California and causing it to glow. The rich gas and material deposits in this area of the Milky Way have given birth to many massive stars, of which the previously mentioned Menkib and Adid Australis are probably prime examples. The California Nebula is thought to lie some 1000 light years from our position in the galaxy and is about 100 light years across at its widest point.

Moving to the opposite end of Perseus from the California Nebula, we come to the spectacular Double Cluster, or Sword Handle - NGCs 869 and 884. It is perhaps testament to the easy nature of their observation that they were never given Messier number classification. These twin clusters - and there can be little doubt about their mutual origin - are of +5.9 visual magnitude and are excellently seen through binoculars of all sizes, but really come alive in wide field telescopes. Of the two, NGC 869 is the slightly more populous being of 3700 solar masses to NGC 884's 2800 and are thought to between 3.2 and 12.8 million years old (sources, again differ on this figure) - considerably younger even than the Pleiades '75 million years. Both clusters have in excess of 150 hot blue stars visible to amateur telescopes and are also a fabulous target for astrophotography. Both elements of the Double Cluster lie between 7500-9600 light years distance from us and are approaching us at around 39 km per second.


NGC 869/884 Double Cluster - Perseus
© 2017 Mark L Blundell
29th October 2017

The Double Cluster by Mark Blundell. Image used with kind permission.

The last target we shall examine in Perseus is M76, otherwise known as the “Little Dumbell”, due to its physical similarity to M27 the Dumbell Nebula in Vulpecula. Found 3 degrees North of 51 Andromedae, the other of Andromeda’s feet (alongside Almach), M76 is a very compact object and one of the dimmest of the Messier list at +10.10 mag. Still, as with many planetary nebulae, it is an attractive object. Unlike the Ring Nebula, M57, M76 is presented side on, so we can clearly see the two lobes of bass that were ejected from the central star. Were this object presented to us end on, much like the Ring Nebula, we would see the distinctive disk or ring-like pattern, rather than a sort of hourglass shape that M76 resembles. As with most planetaries, M76 responds well to OIII filters.


M76 Little Dumbbell
By Mark Blundell
19th August 2014

M76 by Mark Blundell. Image used with kind permission.

M76's distance is widely disputed, some sources give it as 1500 light years distances, others in excess of 15,000 light years away. Spectroscopy has shown it is certainly approaching the Solar System, at a rate of 19 km per second.

Moving away from M76, we cross the border into Andromeda and turn our attention to the less well-known, but prominent and easily-found galaxy in the constellation: the wonderful NGC891. 11 1/2 degrees to the SE of M76 and discovered by Sir William Herschel in 1784, NGC891 is a spiral galaxy, potentially much like our own, presented absolutely edge-on to our perspective. At +9.89 mag, it is not especially bright, but it is well-condensed. Its axis is bisected by a dark dust lane, splitting the object in two. In telescopes of moderate aperture, NGC891 appears like a shard - or rather two parallel shards of light, with a very small bulge of the galaxy's core in the centre. It is a lovely object - maybe not having the glamour of its neighbour M31 (NGC891 is 30 million light years away from us), but a very rewarding galaxy to observe or photograph.


NGC 891 Galaxy
Const: Andromeda
By Mark Blundell
2nd October 2016

NGC891 by Mark Blundell. Image used with kind permission.

3-degrees to the west of NGC891 can be found Gamma Andromedae, or Almach - an easy pointer to the galaxy, but an equally interesting object in its own right. Almach is one of the sky’s best double stars: a pair of orange-yellow and striking greeny-blue stars of +2.17 and +4.75 mag respectively. The principle element of the system is a K3 giant star, nearing the end of its life. However, the fainter secondary green-blue star is itself a double - albeit a very difficult one. It will take telescopes in the 30-inch + class to split this second double. However, in coming years, this secondary element will become steadily easier to split with smaller instruments as the elements drift apart around their mutual gravitational centre - although it will be the mid-2020s before they are resolvable with 8-inch class telescopes.

The main elements of Gamma Andromedae are gloriously split in most small telescopes. Even for those with the smallest of telescopes should have a go at splitting this star.

Andromeda is, of course, home to the most prominent galaxy in the sky - M31 and its attendant satellite galaxies M32 and M110. As a major member of our Local Group of Galaxies, the M31 system is the largest gravitational influence on our own Milky Way and in under 4 Billion years it is likely the two Spirals will collide and eventually form a large Spheroid elliptical Galaxy. Approaching the Milky Way at around 300km per second, M31 is already a huge angular size - the boundaries of which stretch over 6 times the width of the Full Moon in the sky. At +3.4 mag, M31 was probably one of the rst Deep Sky objects - certainly the rst galaxy - to be noticed by humanity. First recorded by the great Persian Astronomer Abdul al-Rahman al-Su in his 962CE text “Book of Fixed Stars”, al-Rahman described M31 as the “Little Cloud” - and while his is the rst record of the object, it was doubtlessly noticed sooner, being the most prominent deep sky object alongside the Pleiades and Hyades in Taurus and M42 in Orion.

Simon Marius first turned a telescope to M31 in 1612, though made no claim to its discovery - he may have been aware of it from earlier star charts - a Dutch example dating from 1500 shows the object. Throughout the 17th and 18th Centuries, the Galaxy was “re-discovered” independently by astronomers. While there was clearly communication between astronomers of the era regarding M31, many, including Edmund Halley, erroneously credited the discovery of the object to different people. Charles Messier credited its discovery to Marius, when forming his famous Messier list in 1764. Theories abounded as to the true nature of M31: a nascent Solar System forming, a cloud of glowing gas forming stars, a dying, decomposing star. Spectroscopy hinted at the true nature of M31. William Huggins , the early adopter of telescopic spectroscopy found that unlike many other nebulae, M31 exhibits a broad, continuous spectral response, rather than the definitive lined spectra of a gaseous nebula. Something that clearly set M31 apart from the likes of M42. In 1887, the first of many, many photographs of the galaxy was taken by Isaac Roberts from Crowborough in Sussex (just a short journey from the location of Telescope House in Edenbridge). Robert’s beautiful picture clearly shows dust lanes in the outer spiral arms and the satellite galaxies of M32 and M110, much as Mark Blundell’s more modern portrait does below.


M31 Andromeda Galaxy
By Mark Blundell
19th December 2014 (PM)

M31 by Mark Blundell. Image used with kind permission.

Roberts subscribed to the theory that M31 was a Solar System in the early stages of formation. However, this theory was put to bed by mounting evidence of Novae observed and photographed within the reaches of M31. Heber Curtis discovered his first Nova in M31 in 1917 and went on to find a further 11. These were observed to be a mean of 10 magnitudes fainter than those observed within our own galaxy, leading to Curtis to suspect that M31 was considerably further away than first thought. Curtis was amongst those Astronomers that put forward the theory that objects of this type were "Island Universes". This was famously debated in a meeting between Curtis and Harlow Shapely in 1920 - Curtis was for, Shapely against.

The matter was settled in 1925 by Edwin Hubble, who discovered the first Cepheid Variable in M31. Comparisons with these variables and the Cepheids in our Galaxy proved that M31 was a separate conglomeration of stars, distinct from the Milky Way. Although underestimating the distance of M31 by a factor of two, Hubble proved that the Universe was a much larger and more mysterious place.

Walter Baade, using the 200-inch Palomar Reflector discovered two separate types of Cepheids Variables in the population of M31, which had the effect of doubling Hubble's pervious distance estimate in 1943. Current distance estimates are around the 2.5 million light years mark. M31 was also discovered to be heavily blueshifted in its spectral lines, proving via the Doppler effect that unlike the vast majority of galaxies in the sky, it is actually advancing towards us (or more accurately, both galaxies are attracting one another).

M31 can be observed with (or without) all manner of optical equipment. It is probably best seen in large Binoculars (70mm objective size +) from a reasonably dark location. Rich field, short focal ratio telescopes like Dobsonians, and shorter Refractors show it well too, but due to its large angular size, powers must be kept low to see the Andromeda Galaxy in all its glory. Both satellite galaxies, M32 and M110 are easy to spot too (M32 the easier of the two). In larger instruments, with suitable filtration, it is possible to observe nebulous regions in M31 - similar features to the Orion Nebula in the Milky Way. This is a challenge, but a rewarding one! We'll never see the true beauty of our own galaxy from the outside, so must content ourselves with the marvellous vista that M31 offers us. Some of M31's globular clusters, including the remarkably large G1 are also visible though instruments of 10-inch aperture and above.

However, it is in long duration photography that M31 really reveals its true extent and size. A 30 second unguided exposure with a wide field lens will easily show M31, though a small, high-quality refractor on an equatorial mount will be ideal in terms of framing the whole object on a standard DSLR chip. Multiple exposures, when stacked in a free program such as Deep Sky Stacker, will reveal the huge dust lanes and knotted, hydrogen rich areas of nebulosity. M31 is a prime beginner's Deep Sky photographic target, but it is such a rewarding photographic object that Astrophotographers feel compelled to return to it time and time again. That it is well-placed for those of us in the northern hemisphere during the winter months is indeed fortuitous. All though observable through much of the year, now is the time to take full advantage of this fabulous Deep Sky wonder.

To the western side of Andromeda, 2.5-degrees to the W of Iota Andromedae is the lovely NGC7662 - otherwise known as the Blue Snowball Nebula. This Planetary Nebula is a great object - albeit compact, at 0.5 minutes of arc - and is well seen in telescopes of most apertures. A 6-8-inch class telescope will show it clearly as a blue-green ball of light. However in larger telescopes, the subtleties of NGC7662 really become noticeable - it's internal rings and slight elongated internal lobes can be distinct. The Blue Snowball can exhibit “blinking” just like the famous Blinking Planetary and Saturn Nebula. The Blue Snowball's central white dwarf star shows distinct variability - peaking at +12 mag, but sometimes dimming down to below +16 mag. Current distance estimates put it at 5,600 light years distance from us and 0.8 light years in diameter.

The Blue Snowball Nebula. Image Credit: HST/NASA/ESA. Public Domain.

Drifting back east, beyond M31 and its companions, we come to two unusual objects. Mirach and Mirach's Ghost are formed by Beta Andromedae and a condensed elliptical galaxy, NGC404. Line of sight from our perspective on Earth place these two completely unrelated objects in a very close pairing - they are separated by just under 7 arc minutes, making this galaxy easy to locate, but not necessarily so easy to see! Mirach has a tendency to overpower its neighbour, due the their differences in brightness. In clear, calm conditions NGC404 can be spotted in large binoculars, though telescopic observation can be a little trickier. Higher magnification can help under some conditions, though aperture will help as well. Photography of NGC404 is a challenge as well, but a worthwhile one. Mirach and Mirach's Ghost are one of those interesting "Odd Couples" of the night sky, that perspective and chance throws our way. It would be a pity to let the perceived dificulty of observation stand in the way of taking a look.

Another of Andromeda's obscurer residents is the open cluster NGC752. Consisting of over 70 stars of around the 9th magnitude, NGC752's cumulative magnitude stands at +5.7. Best seen in giant binoculars, this cluster has some particularly elderly residents for a star cluster: its A2-class stars indicate an age of over a billion years. The cluster is full of star chains and occupies an area of over 75 minutes of arc in the sky. It lies over 1500 light years from Earth.

Just under 9 degrees to the SW of NGC752, just over the border in neighbouring Triangulum, forming an almost right-angled triangle in the sky with the cluster and the previously-mentioned Mirach and Mirach's Ghost is the third largest member of our local group: M33, otherwise known as the Pinwheel (a description it unhelpfully shares with M101 in Ursa Major) or simply, the Triangulum Galaxy. Whereas M31 is inclined to our perspective, M33 is presented to us in a much more "face on" aspect. It is a smaller, less massive object than its neighbour, and occupies less area in the sky - M33's major dimension is about as wide as M31's narrowest. However, at it is still a major object, though its lower surface brightness make it more difficult to spot.


M33 Triangulum Galaxy
Const: Triangulum
By Mark Blundell
23rd September 2015

M33 by Mark Blundell. Image used with kind permission.

At +5.69 mag M33 is technically visible to the naked eye, but one would have to be in a particularly dark location and very well dark-adapted in order to see it unaided Discovered in 1654 by Giovanni Batista Hodeierna and then independently re-discovered and catalogued by Charles Messier in 1764, large binoculars will show M33 very well from a good locale and larger aperture observations can reveal some of the brighter nebulous regions. The largest and most prominent of these was first recorded by William Herschel in 1784 and now known as NGC604. As previously mentioned with M31, these two galaxies (setting aside the satellite Magellanic Clouds of our own Milky Way) are the only two external systems in which it is possible to view nebulous regions visually through a reasonably-sized telescope. H-Alpha and H-Beta Filters will help considerably with this endeavour - though inevitably, aperture and a good sky is key. Those with access to instruments in the 16-inch or above class would be able to spot some of M33's globular clusters, arranged in a halo around the galaxy, much as they are in our own Milky Way.

Current measurements put M33 at a distance of around 3 million light years away from us - 500,000 light years further from us than M31. M33 contains around 30-40 billion stars, less than our galaxy's 200-400 billion and much less than M31's trillion stars. M33 has supposedly interacted with M31 in the distant past, and as it is moving towards us and M31, will probably do so again. Whether this results in a collision such as that predicted for the Milky Way and M31 is, as yet, unknown.