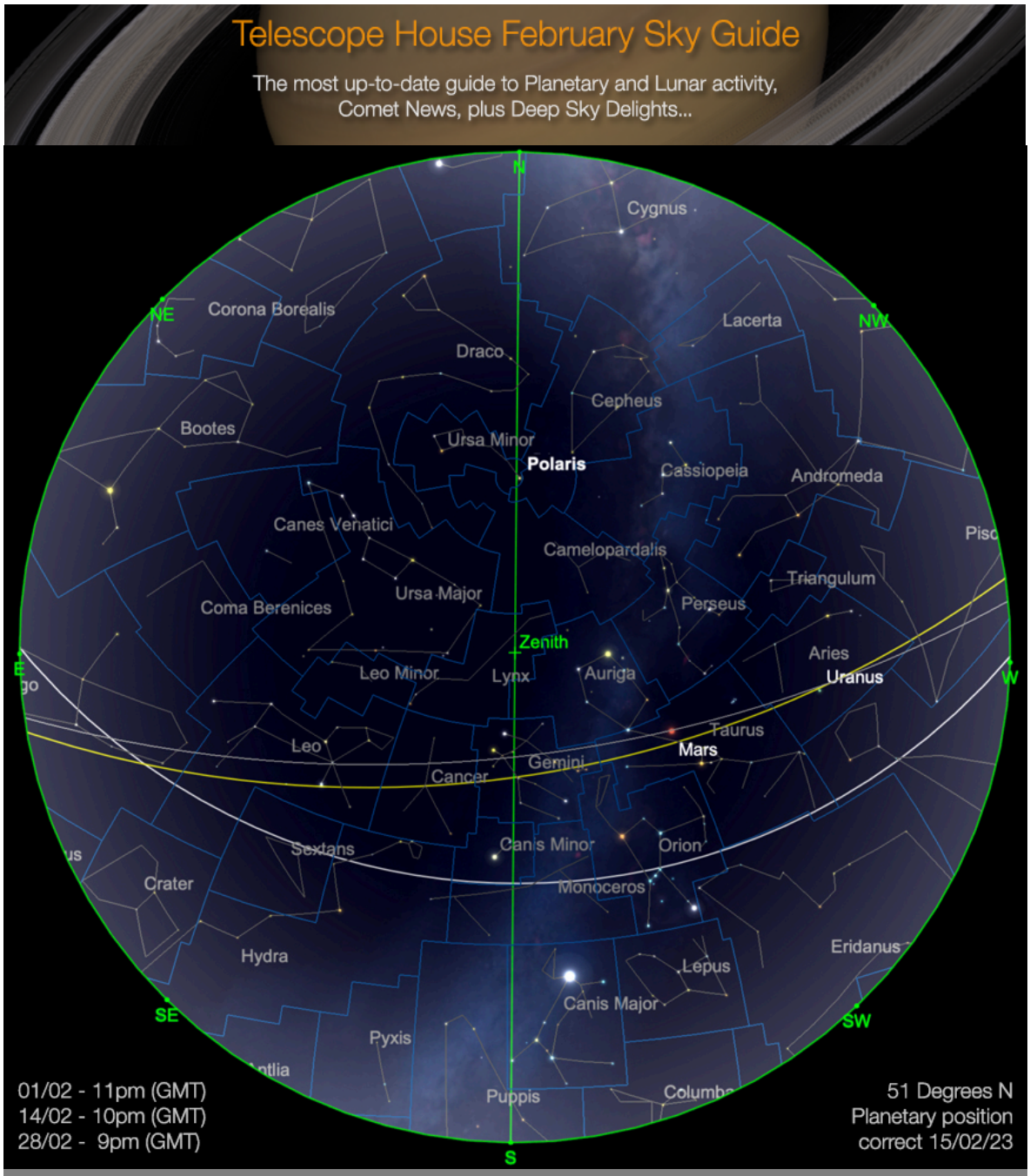
Telescope House February Sky Guide



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February is always the shortest month. This year, is not an even year, so is not a

leap year - so February is only 28 days long. To qualify as a leap year, in the Gregorian calendar, the year must be wholly divisible by 4, apart from those that are divisible by 100. It is only those “centurial leap years” that are divisible by 400 that are also leap years. Subsequently, February this year only has 28 days. Our next leap year will be in 2024. This peculiarity is designed to keep our calendar as closely locked with the actuality of the equinoxes and solstices. As the Earth’s full orbit of the Sun is actually around 365.25 days long, if we did not add leap days every four years to our calendar, our year would slowly drift against our true orbital period. Most calendars used around the world also use leap years to try and keep proper time with our orbit around the Sun. We can thank our ancestors, who long ago through their painstaking observations of the skies noticed this potential anomaly and took action to correct it. This is a direct example of astronomy and orbital dynamics affecting daily life on Earth and our attempts to mark time our time on this planet accurately.

With the Sun sitting firmly in the centre of Capricornus during the early part of February, those of us in the Northern Hemisphere will be noticing a slight increase in daylight hours from the very short days of midwinter. Conversely, those readers in the southern hemisphere will now be experiencing slightly longer nights after their recent midsummer.

Wherever you are in the world, as ever, there’s plenty to see in the skies above us - so let’s see what February 2023 has in store for us…

The Solar System

The Moon

The Moon begins February, at Waxing Crescent phase, with our natural satellite a resident of the constellation of Taurus. Riding high in the northern Ecliptic, the Moon rises at a little after 12:30 pm (GMT) and transits at a little before 9:30 pm. It is visible throughout the entire night, only setting at a little before 5:30 am the following morning. Over the next few days, the Moon will continue its journey through the upper northern part of the Ecliptic, passing through Gemini, Cancer and on into Leo, where it becomes Full on the evening of the 6th of February. Needless to say, this part of the month won’t be the most opportune for those interested in observing fainter targets in the nighttime sky, or those interested in deep sky astrophotography (without recourse to rather extreme filtration).

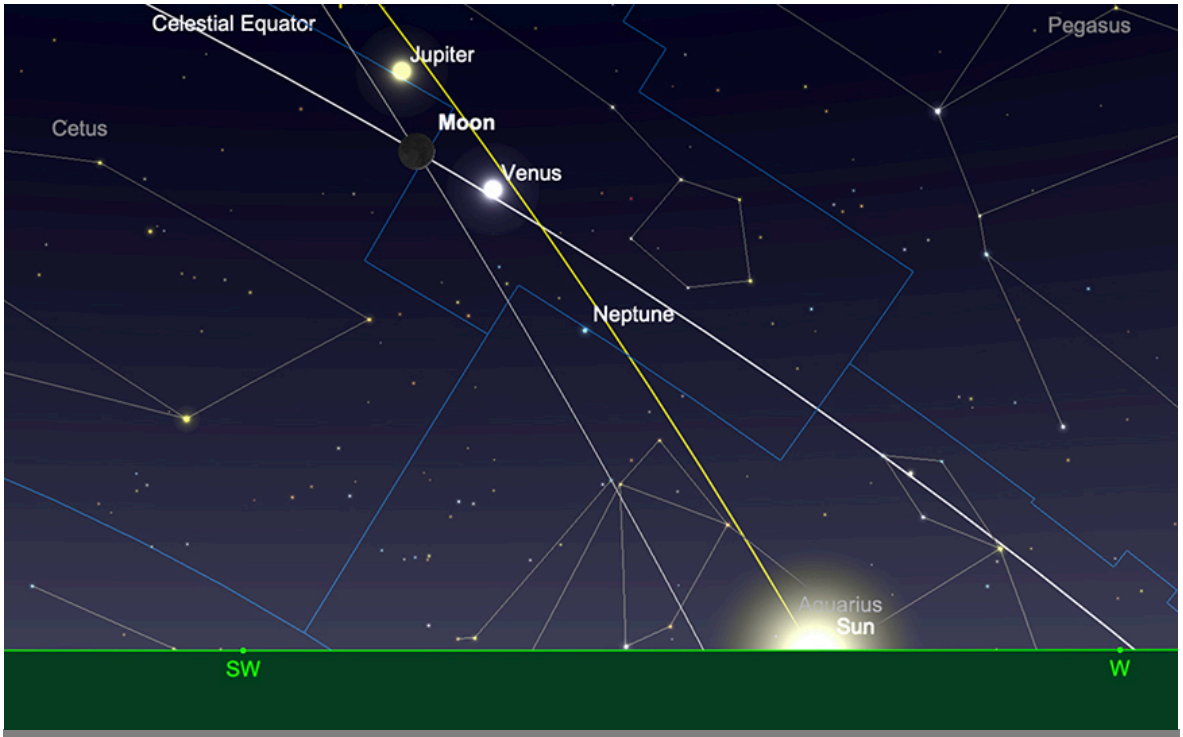
Beyond the 6th, the Moon begins to wane and as it exits Leo, moving into the vast expanse of Virgo (which it takes nearly 5 days to cross), on into Libra and Scorpius, its Gibbous phase will decrease - until it reaches Last Quarter

in Ophiuchus on the 15th of the month. By this point in time, the Moon will be very much a morning object, rising just before 3 am and transiting at little before 6:30 am (GMT).

Skirting through the most southerly part of the Ecliptic, the Moon catches up with the Sun in Aquarius on the 20th. After this point, the Moon becomes an evening target again. Over the next few days, the Moon begins to climb higher in the sky, as seen from mid and higher-northern latitudes. On the evening of the 22nd, the 8% illuminated crescent Moon can be found almost equidistant between Jupiter and Venus on the Pisces/Cetus borders. This event will be a great opportunity for widefield astrophotography and also observation through binoculars and telescopes (using lower magnifications).

The last few days of the month will see the Moon drifting higher and higher into the northern sky, through the constellations Aquarius, Pisces and Aries, before returning to where we first started the month, Taurus. Although late February will probably not feel particularly Spring-like, this is the first of the Moon's "High Spring Crescent", phases of 2023. These occur at this time of the year for those in higher northern latitudes, due to the Moon's position in the Ecliptic plane. The Ecliptic sets at a very steep angle in the evening at this time of the year and subsequently, the Moon's crescent phases in the evening represent the best time of year to observe the Moon in the evening sky. Separation from the horizon, coupled with cold, clear weather often leads to some great lunar observing opportunities.

The Moon comes First Quarter phase on 27th February, when it can be found just next door to Mars, in Taurus. As the month ends, a day later, the Moon will be close to its highest point in the northern Ecliptic, rising at just after 10:30 am (GMT) and transiting at a little before 7:30 pm (as seen from 51° north).



Moon, Venus and Jupiter, sunset 22nd February. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Mercury

The innermost planet starts February at just a couple of days past maximum western elongation and is well-situated for observation in the early morning sky. On the morning of the 1st, we find Mercury a resident of Sagittarius, shining at -0.1 magnitude and displaying a 6.5 arc second diameter disc, Illuminated by around 66%. As the Sun rises (as observed and 51° north), Mercury will sit a little above 8° high in the south-east.

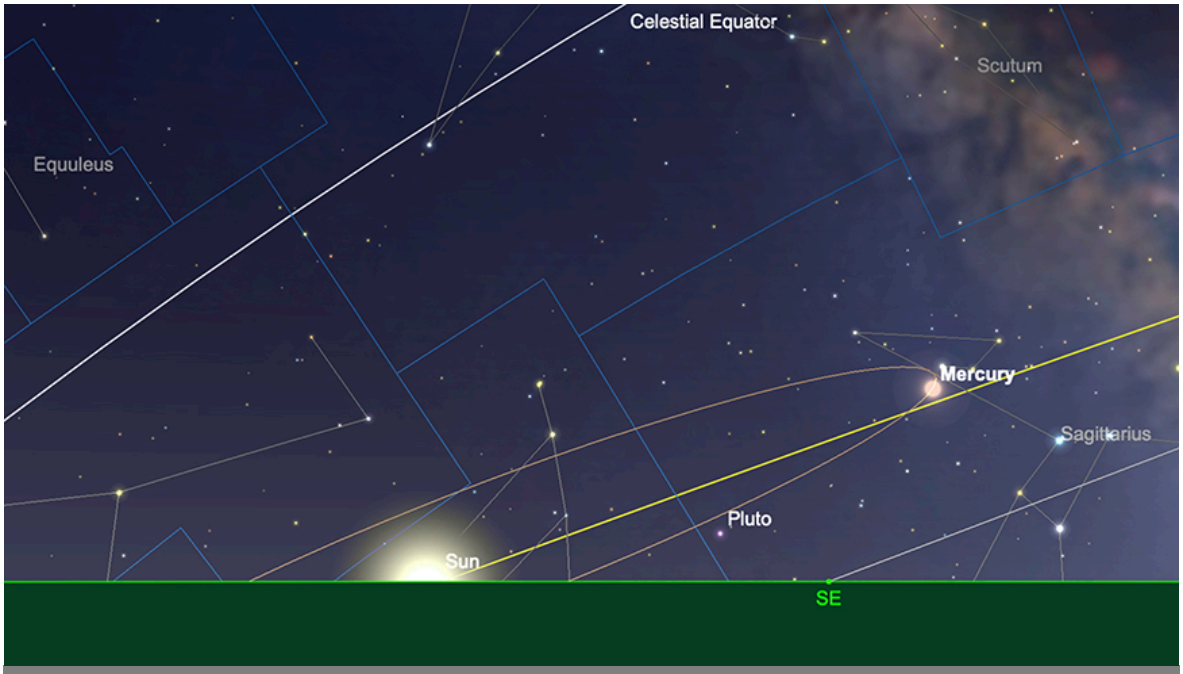
Mercury is in the descending node, as observed from the northern hemisphere and is dropping below the Sun in the sky as we see it. The next few days sees the planet retain its brightness, though shrink somewhat, whilst increasing its phase - leading to an equilibrium of brightness, as the illuminated surface area of Mercury remains pretty constant. However, while brightness remains fairly constant, separation from the Sun and concurrent height above the horizon, certainly does not. By the time we get to mid-month, Mercury will sit at around 4 1/2° above the horizon as the Sun rises.

The rest of the month sees Mercury increasing in brightness fractionally, as its phase increases, though its separation from the Sun and height above the horizon continues to dwindle. By the time we get to late February, for those of us in the temperate northern hemisphere, Mercury will be a very difficult target to observe, sitting just a couple of degrees above the horizon at

sunrise.

The end of February sees Mercury separated from the Sun by around 14°. The planet will have a visual magnitude of -0.5 at this point, displaying a 5 arc second diameter disc, illuminated by 92%. From 51° north, the planet will stand a pitiful 1 1/2° above the horizon at sunrise, making it impossible to observe. In direct opposition to the angle of the Ecliptic in the evening part of the sky, in this part of the year, Capricornus and Aquarius, where both Mercury and the Sun reside, rise in a very shallow way in the mornings (as observed from higher northern latitudes). It is this situation makes Mercury so difficult to observe for those in the northern hemisphere at this time.

Those much further south and in the equatorial regions of our planet will fare much better, as far as observations of Mercury is concerned, in the latter parts of February.



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

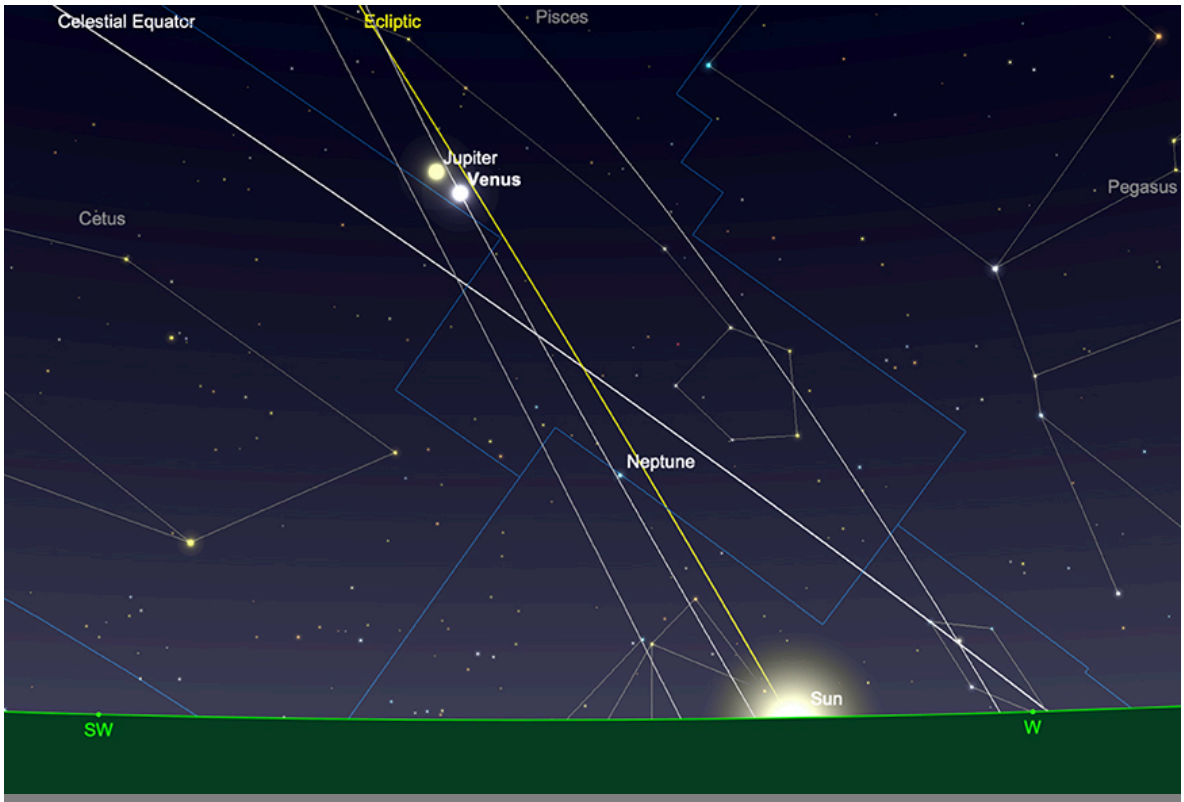
Venus

In almost direct opposition to its neighbour, Venus is in a much easier part of the sky to reserve for residents of the northern hemisphere. The 1st February finds Venus a resident of Aquarius. The planet is easily observable after the Sun goes down, shining at a brilliant -3.9 magnitude. At 11 arc seconds diameter and 91% illumination, Venus will be worthwhile observing in telescopes at this time. It will stand at around 17 1/2° above the horizon at

the sunset on the 1st (as seen from 51° north), so any telescopic observations will naturally be tempered by the whims of atmospheric seeing.

Venus is moving away from the Sun, as viewed from our perspective here on Earth. The beginning of the month sees the two separated by around 24°. By the time we get to mid-month this has increased somewhat to just over 27 1/2 degrees, and as a result, Venus will stand just over 21 1/2° above the horizon as sunsets on the evening of the 15th. The planet brightens fractionally by this point to -4.0 magnitude, now displaying and 11.6 arc second diameter disc.

During the latter half of the month, Venus continues its pull away from the Sun, crossing over the border into Pisces. It will appear to approach the planet Jupiter during the latter half of the month. On the 29th, the two planets sit side-by-side in the sky, separated by a mere 1 1/2°. This will make them easily visible in binoculars and telescopes, within the same field of view. This conjunction is merely a line of sight effect, with the two planets being separated from each other by considerable distance within the solar system. Still, it should make for an interesting view. The two planets will actually be closer to each other on the evening of March 1st, when they will be separated by just 2/3 of a degree.



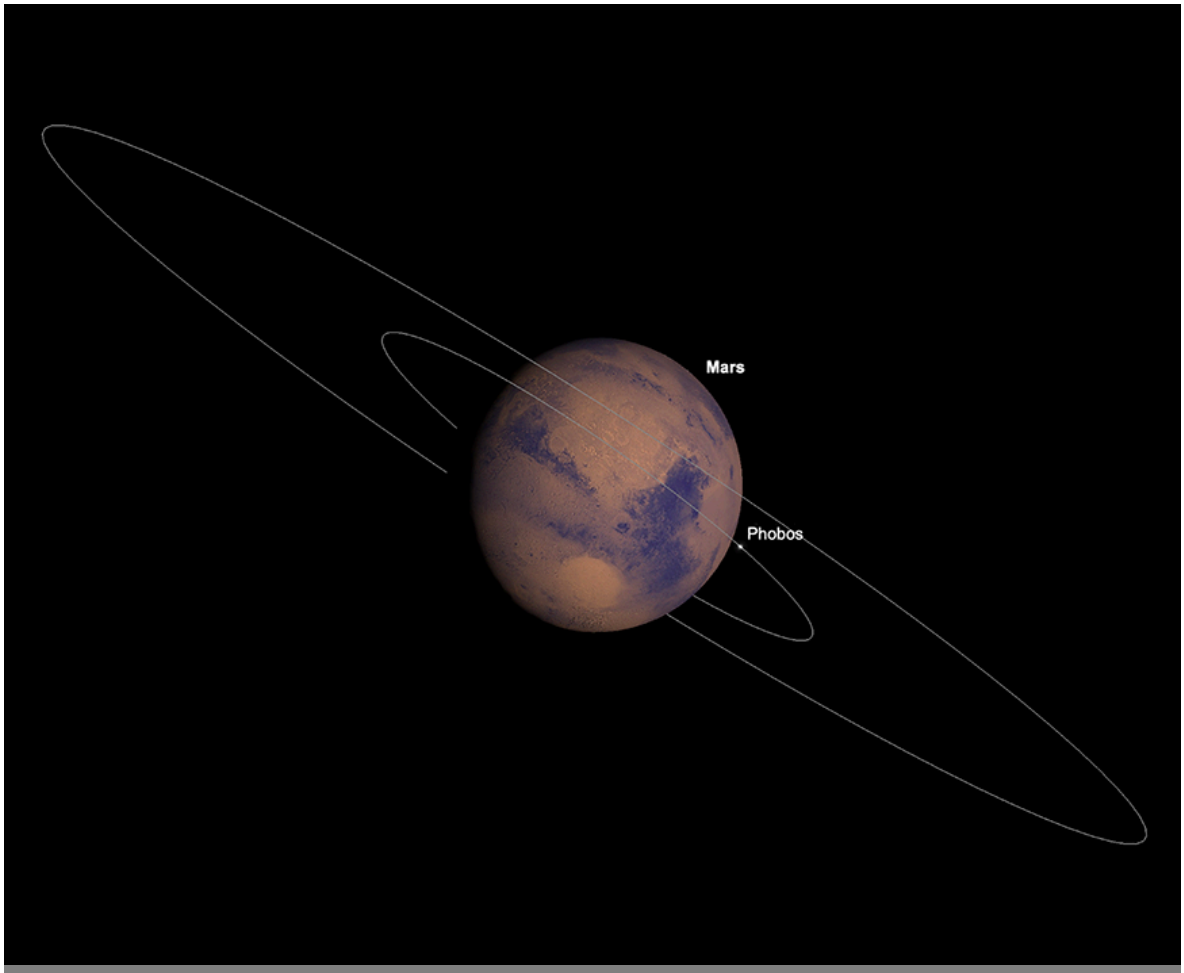
Venus and Jupiter, sunset, 28th February. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Mars

Although considerably passed its best, Mars is still well situated for observation during February. The planet rises a little before noon on the 1st, transiting at around 8 pm in the evening. The beginning of the month will find Mars at -0.2 magnitude, displaying a 10.6 arc seconds diameter disc. A resident of the central part of Taurus, Mars will ride particularly high in the sky at transit point, presenting a similar colour and brightness to that of Taurus' principle star, Aldebaran (Alpha Tauri). Those with telescopes are encouraged to make the most of Mars as early in the month as possible, as it will fade and diminish in size quite rapidly. Continental sized features on Mars' surface should still be reasonably easy to see at higher powers in telescopes during the beginning of the month, though this will get progressively more difficult as time marches on.

By the time we get to the 15th miles will have dimmed fractionally to +0.1 magnitude and now displays a 9.2 arc diameter disc.

Mars will drift slowly eastwards in the Ecliptic for the rest of the month. By the time we get to the 28th February, Mars can be found closer to the "horns of the bull" in Taurus and will have faded to +0.4 magnitude. Mars will now display an 8.2 arc second diameter disc and rise at a little before 10:30 am, transiting just before 7 pm.



Mars, 9pm (GMT), 1st February. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Jupiter

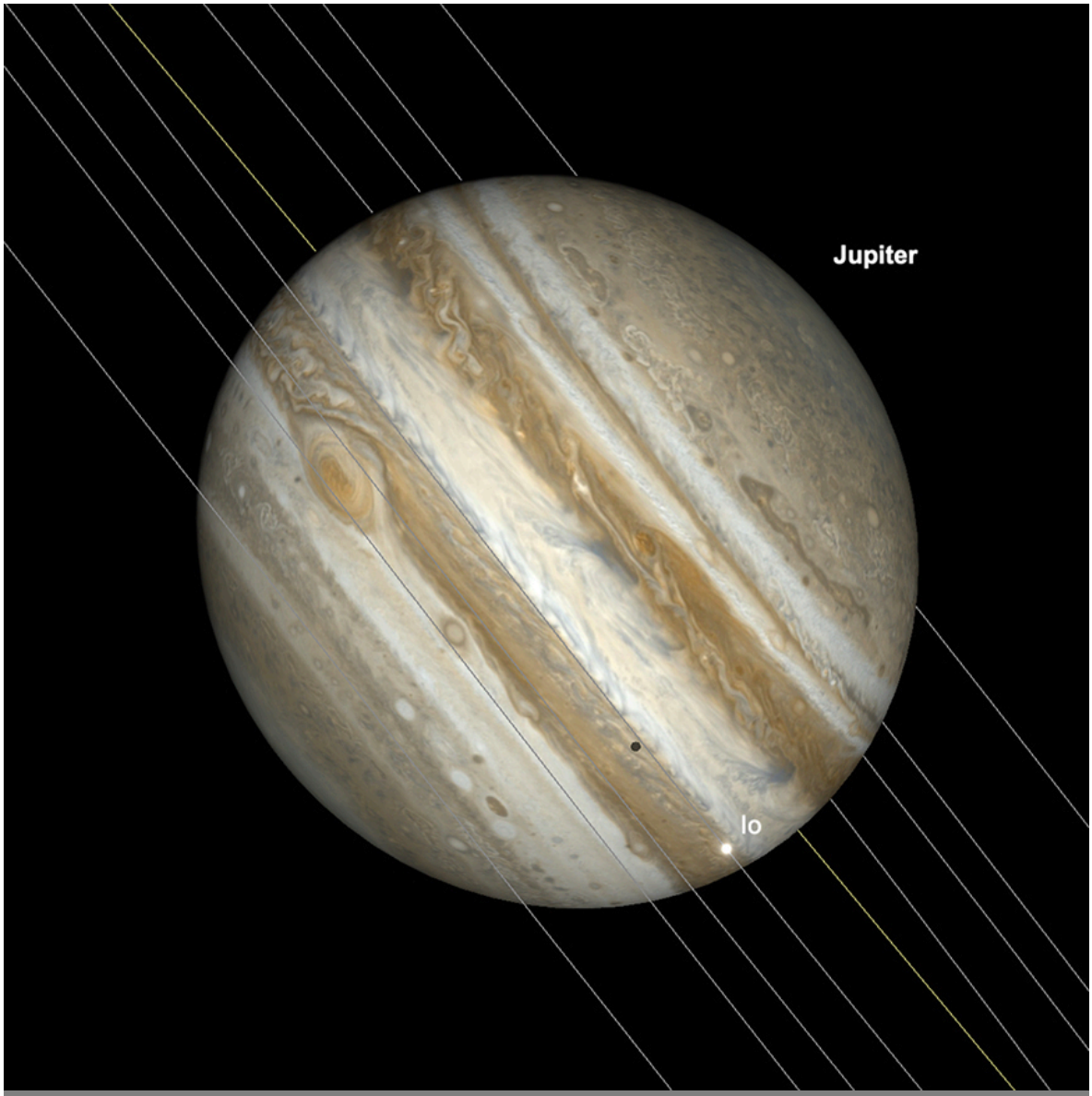
The King of the Planets is still well-placed for evening observation during the first part of February. On the evening of the first, Jupiter can be found in Pisces, shining at a brilliant -2.2 magnitude and displaying a 36 arc second diameter disc. Standing at just over 38° above the horizon of the sun sets (from 51° north), Jupiter will be a great sight in any telescope. The planet will set at just after 10 pm (GMT) on the evening of the first.

By the time we get to mid-month, Jupiter has crossed the border over into the neighbouring non-zodiacal constellation of Cetus, by which point, it will have faded fractionally 2-2.1 magnitude and will display a 35 second diameter disc. The planet will sit it at around 33° elevation in the Southwest as the sun sets (again, from 51° north). Jupiter will set at just before 9:30 pm (GMT) on the evening of the 15th.

As previously mentioned, Jupiter or come together, includes conjunction with

Venus, at the end of the month, by which point, it will be visible in the evening sky, four significantly less time of the sunset. The evening of the 28th sees Jupiter retaining brightness of -2.1 magnitude, they have shrunk almost in perceivably to just over 34 oak seconds diameter. As the Sun sets, Jupiter will stand a little over 26° high above the horizon (as observed from 51° north). It will set at a little after 8:45 in the evening (GMT).

There are few interesting mutual transit events, as far as Jupiter is concerned, during February. There is a mutual Europa and Great Red Spot transit beginning at just before 7 pm (GMT) on the evening of the 6th. That will be very difficult to observe mutual transit of Io and the GRS around 9 pm, February 10th - though this will be visible as the planet is setting from the western parts of Europe. There will be an interesting Io and Io shadow transit on the evening of February 19th, starting at around 7 pm (GMT). That will be an interesting Europa, Europa shadow transit and GRS transit event to observe just before sunset on February 24th. This is followed by similar GRS, Io and Io shadow transit, which should be visible a little before sunset on February 28th.



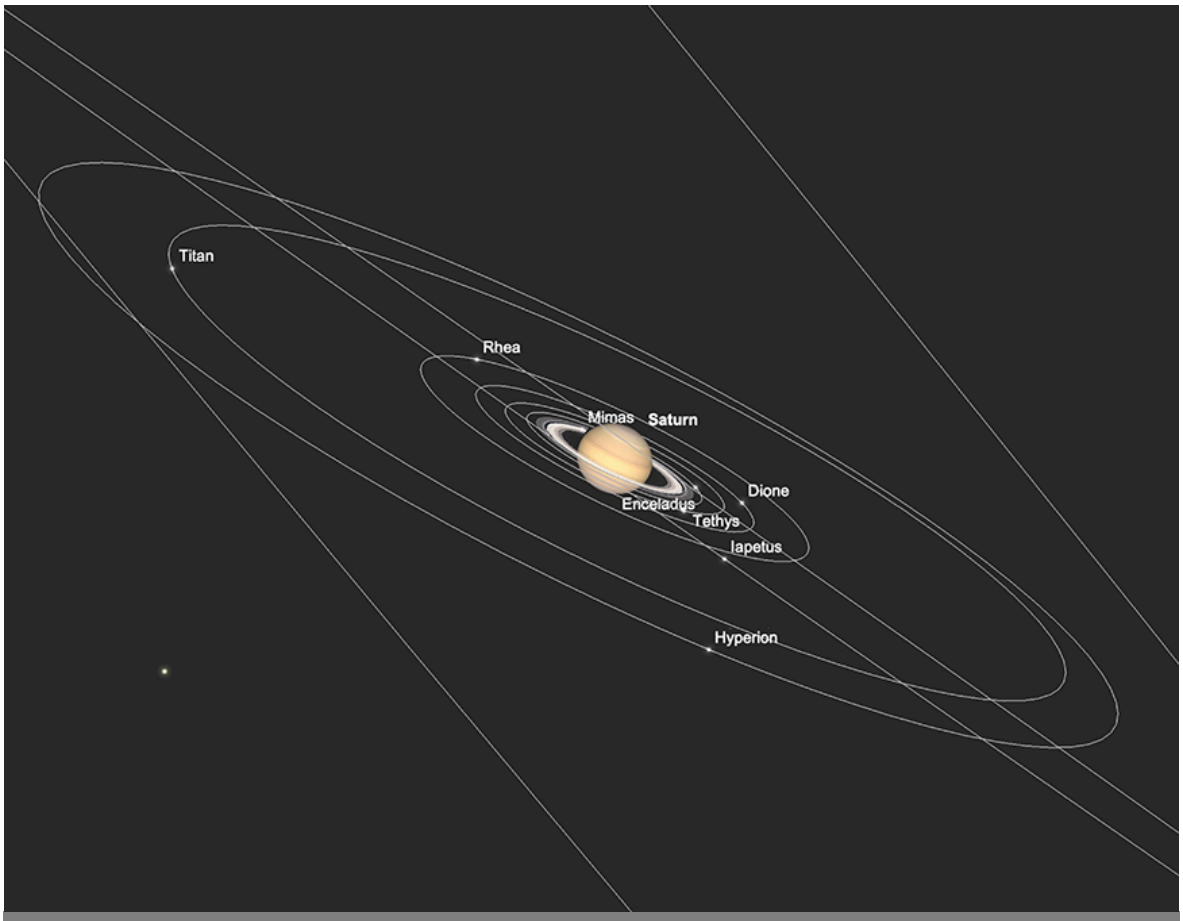
Jupiter, Great Red Spot and Io and Io Shadow Transit, just before sunset, 5th February. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Saturn

Saturn begins the month as a rather more tricky target than the other major planetary residents of the evening sky. At +0.8 magnitude and 15.4 arc seconds diameter, in Capricornus, the ringed planet is separated from the Sun by just under 13 1/2° on the evening of the 1st. It will stand around 9° above the horizon (as viewed from 51° north), and will be tricky to locate in the glare of the evening sky.

The next two weeks, see Saturn draw ever-closer to our parents store, making it more and more difficult to observe as it does.

Saturn reaches superior conjunction on February 16th, passing behind the Sun as seen from our location here on Earth. After this, it will re-emerge as a morning target, though it will some time before there is any chance of observing it in the morning sky, as the planet will remain pitifully low in elevation for northern hemisphere observers, for some time to come.



Saturn and inner moons, sunset, 1st February. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

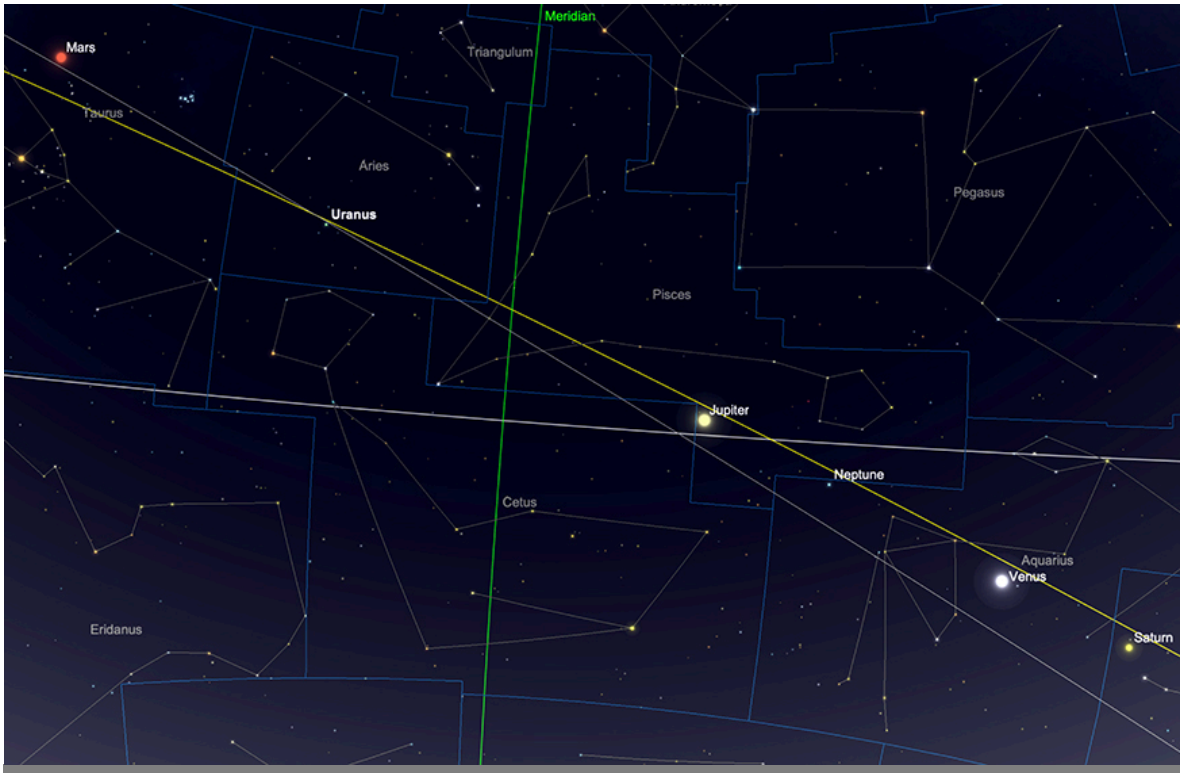
Uranus and Neptune

The two outer gas giants are a mixed bag during February. Uranus, the more easterly of the two, located in Aries, is well situated for observation during the evening. The planet is +5.7 magnitude and displays 3.6 arc second diameter disc on the 1st. Uranus transits as a little after 6 pm and sets at around 1.45 am the following morning - meaning there is a reasonable window for observation during truly dark skies.

Neptune, on the other hand, is situated much further west in the Ecliptic, in the constellation of Aquarius. Always the fainter and smaller of the two at +7.9 magnitude and 2.2 arc seconds diameter, Neptune will be by far the

tougher target. It translates at a little after 3 pm, sitting at just before 9 pm on the 1st (as seen from 51° north). By the time we experience astronomical task, Neptune will be around 16 1/2° above the horizon (again as observed from 51° north). This will make it an impossible target, but rather tough for one than Uranus.

Is the month progresses, Neptune will get tougher and tougher to observe, as its observing window closes, heading towards superior conjunction on March 15th. Uranus, on the other hand will continue to be well placed for observation beyond the end of February. While neither planet is as easy to find as the brighter residents of our solar system, those inclined to do so will find Uranus a much easier and potentially more rewarding target than Neptune, during February.



Uranus and Neptune relative positions, February 2023. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Comets

Comet C/2022, E3 (ZTF) is the undoubted highlight for February as far as comets are concerned. Around the end of January/beginning of February, the comet is predicted to reach peak brightness of around 5th magnitude. This won't be particularly bright and is unlikely to be naked eye (unless you're in a very dark location), but should be a good binocular comet to observe as it zips across the circumpolar sky in early February.

Unfortunately, the early part of the month sees the Moon putting in a conspicuous appearance during most of the night, so those wanting to catch the comet at peak brightness have to pick their way around its presence. There is a very limited window on the evening of the 1st, after sunset and before Moonrise, the comet will be visible in the north north-west in the constellation of Camelopardalis.

After the early part of the month, the comet will sink in the southerly direction through Auriga and on into Taurus, passing very close to Mars on the evenings of February 10th and 11th. The latter half of the month will see the comet skirting the borders between Taurus and Orion, fading as it goes.

By the time we reach the end of February, the comet will have faded to the eighth magnitude and will be a much more difficult target as a result

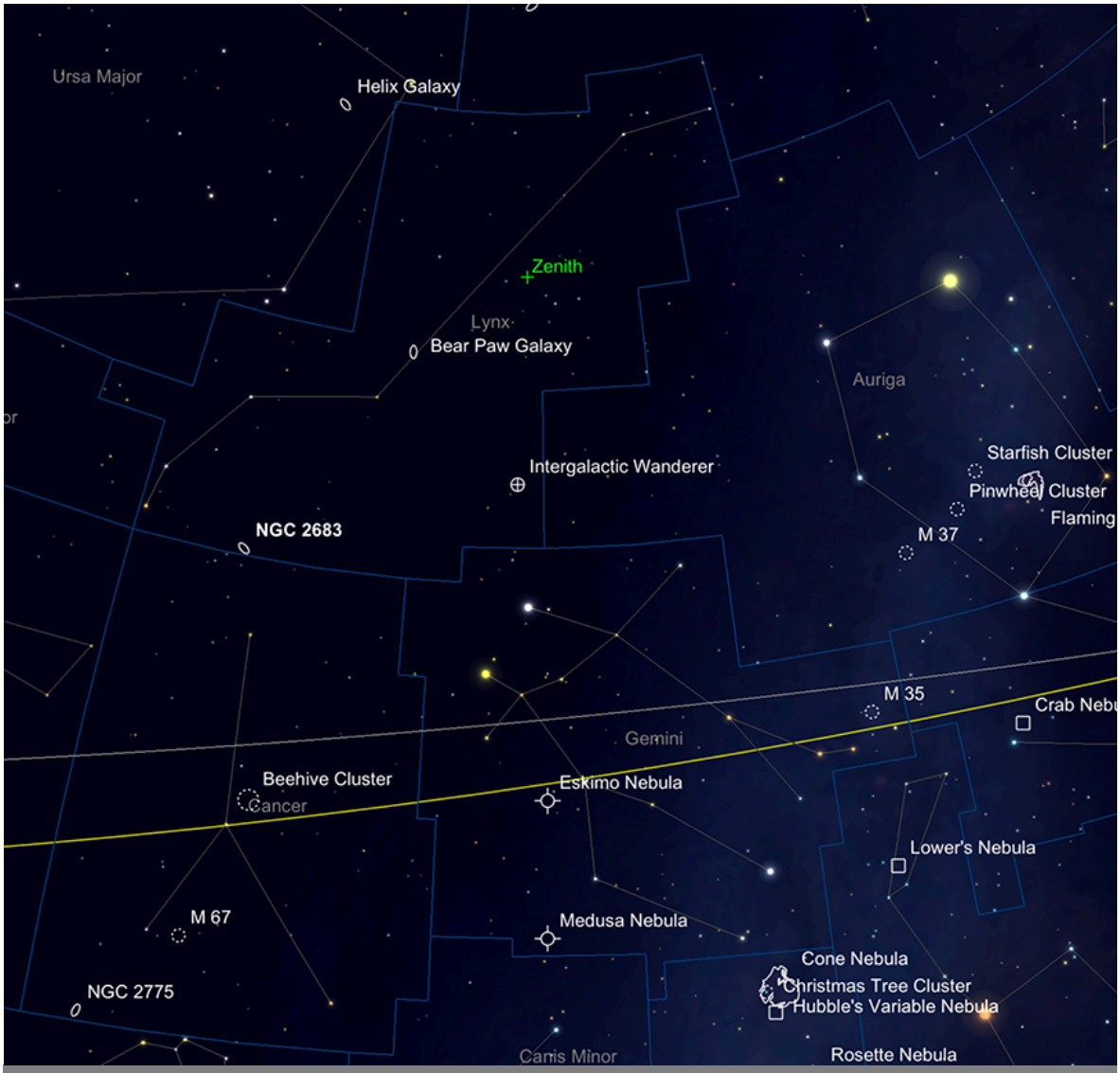
Comet ZTF by Keith Jones in late January. Image used with kind

permision.

Meteors

There are no major meteor showers in February. Sporadic meteors can (of course) be seen in any part of the night sky at any time, but we will have to wait until the Lyrids in late April before there are any regular peaks in activity

Deep Sky Delights in Gemini



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

Gemini is readily identifiable in Winter, containing the two bright “twin stars” of Castor and Pollux and an array of easy to observe clusters and other deep sky delights. Of the twin
stars of Castor and Pollux, Alpha and Beta Geminorum, Pollux, the Beta star is actually brighter than Castor, the Alpha - and while it has been suggested that when Bayer codified the brightness classification of stars in the 17th century, Castor was the brighter of the two, this is extremely unlikely.

Castor is a fine double star and an easy target in small instruments. Consisting of two stars, A and B, of +2 and +2.9 mag respectively, Castor's elements are currently widening and are separated by 4.5-5 seconds of arc. Castor's double nature was discovered in 1678 by Cassini (he of Saturn's ring division fame, amongst many other discoveries) and bears the distinction of being the first gravitationally bound object to be identified beyond the reaches of the Solar System. Castor A and B's orbit about a mutual gravitational point takes around 467 years to complete, but both stars are also in turn doubles, with much fainter M-class dwarf companions. In addition to these companions there is also present in the system a further pair of gravitationally bound M-class stars. This makes Castor not just a double star, but a sextuple - quite a collection! Sadly, only the primary elements are observable in amateur instruments.

To the westerly reaches of Gemini, is to be found M35. M35 is a very prominent star cluster, at +5 mag, easily picked in small telescopes and binoculars and can also be seen with the naked eye from a reasonable site. Consisting of well in excess of 100 observable stars (mags 6-13th), M35 was first noted by Astronomer Philippe Loys de Cheseaux in 1745. Also included in the Uranographica Britannica by John Bevis in 1750, M35 was catalogued by Messier in 1764, who credited Bevis with its discovery.

Many of the 100+ observable stars are types G and K stars - similar in class to our Sun - though these seem to be of a considerably larger mean size than main sequence. M35 is tentatively aged at about 100 million years - about the age of the nearby M45, (the Pleiades) though problematically, stellar evolution is thought to be considerably more advanced in the case of M35. Does this mean that M35 is in fact older, or are the Pleiades actually younger? Further observation and theories will be needed to explain this anomaly.

In the background sky to M35 lies the fainter (+8 mag) open cluster NGC2158, though this is nearly six times further away than M35's 2800 light years. In addition to this, there is also the yet fainter and more compact IC2157 cluster (+8.4 mag) - making this an extremely rich area for sweeping with virtually any type of optical aid.

M35 & NGC2158. Image credit: Mark Blundell

The trailing northern edge of the “winter” Milky Way runs through the south western part in Gemini, which explains the richness of background sky in this constellation.

Drifting eastward, 2 1/3 degrees east of the star Wasat (Delta Geminorum) is the fabulous Eskimo Nebula, NGC2392. This Planetary Nebula supposedly resembles an Eskimo's head, surrounded by the fur of an Arctic Parka hood. A reasonably compact 0.8 arc minute across (about 2/3rds the size of the Ring Nebula, M57), the Eskimo is only +9.19 mag, though its compact size makes its surface brightness quite high and it takes magnification well. Discovered by William Herschel in 1787, it is perhaps surprising that it wasn't noticed by earlier observers - though this is most likely down to its small size. OIII filters reveal more of the two stages of the object: its tenuous outer shell and the gleaming, brighter interior. Larger instruments reveal more of the complex structure of the internal part of the Eskimo - its radial double shell of expanding gasses and fine s blown by cosmic winds form its central star. This central star shines at +10.5 mag and is relatively easy to spot in most instruments. The nebula is thought to lie at 2800-3000 light years distance.

The Eskimo Nebula, Hubble Image. Image Credit: NASA/ESA. Public Domain.

Further south from the Eskimo is another older, larger and fainter object - The Medusa Nebula (Abel 21). Whereas the Eskimo is small and comparatively bright, the Medusa is large - at 10 arc minutes across it is a third the diameter of the Full Moon. Telescopes of 8-inches + aperture, coupled with a good OIII filter and a dark site will be needed to seen the Medusa. Although listed as being +10.19 mag, this is spread out over a significant area of sky, so it is in long duration astrophotography that the wonders of the Medusa really start to reveal themselves. A modest aperture telescope will be needed and a sturdy equatorial mount, capable of being autoguided, will be needed to attempt to image this object. Images reveal the serpent-like tendrils of nebulosity that give this mysterious object its name - its namesake Medusa being the Gorgon, who had snakes for hair, in classical Greek mythology. The

stare of Medusa was reputed to turn people to stone, though staring at this nebula through a large telescope will be a much more pleasant experience… The Medusa lies about half the distance from us as the Eskimo Nebula - 1500 light years and is around 4 light years in diameter. Opinions were divided on the true nature of the Medusa: George Abel, the man who discovered this object thought it to be an old planetary nebula, whereas many considered its irregular nature to indicate it was a supernova remnant. Narrowband imaging has revealed the true extent of the Medusa's helical hourglass figure - making it much more likely to be, as Abel initially suggested, a planetary nebula.

The Medusa Nebula. Image Credit: Joel Schuman, Mt Lemmon Observatory, Creative Commons.