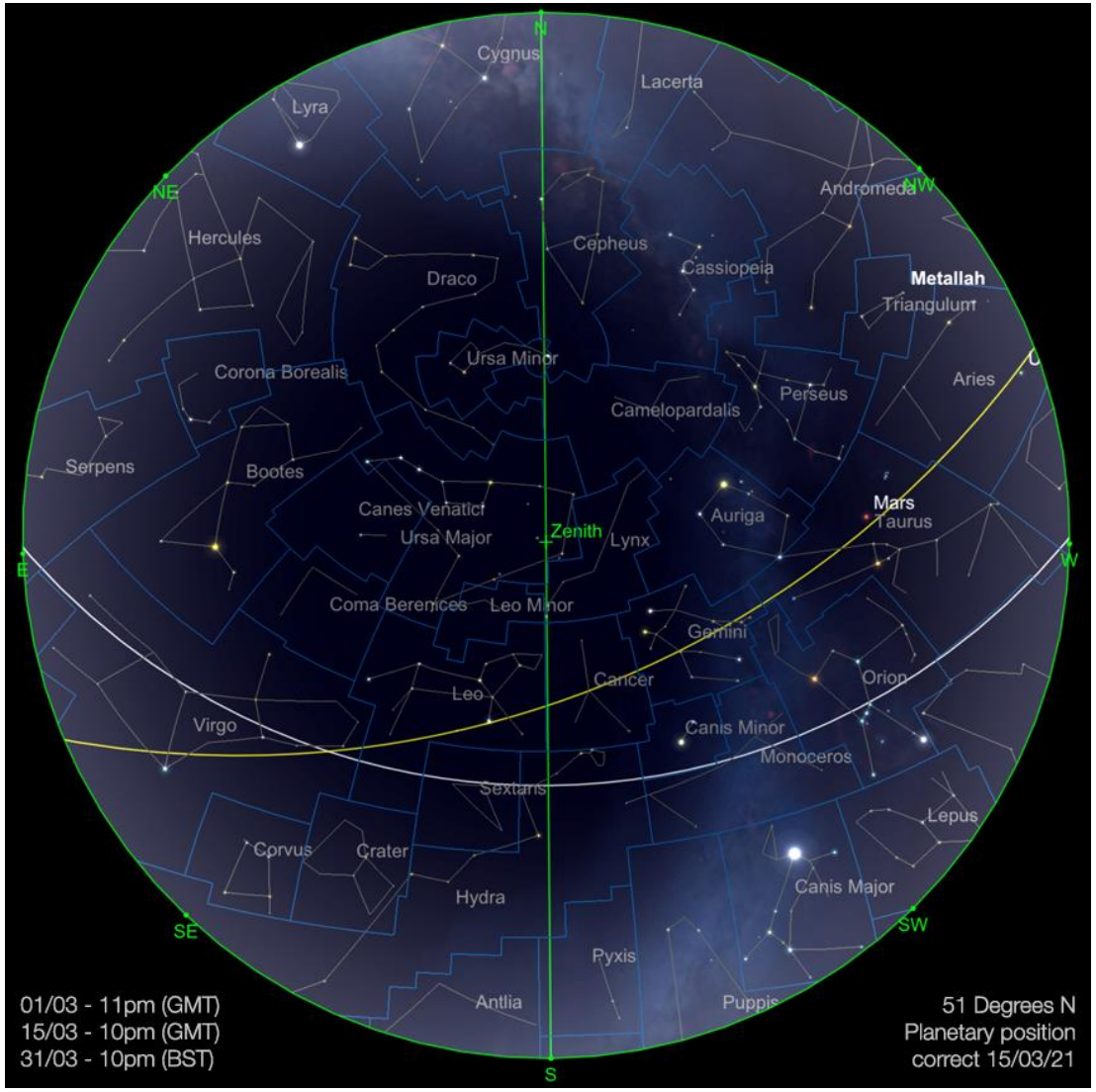
Telescope House March Sky Guide



It's March: one if the annual crossovers of the year, with two significant events occurring that have wider ranging consequences for astronomical observations. First of all, the Vernal Equinox, which occurs this year on the 21st March. This is technically the halfway point between Winter and Summer and the time where the Sun crosses the celestial equator into the sky's northern hemisphere. After this point, very gradually, those in the northern hemisphere start to experience greater hours of daylight than night - though the geometry of our planet and it's orbital tilt, means that these effects aren't felt all over the world in exactly the same way. More equatorial parts of the planet never experience as extreme differences in the shift hours of darkness or light at certain times of the year. However, for those of us at more extreme latitudes, the move of the Sun to the celestial northern hemisphere this has obvious repercussions: most significantly for those seeking true darkness to observe or image deep sky targets - the lack of which peaks at midsummer.

The second event that has secondary repercussions for observations, is the annual changeover from standard time to daylight saving time, which occurs in Europe on Sunday 28th March this year, as a result of the equinox. The old "Spring Forward/Fall Back" adage give you a clue which direction the shift is taking place. This change is most often justified on the grounds of maximising working daylight hours, subsequent productivity and (arguably) to save energy. This has the instantaneous result of the sky being lighter at a later time of the evening for us in the northern hemisphere.

Of course, what works for the northern hemisphere has exactly the opposite effect in the southern hemisphere, who will be experiencing their Autumnal Equinox at the same time, which will precede the shift to standard time in some of these parts of the planet.

Wherever you find yourself, as ever, there's plenty to see in the skies above us this March - so let's see what lies in store for us…

The Solar System

The Moon

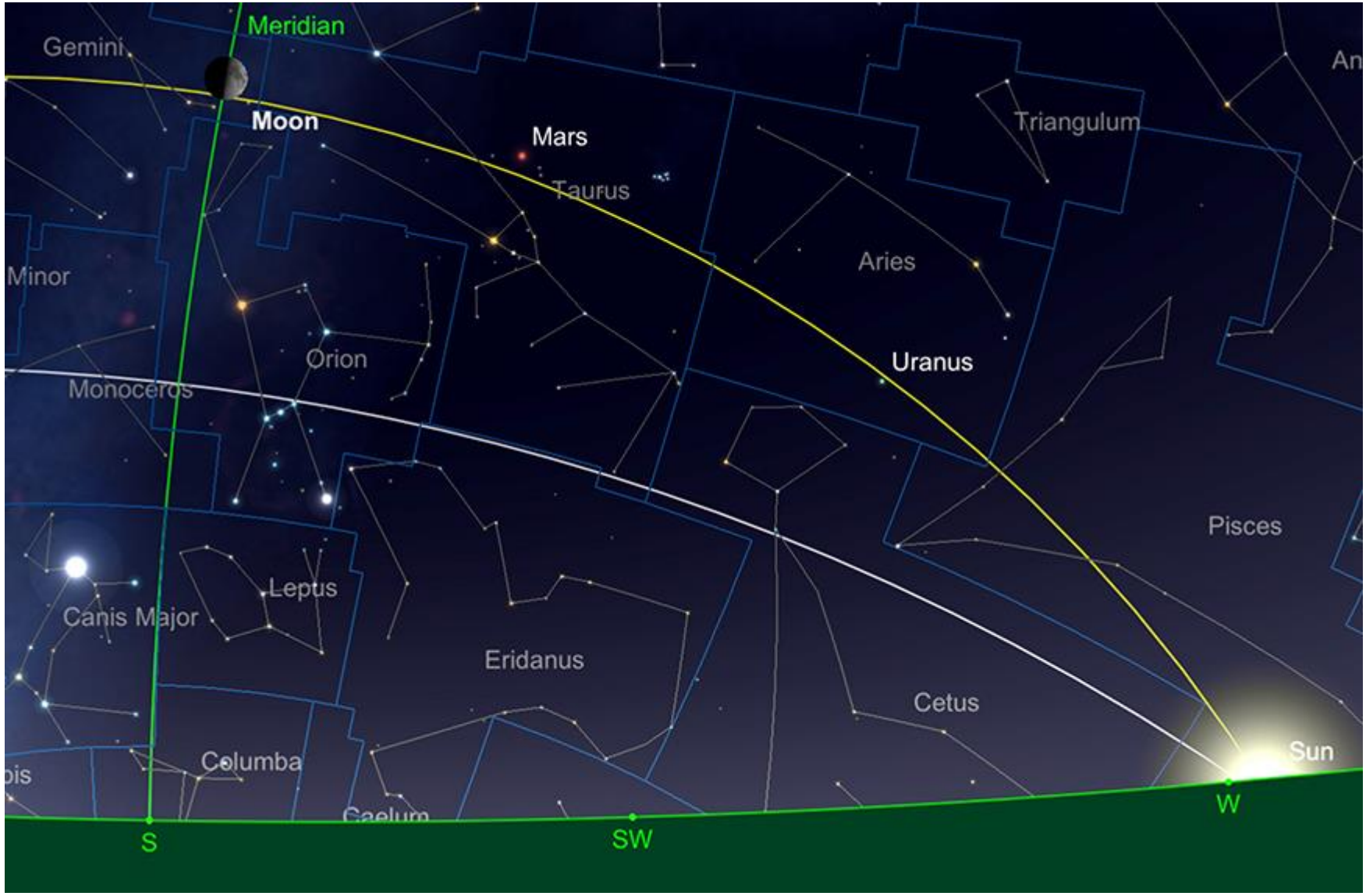
The Moon begins March at 91% Waning Gibbous phase in Virgo, rising just before 9pm (GMT). Subsequently, the very first part of the month (and its end too) will not be the best time for observations of deep sky objects, or astrophotography (without using narrowband filtration), beyond the latter part of the evening.

Last Quarter occurs on the 4th, with the Moon in Ophiuchus. Rising at just before 2.20am (GMT), there will be a significant part of the early part of the night unaffected by moonlight. This situation continues to improve as the moon slides through the southern part of the Ecliptic and then heads northwards to meet the Sun in the eastern part of Aquarius on the 11th. Beyond this is becomes an evening object.

For those of us in the northern hemisphere, we're now in the phase of lunar evening apparitions known as the "High Spring Crescents". These phases are one of the finest times of the year to observe the Moon from the northern hemisphere, as it is at these times that angular separation from the horizon is at its greatest for those of us in the temperate northerly parts of our planet. On the evening of the 19th, the Moon slides between Mars and the Hyades in Taurus, which will make for a very pretty sight with the naked eye and in low power binoculars.

First Quarter is reached on the 21st, in Gemini, with the Moon at practically the highest point in the northern ecliptic. The Moon will be transiting in the south around sunset during the this part of the month and will subsequently appear around its highest point in the sky. Those with telescopes and binoculars are encouraged to get out with them if it's clear in your locality and check out the detail visible down the terminator - the dividing line between the Moons' light illuminated side and dark side which remains in shadow, out of the reach of the Sun's rays. At this time of the month, very dramatic long shadow detail is visible along the ranges of mountains which border the northern Mare Imbrium (The Sea of Rains): the Montes Alpes, Apennius and Caucasus. These ranges are the ring wall of the massive impact crater that flooded with lava and cooled to form the 1200 km / 750 mile-wide Mare Imbrium. This impact - understandably - was a spectacularly violent event, which occurred in the late heavy bombardment period of the Moon's history, where protoplanetary debris of some appreciable size still littered the inner solar system. This impact was so violent that the forces transferred through the Moon's interior by the initial impact are thought to have formed the distinct grooved marks which litter the terrain around the crater Van De Graaff on exactly the opposite side of the Moon from Mare Imbrium. The smooth floor of the Mare belies the chaotic nature of the feature's inception and at this time of year the long shadows cast by the low Sun's rays falling on the deep greys of the sea floor are one of the most evocative sights in astronomy. Take a look yourself!

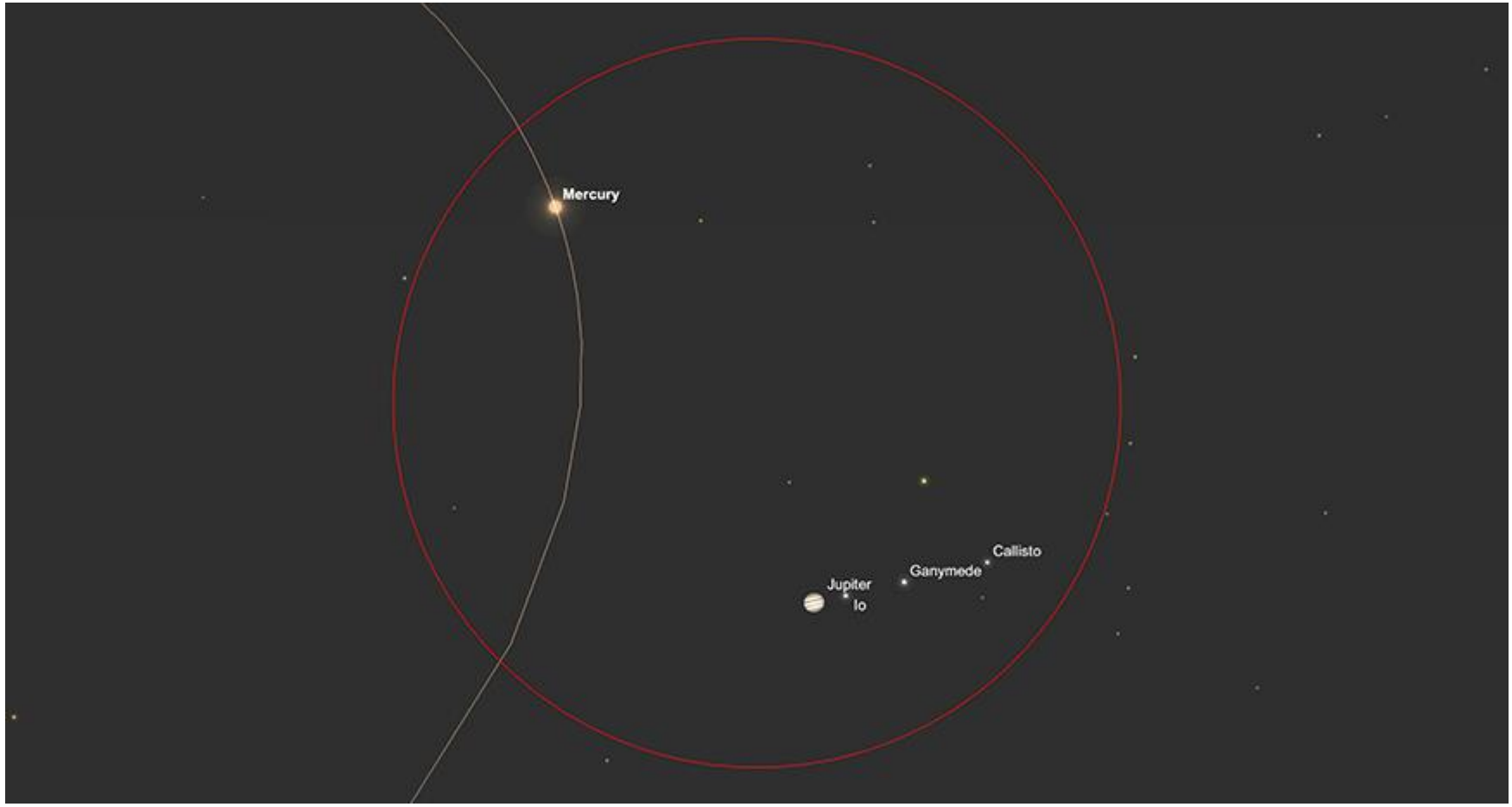
As previous reported, Full Moon occurs on the 27th in western Virgo and the Moon ends March four days later (in Libra) at a 92% illuminated Waning Gibbous phase.


Meridian
Gemini
Moon
Mars
Taurus
Triangulum
Aries
Minor
Orion
Uranus
Monoceros
Pisces
Leptus
Canis Major
Eridanus
Cetus
Sun
Columba
Caelum
S
SW
W

Mercury

Mercury begins the month as a morning object just shy of maxima western elongation. At +0.3 magnitude, the planet is not at its brightest and will only sit just over 7 degrees high at sunrise on the 1st (from 51 degrees N). On the morning of the 5th, Mercury will be around 19 arc minutes to the north of the much brighter Jupiter, with the larger planet acting as a signpost to the much fainter smaller world. By this point, the planet will sit 6 1/2 degrees high at sunrise.

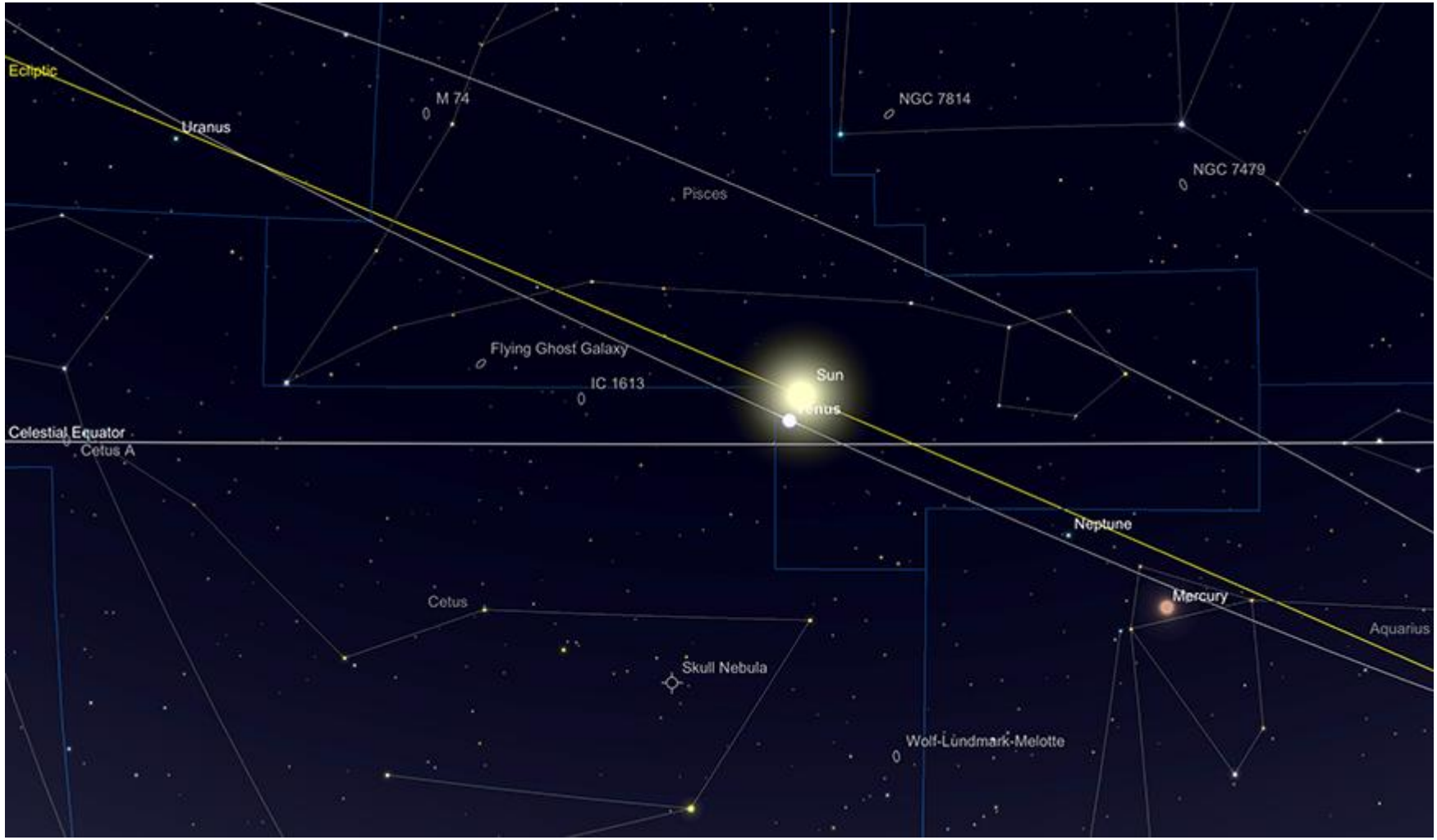
Beyond this, Mercury continues to appear to sinks towards the horizon from a northern hemisphere perspective, making it a more and more challenging target to observe. As the Sun moves higher in the sky and Mercury moves further south, the angle between the two bodies becomes closer to the horizontal from mid-northern latitudes. By the point the Sun reaches the vernal equinox on the 21st, Mercury is to all intents lost on the morning glare and practically impossible to observe due to being just 2 degrees high in the sky at sunrise (again, from 51 degrees N). It ends the month a little under 18 degrees from the Sun.



Venus

Venus is found Aquarius, just over 6 degrees to the west of the Sun, on the 1st. As it is so close to our parent star the planet will be unobservable and spends most of the month inching closer to the Sun, finally reaching Superior Conjunction on the 26th. After this

point, Venus will eventually emerge on the eastern evening side of the Sun, though it will be some time before it is in a better position to be observed.



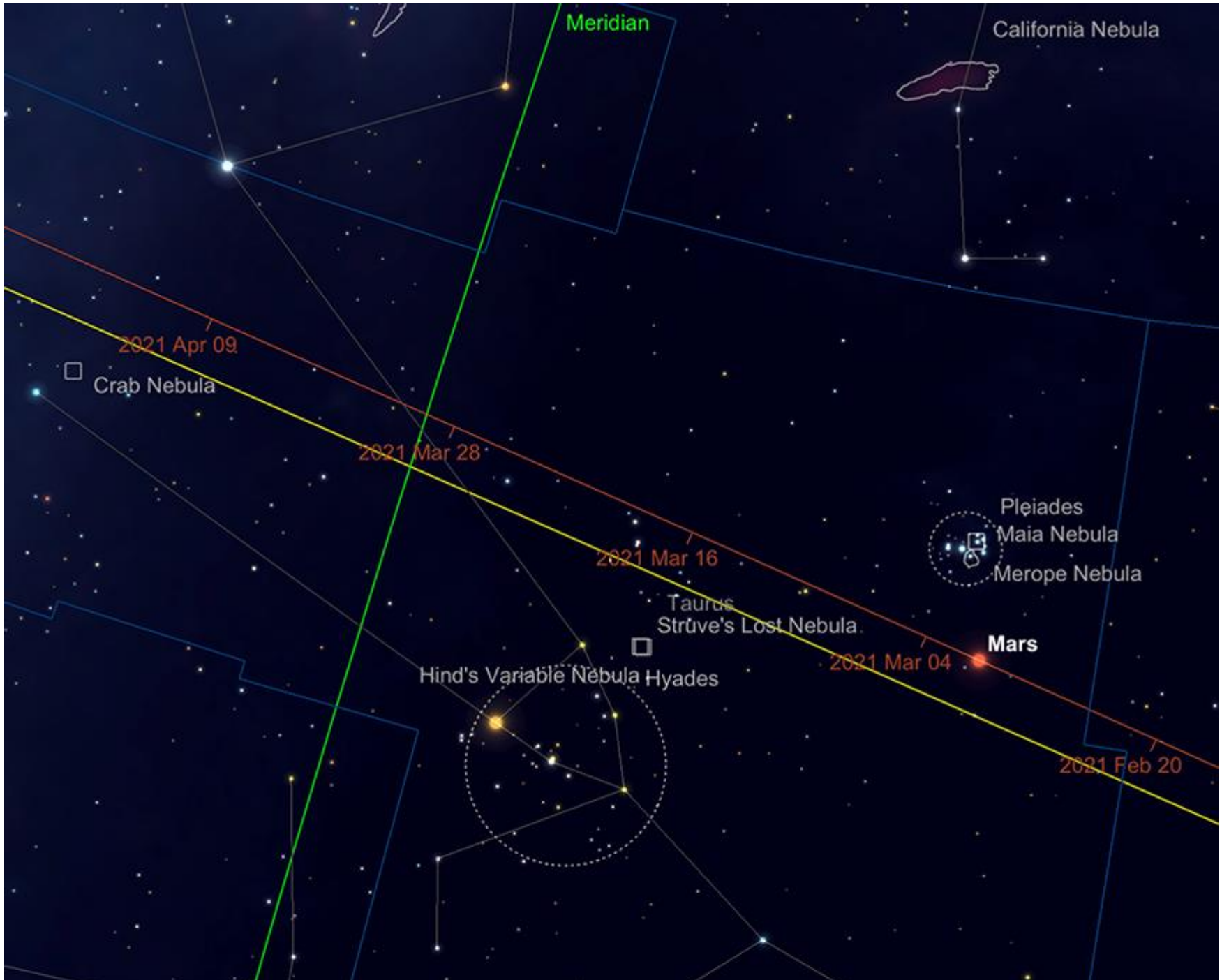
Mars

Mars is still well-placed for evening observations in Taurus, spending most of the beginning of the month slowly drifting between the two major star clusters the Pleiades and the Hyades. Transiting at just after 5pm on the evening of the 1st, Mars is 6.4 arc seconds across and is +0.9 magnitude on the 1st. It will be interesting to compare and contrast both hue and Mars' brightness with Taurus' principal star Aldebaran (Alpha Taurii) at the beginning of the month, as the two objects will appear extremely similar in appearance.

As we have mentioned in previous Sky Guides, Mars is a comparatively small planet in relation to the Earth, the planet's disk appears to shrink quite rapidly once we begin to pull away from it on our faster interior orbit. The planet is well past its best now and it will be a real challenge to pick up any detail from observations of its tiny disk.

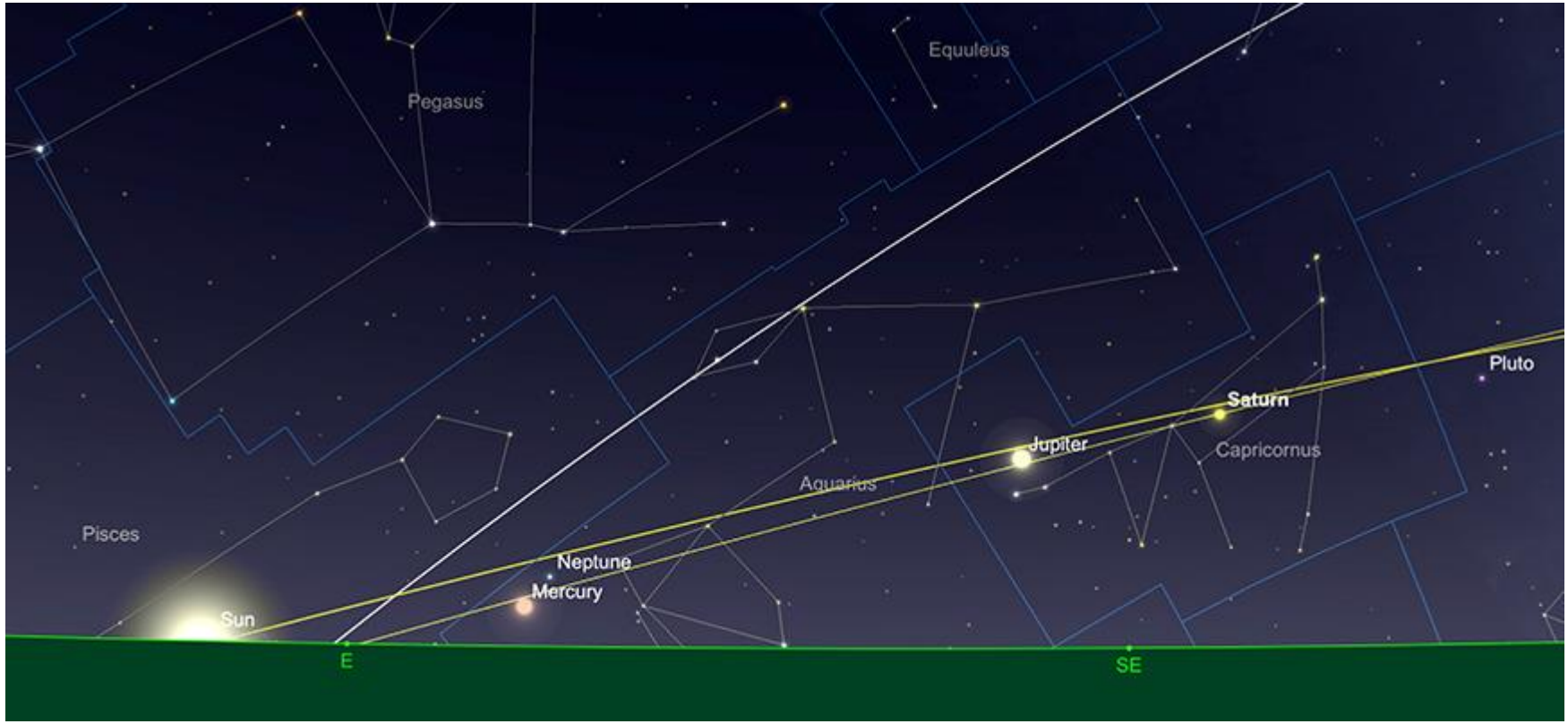
By the 15th, Mars' disk has shrunk to a 5.8 arc second diameter target, shining at +1.1 magnitude. The planet still appears to be climbing northward in the Ecliptic from our perspective and is a very reasonable height from the horizon at transit point - just over 62 1/2 degrees (from 51 degrees N), which it reaches at just before 5pm (GMT).

By the end of March, Mars will present a 5.3 arc second disk. By this point, the planet will be +1.3 mag brightness. Mars will still be worth observing with reasonable magnification in a telescope, but the later in the month it is observed, the less chance you will have to observe any real detail. It ends the month flying high in the northern ecliptic, still in Taurus, reaching a transit point at 5.35pm (BST).


Meridian
California Nebula
2021 Apr 09
Crab Nebula
2021 Mar 28
Pleiades
Maia Nebula
Merope Nebula
2021 Mar 16
Taurus
Struve's Lost Nebula
Mars
2021 Mar 04
Hind's Variable Nebula
Hyades
2021 Feb 20

Jupiter

Jupiter reached Superior Conjunction on 29th January and is still emerging from the Sun's glare as a morning target As Jupiter is *very* low in the sky from northern hemisphere at the month's beginning, it won't appear at its best in telescopes. As previously reported, the highlight of the month is a very close conjunction with Mercury on the origin of the 5th. However, we will have to wait until much later in the month before it is in a more agreeable position for detailed observation. By the time march reaches its conclusion, Mercury can be found just under 50 degrees to the east of the Sun in the mornings, having attained a height of just over 10 1/2 degrees above the horizon at sunrise (from 51 degrees N). At -2.1 magnitude, the planet is its usual striking self, but we will have to wait until the Summer before it is in an appreciably better position to observe.



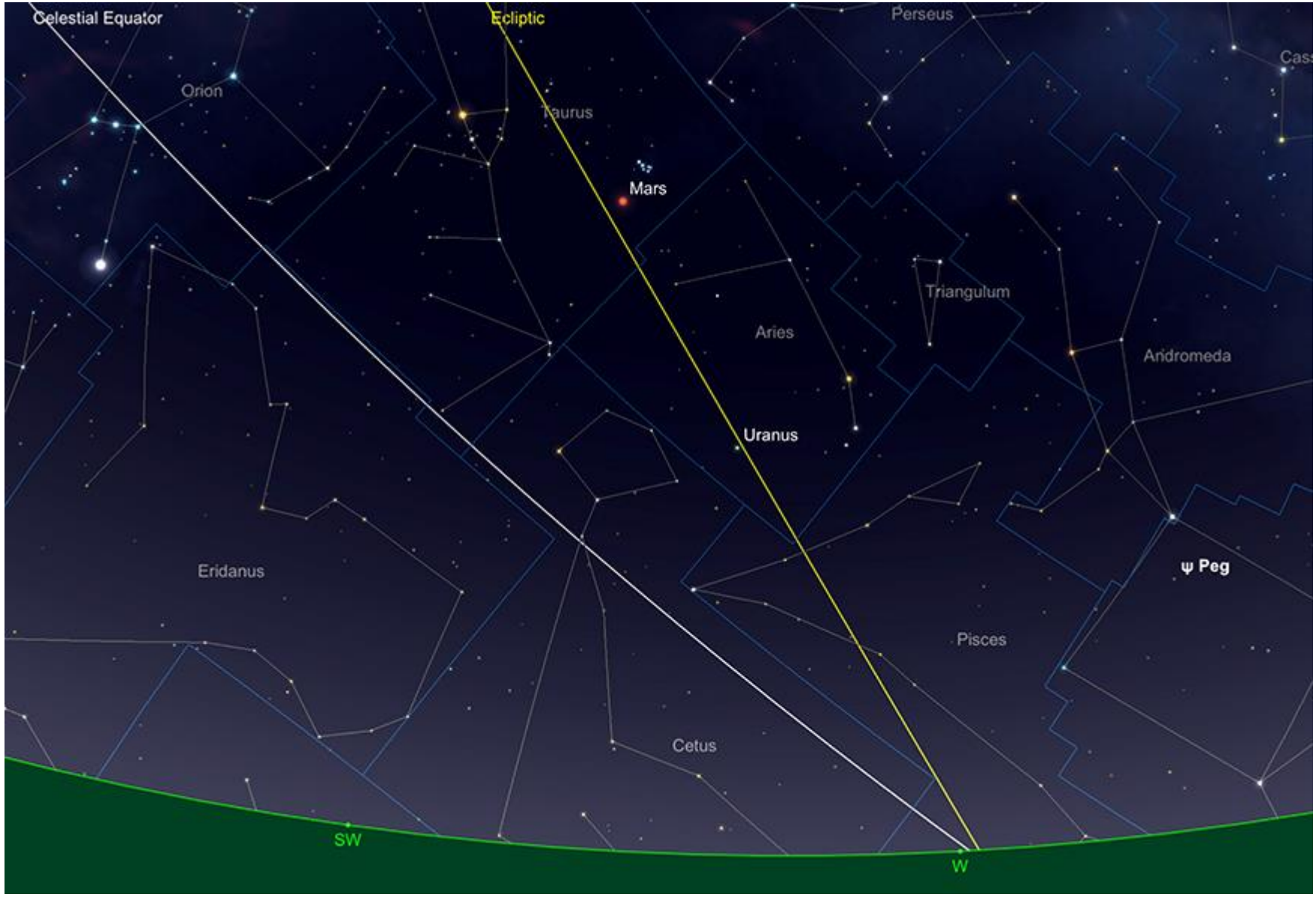
Saturn

In a similar part of the sky to Jupiter, Saturn's visibility in the mornings is also somewhat challenging. Sitting just over 8 degrees 1/4 to the west of Jupiter, at +0.7 magnitude, at the month's beginning, the Ringed Planet will remain static in brightness throughout the month. As with Jupiter, Saturn position is not great for telescopic observations, but as the month progresses becomes easier find in the morning twilight as separation from the Sun increases. Ending the month at just under 60 degrees separation from the solar disk in the morning in Capricornus, Saturn stands a little over 13 degrees high in the SE as the day begins.

Uranus and Neptune

The two outer gas giants are a mixed bag this month. The fainter Neptune is further west within the Ecliptic than Uranus and is headed towards Superior Conjunction on March 11th, making it unobservable during the month. Although by the end of March, it will be 19 degrees west of the Sun, being so faint at the 8th magnitude there is no chance of seeing it until considerably greater separation occurs later in the year.

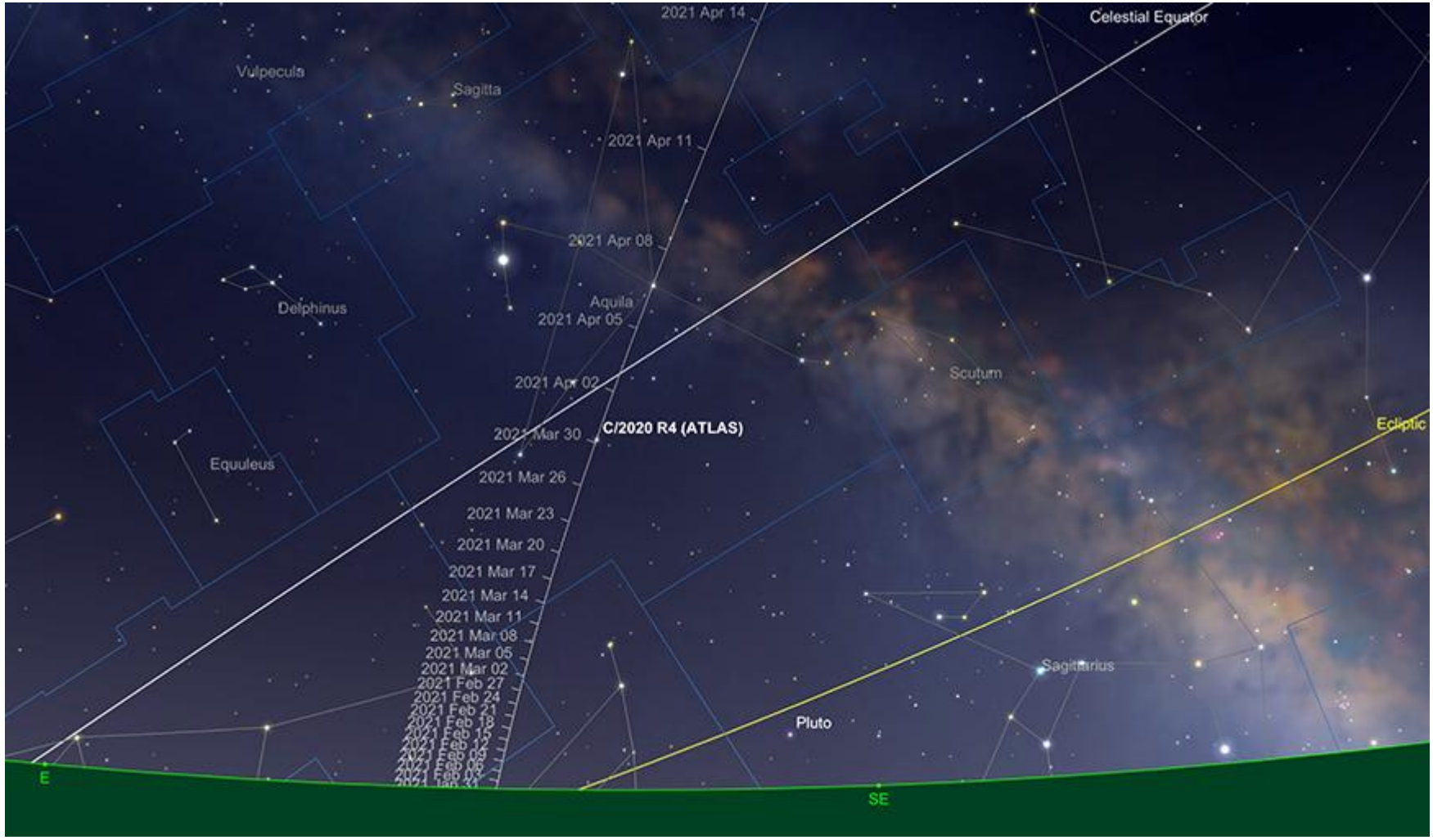
Uranus will be much easier to find in Aries at +5.8 mag and presenting a 3.5 arc second diameter disk on the 1st. By the time Astronomical Dusk has occurred on the 1st, Uranus is still at a reasonable altitude to observe - just over 31 degrees high (from 51 degrees N). However, as the month progresses, the planet appears to dip sunward with some rapidity. This, coupled with the Sun's encroachment into the northern celestial hemisphere after the Vernal Equinox on the 21st, minimises the observing window and subsequently, by the time astronomical darkness is in effect on the evening of the 31st, Uranus sits at just over 5 degrees above the horizon (from 51 degrees N). Although the planet won't reach Superior Conjunction (the opposing side of the Sun, as it appears from our perspective here on Earth) until late April, the observing window by the end of the month is shut. Make the most of your chance to observe Uranus while you can early on in the month.


Celestial Equator
Ecliptic
Perseus
Orion
Taurus
Mars
Triangulum
Aries
Andromeda
Uranus
Eridanus
ψ Peg
Pisces
Cetus
SW
W

Comets

Those with telescopes or large binoculars may wish to hunt out comet C/2020 R4 Atlas in the morning sky as it emerges from solar conjunction. This comet is making a steady trek through Capricornus and Aquila during March, though fading as it does. It is not especially bright, though may interest some observers.

As reported in January, C/2021 A1 Leonard looks like it will be a comet to look forward to, as it passes Earth by 0.23 AU in December 2021, just prior to perihelion. It is predicted that it may reach around the 4th magnitude, so could well be a good binocular and telescopic sight. We'll keep you posted on developments of this comet as clearer picture emerges. It will emphatically *not* be another Comet Neowise, unfortunately, but does look like being something to look forward to.


2021 Apr 14
Celestial Equator
Vulpecula
Sagitta
2021 Apr 11
2021 Apr 08
Delphinus
Aquila
2021 Apr 05
Scutum
2021 Apr 02
2021 Mar 30
C/2020 R4 (ATLAS)
Ecliptic
Equuleus
2021 Mar 26
2021 Mar 23
2021 Mar 20
2021 Mar 17
2021 Mar 14
2021 Mar 11
2021 Mar 08
2021 Mar 05
2021 Mar 02
2021 Feb 27
2021 Feb 24
2021 Feb 21
2021 Feb 18
2021 Feb 15
2021 Feb 12
2021 Feb 09
Sagittarius
Pluto
E
SE

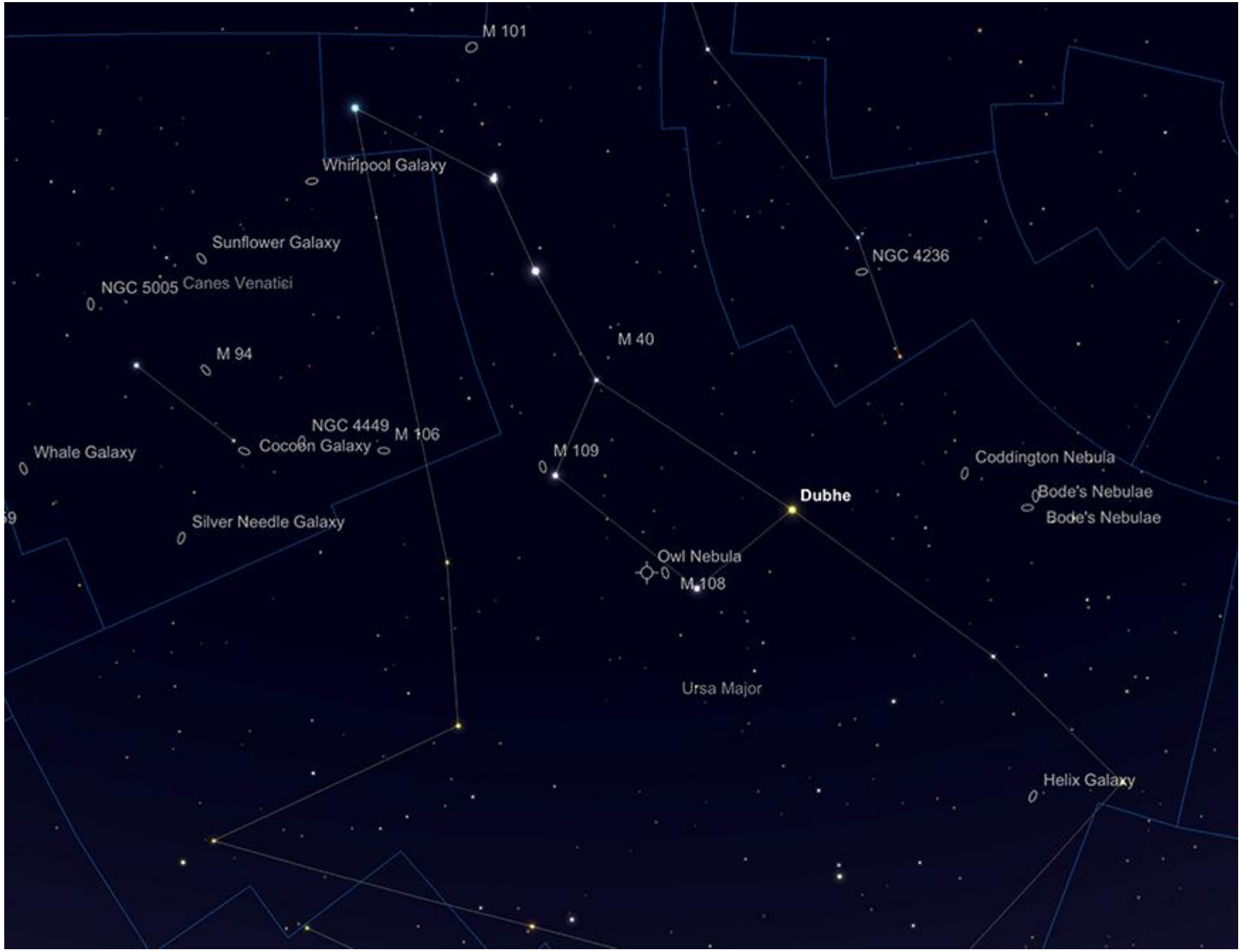
Meteors

There are no major meteor showers in March.

Deep Sky Observation - Welcome to Galaxy Season

Ursa Major

Springtime is traditionally seen as Galaxy Season, so for the next few months, we'll be concentrating on the rich area of the heavens that runs from Ursa Major and Canes Venatici in the North, through Coma Berenices, on into the Zodiacal constellations of Leo and Virgo. This area of sky is well removed from the sweep of our Milky Way's axis and is a major "window" from our perspective out into extra-galactic space. The arc we will be covering, from M81and M82 in the North of Ursa Major to M104, the Sombrero Galaxy in the South of Virgo takes in 90 degrees of sky and is full of easily-found and observed galaxies.


M 101
Whirlpool Galaxy
Sunflower Galaxy
NGC 5005
Canes Venatici
NGC 4236
M 40
M 94
NGC 4449
M 106
Cocoon Galaxy
Whale Galaxy
M 109
Coddington Nebula
Dubhe
Bode's Nebulae
Bode's Nebulae
Silver Needle Galaxy
Owl Nebula
M 108
Ursa Major
Helix Galaxy

We start in the far Northern part of this arc (with suitable apologies to readers in the Southern Hemisphere), in the large and imposing constellation of Ursa Major, the Great Bear.

Known the world over for the distinctive question mark-shaped asterism of the Plough or the Big Dipper, Ursa Major actually extends over a much larger area. As such, it is actually the third largest constellation of all, after Hydra and Virgo.

Ursa Major is rich with deep sky objects, the first of which we shall cover is one of the fainter members of this group, NGC2685, the Helix Galaxy. At +11.30 mag and 4.6 x2.5 arc minutes across, the Helix Galaxy is hardly bright or indeed large, but still worth searching out. It can be found in the extreme west of Ursa Major, some 3 3/4 degrees SE of Muscida, Omicron Ursae Majoris - the star that marks the Great Bear's nose. NGC2685 is what's known as a Polar Ring Galaxy, a curious formation caused by the collision and/or interaction between two large galaxies. This causes great loops and rings of stars to form around the exterior of a central galaxy complex. These filament-like structures of gas and star material are often extremely attractive and NGC2685 is a prime example of this. This galaxy is also of the Seifert type, meaning it is energetically emitting radiation, probably as a result of the collision which formed its outer Helix-like structure. It is only in very large telescopes that it is possible to see the delicate ring structures, but they appear as very evident in long duration astrophotographs. The Helix is thought to lie around 42 million light years from Earth.

12 degrees or so to the NE of the Helix lie two of the most celebrated objects in the sky and one of the great astronomical "odd couples" (another of which later): M81 and M82. These two galaxies are separated by just over half a degree, but are quite different-looking objects. Of the two, M81 is the dominant - a marvellous sweeping spiral, almost perfectly presented to our perspective, with two major arms, surrounding a large, bright core. At +6.90 mag and 24.9 x 11.5 arc minutes dimensions, M81 can easily be seen in telescopes and binoculars of all sizes - some keen eyed observers have even reported being able to see it with the naked eye under perfect conditions. If this is the case, at 12 million light years distance, it must be the most distant object visible to humans unaided. The M81 group of galaxies are thought to be the nearest collection of galaxies to our own local group. Indeed, some sources suggest that we should actually see our local group of galaxies and the M81 group as a larger collective, as there is some evidence of gravitational interaction between the two.

M81 was discovered by Johann Bode in 1774, along with neighbouring M82. As such both objects are often rather confusingly known as Bode's Nebula. Pierre Mechain independently discovered it in 1779 and Messier added both M81 and M82 to his catalogue two years later. In a telescope of 8-inch aperture and above, the true Spiral nature of M81 really begins to reveal itself - indeed it is one of the few spirals that show real evidence of its shape at such apertures. In long duration images, M81 practically leaps out of the darkness and

given it and M82's proximity to one another, it is hardly surprising that these two objects are amongst the most photographed in the entire sky.

M82 by contrast is a very unusual object - otherwise known as the Cigar Galaxy (for very obvious reasons). This galaxy is somewhat fainter than its neighbour at +8.39 mag, but is also considerably smaller in area at 11.2 x 4.3 arc minutes dimensions. Subsequently, the surface brightness of M82 is not dissimilar to M81's. M82 is thought to have been somewhat deformed from a regular spiral structure by interaction with M81 and is bisected by a deep red lane of heavy star forming material. This bisection is clearly visible in telescopes and spectacularly revealed in even modest length exposures . This region looks almost organic in images, with feathery, root like structures shooting in both directions perpendicular to the galaxy's major axis. The power behind this structure seems to be Supernovae, which have been thought to have occurred in M82 with almost metronomic regularity - estimates put the figure at once every decade, though not all of these have been directly observed. The last Supernova event, a type Ia, in M82 was observed in January 2014 and brightened to +8 mag - it was the closest and brightest observed Supernova since the LMC Supernova in 1987.

In addition to M81 and M82, a smaller outlying galaxy, NGC 3077, which is a 5.2 x 4.7 arc minute +9.89 mag object, forms a sort of equilateral triangle with its two more dominant neighbours. This is a little more difficult from a visual perspective, though shows up well in images.

You don't need a large telescope to observe these galaxies, binoculars and a reasonable sky will show them, but the beauty of M81 and the mysterious nature of M82 are a joy to behold in a medium to large-sized telescope.


M81 Bode's Galaxy
M82 Cigar Galaxy
Const: Ursa Major
By Mark Blundell
11th February 2016

The curious Coddington's Nebula, IC 2574, lies around 3 degrees to the E of M81 and M82, in the direction of Dubhe, Alpha Ursae Majoris. This galaxy is an outlying member of the M81 group too. At +10.39 mag and 13.2 x 5.4 arc minutes area, it is somewhat low in surface brightness and not nearly as conspicuous as its neighbours - subsequently it was overlooked until Edwin Foster Coddington discovered it in1898.

Follow Duhbe down the "Bowl" of the Big Dipper to Merak, or Beta Ursae Majoris. A degree and a half E of Merak lies another "odd couple" - the galaxy M108 and the planetary nebula, M97, otherwise known as the Owl Nebula. Both were discovered by Pierre Mechain in the early 1780s, though M108 was not officially added to the Messier list until the 1950s. M108 is a fine spiral galaxy, viewed nearly edge on and showing a distinct mottling in its texture. At +10 mag and 8.6 x 2.4 arc minutes, M108 can be seen fairly easily in most small telescopes and shows some notable H II nebulous regions with a UHC filter or similar in larger scopes. This galaxy is thought to be an outlying member of the M81 group and lies some 35 million light years away.

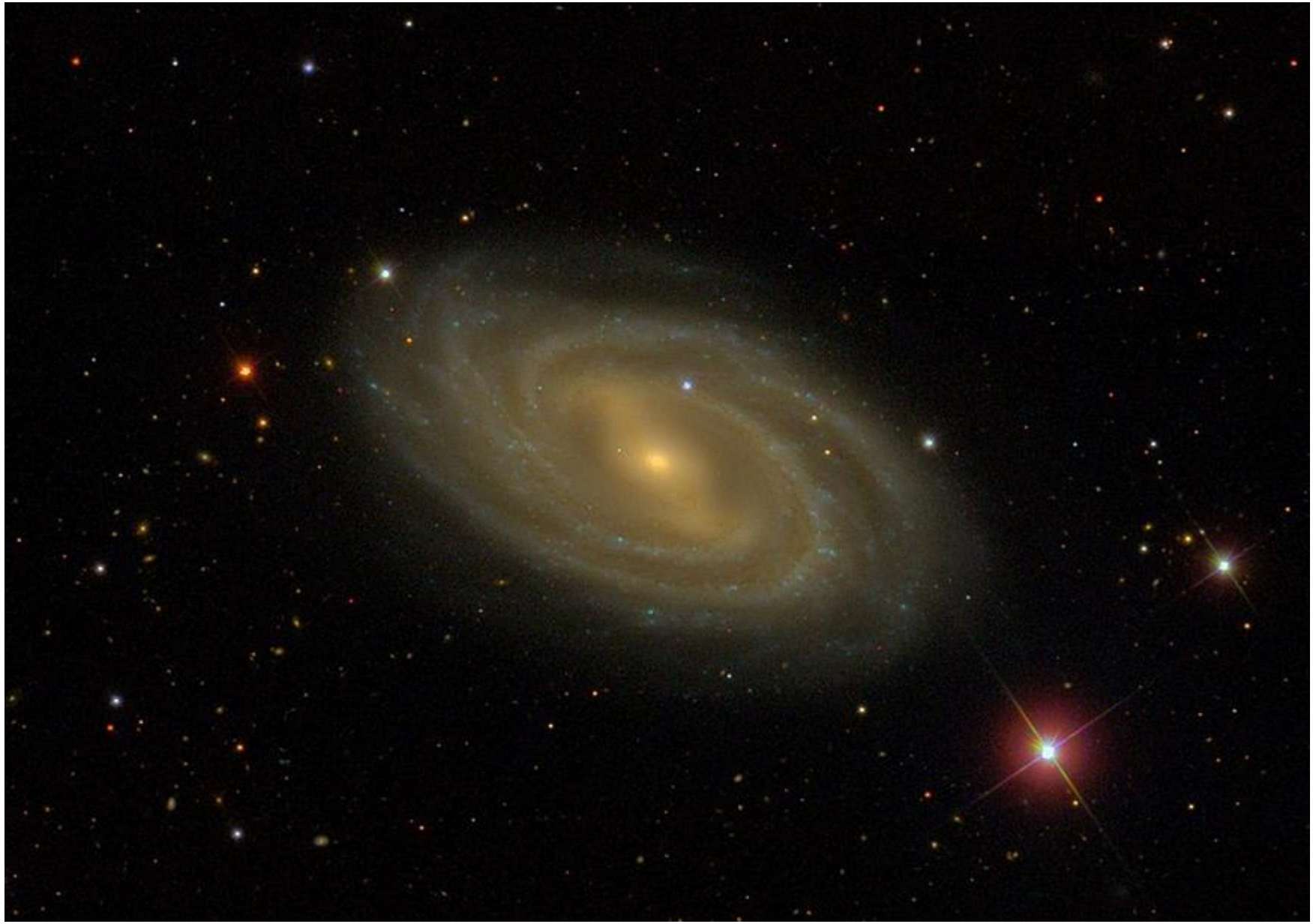
M97, or the Owl, is much closer at 1900 light years away and is very much a part of our galactic neighbourhood - its association with its neighbour is merely a lucky line of sight event and has no further significance than that. Unlike M108, the Owl was originally classified by Messier in 1781. When one observes the Owl through a reasonable sized telescope, most successfully when using an OIII filter, the reason for its nickname become apparent. This Planetary shows two distinct dark "eyes" like the face of an owl looking out through the cosmic gloom. These eyes are simply regions in the toroidal structure of the nebula where there are voids of gas - these are quite common features of many Planetary nebulae - the less material in these sections leads to a lower contrast area. The Owl has a central star, which is difficult to observe in smaller telescopes.

This pair of lovely objects, much like M81 and M82 is understandably a perennial subject for imagers.


M97 Owl Nebula and M108
By Mark Blundell
28th December 2014 (PM)

Moving east along the bowl of the Dipper, or the blade of the Plough, we come to Phecda, or Gamma Ursae Majoris. Some 38 arc minutes to the E of Phecda is the stunning galaxy M109. Like M108, this is a latter addition to the Messier list, though discovered by Mechain in 1781. M109 is a +9.80 mag, 7.5 x 4.4 arc second target and one of the most beautiful Barred Spiral Galaxies in the entire sky. It can be spotted in binoculars under good conditions, though larger telescopes are needed to show evidence of its spiral arms and prominent central bar. M109 has three major arms which become evident under higher magnification in larger telescopes, though suffered the indignity of being incorrectly classified as a Planetary nebula by Sir William Herschel. Under lower magnification, M109 looks distinctly egg-shaped, so this might go some way to explaining the great Astronomer's error! Lying around 75 million light years away, M109 is the most prominent member of the larger Ursa Major group of galaxies, which are distinct from the closer M81 group.

From M109, we now travel up the bowl of the Big Dipper, along the handle, passing Megrez, Alioth and the double star Mizar and Alcor. If we continue to trace a line from Alioth, through Mizar, to the point where this line would be bisected by a perpendicular line moving up Northward from the last star in the handle, Alkiad, we come to the location of the last of the galaxies in Ursa Major we will cover this month: the face-on spiral M101.



M101 is a large galaxy, taking up an area 28.8 x 26.9 arc minutes across - much larger than even M81. Although its brightness is listed as around +7.9 mag, due to its face-on presentation, this brightness is spread over a very wide area, leading to quite a dim overall target. This galaxy was discovered by Mechain in 1781 and is one of the final original Messier objects, as it was added to the list by Messier later in the same year. Although studied by many astronomers in the interim period, it was only when Lord Rosse turned his 72-inch Leviathan of Parsonstown Reflector towards it in 1851 that its true spiral nature was revealed. Although some observers claim to have seen the first suggestion of spiral structure with instruments as small as 4 inches aperture, it will take exceptional sky conditions to be able to achieve this - or a much larger telescope. Larger telescopes, when combined with UHC, or similar Hydrogen-responsive filters, will start to reveal some of M101's remarkably rich HII regions, where star formation is rife. Indeed, M101 is somewhat of a monster in size, as it is estimated to be twice the diameter of our own Milky Way. It lies around 22 million light years away.

Somewhat confusingly, M101 is one of the three galaxies in the sky known by the nickname "The Pinwheel" - M33 in Triangulum and M99 in Coma Berenices also share this title.


M101 Pinwheel Galaxy
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Original text: Kerin Smith