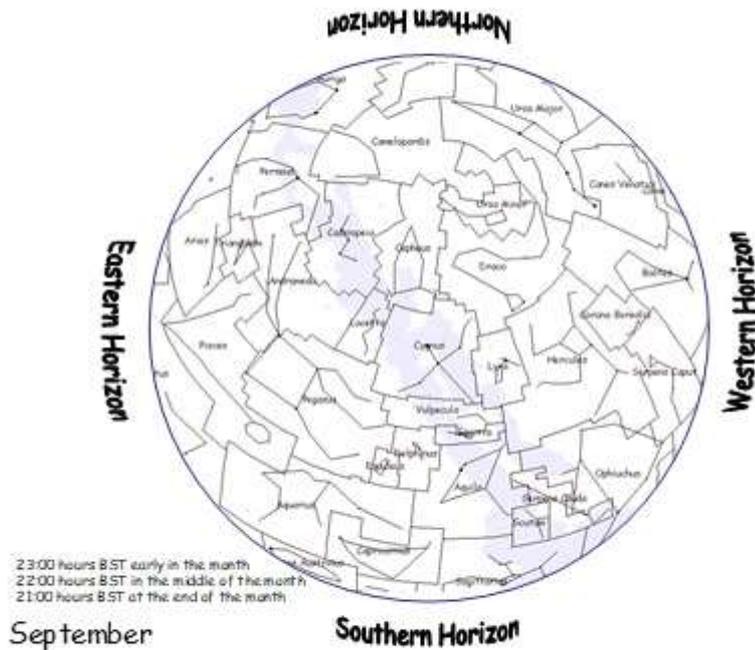




# The Night Sky (September 2019)

BST (Universal Time plus one hour) is used this month.



## The General Weather Pattern

September is often a drier month than the previous two and it can be a quiet, calm month. However, we have experienced another record breaking, hot summer so far with heavy downpours in places in August. Any winds carried from the west by depressions usually bring to Wales a mixture of wet and windy weather with cool temperatures. At night it can be quite cool and humid, and during clear, still nights mist and dew usually present a problem,

Should you be interested in obtaining detailed weather predictions for observing in this area, log on to [https://www.meteoblue.com/en/weather/forecast/seeing/usk\\_united-kingdom\\_2635052](https://www.meteoblue.com/en/weather/forecast/seeing/usk_united-kingdom_2635052) to acquire up-to-date information for your observing site.

## From Earth

Throughout this month, the ecliptic is at a very shallow angle of about  $15^\circ$  at sunset. The minimum angle will be around the Autumn Equinox which is on the morning of the 23<sup>rd</sup> this year. In this configuration, the angle of separation of a planet from the Sun translates into lower altitude at sunset, and a planet in close line-of-sight and to the east of the Sun would be harder to see; Jupiter and Saturn are below  $16^\circ$  at the end of the month. The opposite is true of the dawn.

The nights are lengthening most quickly in the last two weeks of September, and thank goodness, the short, hot, bright nights of summer are nearly over! This is a comfortable time of year to observe in the evening. Unfortunately, for beginners, the evening skies in autumn are not up to the standards of winter; however, this might be a nice time to take a look at the Andromeda Galaxy.

There are signs of the glories to come late evening and early morning as the winter sky looms over the eastern horizon.

## 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.

## The Milky Way In Welsh

Llwybr Llaethog *nm.* Modern; literally the Milky Way.

Recent research suggests that 60% of Europeans and 33% of mankind no longer see the Milky Way due to worsening light pollution. Throughout September, in the hours of darkness, the Milky Way lies within 20° of the zenith. On two occasions each night, around 23:00 and 05:00, the plane of the Milky Way can be found above you, at the zenith.



This is a wonderful time of the year to observe our Galaxy. For instance, dark regions of dust and gas which obscure light from more distant stars can be seen along the galactic plane from dark-sky locations, such as the Brecon Beacons.

In September the Great Rift can be found along the plane of the Milky Way from Sagittarius in the south through Cygnus at the zenith.

Historically, unresolvable clusters of stars and galaxies were known as nebulae until technology advanced to reveal them for what they are. Excluding them, there are four major types of other nebulae recognised

today and found within our Galaxy, consequently most can be observed along the band of the Milky Way.

H II regions, large diffuse nebulae containing ionized hydrogen (e.g., Orion Nebula in the Sword of Orion)

Planetary nebulae (e.g., Cat's Eye Nebula in Draco)

Supernova remnants (e.g., Crab Nebula in Taurus)

Dark nebulae (e.g., Horsehead Nebula in Orion)



H II regions



Planetary nebulae



Supernova remnant



Dark nebulae

For the same reason, star clouds such as open clusters can be found in this region.

## Sun

Mid-month on the morning of the 17th the Sun moves from Leo into Virgo. If you have any news of sunspot activity, other members would be interested, so let us know. Don't forget to ask experienced members for help if you want to observe the Sun.

On the 23<sup>rd</sup> the Sun passes into the southern celestial hemisphere; the centre of the solar disc crosses the celestial equator at the first point of Libra (07:51 UT). It was defined in 130 BCE by Hipparchus when it was located in the constellation of Libra. Because of precession, it has migrated into the constellation of Virgo where we find it in modern times, also known as the Autumnal Equinox.

Equinox derives from the Latin *aequinoctium*; *Aequusi* meaning "equal" and *nox* meaning "night". Autumnal from *autumnus* means autumn, for the Autumnal Equinox, divulging its historical origins in the Northern Hemisphere.

The Solar Cycle Prediction Panel has, for only the fourth time, made predictions for the behaviour of the Sun in a solar cycle. Some scientists have come to the conclusion that cycle 25 is already underway, but this is a new science and as yet there is no clear definition with which to compare. It is clear, however that it is imminent.

## Moon

The First Quarter is on 6<sup>th</sup> at about 03:10 in the constellation of Ophiuchus.

The Full Moon on 14<sup>th</sup> at about 04:35 in the constellation of Aquarius, is commonly called the Harvest Moon\*.

The Last Quarter is on 22<sup>nd</sup> at about 02:40 in the constellation of Orion.

The New Moon is on 28<sup>th</sup> at about 18:30 in the constellation of Virgo.

The Moon is at perigee (nearest Earth) on the 28<sup>th</sup> and at apogee (most distant from Earth) on the 13<sup>th</sup>.

\*The names of full moons were, at one time, associated with the names of the lunisolar months. The Romans, with the introduction of the Julian calendar, helped to decouple that tradition, as did the Gregorian calendar. However, in recent times naming full moons has been revived and has taken hold in urban myth. According to folk-lore, the Harvest Moon is supposed to be the full moon nearest the autumnal equinox; the 14<sup>th</sup> this year. The fallacious myth is that it is used as illumination when the harvest is being gathered after sunset.

### The Planets

☿ **Mercury**, at superior conjunction on the 4<sup>th</sup>, ♀ **Venus** at superior conjunction on the 14<sup>th</sup> of August, and ♂ **Mars** at superior conjunction on the 2<sup>nd</sup>, are all but observable in September this year.

♃ **Jupiter** first appears in the evening twilight about 15° above the southern horizon at the beginning of the month, and can be found in the constellation of Ophiuchus throughout September. It is best observed early in the month because as the month progresses, Jupiter moves closer to the sun from our vantage point. By then it has reduced to 12° at best as it moves towards conjunction in December.

♄ At the beginning of September, **Saturn** appears around about 20:30 in the south in twilight, and can be found around 30° farther east than Jupiter in the constellation of Sagittarius. Saturn will be best placed at the beginning of the month, and with its ring system open, is worth an observing session.

♅ **Uranus** is in Aries this month and is best observed at the end of the month as it moves towards opposition in October. At this time it can be found at RA 2h 14m 18s, Declination 12° 56' 01"; in the south-east, at a magnitude of 5.69. It rises around 19:30 at the end of the month and culminates around 02:30. It is becoming more convenient to observe, but needs a good telescope to even perceive its disc.

♆ **Neptune** is at opposition on the 10<sup>th</sup>, and it can be found in the constellation of Aquarius at RA 23h 15m 0s, Declination -5° 59' 0"; in the south. It only has a magnitude of 7.82, and is best seen through a 150mm or greater telescope with decent magnification to get a glimpse. With an orbital period of 165 years, Neptune is at opposition in the constellation of Aquarius each year for some time, making September through to November the best months to try to observe Neptune if you are inclined to do so.

### Meteors

September is a poor month for meteor showers, but sporadic meteors are more evident at this time of year, building up to an annual maximum in November. Sporadics are loners, not associated with any one part of the sky, entering our atmosphere from all directions and therefore they require much more patience to observe than do showers which emanate from one part of the sky.

The **Piscid** meteor showers have weak meteors with multiple-radiants on the 9<sup>th</sup> and 21<sup>st</sup> Sept and 13<sup>th</sup> October. This year their maximum is on the 21<sup>st</sup>, with a low ZHR of 5.

### 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
Aquila	21:00 Late September	Early August	Whole constellation
Sagitta	21:00 Late September	Early August	Whole constellation
Cygnus	20:00 Mid-October	Mid-August	Whole constellation at zenith
Delphinus	20:00 Mid-October	Mid-August	Whole constellation
Vulpecula	20:00 Mid-October	Mid-August	Whole constellation
Equuleus	20:00 Late October	Late August	Whole constellation
Capricornus	20:00 Late October	Late August	Whole but poor; low in the murk
Microscopium	20:00 Late October	Late August	Unfavourable and partially hidden
Aquarius	19:00 Mid-November	Mid-September	Whole constellation
Cepheus	19:00 Mid-November	Mid-September	Whole - upper culmination - north
Lacerta	19:00 Mid-November	Mid-September	Whole - upper culmination - zenith
Piscis Austrinus	19:00 Mid-November	Mid-September	Whole - v poor; v low in the murk
Pegasus	19:00 Late November	Late September	Whole constellation - high

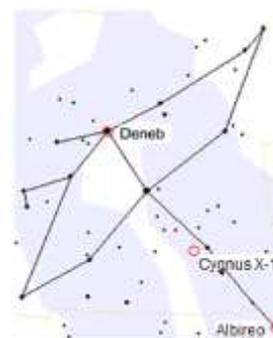
**Cygnus** (Pronounced sig' nus)

#### In Welsh

Yr Alarch *nm.* Modern; literally the Swan.

#### Astronomy

From the Latin for 'the Swan', the constellation Cygnus lies immediately above our heads in mid-September, at about 22:00 BST. Locating it is easy at this time, the asterism known as the Northern Cross lies at its core. The cross stretches from Deneb, the tail star, through the body and neck to Albireo at the head. The arms of the cross attach to Sadr, the body of the swan.



Deneb, the dimmest of the three stars that comprise the 'summer triangle', is in fact one of the most luminous of visible stars. Its distance is not known with any degree of certainty, but is of the order 2600 ly, compared to Vega at only 25 ly it is clear how intrinsically bright it must be, with an estimated absolute magnitude of -8.38 it is approximately 60,000 to 200 000 times brighter than the Sun. It has a visible magnitude of about 1.3.

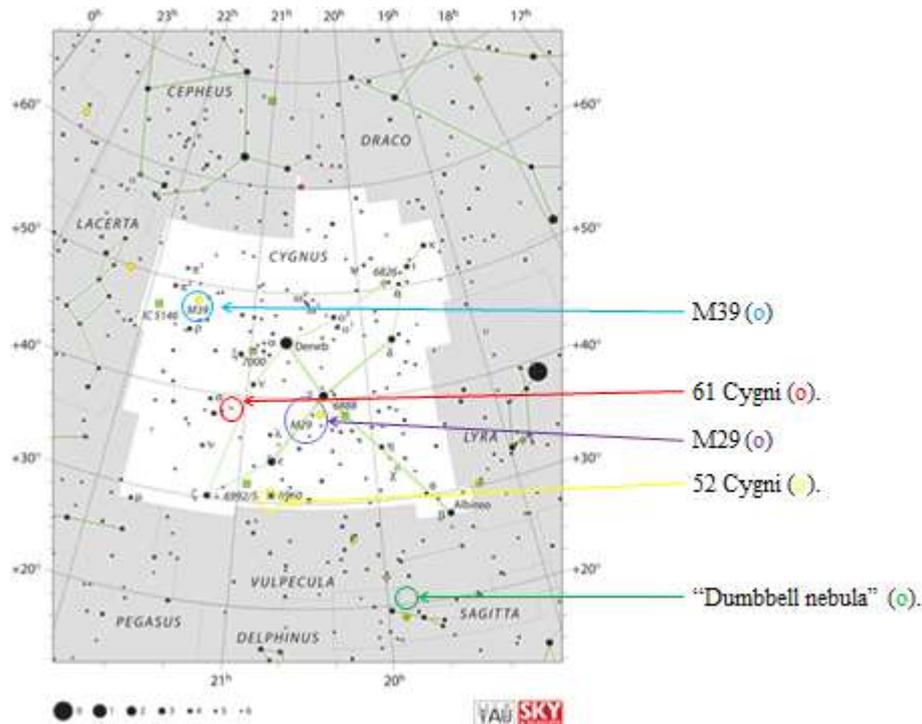
Next to Eta Cygni, in the neck, lies a blue supergiant, HDE 226868, at a distance of about 6,100 light years. It was discovered in 1964 that this region is also a source of powerful X-rays. Not only that, but HDE 226868 also wobbles under the influence of a companion with a mass some 9 to 10 times that of the Sun. There is considerable evidence that Cygnus X-1, as the hidden, compact companion is designated, is a black hole. Consequently, you may find its position, but will not be able to observe it!

Albireo in a low power amateur telescope



Albireo is the primary star of a magnificent double with a separation of 34 arcseconds from its companion star  $\beta$ 2 Cygni. Even a small telescope can separate them so that you can distinguish their individual gold and blue colours.

Another star in Cygnus although quite dim at magnitude 5.2 has historical fame. 61 Cygni (♁) was the first star to have its distance measured by the parallax method in 1838 by Friedrich Bessel. He obtained a figure of 10.4 light years whereas the figure accepted today is 11.4 light years – Bessel had achieved a triumph of 19th century astrometry. This is the main method still used today for accurately measuring the distance to stars.



While we're in the area of Cygnus a prominent deep sky object is M27 or the "Dumbbell nebula" (♁). This is a planetary nebula. Technically it is in Vulpecula a rather insignificant constellation. It is easily visible in binoculars and very easy to find with any telescope. It looks more like a misty bow-tie rather than a dumbbell. As planetary nebulae go it is one of the easiest to observe and was in fact Charles Messier's first planetary, he discovered it in 1764. It is around 1227 light years away and is the remains of a dead star that has puffed layers of gas into space; it has a white dwarf at its centre. It is very easy to locate just above the small arrow of Sagitta.

Another popular target in Cygnus is the Veil nebula also known as NGC6992 and NGC6950. This is believed to be the remains of a star that exploded some 8000 years ago and had a mass 20x that of the Sun. It is a large object covering some 3 degrees of sky and is in a number of parts. You will need a very dark night to spot it and the use of an UHC or OIII filter helps a lot. NGC6960 is a favourite of amateur astrophotographers, it is also known as the witches' broom. It appears as twisted filaments of gas in the region of 52 Cygni (♁), which is the signpost for finding it. The Eastern Veil is possibly the easiest part to spot although it still needs a dark night but can, with care, be spotted with 50mm aperture binoculars. It appears a faint curved patch of light. With a telescope use a

very low power, say 20X and preferably an OIII filter to emphasise it. On a really dark night in say the Brecon Beacons with good transparency it can be quite obvious.

M29 (O) is an open cluster just to the east of Sadr. It can be found with binoculars or a low power telescope.

M39 is another open cluster that like many others is probably best observed with binoculars. With such objects that cover a relatively large area (about ½ degree for M29) it is very easy to “look through” the cluster with a telescope. Also as with many open clusters M39 (O) (and M29) is in the Milky Way and can get lost amongst all the other stars with too much magnification. There are about 11 open clusters in Cygnus in addition to many double stars and nebulae; it is a very rich constellation for observers whatever the instrument they are using.

Lines drawn between the bright stars Deneb, Vega and Altair form the Summer Triangle, a prominent formation of stars, which is known as an asterism not a constellation.

**Deneb**, in the tail of Cygnus, is a very luminous blue-white supergiant and, although there is some uncertainty, is believed to lie at a distance of about 2,600 light years.

**Vega**, in the constellation of Lyra, is 25 light years away. It was the pole star around 14000 years ago; due to the precession of the Earth.

**Altair** in Aquila is about 17 light years away.



The Summer Triangle

### Myths

The location of Cygnus has been associated with a bird even by the Mesopotamians and to early Greeks like Eudoxus it was known as a bird or hen constellation, as it was some time later to some Arabic authors. The name Deneb derives from Arabic phrase *Dhanab ad-Dajājah*, which means “the tail of the hen”, *Dhanab*, meaning “tail”.

The constellation of Cygnus, pictured by us as a swan flying along the plane of the Milky Way, comes down to us from a number of Greek myths. The most repeated, once again, involves the promiscuous god, Zeus who, you may recall, lusted after the beautiful Leda and visited her on her wedding night disguised as a swan to seduce her. Her marriage to Tyndareos was consummated 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 (of Troy), the mortal children of Tyndareus.

Castor and Pollux are characterised by the twin constellation Gemini, and Zeus in his guise of a swan, is symbolised by Cygnus.