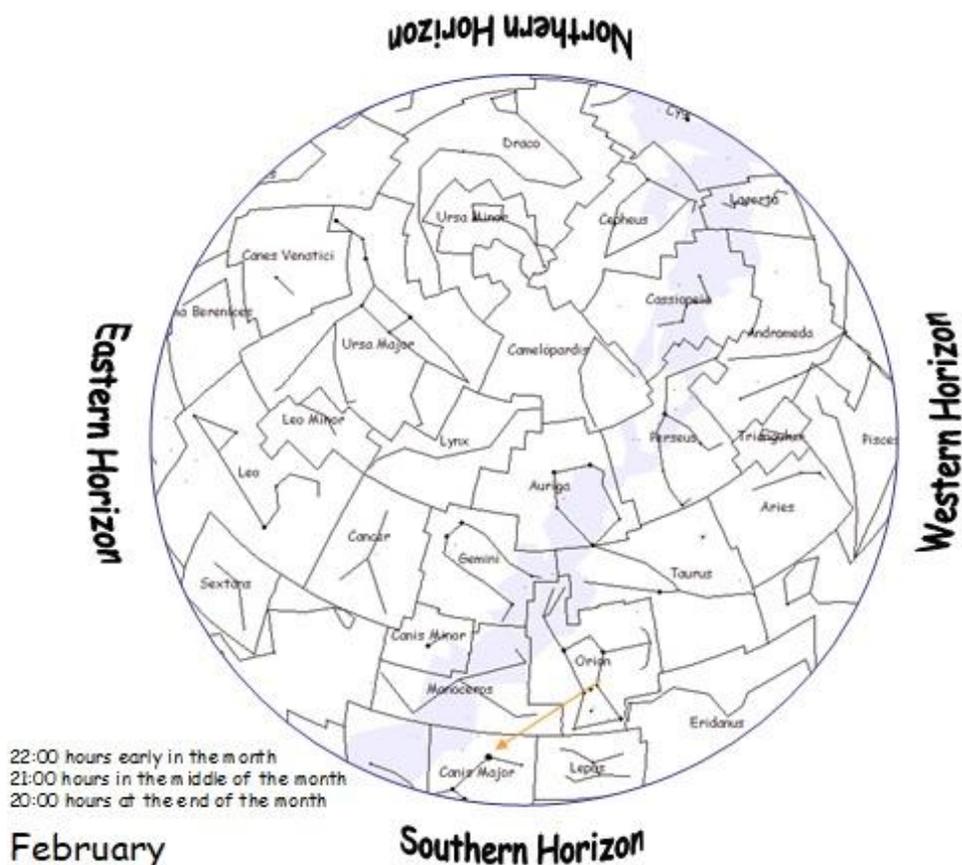




The Night Sky (February 2019)

UT (Universal Time) or GMT is used this month.



The General Weather Pattern

The first week in February trumpets the middle of the winter, and February is usually the coldest time of the year, especially early in the month. It can be very cold at night, often with freezing temperatures in the day. Snow and ice can be expected in cold years. Don't underestimate how cold it can be at this time of the year, and dress for it. Wrap up warm and wear multiple layers of clothes, with a warm hat, socks and shoes. An energy snack and a flask containing a warm drink wouldn't go amiss.

Should you be interested in obtaining a detailed weather forecast for observing in the Usk area, log on to

https://www.meteoblue.com/en/weather/forecast/seeing/usk_united-kingdom_2635052

Other locations are available.

From Earth

The winter sky can be observed culminating early in the evening, and Orion, with his retinue, is due south at 20:00 UT early in the month. In the middle of the month, the Milky Way stretches right across the sky from the south-east to north-west through the zenith just after twilight disappears. Follow a line south-eastwards along Orion's belt and you will find Sirius the brightest star in the night sky.

Artificial Satellites or Probes

Should you be interested in observing the International Space Station or other space craft, carefully log on to <http://www.heavens-above.com> to acquire up-to-date information for your observing site.

Sun

The Sun moves from Capricornus into Aquarius around 18:00 on the 16th, as it moves towards more northerly latitudes.

Once again, it is worth reminding members that sunlight contains radiation right across the spectrum that is harmful to our eyes and that the projection method should be used, or else, use the society's solar telescope. Ask experienced members for help if you want to observe the Sun. Do not look directly at the Sun with your naked eyes. For those that do have the correct equipment and expertise to observe the Sun it is a bit disappointing at present as we seem to have come to the end of Solar Cycle 24 (which began in December 2008). The cycles are numbered starting from 1755. Being at the end of a cycle there are very few and on many days no sunspots, filaments or prominences to be seen. Reversed polarity polar-active sunspot regions in December 2016, April 2018 and November 2018 indicate that a transitional phase to solar Cycle 25 is in progress. The magnetic poles of the Sun reverse with each new cycle.

Moon

New Moon is on the 4th at about 21:05 in the constellation of Capricornus.

First Quarter is on the 12th at about 22:25 in the constellation of Taurus.

The Full Moon is on 19th at about 15:55 in the constellation of Leo.

Last Quarter is on the 26th at about 11:30 in the constellation of Scorpius.

The Moon is at perigee (nearest Earth) on the 19th and is the largest of this year's full Moons. Apogee (most distant from Earth) occurs on the 5th.



At this time of year the first quarter Moon is well placed, high in the southern sky at night-fall. It can be observed through less air than when it is lower down. Binoculars will enhance many impressive selenological features found at the terminator.

The Moon bisects the Hyades during the night of 13th/14th; a possible photo-opportunity. As the Hyades lies close to the ecliptic the moon passes through the cluster quite frequently and can present opportunities to observe lunar occultations – that is when the Moon passes in front of an object, in this case stars, and hides them. The precise timing of occultations can be used to give exact positional data or when asteroids occult stars, the shape can be gleaned. Although there are no major occultations listed for February it is worth checking on planetarium software such as Stellarium if there are minor occultations. For example from South Wales the Moon will occult the star 63 Tau (mag 5.6) at 23:17 on the 13th February 2019. With a telescope you will find many more, but dimmer, stars occulted in the Hyades cluster. NB if you check the published occultation times such as the BAA handbook you will notice that the times indicated by Stellarium for South Wales are a couple of minutes earlier due to the difference in longitude of the observing location.

The Planets

☿ **Mercury** is recovering from the superior conjunction of the 30th January, and so is poorly placed for observation. It sets at a steep angle about an hour and a half after the Sun on the 27th February, when it is at greatest eastern elongation but may not emerge into the evening twilight at much more than 10° above the horizon.

♀ In the beginning of February, **Venus** climbs at a shallow angle when it can be found 2½ hours before sunrise, reducing to 1½ hours at the end as its elongation reduces. Venus never reaches above 10° and then early in the month when it is best observed. Saturn and Venus materialise together on the morning of the 18th with Jupiter about 25° to the west.

♂ **Mars** appears in the evening twilight in the same direction throughout the month, even though it moves against the background of the 'fixed stars'. On the morning of the 13th it goes from the constellation of Pisces into Aries for the rest of the month. Just as twilight is overcome in the evening of the 10th a waxing crescent Moon escorts Mars and 2.5° to the east it may be possible to locate Uranus, over the border in Aries.

♃ **Jupiter** can be found in the constellation of Ophiuchus, and hardly changes its position against the background stars throughout February. Jupiter is available for a couple of hours before morning twilight for the more serious of observers; rising at a moderate angle around 4:45 on the 1st. By the end of the month Jupiter will rise about 03:15. As opportunities for observing Jupiter improve for more casual observers; it is at opposition on the 10th June, it is worth reminding members that there is much to see in a decent telescope. For instance on the morning of the 7th, just after Jupiter rises, start observing Jupiter's moon Ganymede as it approaches transit. The same applies to Io on the 8th. On the morning of the 27th the Moon, just passed last quarter, escorts Jupiter.

♄ **Saturn** is to be found in Sagittarius throughout February. It rises at about 06:30 at the start, and 05:00 at the end, and isn't in the sky long enough before being overwhelmed by the morning twilight, even for dedicated observers. With an opposition on the 9th July, more casual stargazers may like to wait until later this year.

♅ **Uranus** is best observed early in the month in the south-west when it is highest in the sky in night-time. It can be found in the constellation of Pisces, at RA 23h 29m 30s, Declination +9° 31' 56", but at a magnitude of 5.84, is just too dim to easily see with the naked eye. It moves into Aries at sunset on the evening of the 5th. Binoculars or a telescope might show a cyan (blue-green) hue, but since Uranus usually has few features, little else may be seen even with a larger amateur instrument. A good time to find it is in the evening of the 12th when Uranus lies 1° to the east of Mars.



Neptune closes in on the Sun from our perspective; heading towards conjunction with the Sun in early March. It becomes unobservable as it moves through its glare.

Meteors

February is a poor month for meteor showers; it will be quite quiet until mid-April. Sporadic meteors can of course be spotted, but require much more patience to observe than do showers because they are not associated with any one part of the sky. The **Virginids** are only just evident from February through to April, becoming a little better in March and again in April.

Constellation Culminations from Usk

A celestial body or region of the sky is said to culminate when it crosses an observer's meridian (an imaginary line drawn overhead and through both poles). All other things being equal objects are usually best observed in this position as the light from them travels through the least amount of atmosphere.

Constellation	Convenient Culminations	Midnight Culminations	Observability
Eridanus	19:00 Early February	Late November	Only northern stars visible
Taurus	19:00 Mid-February	Late Nov. /Early Dec.	Whole
Lepus	20:00 Mid-February	Mid-December	Whole but quite low
Orion	20:00 Mid-February	Mid-December	Whole
Columba	20:00 Mid-February	Late December	V unfavourable; partially hidden
Puppis	20:00 Mid-February	Mid-January	Unfavourable - partially hidden
Auriga	20:00 Late February	Late December	Whole - at zenith

Monoceros (pronounced muh-NAH-ser-us)

Astronomy

Paradoxically Monoceros is easy to locate but really hard to see. It is the patch of the sky to the east of Orion. It is hard to see because all its stars except for two have magnitudes dimmer than 4 and even the two brightest are only just brighter than magnitude 4. Even on a clear night a bit of mist will hide the constellation. However it does contain some interesting objects.

February is an opportune time to find the location of an interesting 'star' in the constellation of Monoceros. Evidence was presented in March 2018 that a now faint binary system, probably interacted with the outer reaches of the solar system about 70,000 years ago, and came within 10 light months of the Sun! It is now about 20 light years away at RA 07h 20m 03.25s, Dec -08° 46' 50", and with an apparent magnitude of 18.3 it is far too dim for easy observation.

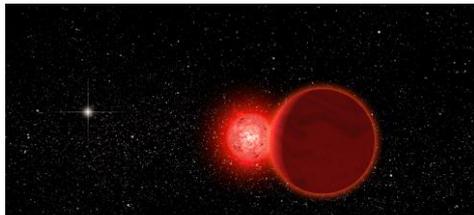
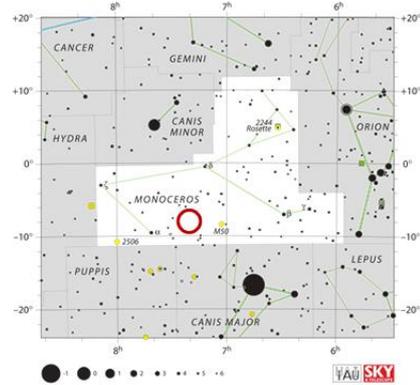


Illustration Credit:
Michael Osadciw/University of Rochester.

Scholz's star, the primary of the binary system is a red dwarf and the secondary is a brown dwarf with 8% and 6% solar masses respectively.

The Sun's encounter (bright star, left) with Scholz's star (centre) and its companion (right) at a distance of just 52,000 AU was likely to have disturbed the Oort Cloud, which may after all extend out to around 200,000 light years. In order to verify this hypothesis the trajectories of 339 cometary objects were analysed with the result that the orbits of 36 of them had a statistically significant over-density in the direction of the constellation of Gemini. A greater effect upon the Oort Cloud

than was initially thought, and lending weight to the idea.

The constellation has one Messier object, M50. This is an open cluster that has the nickname 'heart-shaped cluster'. It is quite a large and easy binocular object. It is around 3,200 light years away and is estimated to be quite young at 72 million years. With a modest telescope it can be resolved into individual stars with a nice mix of hot blue and more mature red stars.



Photograph Credit: Nick Busby

Monoceros also contains an object which is very popular with astrophotographers, the Rosette nebula. This nebula comes in two parts (in fact five NGC numbers are associated with the complex): a star cluster that is reasonably easy to see in a small telescope and an HII region or emission nebula. This nebula emits mainly red light that is really difficult to see in anything less than ideal conditions. Ultra high contrast (UHC) filters may help; they cut out light pollution and allow the light of ionised hydrogen and oxygen to pass. Also use low magnification to increase the contrast - it is about one degree across. Digital cameras are much more sensitive to the



Image Credit: Jeremy Perez

wavelengths emitted by such objects and the Rosette nebula is a relatively easy target being large and bright.

Gemini (pronounced gem' in eye)

In Welsh

yr Efeilliaid *npl.* literally 'the Twins'.

Astronomy

Gemini lies north-east of Orion, and in mid-February Gemini culminates at around 21:30. Gemini is Latin for 'twins' and although the stars of this constellation can be joined up to make stick figures of the twins, they are usually seen with the naked eye simply as the twin stars Castor and Pollux, following Orion across the night sky.

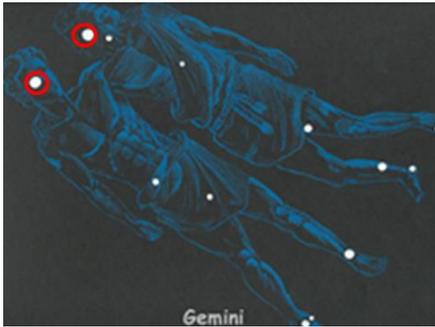


Castor A & B

Appearing to the naked eye as a single white star at a distance of 46 light-years, the right hand star, Castor, is actually a complex system. It was in fact, in the 18th century, the first binary system recognised; Castor A and Castor B. In 1895 Castor A was then discovered to be a spectroscopic binary, its two components having a separation of only 6.4 million km. Both are class-A main sequence stars, about twice the size of the sun. They can be separated with a good small telescope.

Castor B is now also known to be a spectroscopic binary whose components are even closer, at only 4.5 million km distance and having an orbital period of only three days. A distant 9th mag. companion star was also discovered 150 billion km (1000 AU)

distant from the A-B pair. Designated Castor C, it was also detected as a spectroscopic double but its components are red dwarfs, completing one orbit about their common centre every 19½ hours. 'Castor' therefore actually comprises six stars, four considerably larger than our sun and two much smaller.



Gemini

By contrast, Pollux the left hand star is a loner, spectral type KO, orange in colour and approximately ten times the diameter of our own sun. It is closer than Castor, being only 36 light-years distant. Stars usually conform to the modern convention of having the brightest stars in a constellation denoted as α (alpha) and using the next letter of the Greek alphabet β (beta) for the next dimmer, and so on. Interestingly Castor (α Geminorum) with a magnitude of 1.58 is dimmer than Pollux – (β Geminorum) which has a magnitude of 1.13.

Gemini lies about 30° east of the Galactic anticentre which is found in Auriga at about R.A. 05h 46m, Dec. +28° 56'; in the equatorial coordinate system. Facing out from the core and above the plane of the Galaxy in Gemini, is not the easiest place to find bright

nebulae. However, there are some nice objects of delight.

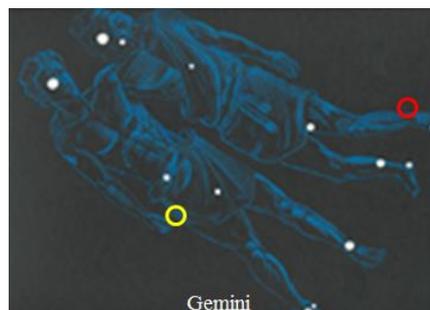
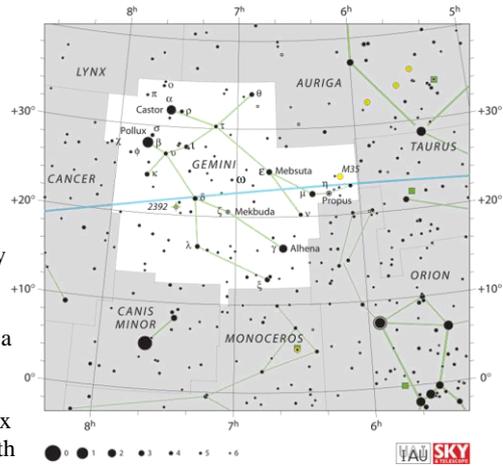


NGC 2392, the Eskimo Nebula (👁️) lies about two degrees to the south-east of Wasat, near the right wrist of Pollux. William Herschel thought that many of these nebulae looked similar to planets in his telescopes. They are still miss-named planetary nebulae to this day. We now know such an object is made up of glowing shells of predominantly ionised gas, resulting from the instability of some stars pulsating at the end of their lives. As the outer layers expand and escape from the exposed core, ultraviolet radiation ionises and accelerates the gas. Consequently the core contracts into a white dwarf and for a short time the expanding gas re-emits the energy in frequencies we can see.

With a magnitude of about 10 the Eskimo Nebula it is not an easy object to observe even with a good amateur telescope. However using ultra high contrast filters as described above is usually very successful with planetary nebulae. William Huggins was the first to demonstrate that planetary nebulae typically emit lines of ionised hydrogen (HII) and ionised oxygen (OIII) in 1864 when he obtained a spectrum of the Cat's Eye planetary nebula in Draco. These are the lines passed by UHC filters. Like many planetary nebula it is quite small being less than 1" across, however when photographed with a big telescope, it is seen to be one of the glories of the heavens.



The open star cluster M35 (NGC 2168) (👁️) has an area equal to that of the Moon and lies at the left foot of the figure of Castor. Find Tejat in a low-power instrument to find M35, the only messier object in Gemini, in the same field of view, with an apparent magnitude of 5.30. It is a large and rather loose open



Gemini

cluster, a worthy target for amateurs, even with binoculars.

Babylonian Myth

Castor and Pollux were known to the Babylonians as the Great Twins (MUL.MASH.TAB.BA.GAL.GAL). They were considered to be the minor gods Meshlamtaea and Lugalirra, meaning 'The One who has arisen from the Underworld' and the 'Mighty King' respectively. They used to dismember the dead as they passed through the gates to the underworld, and are associated with Nergal, the King of the underworld and the major Babylonian god of plague and pestilence.

One of two MUL.APIN cuneiform tablets consisting of lists of astronomical data



Greek Myth

Although Castor and Pollux are almost universally known as twins, they are in fact half-brothers. Leda, princess of Aetolia, was given in marriage to Tyndareos, the King of Sparta. Zeus was also particularly attracted to the beautiful Leda and visited the young bride on her wedding night disguised as a swan, and seducing her. She also consummated her marriage to Tyndareos the same night and as a result she bore two sets of twins. Each pair enclosed in a single, huge egg; one containing Polydeuces (later Pollux) and Clytemnestra who were Zeus's children and immortal; the other Castor and Helen, the mortal children of Tyndareos.

Castor and Pollux were both outstanding athletes and became devoted to each other. Among their many exploits they sailed with Jason and his Argonauts and were instrumental in saving the fleet of the Argo during a fierce storm. Castor and Pollux were seen as the guardians of sea-farers and were thought to cause St Elmo's fire, so Gemini was known to sailors as the 'protector of ships', hence the term 'by Jiminy'.

The twins became celebrated throughout Greece and Rome. Their likeness appeared on coins, a temple was erected in the Forum in their honour and they were even the inspiration for the formation of the cult of the Dioscuri. Revered as they were, they were not without the weaknesses of men. They were strongly attracted to their cousins Phoebe and Hilaira and when the two young women were married the Twins, having been properly invited to the wedding, behaved quite outrageously in seizing the young brides from the reception and taking them by force to Sparta.

Later, the Twins resolved their differences with the aggrieved husbands, Idas and Lynceus who were also brothers and to whom they were distantly related. Together they carried out a successful cattle raid in Arcadia (cattle were, of course, far more important than women). Feasting after the raid, Idas and Lynceus had already finished most of their meat when Idas announced that there should be a contest, and that whoever finished his meat first should take half the cattle as a prize, and the runner up should take the other half.

The Twins were enraged at this treachery and drove the entire herd of cattle back to Sparta, hotly pursued by Idas and Lynaeus. Encumbered by the cattle, the Twins were quickly caught. Idas killed the mortal Castor with a spear, while Pollux exacted revenge by killing Lynaeus in a similar manner. Zeus also joined in the melee and killed Idas with a thunderbolt.

Zeus then offered Pollux eternal life on Olympus, but he rejected this unless his beloved brother could join him. It had never been possible for a mortal to join the gods in their hallowed halls but Zeus made a special arrangement whereby both brothers would spend alternate days on Olympus and in Hades, the underworld and normal destination for the mortal dead. Eventually they were both transferred to their heavenly resting-place.