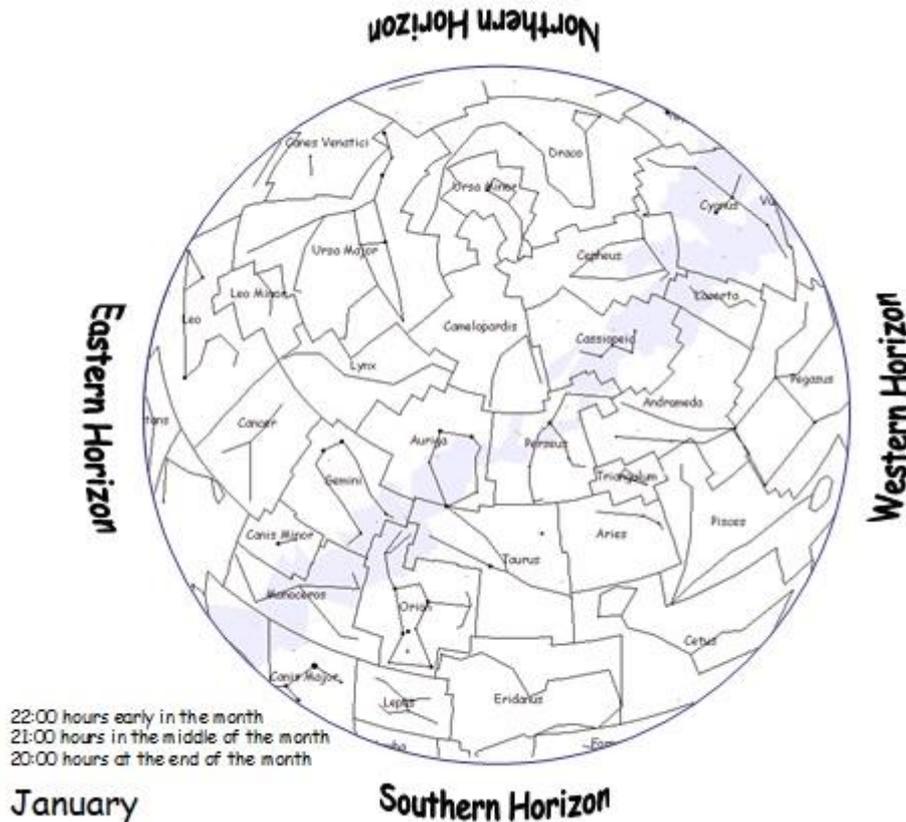


The Night Sky (January 2019)

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



The General Weather Pattern

January is often a windy month. Rain is less obvious than in the previous two months, but it usually gets colder as the month ages. It can be very cold at night, often reaching freezing temperatures with clear skies. Snow can be expected in cold years. Wrap up warm with a warm hat, socks and shoes and wear multiple layers of clothes. 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

From Earth

The Earth is at perihelion (closest to the sun) in its elliptical orbit on the morning of the 3rd of January. The word perihelion derives from the Greek words, *peri* meaning 'near' and *Helios* the Greek god of the sun.

The winter sky, dominated by Orion, presents itself due south, late in the evenings for most of this month. In the first half of the month, the Milky Way stretches right across the sky from east to west through the zenith at the end of evening twilight.

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

Due to the equation of time the latest sunrise of the year occurs around New Year's Eve; 30th December and the mornings start to lighten, but you may not notice until near the end of January.

The Sun moves from Sagittarius to Capricornus on the morning of the 20th. It is also beginning its journey towards more northerly latitudes once more, and will eventually become better placed for observing as the days get longer.

Use appropriate, safe methods to observe the Sun and notify other members if you observe any sunspot activity. Auroral activity is quite transient, so share information with other members ASAP. This month's partial solar eclipse on the 6th is not visible from the UK.

Moon

The New Moon is on 6th at about 01:30 in the constellation of Sagittarius.
 The First Quarter is on 14th at about 06:45 in the constellation of Pisces.
 The Full Moon is on 21st at about 05:15 in the constellation of Cancer.
 The Last Quarter is on 27th at about 21:10 in the constellation of Libra.
 The Moon is at perigee (nearest Earth) on the 21st and is the third closest perigee this year. The Moon is at apogee (most distant from Earth) on the 9th.
 The Moon passes within 1° of Aldebaran in the evening twilight on the 17th.
 The whole of the total lunar eclipse on the morning of the 21st is visible from the UK. Totality lasts for just over an hour, but to see the progress of the penumbral shadow you need to be up and running before 03:30. The whole event lasts from 02:37 until 07:48.

The Planets

The only conspicuous planet in the evenings of January is **Mars**.

 **Mercury** will start the month rising about an hour before the Sun. Mercury is only just above the ecliptic at this time, and is 4° to 7° above the Horizon in the twilight. It is not well placed for observing, as always, be aware of the rising Sun if you wish to take a chance! At this time of year the ecliptic is shallow at sunrise, and even low down, the Sun can be quite dangerous to your eyesight. It rapidly closes in on the Sun from our perspective and reaches superior conjunction on the 30th.

 **Venus** is at greatest western elongation on the 6th, and is to be found in the south east before the morning twilight. This is about the best time and position to observe Venus this year. A waxing crescent Moon sits between Venus and Jupiter in the morning twilights of both the 1st and 31st Jan.

 **Mars** appears culminating in the evening twilight at around 17:30 early in the month. It can be found in the constellation of Pisces, about 40° above the horizon throughout; moving to the other side of the solar system and diminishing in diameter. On the 12th a waxing crescent Moon escorts Mars for a photo-opportunity.

 **Jupiter** can be found rising just before the Sun, low down in the morning twilight throughout January. It is not well placed for observing. A waxing crescent Moon sits between Venus and Jupiter in the morning twilights of both the 1st and 31st Jan.

 **Saturn** is in conjunction with the Sun on the 2nd and is unobservable in January, except for the very last days when it emerges briefly in the morning twilight. It is in opposition on the 9th July, so better observing to be had later this year.

 **Uranus** is best observed at the beginning of the month. It can be found in the constellation of Pisces at RA 1h 47m 8s, Declination 10° 28' 57". At a magnitude of 5.78 it may well be found with a good pair of binoculars. You may also just see the planet's cyan (blue-green) hue in a small telescope. Uranus usually has few features visible at such a distance, so little else may be seen even with a larger amateur instrument or by astrophotography.

 **Neptune** is best observed early in the month, low down in the south-west, early evening. It fades into the evening twilight later in January. It can be found in the constellation of Aquarius all month, and on the 1st it will be at RA 23h 2m 56s, Declination -7° 8' 59", at a magnitude of 7.92. A thin crescent Moon can be seen to approach within 5° south of Neptune on the 10th at 18:30 making it slightly easier to find.

Meteors

One of the best showers seen from the UK, the **Quadrantids** can be seen from 1st to 6th January. The ZHR varies between 40 and 110 (expected to be around 80), and is at its best observed around the early hours of the 4th, the peak only lasts a couple of hours. The radiant, in northern Boötes, is circumpolar and lies towards the star Alkaid in Ursa Major, in a part of the sky that once contained a constellation called Quadrans Muralis; the Mural Quadrant! At about 40 km/s, these meteors are relatively slow, but brighten just after maximum with occasional green, yellow or blue hues. This year the thin waning crescent Moon, below the horizon, renders this shower very favourable. The Quadrantids' associated parent body is not known for certain, however, 2003 EH1 is a contender.

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
Cetus	19:00 Early January	Late October	Whole
Triangulum	19:00 Mid-January	Late October	Whole
Aries	19:00 Mid-January	Early November	Whole
Fornax	19:00 Late January	Early November	Unfavourable - partially hidden

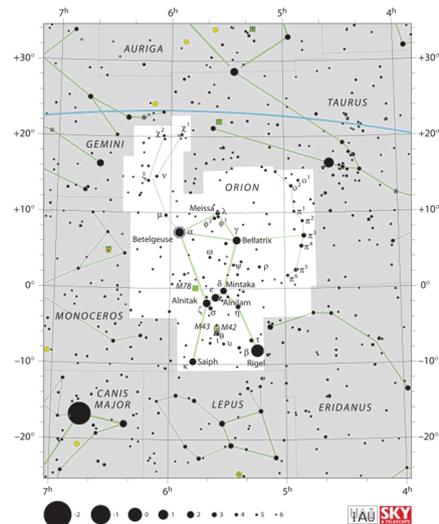
Orion (Pronounced oh-RYE-un)In Welsh Orion *nm*.

Astronomy Orion is a magnificent constellation, which stands out amongst the southern stars in winter time. Finding Orion should be no problem; its stars are some of the most familiar in all the heavens and lie due south at 22:00 in mid-January. The famous Orion's Belt marks the centre of the constellation and helps us find other stars of interest. When Orion is orientated in this way, follow the line of the belt south-easterly to find Sirius, the brightest star in the night sky, and north-westerly to find the Pleiades nebula, a magnificent open cluster.



As well as dominating the winter sky with its size, and definition of shape, Orion has more to offer the observer than most other constellations. Observe the glorious red giant Betelgeuse, the equally brilliant blue-white giants, Rigel and Bellatrix, and the nebulous beauty of the Great Orion nebula in the sword.

Orion's bright, right shoulder is famously called Betelgeuse, one of the largest and most luminous of observable stars. Betelgeuse is frequently described as the 'Armpit of the central one', however modern authorities suggest the name derives from the Arabic *Jad al-Jauza* meaning 'Hand of *al-Jauza*' (the Arabic name for Orion). Betelgeuse, which lies about 640 light years away, is a red supergiant with a luminosity some 100,000 times that of the Sun and a diameter 1,000 times that of the Sun. This star is reaching the end of its life and pulsates, both in size and brightness.



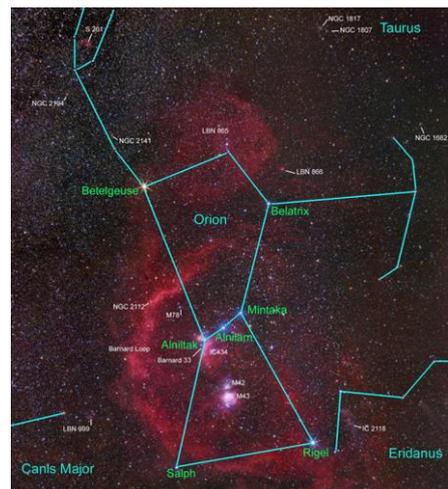
Another famous star in Orion is his left foot, Rigel, from *Ar-risha* meaning 'the foot'. This bright star is different to Betelgeuse as it shines blue rather than red. This is due to the surface temperature of the star, blue stars are much hotter, and Rigel is about 16,000 °K, whilst cooler Betelgeuse averages 2,700 °K. Rigel is a multiple star system of at least three stars, although you'd need a small telescope to separate them.



Take a look at the three stars that make up the belt, the one on the right is known as Mintaka, and the one on the left is Alnitak. Both names derive from the Arabic meaning 'the Belt'. Alnilam, the central star means 'The string of pearls'.

Even with the naked eye, it can be seen that the central 'star' in the three 'stars' marking the dagger hanging from Orion's belt appears to be a fuzzy patch rather than a star. This is the Orion Nebula (M42), perhaps the most photographed deep sky object in the heavens, a vast nebula of gas and dust exquisitely lit by the internal and surrounding stars. This is

a stellar maternity ward, in which more young stars will appear from this wealth of cosmic matter during the next tens of millions years. Take a pair of binoculars to this part of the sky, inside the nebula can be found a small, fascinating four-star asterism known as The Trapezium.



There are many nebulous (cloudy) regions in and around Orion. Barnard's loop, the Horse head and many other nebulae are all part of the huge molecular cloud situated in that part of the sky. Unfortunately with the exception of the Great Orion Nebula, they are all quite difficult to observe by eye. That is because the eye is not very sensitive to the wavelengths of the emitted light. However modified digital SLR (internal filters removed) cameras are very

sensitive to these wavelengths and photographing the nebulae with an ordinary camera lens is easier than you might think.

In larger telescopes the semi-circular Barnard's Loop and just a smidgen south of Alnitak, the Horsehead Nebula present rewarding challenges for the observer. The prominent horse-head portion of the nebula is a popular target for amateur astronomers. The Horse Head was first recorded in 1888 by Scottish astronomer Williamina Fleming on photographic plate B2312 taken at the Harvard Observatory. The Horsehead Nebula is approximately 1500 light years from Earth. It is one of the most identifiable nebulae because of the shape of its swirling cloud of dark dust and gases, which bears some resemblance to a horse's head when viewed from Earth. The Horsehead Nebula appears to be a region devoid of stars, surrounded by a distinguishing cloud of stars. However, in reality, this is a dark molecular cloud which is obscuring the starlight from the brighter nebula, IC 434, situated beyond it. It is a region within the larger Orion molecular cloud of ionised atomic hydrogen called HII regions.

The Great Orion Nebula was the first such HII region (pronounced "H two") discovered (1610). Such zones are important star-forming regions and can readily be seen in other active galaxies because they tend to be very large. The Horse Head, Great Orion and Running Man nebulae, to mention a few are examples of HII regions.

Associated with it and enveloping it is Barnard's Loop, which can be seen extending from the centre of the picture, around toward the bottom. Although it was named the 'Orion Loop' by E. E. Barnard, and then renamed in his honour for its discovery, it was possibly detected by William Herschel in 1786.

Positioned about 1600 light years away and stretching several hundred light years across, there are a number of speculations as to the origin of this huge bubble. It may be a supernova remnant or possibly it was formed by a series of supernova explosions.

It could also have developed when a density wave, associated with the structure of the Milky Way, moved through the Galactic disk. While difficult to observe visually, it can be effectively photographed on long exposures as can be seen in the above (top) image by Nick Busby, chair of Usk Astronomical Society.

Many amateur astronomers use special ultra-high contrast filters (UHC) to enhance views of such regions. In particular they emphasises ionised oxygen (OIII) which has a greenish colour. Although intended to be screwed onto the barrel of the eyepiece they can also be held between the eyepiece and the eye and moved in and out to reveal the nebulae and are highly recommended

The Orionid meteor shower can be seen emanating over the eastern horizon at about 11.00 pm between 16th to 27th October.

Myths

An ivory carving dated to around 35000 BCE seems to illustrate that the stars of Orion have long been associated in the minds of humans, and by 4000 BC, over 6000 years ago, the patterns of the Bull, Lion and Scorpion were first characterized in Mesopotamia. A belief that Orion's name originated with the Sumerian sun-god Uru An.na, meaning 'light of the heaven' is largely unsupported.

Babylonian star catalogues from the Late Bronze Age identify MULSIPA.ZI.AN.NA, "The Heavenly Shepherd" or "True Shepherd of Anu" (Anu being the chief god of the heavenly realms) as the most likely origin.



In 1100 BC **Amenhotep** produced a 'Catalogue of the Universe' listing five constellations including Orion and the Great Bear. In mythology, the Orion region has been associated with the human form since ancient times. In Egyptian mythology, Sah (Orion) was syncretized with Osiris. His consort was Sopdet, the goddess of the flood, personified by the star Sirius. Both held an important role in Egyptian mythology, and the corresponding deities were associated with Osiris and Isis.

Sah was frequently mentioned as "the Father of Gods" in the Old Kingdom Pyramid texts. Pharaoh was thought to travel to Orion after his death.



It is in Greek myth we find a man of gigantic stature, unrivalled good looks and a hunting prowess celebrated throughout the ancient world and named Orion.

He was, according to Eratosthenes, the son of Euryale and Poseidon and consequently could walk on water. One day, on a visit to the island of Chios he fell in love with Merope, beautiful daughter of the goddess Dionysus. He sought her hand in marriage from her father Oenopion and was promised this in return for ridding the island of the many dangerous beasts that troubled the inhabitants.

Orion exercised his skills with great success against the wildlife of the island but Oenopion began to delay the marriage by inventing more and more tasks for Orion to undertake. Eventually, in a fit of desperation and self-pity Orion consumed a flask of his unwilling father-in-laws most potent wine. With his senses dulled by the wine, Orion forced his intended to consummate the marriage prematurely. Incensed by this, Oenopion plied Orion with even more wine until the great hunter was insensible, and then put out his eyes.

Orion sought the help of the oracles to regain his sight and was instructed to seek the morning sun. He set off with his loyal crew of sailors for the east and docked at the Isle of Lemnos, where Vulcan, the gods' blacksmith, aided him. He gave him Cedalion, an apprentice, to sit on his shoulders and guide him to the furthest ocean, where he

found the sun god Helios. Orion appealed to Helios to restore his sight. His plea was granted and with his sight restored Orion enjoyed a love affair with Eos, sister of Helios and goddess of the Dawn.

Eventually his desire for Eos was overtaken by his desire for revenge against Oenopion and Orion once more set off on his journey. In Crete he met Diana, goddess of the moon and also an ardent hunter. They rejoiced in their common love of hunting and Diana now accompanied Orion on the chase. However, their closeness caused great concern to Apollo, Dianan's brother, who feared that his sister would become Orion's next conquest, and he waited for an opportunity to discredit the hunter.

Orion had one great weakness. He boasted injudiciously about his achievements and claimed that there was no animal that he could not slay. Apollo seized his opportunity and repeated these boasts to Mother Earth. She was not only annoyed at his wantonness, but also fearful that he would destroy all predators (as he had on the island of Chios) and decided to halt his exploits by producing a monstrous scorpion under his feet, covered in armour so thick that it could never be slain.

For the first and last time in his life Orion was totally defenceless and died from the sting of the terrible beast. Diana was distraught at the loss of her friend and companion and begged the gods to allow her to immortalise Orion among the stars. Her wish was granted and Orion was sent to the mid-heavens.

As a reward for conquering such a hero, the scorpion was also granted immortality, but was sent to the southern skies so that the two enemies should not be seen in the sky at the same time, and Orion should not be reminded of his ignoble defeat. To give the hunter some sport in his permanent abode the gods thoughtfully provided him with Taurus the bull to fight, and Canis Major and Minor, his loyal hunting dogs for company.