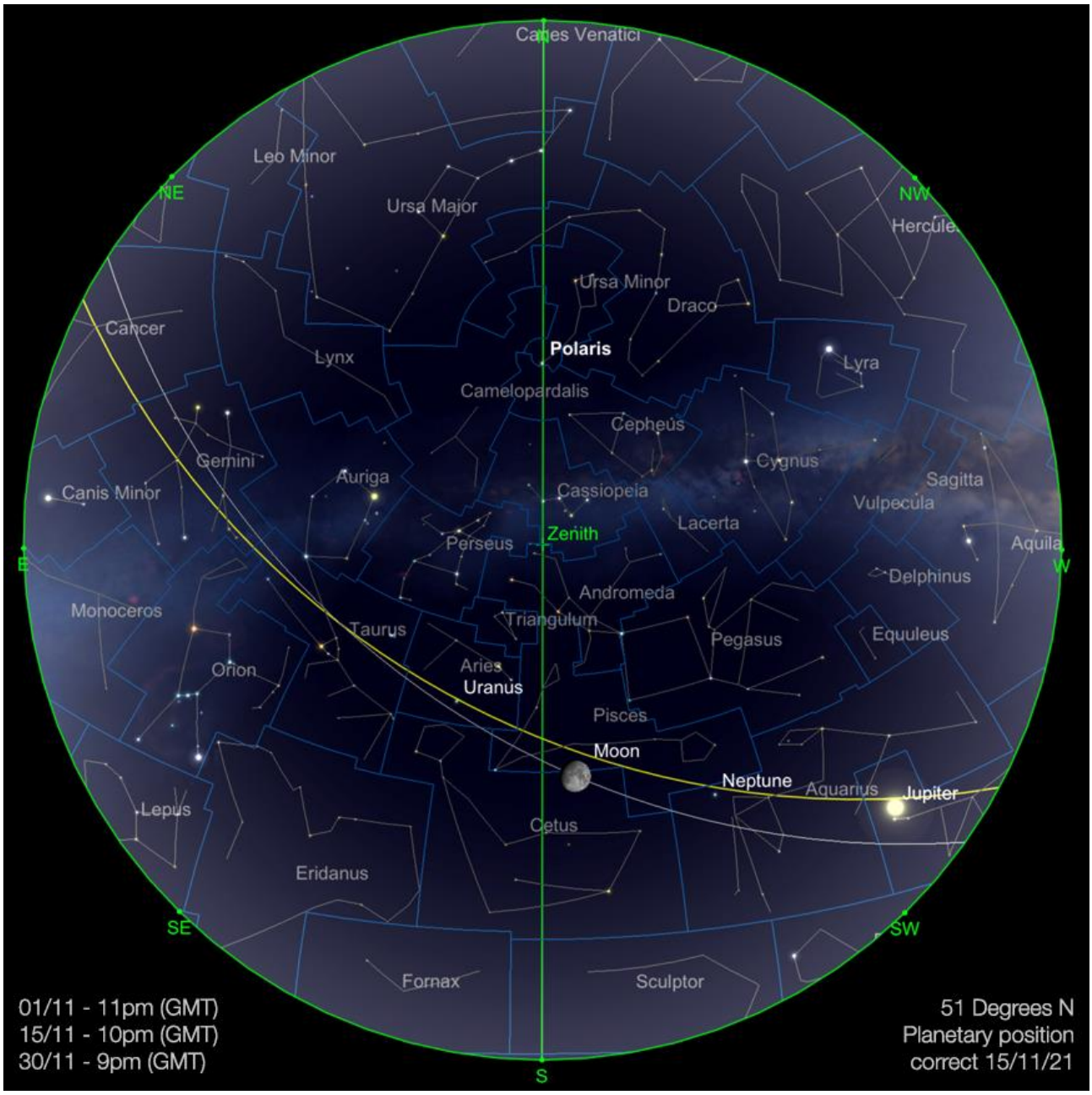
Telescope House November Sky Guide



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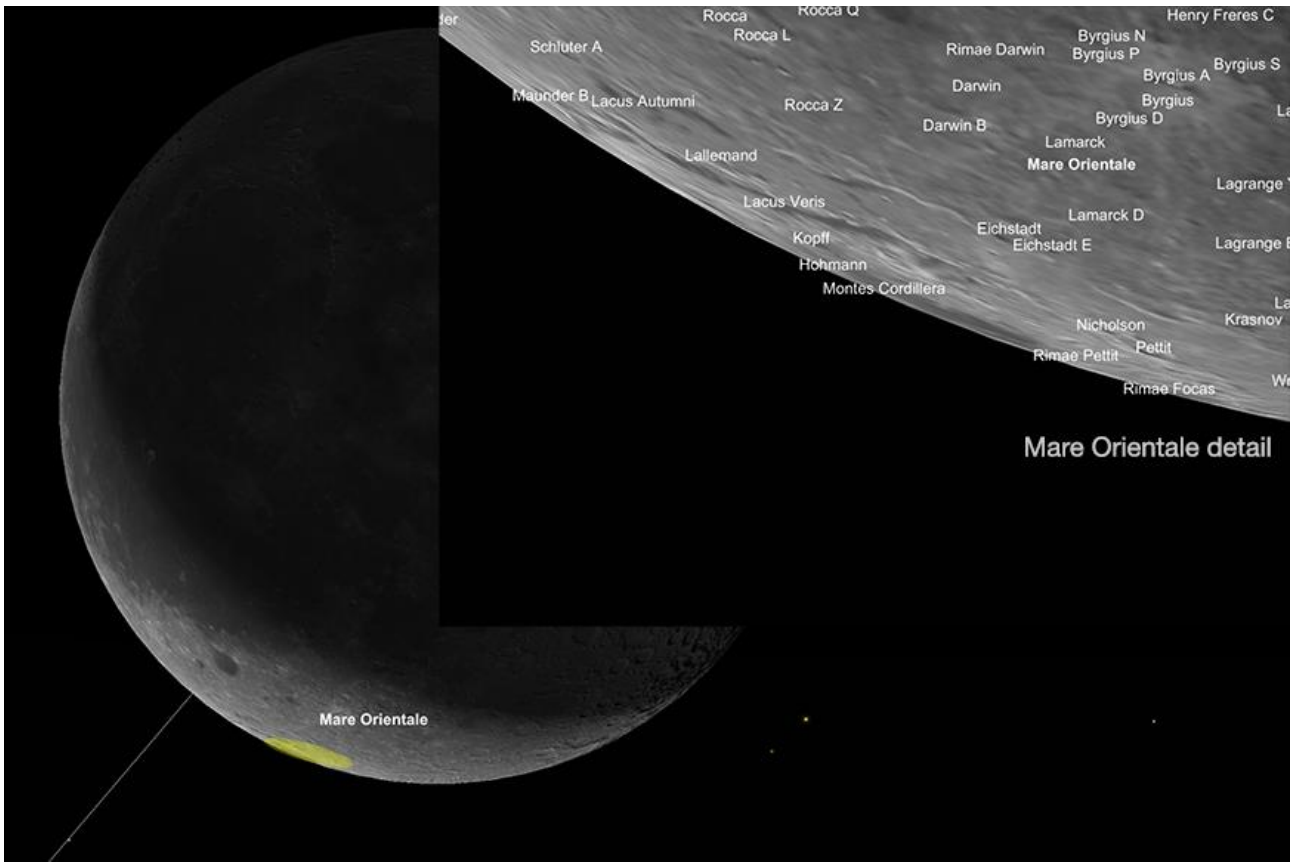
It's November and those of us in the temperate northern hemisphere will definitely be noticing the increasing hours of darkness. Now that Europe and North America have ceased Summer Time, astronomers in these parts of the world will enjoy earlier opportunities for observing. Naturally, the weather will inevitably have its part to play in this, with November being, on average cloudier and rainier than any other month than December and January in the northern hemisphere. However, the drop in temperature that normally comes at November's end can herald clearer conditions. We all hope for these - as ever, there's plenty to see in the skies above us...

The Solar System

The Moon

Our natural satellite begins November towards the tail end of its 28 day orbital period around the Earth, as a 16% illuminated waning crescent In the constellation of Leo. At this point of the month, it will rise about five hours before the Sun attaining a height of 40° above the horizon (from 51° north) by sunrise. As covered in previous sky guides, this part of the year is a great one to observe the waning crescent moon in the morning sky, being the exact opposite of Spring's high evening Crescent phases. Those who are up early enough can take the opportunity to study the finer details of the moon's Western limb. Lunar libration is such that at present the fascinating feature of the Mare Orientale and it's surrounding mountain ranges, rills and lakes is considerably more visible than at other times during 2021. While October and December's Waning Moon also revealed the Mare Orientale, this month is where western liberation reaches its peak, giving observers the best chance of catching this illusive feature.

The Mare Oriental was discovered by German astronomer Frank in 1906. He included this discovery in his seminal work Der Mond, published shortly after. In 1961 the International astronomical union decided to re-orientate the Moon's Eastern and western cardinal points. Swapping these Cardinal points from the initially-used telescopic view, to the more regular global positions, means that the Mare Orientale - the Eastern Sea - is now on the western side of the moon. Rather than rename the Mare Orientale, what would be now more correctly known as the Mare Occidentale, Franz's name for this feature has been kept. This is the reason why the Moon's Eastern Sea is actually on its Western side.



Mare Orientale location and detail (Moon showing 1st November phase). Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

The Mare Orientale is probably the Moon's youngest impact basin. It is thought to have formed around 3.85 to 3.9 billion years ago, when an object, thought to be an asteroid around the 60 km diameter, slammed into the moon's surface. This formed the distinct bull's-eye pattern of twin surrounding mountain rings - the Montes Cordillera and Montes Rook. The bottom of the "sea" flooded with lava, after the impact, which then solidified into the darker area we can see today and also gave rise to the "satellite" lakes the Lacus Autumni (lake of autumn) and the Lacus Verdi's (lake of spring) - all of which can be seen further to the east of the main impact site. The intertwined fissures, the Rimae Kopff, Pettit and Focas will also be seen when liberation is favourable.

At just under 300 km in diameter the Mare Orientale is one of the biggest impact craters still on view in the solar system. When we look at it today from our rather more sedate part of the solar system's history we are seeing an enormously violent event etched for posterity on the lunar surface. Early November 2021 gives us the best opportunity of the year to observe this feature through telescopes and powerful binoculars.

The Moon joins the Sun in Libra on the 4th of November, after which it will become an evening object. However, for observers in the temperate northern hemisphere, this month's evening

apparition of the moon as a crescent phase in the evening sky, will be quite a low one as the moon at present will be drifting through the more southerly people arts of the ecliptic in the sky.

On the evenings of November 7 and eighth, the moon will be found either side of the bright planet Venus in Sagittarius. This represents the lowest part of the ecliptic from the northern hemisphere perspective, and from this point onwards the moon will appear to climb in the sky.

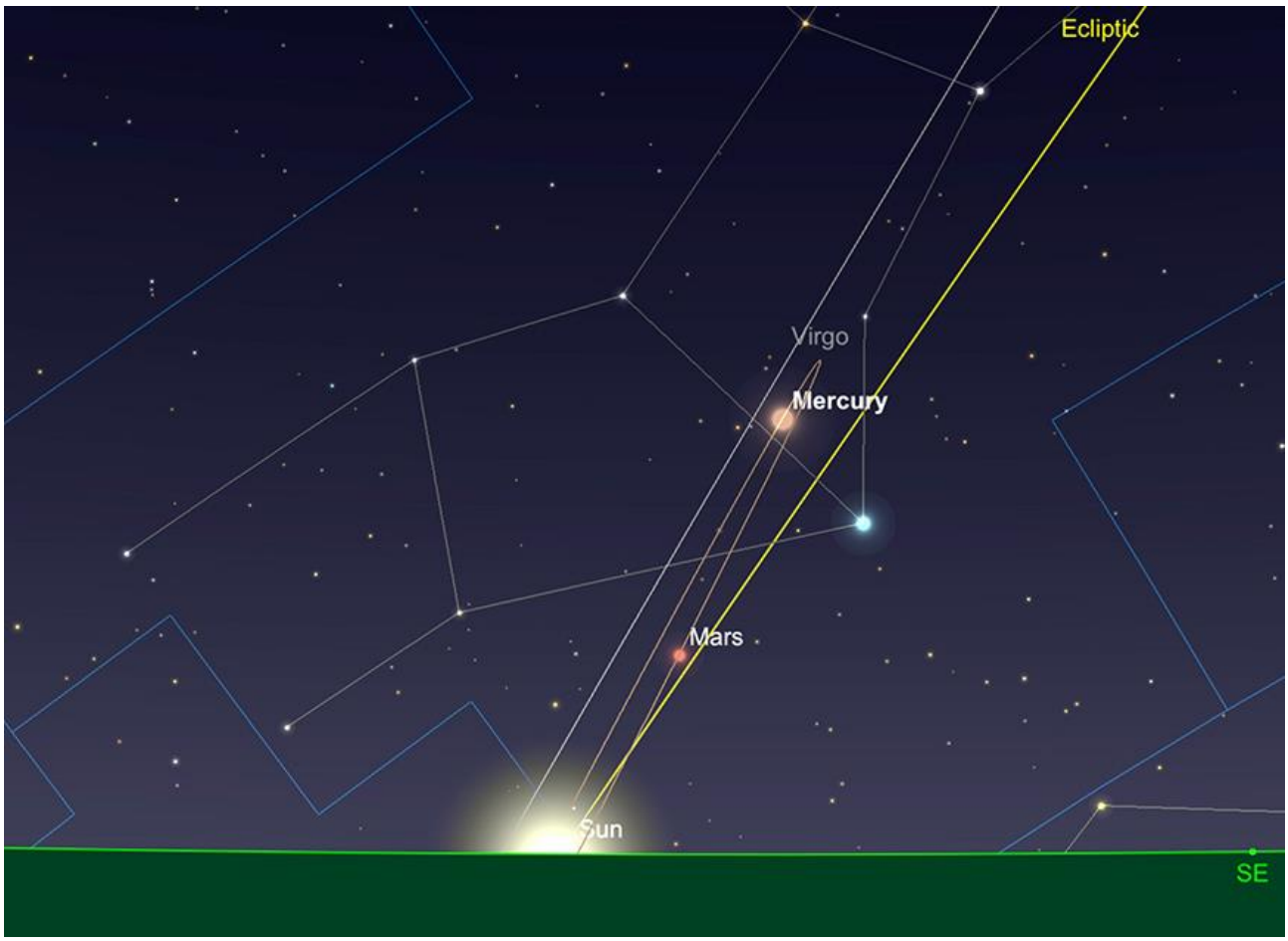
On the evenings of November 10 and 11th the moon can be found around Saturn and Jupiter in the constellation of Capricornus. The evening of the 11th of November also finds the moon reaching first-quarter phase. The Moon then continues climbing the northerly part of the ecliptic, until it reaches Full on Friday, November 19th - this will coincide with a lunar eclipse. The Penumbral stage of this eclipse (which is total), begins at just before 5 am (GMT). The “total”, Umbral part of the eclipse will start at around 6 am and will reach complete totality at a little after 7:15 am. The midpoint of this eclipse occurs at just after 9 am (GMT), but by this point, the Moon will have set in Europe. The event will still continue to be seen by those in the Americas and will end at around 1:15 pm (GMT). With the moon in Taurus, sitting a little beneath the Pleiades, this should make for a very lovely experience to observe.

As ever, we encourage readers of this sky guide to capture images of this fascinating event. A total lunar eclipse, unlike a total solar eclipse, is a rather more sedate affair and lasts considerably longer and gives imagers a rather easier ride. This particular eclipse will naturally reward the early riser for those in Europe, Africa and parts of the Middle East. But if the weather is clear, we encourage you to set you alarms to observe and photograph the eclipse. Lunar eclipses can appear quite differently to one another. Some are fairly bright and colourful, others are very dark and the Moon can almost disappear almost completely from view in the sky. Darker eclipses, tend to occur when there has been recent significant volcanic activity around the world. With the recent eruptions in the Canary Islands, it will be Interesting to see if this eclipse is a light or dark one.

After all the excitement of the lunar eclipse is over, the moon will crest over the most northerly part of the ecliptic and then descends down (from a northern hemisphere perspective) the other side. It will reach last quarter on November 27th, when it can be found in the constellation of Leo. The moon ends November in Virgo, at a phase of just under 20% illumination. Again, this will be a good time to observe the moon at crescent phase in the morning sky. Western liberation is still good, though not quite as extreme as it was in early November.

Mercury

We find Mercury the solar system’s smallest planet, in Virgo in the morning sky, at the beginning of the month. At just past greatest western elongation, Mercury will shine at -0.8 magnitude, and will stand just over 13 1/2° above the horizon (from 51° north) on the morning of the 1st. This will present the best chance to observe Mercury this month, so get your telescopes and binoculars out early!



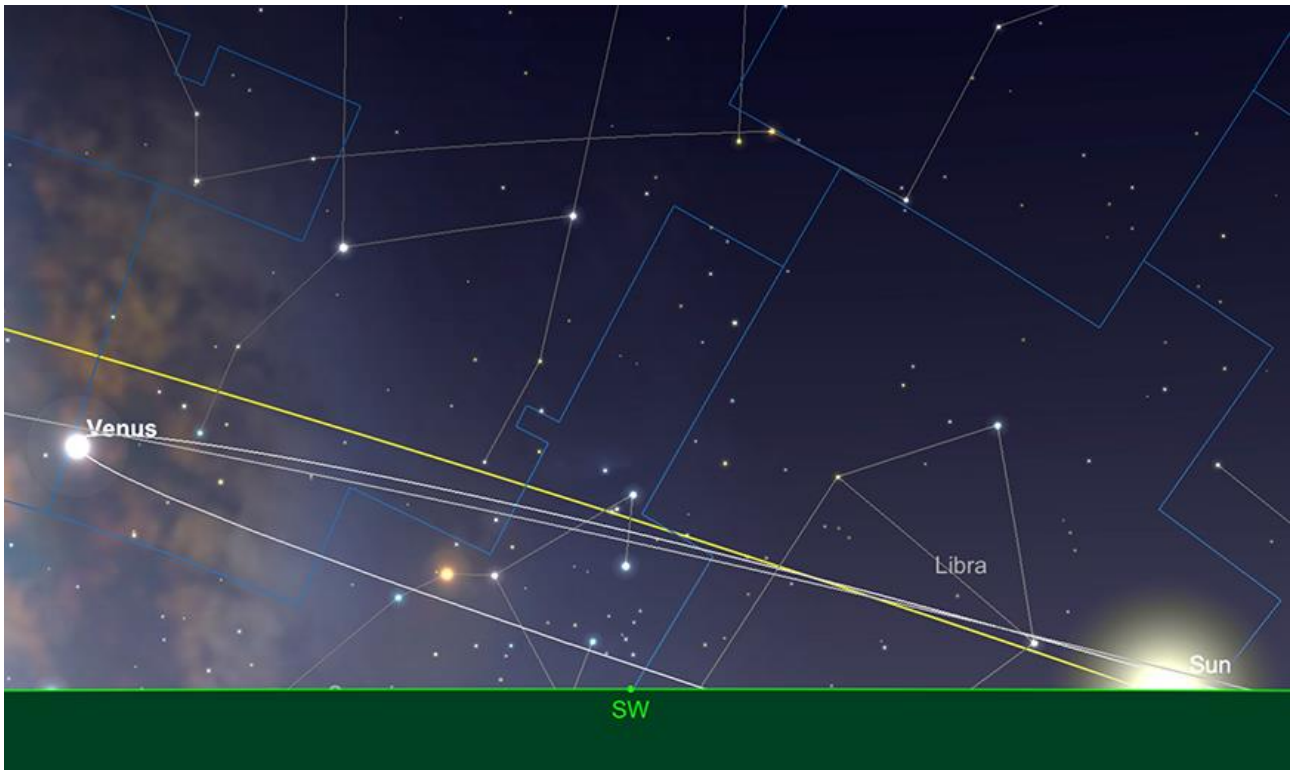
Mercury, sunrise 1st November. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

As with anything mercurial, Mercury does not stay in the same place for long at all. By the time we get to the middle of November, Mercury will stand just 6° above the horizon at sunrise making it a very difficult target to find, despite a slight increase in brightness to -0.9 magnitude.

Superior conjunction, which is when Mercury is to be found on the opposite side of the Sun from us here on Earth, occurs on Sunday, November 28. After this point Mercury will re-emerge as an evening object, though it will be another couple of weeks into December before it can be more readily seen. With the Sun approaching its furthest south point in the ecliptic plane, evening apparitions of Mercury at this time of year are never really favourable for those in the northern hemisphere. As such, the beginning of November represents the best chance to see Mercury from mid northern and northern latitudes before the beginning of 2022.

Venus

Venus is an evening object at the beginning of November and indeed remain so for the rest of the month. We join Venus on the 1st of November just a few days after maximum eastern elongation. This means that the planet is practically at its furthest point from the Sun in terms of angular separation. However, with the Sun now in the most southerly part of the ecliptic, just as we have seen for Mercury in the evening, Venus never appears to rise very high above the horizon during this period. On the evening of the 1st of November, Venus will be found at a dazzling -4.4 magnitude, but will sit just below 9 1/2° elevation above the horizon (from 51° north). The planet will be striking and easily-found if you have a clear south-westerly horizon, but due to its lack of elevation for those of us in the northern hemisphere, remains a fairly disappointing telescopic target. Through a telescope, Venus will appear at half phase, though those observers in the southern hemisphere and the equatorial regions of the Earth will see it much better, as the planet will appear much higher in the sky and all thus be less affected by atmospheric conditions. On the 1st of November Venus will be separated from the Sun by 47° and as such, will be relatively straightforward to find during daylight hours, though caution is always applied here, with sensible attention paid to solar safety if you attempt to find it when the Sun is up.



Venus, sunset, 1st November. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

By mid-November, Venus will have brightened a fraction to-4.6 magnitude. At this point in time it will be at just below 11° elevation above the horizon at sunset (again, from 51° north). As the planet is past its most southerly point in the ecliptic, it will continue to rise in elevation at sunset, but this

will be somewhat offset by its slow dive towards the Sun, as observed from our perspective here on Earth.

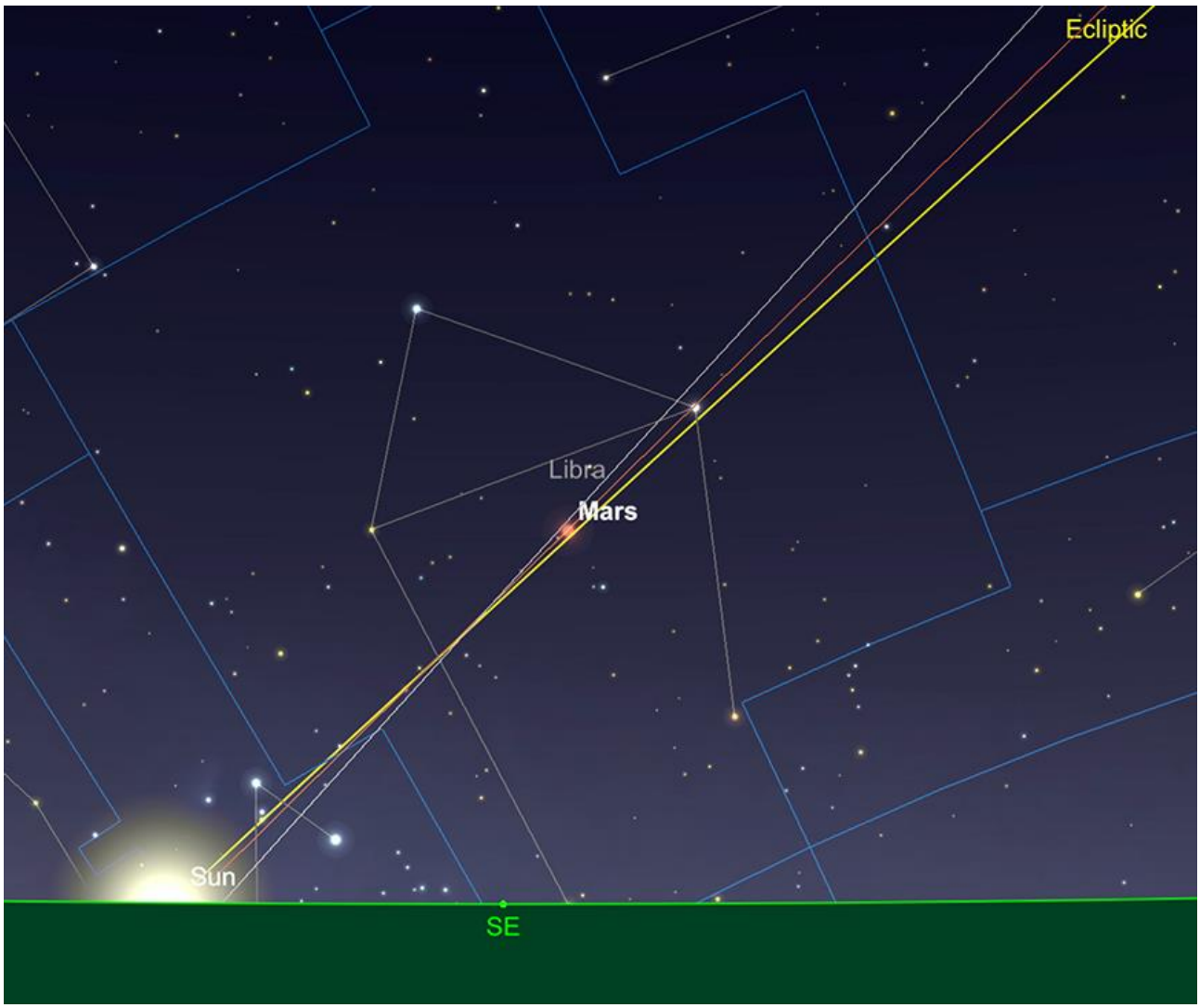
By the end of November, Venus is a dazzling -4.7 magnitude - practically the brightest it ever gets. It is a pity from the northern hemisphere perspective it still appears relatively low down in the sky, reaching just over 13° elevation at sunset (again from 51° north). Still, it will be interesting to observe Venus at this point in the month, those with telescopes may benefit from no.47 Violet filters, or heavier neutral density filters, which will help stop down the planet's glare. However those of us in the northern hemisphere observational position will still be doing battle with the turbulent atmosphere of our planet whilst attempting to view Venus at higher powers. As such, we urge caution when picking magnifications for observing Venus at this point in time - less is definitely more, when the planet appears relatively low in the sky. Those in the southern hemisphere or equatorial regions of the Earth will have a fantastic of the planet at this point. If you find yourself in these parts of the world at this point, enjoy the view of Venus, it's bound to be spectacular.

Mars

At a rather disappointing +1.7 magnitude, showing a tiny 3.6 August 2 diameter disc, Mars is pretty disappointing at the moment, to put it mildly. Found in the constellation of Virgo, at just over 6° elevation above the horizon at sunrise on the 1st of November, the red planet will be practically impossible to find in the early morning glare. It is separated from the Sun by just under 8° at the beginning of November.

As the month progresses, nothing changes significantly as far as Mars is concerned. By the 15th, Solar separation has increased to just over 12 1/2° p, however the planet is only fractionally brighter at +1.6 magnitude.

By the end of November, Mars will be found in Libra. At this point in time it will stand 11° above the horizon at sunrise (from 51° north) and will have increased its separation from the Sun to around 17 1/2°. It will still be at the brightness of +1.6 magnitude on the 30th November and although the planet will have increased its separation from our parent star by a reasonable amount during the month, it will still be a reasonably difficult target to find in the dawn sky and very disappointing telescopically, if you manage to. As we approach the end of 2021, we remind readers that the next Martian opposition will occur in early December 2022. There is still quite some way to go before Mars is much worthier of our attention.



Mars, sunrise 30th November. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Jupiter

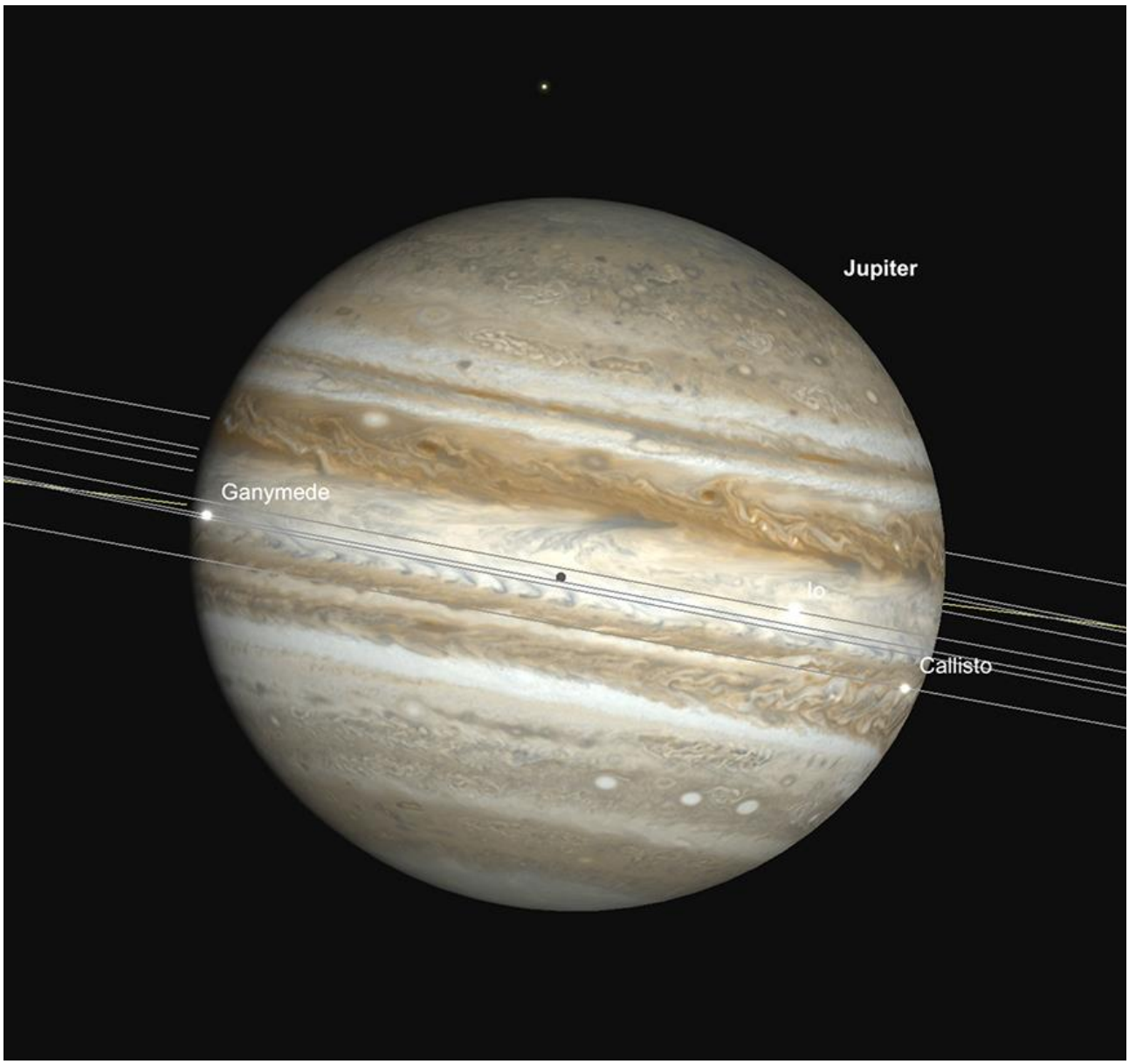
Where Mars is disappointing, Jupiter is anything but. Found in eastern Capricornus at the beginning of the month, Jupiter is brighter than anything for the Sun, Moon and Venus, at -2.5 magnitude. Transiting at around 7 pm (GMT) thesis on the first, Jupiter is in an ideal position for early evening observation. At 42.1 arc seconds across at the beginning of the month, while we are now some point past opposition in August of this year, Jupiter is still a fantastic site in a telescope. At just below 24 1/2° elevation above the horizon (from 51° north), the planet is approaching the magic 30° elevation from mid-to-higher northern latitudes, beyond which point, atmospheric seeing conditions start to become much more kind to the telescopic observer. Of course, those situated further self will already be experiencing these more favourable conditions. But having endured a particularly low Jupiter for the past few years, those of us in higher northern latitudes can look forward to an increasingly better observing situation as time progresses. We are not there quite yet, but the next

year or two will see hopefully quite a dramatic improvement in terms of Jovian observing and imaging opportunities for those of us in the northern hemisphere.

Mid-November, finds Jupiter having decreased in brightness fractionally to-2.4 magnitude, now displaying a 40 arc second diameter disk. By this point, Jupiter will transit at a little past 6 pm.

By the end of November, Jupiter will have dimmed yet again 2-2.3 magnitude, still very bright, and will now display a disc of just over 38 arc seconds diameter. The planet will transit at just before 5:30 in the evening, when it will attain an elevation above the horizon of a little below 25 1/2° (again, from 51° north).

There are a few mutual transits to look forward to in the early evenings during November. On the 1st of November we find the Great Red Spot and Europa in mutual transit at around 5:30 in the evening. Callisto and Io can be found in transit at around the same time on respective evenings of the sixth and seventh of November. The Great Red Spot, Ganymede and Io can be found in mutual transit on the afternoon of 16th, though Jupiter will have to be observed with the Sun still in the sky to see this event. There will be a fantastic triple transit of Ganymede, Io and Callisto just after sunset (4.45pm GMT) on November 23rd - though the window for observing all three moons in transit at the same time is pretty brief (a matter of minutes), so plan this well in advance. There is also a nice mutual GRS and Io transit at around 4pm on November 30th.



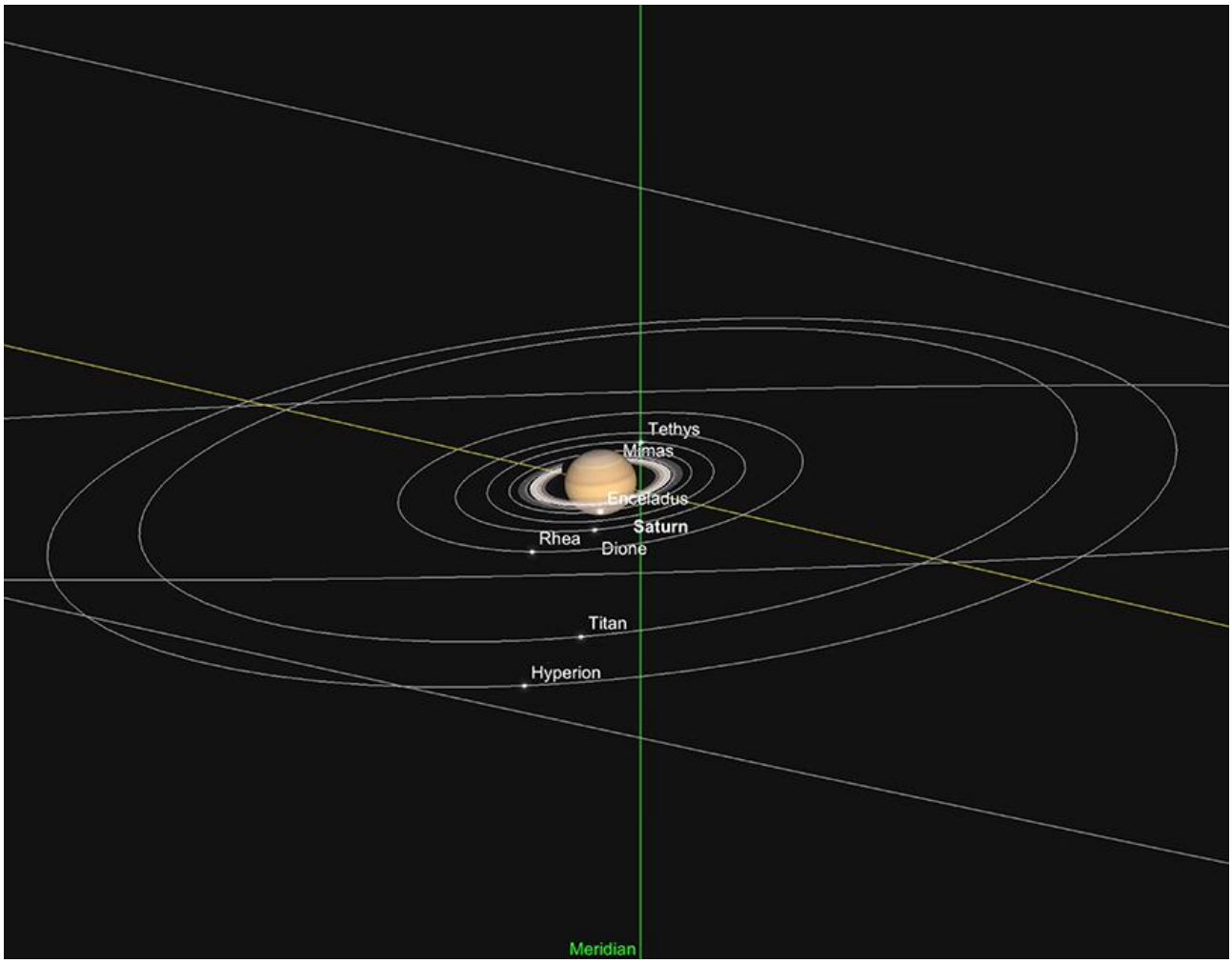
Triple transit of Ganymede, Io and Calisto, 4.45pm, November 23rd. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Saturn

Sitting a little to the west of Jupiter in the same constellation of Capricornus, Saturn is by no means as prominent as its neighbour, but is still easy enough to find in the evening sky. Saturn will transit at a little after 6 pm (GMT) on the 1st, shining at a steady +0.6 magnitude, presenting a 16.8 arc second diameter disc. Saturn will stand just over 20° high in the sky at transit on the 1st (from 51° north). As with Jupiter, November presents us with an ideal opportunity to observe Saturn at a clement hour of the evening.

By mid month Saturn will have faded fractionally to +0.7 magnitude and now displays a 16.4 arc second diameter. It will rise at a little before 1 pm and transit at 5:15 pm (GMT). There is no great change in its elevation at transit point, as Saturn moves much more sedately in the sky than Jupiter.

By the end of November, Saturn will transit at a little after 4:20 pm (GMT), but will remain at the same brightness, displaying a 16 arc second diameter disc in telescopes. The planet will set at just before 8:45 in the evening (GMT), making the window of opportunity for observation during hours of true darkness reasonably short.



Saturn and Moons, transit point, 30th November. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Uranus and Neptune

The start of the show when it comes to the two outer gas giants is definitely Uranus this month. Uranus comes to a position on November 4th when it can be found in the constellation of Aries, at a magnitude of +5.7, displaying a 3.8 arc second diameter disk.

Uranus was discovered by probably the greatest observational astronomer of all time, Sir William Herschel, from his garden in Bath in 1781. Herschel was somewhat bemused by his discovery, initially thinking it was a comet. However when analysis started to be made of the object's orbit, it did not appear to be elongated like a comet's, nor did it display any coma, nor tail. Yet it was clearly not a background star, though had been readily observed and identified as such, possibly as far back as Hipparchus' stellar catalogue of the second century BCE. Further observations confirmed that what Herschel had discovered was indeed a new planetary member of our solar system. He was asked to name this planet by the astronomical community at the time and plumped for the snappy title *Georgium Sidus (*George's Star), after his patron King George III. While this title may have gone down quite well in Britain, it was much less popular outside what was to become the United Kingdom. It would be another 70 years before Uranus finally was recognised as the object's true name by the International astronomical community.

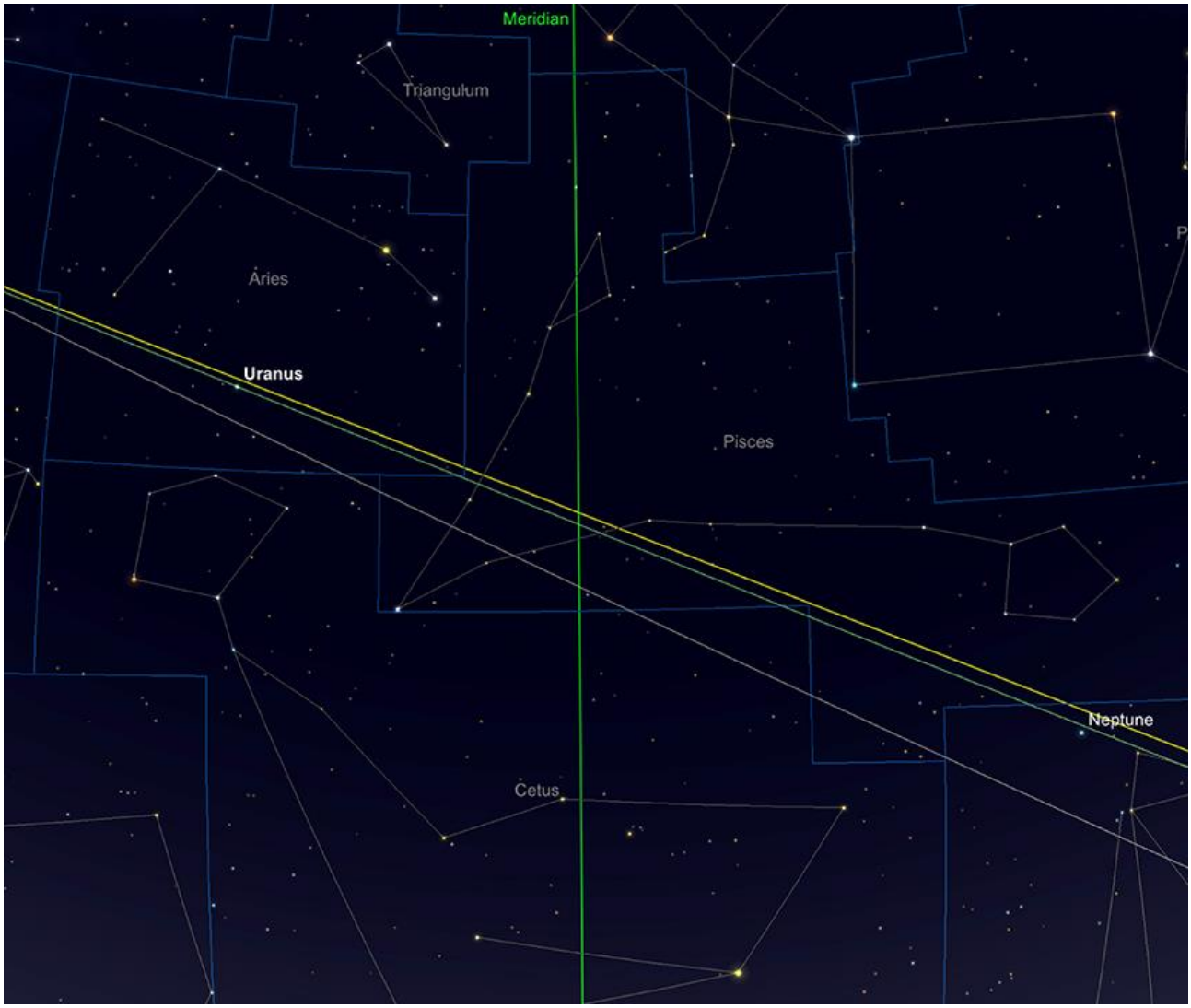
Uranus orbits the Sun once every 84 years, which means that in 2033 we will have been observing it telescopically for three of its orbits. While it is technically possible to observe Uranus with the naked eye from suitably dark locations, it is only in powerful binoculars, or preferably a telescope, that we can see any suggestion of a disk, let alone any detail within it. Suitable magnification and conditions with the right telescope can reveal some banding of Uranus at times, though this is difficult to observe. The larger the aperture of your telescope, the better chance that you have of making such observations. At present, Uranus is presenting its north pole towards the Earth. Uranus is pretty unique within planetary standards in having a very pronounced orbital tilt. The planet is tilted over in respect to its orbital plane by nearly 98° – this is far more than any other planets in the solar system and could be a sign that Uranus has had a close encounter with a much larger body in the past, tipping it on its side.

Those with larger instruments in the 10+ inch aperture range may be able to find the brighter of Uranus's satellites, Oberon and Titania. These small moons will always be a challenge to observe, even for those with larger instruments, as they display a mean magnitude of around +13.7 to +14th magnitude. As for three fainter of the five largest moons - Ariel, Miranda and Umbriel - these can be detected in smaller telescopes, using cameras, which are more efficient than the human eye.

With Uranus riding relatively high in the northern ecliptic, now is a great time to make observations of this outer world. Although Uranus rarely gets fainter than +5.9 magnitude and can subsequently be observed through much of the year, rising at just before 5pm on the 1st of November and transiting at a little after midnight, makes it easy to track down at a reasonable hour of the night at present.

Neptune, now the last true "planet" in the outer solar system, can be found in Aquarius, further to the west. At +7.8 magnitude, Neptune can never be seen with the naked eye but is relatively easy to find in binoculars or small telescopes. Presenting a 2.3 arc second diameter disc, the planet is never particularly prominent, but once found displays a distinct bluish tinge, which is considerably more

striking in hue than the grey-green disk colour that Uranus displays. Neptune transits at just before 9pm on the 1st of November and like Jupiter and Saturn should be sought out in the evening sky - though will be considerably more challenging to do so.

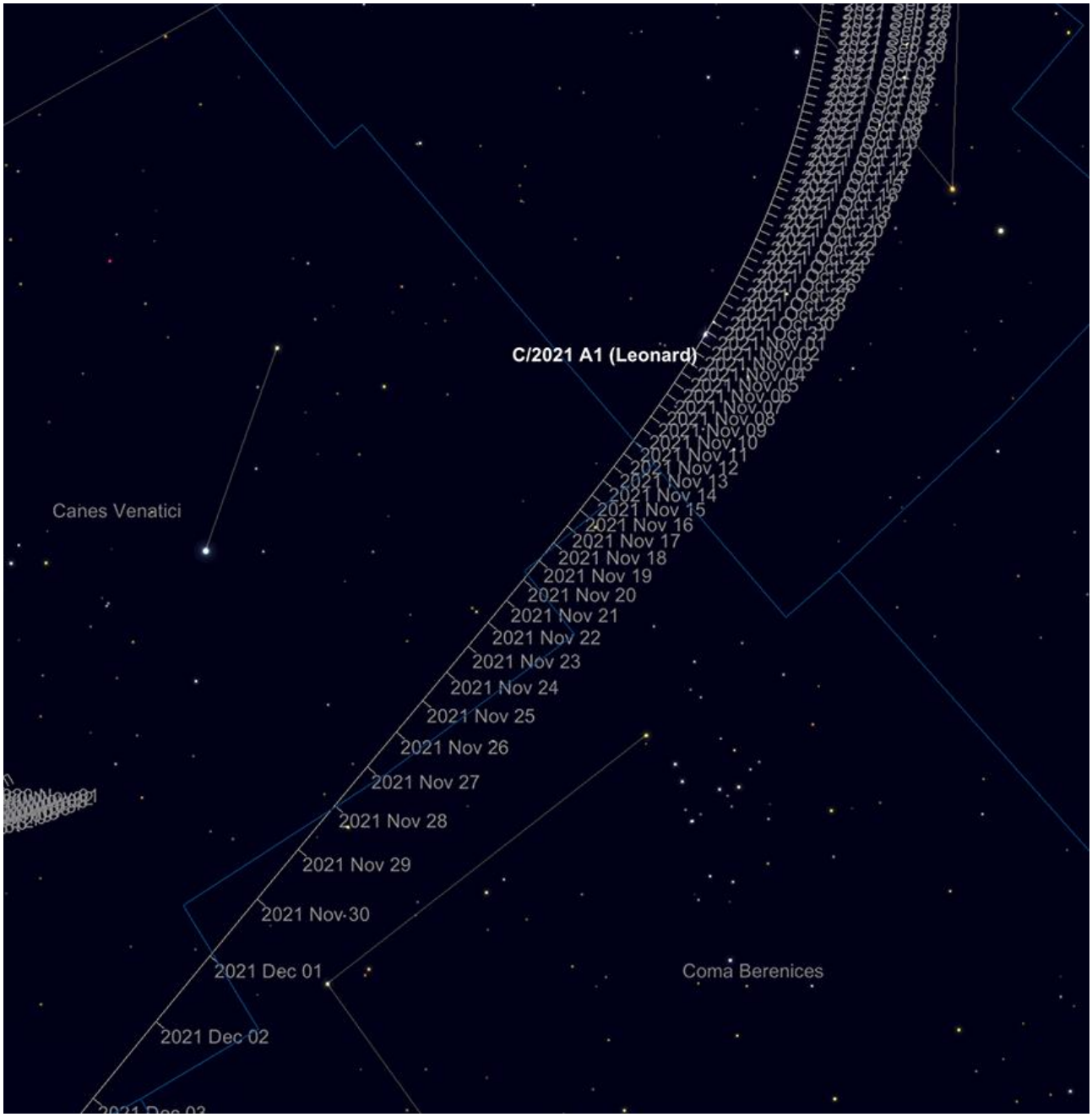


Uranus and Neptune relative positions November 2021. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Comets

Comet C/2021 A1 (Leonard) may begin to be worthwhile seeking out in a telescope or large binoculars during November - particularly the latter half. This comet is creeping south through Ursa Major, into Canas Venatici and on into northern Coma Berenices during the month and may become a faint naked eye object later on in the year. As ever, as far as comets go, caution must be applied. Comets have a habit of underdelivering, so we must be wary of being too optimistic as far

as this one is concerned. This comet will be best observed in the early morning before sunrise, though at time of writing is low 11th magnitude, but is expected to brighten rapidly. December will find the comet reasonably close to earth at 0.2 AU.



Comet C/2021 A1 (Leonard) path through November (comet position shown 1st November). Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

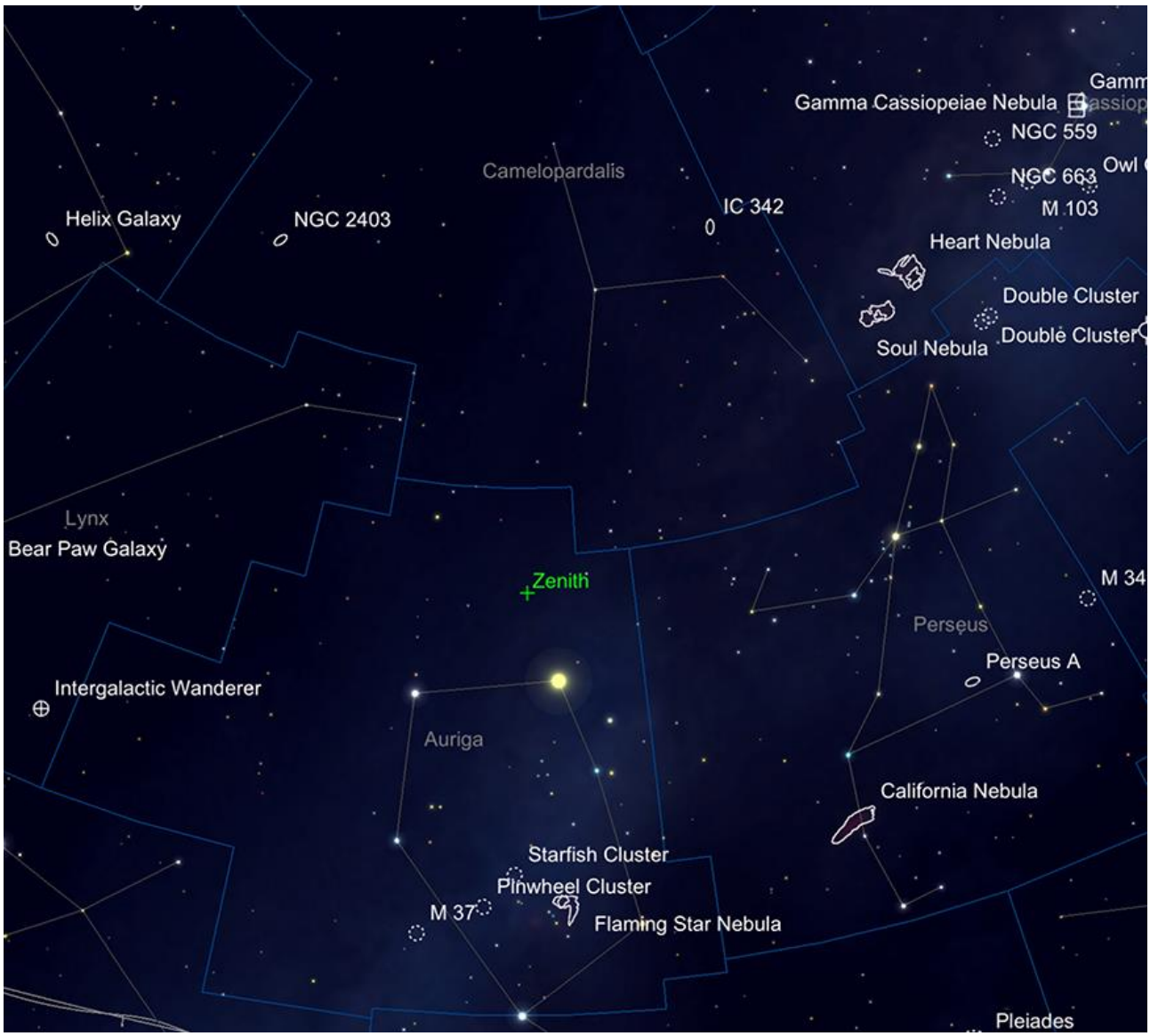
Meteors

One of the most famous meteor showers, the Leonids, peak on the 17th/18th of November. This shower is fed by the periodic comet 55P Temple-Tuttle, which returns to the inner solar system once every 33 years, potentially triggering a large outburst in the shower after reseeding its orbit with debris. The next return will not be until 2033, which means the shower at present is fairly inactive in comparison to its loft, but very brief, peaks.

The eternal nemesis of meteor showers, our Moon, will be around to spoil the Leonids shower this particular year, as it is close to Full and up for most of the night, only setting at a little after 5am. This truncates the opportunities for observing the Leonids this year somewhat. While we would never discourage anyone from attempting to observe any meteor showers, there are better opportunities in the future, than the Leonids this year.

Deep Sky Delights in Camelopardalis and Auriga

Last month's Deep Sky section was a trek around the multiple delights of Perseus, Andromeda and Triangulum. This month we will examine the nearby constellations of Camelopardalis and Auriga.



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

Starting at the top - or very close to the North Pole (with suitable apologies readers in the Southern Hemisphere) - we begin with the rather uninspiring castellation of Camelopardalis. Camelopardalis represents a Giraffe in the sky, its name being a rather literal amalgamation of "Leopard" and "Camel". While those who have seen a Giraffe up close will marvel at the scale and majesty of this peaceful, unassuming animal, the same cannot be said for its representation in the sky. When the principle star of a constellation - in this case Beta Camelopardalis - is only +4 mag in brightness. As a constellation, Camelopardalis is a relatively new one, being added to the sky in 1612 by Dutch Astronomer Petrus Plancius and not being one of Ptolemy's original 88.

Maybe it is because of Camelopardalis' relative obscurity and lack of bright stars that two very worthy objects for observation were overlooked by Messier and his correspondents during the compilation of his original list. The first of these is the wonderful galaxy NGC2403, which Herschel first catalogued in in 1788 - surprising maybe as this target can easily be seen in large binoculars from a decent site. Spiral in structure, NGC2403 is not presented fully face on, but at an attractive angle that benefits both surface brightness and a clear view of its architecture. 23.4 x 11.8 arc minutes in angular size - roughly the same size as M81 - and 8.5 mag in brightness, NGC2403 can be seen clearly in small telescopes, while larger instruments will show a suggestion of spiral structure and knots of nebulous material in its arms. In this way, NGC2403 is akin to a mini-M33, the Triangulum Galaxy - and is a treat for both visual observers and Deep Sky Astrophotographers too. NGC2403 is part of the M81 group of galaxies in neighbouring Ursa Major and lies around 10 million light years from us.

NGC2403 by Mark Blundell. Image used with kind permission.

Just under 23 degrees to the west of NGC2403 lies the second of Camelopardalis' Deep Sky treasures, the wonderful face-on spiral galaxy IC342. This object is a true victim of celestial geography, as it lies close to the plane of our Milky Way galaxy and is obscured - as are many other objects in Camelopardalis - by interstellar dust surrounding our galaxy's main spiral arms. Estimates are varied, but this dust is generally though to have decreased the brightness of IC342 by 2.5 magnitudes. At +8.39 mag, it is of reasonable brightness, but would be a dramatically easier object were it not for us seeing it through the veil of our own galaxy. At 21.4 x 20.9 arc minutes in diameter, it is one of the larger observable galaxies in the heavens and a fantastic subject for

imagers. Visually, IC342 is not in the same league as neighbouring NGC2403, as it is of low surface brightness. Observers with reasonable sized telescopes will see the glowing core of this target but little else. Much larger instruments are needed - and dark skies - to see much else of IC342's extensive spiral structure. However, long duration photography is on and to give us a real idea of quite how beautiful this object - said by many to be an analogue of our own Milky Way's make-up - truly is. Lying just 7 million light years hence, IC342 is not a true part of our local group, but is certainly close enough to have had some gravitational interaction with our own group of galaxies.

IC342 imaged by Sean Curry. Creative Commons

Sliding down the rather dim forelegs of the Giraffe, from IC342, we come to into neighbouring Auriga, the Charioteer, and its principle star, Capella, or Alpha Aurigae. This is the sixth brightest star in the sky at +0.08 magnitude and the brightest, most northerly star in the sky. Capella is actually a binary star and once of the first to be found by spectroscopic observation, where it was found to have two spectra, overlaid on top of each other, which appeared to doppler shift in relation to each other - hence it became known as a spectroscopic binary. The two stars in the system are orbiting each other by 0.75 AU - three quarters of the distance of the Earth to the Sun. As they are so close, even lying at a comparatively close 42 light years, they cannot be split, even with the largest telescopes on Earth. The system also comprises of two additional red dwarf stars lying

much further out. The two main components are similar spectral class to our Sun (G class), but much bigger and classed as giants. They are thought to be much further along their lifespan than the Sun is and have run out of hydrogen as nuclear fuel and are now “burning” helium and in the case of one, carbon. Neither are thought to have enough mass to go supernova at the end of their lives and are likely to end up as planetary nebulae.

Moving to the southern part of the constellation, we find to the Flaming Star Nebula, IC405. Found just under 12 degrees almost due south of the Capella, this object is a partial emission, partial reflection nebula, meaning that one part of its structure glows under excitement from radiation, whereas the other part merely reflects light from the stars imbedded in the object. Measuring around 30 x 19 arc minutes, IC405 is centred around the star AE Aurigae, a star which was ejected from the nearby Orion Nebula under 3 million years ago. At +10 mag, it is not an intrinsically bright object, but condensed enough to be seen in small telescopes from a decent location. It is unsure if any of the material that makes up the Flaming Star Nebula was once a part of the Orion Molecular Cloud - it is more likely that it is material that the star is merely passing through. As previously mentioned, this is an area rife with gas and other star forming material. IC405 lies some 1500 light years from Earth.

The Flaming Star Nebula by Mark Blundell. Image used with kind permission.

Just under 3 degrees to the NE of the Flaming Star lies the first of Auriga's three great open star clusters, the lovely M38, otherwise known as the Starfish Cluster. It's difficult to see exactly what resemblance this +6.4 mag, 20 arc minute diameter collection of stars has to the titular marine invertebrate, but it is certainly a pretty sight in any sort of optical instrument. M38 was first recorded by the preeminent Sicilian astronomer Giavanni Batista Hordierna in 1654 and re-squired much later by French observer Le Gentil in 1749. Le Gentil's observations alerted Charles Messier to M36's location and it was included in his original list in 1764.

At over a third of a degree angular diameter, M38 is ripe for observation in most telescopes and binoculars. Observers will note long chains of stars, many of which are blue, but there are also some lovely contrasting yellow and gold-coloured members. In total, M38 has around 100 stars as members and lies around 4200 light years from us. It is thought to be around 200-225 million years old.

M38 9and the smaller NGC1907) by Mark Blundell. Image used with kind permission.

2 and 1/3 degrees to the SE of M38 we come to the second of Auriga's great clusters, M36. This cluster is a good deal more compact than its neighbour at 10 arc minutes diameter and slightly brighter as a resultant +6 mag. Through a telescope, this collection of hot white stars can appear quite brilliant in comparison to M38 - indeed, it is said that if M36 were placed in the position of

the Pleiades, it would outshine them by a factor of three. M36 was again discovered by Hordierna, in 1654, rediscovered by Le Gentil and added to the Messier list in 1764.

M36. By Ole Neilsen. Creative Commons

This cluster is a good deal younger than its neighbour and contains many young hot blue main sequence stars, of spectral type B2 and B3. There are no older population stars to speak of in M36, so it is thought to be just 25 million years old. Lying at around 4300 light years hence, M36 is one of the many objects that share the moniker "The Pinwheel" - though apart from a circular collection of stars to the NE side of the cluster, it is difficult to see why it has picked up such a name - especially in the light of the other "Pinwheels" in the sky. Perhaps we should come up with a new more original nickname for this great cluster - it deserves better.

The last of Auriga's fine open clusters is its best - the spectacular M37. There are many great clusters in this area of sky: the much nearer Hyades, Pleiades, Beehive, the nearby M35 in Gemini and the Double Cluster in Perseus - but M37 is one the most beautiful of these and is a lovely sight is any telescope or binoculars. At a quarter of a degree in diameter, M37 is about the same angular size as the Full Moon in the sky. It is also the brightest of Auriga's "Trio" at +5.59 mag and the oldest at an estimated 300 million years of age. Like its neighbours, M37 contains many hot blue

stars, but also significantly many more mature yellow , orange and red giant stars. This more evolved stellar population makes for some fine viewing for we astronomers here on Earth as the blues of the newer, hotter population contrast superbly with the warmer tones of the older stars.

M37 by Jim Mazur. Creative Commons.

M37 was again discovered by Hodierna, though almost inexplicably was missed by Le Gentil - Messier himself found it again at catalogued it in 1764. M37's total stellar population is thought to number in the 500+ levels, of which maybe 150-or-so are observable in amateur telescopes. It is the furthest lying of Auriga's clusters at 4500 light years distance and the largest at 25 light years across.