

# The Night Sky (April 2018)

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

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### **The General Weather Pattern**

Surprisingly rainfall is not particularly high in April, but of course heavy rain does occur, often with hail and thunder. Expect it to be cloudy. Temperatures usually rise steadily, but nights can still be chilly.

Wear multiple layers of clothes, with a warm hat, socks and shoes to maintain body heat. As always, an energy snack and a flask containing a warm drink might well be welcome at some time.



### **From Earth**

As the Earth moves from the vernal equinox in March, the days are still opening out rapidly. The Moon no longer raises high in the mid-night sky as it does in the winter, but takes its place at lower latitudes for the summer. The Sun of course does the converse.

### **Sun**

The Sun is becoming better placed for observing as it climbs to more northerly latitudes, and, it is worth reminding members that sunlight contains radiation across the spectrum that is harmful to our eyes and that the projection method should be used. Unfortunately, solar cycle 24 continues to abate towards solar minimum predicted to be around 2019/20. If you should happen to find sunspot activity other members would be interested, so let us know.

### **Moon**

Last Quarter is on 8<sup>th</sup> at about 07:20 in the constellation of Sagittarius.

New Moon is on 16<sup>th</sup> at about 02:00 in the constellation of Pisces.

First Quarter is on 22<sup>nd</sup> at about 21:50 in the constellation of Cancer.

Full Moon is on 30<sup>th</sup> at about 01:00 in the constellation of Libra.

The Moon is at perigee (nearest Earth) on the 20<sup>th</sup> and at apogee (most distant from Earth) on the 8<sup>th</sup>.

At this time of year the first quarter Moon is well placed, high in the south-western sky at night-fall. Its light travels through less of the atmosphere to reach our telescopes than when it is low down, and even hand-held binoculars will find many impressive selenological features to observe at the terminator.

### **The Planets**



**Mercury** is at inferior conjunction on the 1<sup>st</sup> April and moves rapidly to greatest western elongation on the morning of the 29<sup>th</sup>, when it will rise in the blaze of the morning twilight. It is unfavourable this month.



**Venus** becomes more a favourable object as this month progresses as it moves away from the Sun at a steep angle. It moves from the constellation Aries into Taurus on the 19<sup>th</sup> and by the 27<sup>th</sup> can be found shining brightly, nestled between the Hyades and the Pleiades. Venus doesn't appear much higher than 17° in the western evening twilight throughout April, but by the end of the month its magnitude has risen to -3.82.



**Mars** is a morning object, rising with Saturn at about 03:30 in the first week or so of April. The Moon can be found with them on the mornings of the 7<sup>th</sup> and 8<sup>th</sup>. Mars is best observed early in the month when it is in this interesting configuration. You might like to compare Mars with Saturn. Its magnitude increases from 0.32 in the beginning to -0.35 at the end of the month.



**Jupiter**, in the constellation of Libra throughout the month, moves towards opposition in early May. It culminates just before 02:00 at the end of the month and is in retrograde motion at this time. There is much to see in a decent telescope, even though it gets no higher than 22°. The Galilean Moons with their accompanying phenomenon are often to be observed. If you have good seeing you may well make out the North and the South Equatorial Belts, and the Great Red Spot is visible at times too.



**Saturn** rises with Mars around 03:30 at the start of the month, in the constellation of Sagittarius. The Moon makes for an extra interest in the morning of the 7/8<sup>th</sup>. Saturn reaches first stationary point on the 17<sup>th</sup> and proceeds in a retrograde motion for about the next five months. Dedicated observers will be pleased with the open ring system, but for less enthusiastic and casual observers Saturn continues to become more convenient over the next few months as it moves towards opposition on 27<sup>th</sup> June. By the end of April Saturn rises at about 01:30. Saturn will rise earlier as the year progresses and less enthusiastic observers might try in June/July.



**Uranus** is at conjunction with the Sun on the 18<sup>th</sup> April and is unobservable this month.



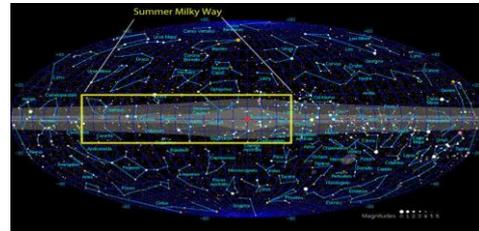
**Neptune** rises at shallow angle, in the glare of the Sun, and is unobservable this month.

### Dwarf Planets

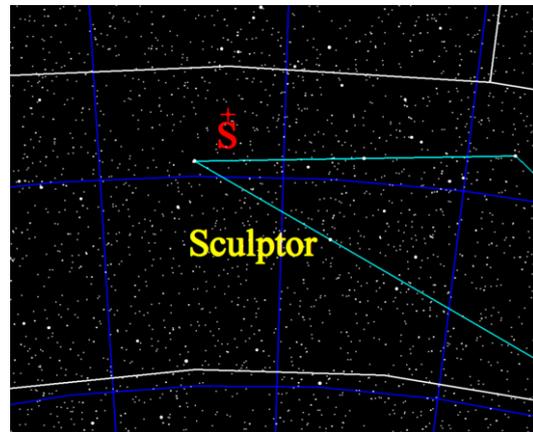
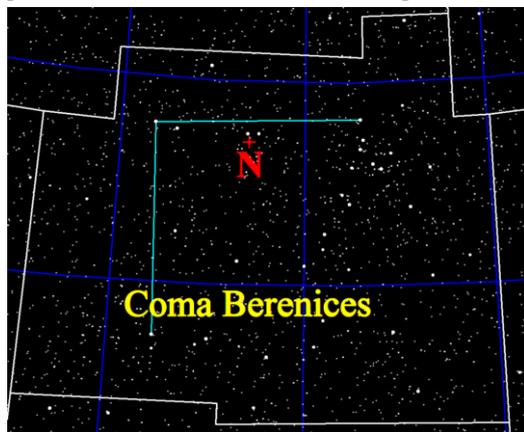
Dwarf planets are very dim, even the second brightest, **Pluto**, gets no brighter than 14.8 even at opposition in July. The brightest, **Ceres**, at a visible magnitude of about 8.3, can still be found in the constellation of Cancer throughout April. A decent telescope is needed, but after 22:00 (BST) it will present itself in the south-west at RA 8h 41m 45s, Declination -31° 40' 55" around about the 22<sup>nd</sup>.

### Galaxies

Our Galaxy rotates in a plane identified by us as the plane of the Milky Way. Observe along this plane and you can find stars, clusters of stars and dust within it but our view beyond is obscured somewhat, particularly towards the centre which is known as the 'Zone of Avoidance'.



Naturally, the galactic poles lie at 90° to the Milky Way, and it is not surprising we can more easily observe distant galaxies and clusters of galaxies in these regions. The north galactic pole is found in the constellation of Coma Berenices and its position is defined as RA 12h 49m, Declination 27° 24'. There is a corresponding south galactic pole in the southern constellation of Sculptor.



The 'Season for Galaxies' runs from February through to early July, when, amongst the constellations of Coma Berenices, Virgo and behind Leo there is much to see. Observe 'the Realm of Galaxies', on the meridian, at a most convenient evening time in late April.

### Meteors

The first half of April gives us an opportunity to find meteors from Virgo. The **Virginids**, with an average fall rate of about 1 or 2 per hour, are not easy to spot. They are slow but bright meteors, emanating from near Spica with its maximum around the 11<sup>th</sup> and 12<sup>th</sup>.

The **April Lyrids** are seen from the 18th to the 25th of April. The radiant is on the border of Lyra and Hercules. The shower is associated with Comet Thatcher, and has been observed since about 500 BCE, although it has been getting less active over the past 200 years. These meteoroids hit the Earth's atmosphere at around 49 km/s, so some bright, fast meteors can be seen, some leaving vivid trains in their wake. The maximum occurs in the early morning of April 22<sup>nd</sup>/23<sup>rd</sup>, with a usual ZHR of about 10 to 15. Very occasionally the rates can be as high as 200, so it may be worth observing. The first quarter Moon is opposite Lyra in the sky and sets around 03:00 so this year is favourable.

### Culmination of Constellations

Culmination, the highest point an astronomical target like a constellation can reach in the sky, occurs on the north-south line at your observing position; the local meridian. All things being equal, this is the best time to observe the constellations. Northern circumpolar constellations, those that circle around the north celestial pole, will cross the meridian above and below the pole, it is the upper culmination that is best.

Constellation	Convenient Culminations	Midnight Culminations	Observability
Hydra	22:00 Early April	Late February	Northern stars visible - partially hidden
Antilia	22:00 Mid-April	Late February	Unfavourable and partially hidden
Sextans	22:00 Mid-April	Late February	Whole
Leo Minor	22:00 Mid-April	Late February	Whole
Leo	22:00 Mid-April	Early March	Whole
Crater	23:00 Mid-April	Mid-March	Whole

## Ursa Major and Ursa Minor (pronounced er' suh may' jor) and (pronounced er' sa my' nor)

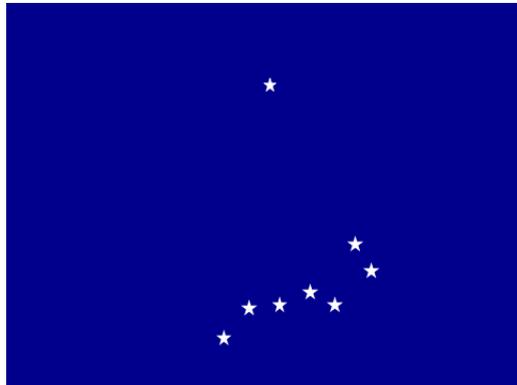
### In Welsh

- 1) Arth Fawr *nf.* literally 'Great Bear'.
- 2) Arth Fwyaf. literally the 'Greater Bear'.
- 1) Arth Fach *nf.* literally 'Little Bear'.
- 2) Arth Leiaf. literally the 'Lesser Bear'.

### Astronomy

**Ursa Major**, seen here at 22:00 BST in mid-April, is one of the most ancient and famous of the constellations in the Northern Hemisphere. At our latitude most of Ursa Major can be seen each night, all year round, circling the pole star and is therefore known as a circumpolar constellation.

**Ursa Minor** was not recognised by the Greeks until about 600 BCE. Prior to that, the Phoenicians knew Ursa Minor as a navigational guide, and recognised that the close proximity of the Phoenician Bear to the then pole star ( $15^\circ$  from Polaris) made Ursa Minor more useful than its larger relative.



The seven brightest stars in Ursa Major can be seen even from light polluted skies, and so this group of stars is easily recognised, seen here as it looks at 20:00 in mid-December. Both Greek and Roman writings frequently mentioned this region as a bear. However, those seven stars have been given many names by many different cultures. They are also commonly associated with cups (ladles) and wagons (wains) amongst other things.

In the UK and Ireland it is commonly called the Plough, in the USA – 'the Big Dipper', a ladle. A story from Arabia describes a coffin, with three mourners. In Scandinavia it is 'the Wagon'. Would you believe, in Dutch, it is commonly called *Steelpannetje* 'the Saucepan' even though its official name is the 'Great Bear' (*Grote Beer*). Among the Welsh, it is also known as *Y Sosban*, 'the

Saucepan' which, I feel, it most resembles.

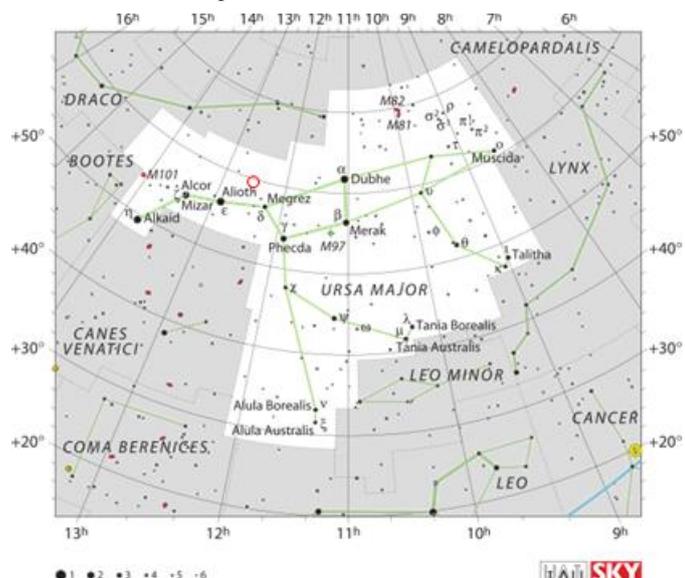
The Plough is not a constellation in its own right; it is a recognisable group of stars, known as an asterism, consisting of the seven brightest stars of the Great Bear, Ursa Major, in Welsh, *Arth Fawr* literally 'Great Bear'. Starting from the end of the handle of the pan (or the tail of the bear) the star names are: Alkaid, Mizar, Alioth, Megrez, Phecda, Merak and Dubhe.

Merak (the brightest) and Dubhe (the second brightest) are famous for being the pointer stars, pointing to Polaris, the North Star. To locate it, take the distance between the pointers as one step, and take five steps away from the lip of the saucepan; Dubhe. Visually Polaris is not an outstanding star, but it is the most significant in this region. It isn't precisely on the polar axis, but so close at  $89^\circ 02'$ , that its minimal movement makes it well suited for some navigational purposes. Due to the earth's precession this will soon change in astronomical terms. In 8000 years Deneb ( $\alpha$  Cygni) will be the pole star, while 4000 years after that the closest visible star to the pole will be Vega, and even that will be  $12^\circ$  from the pole!

The second star from the start, Mizar, is famous for its companion star Alcor. They are a naked eye double; they look close together but are in fact about 6 light years apart. Mizar is the brightest star at Magnitude 2.27 and Alcor is Magnitude 4.01. Named the 'Horse and Rider' by the Arabians these two were a test of vision to them; if someone could split the two with the naked eye, they were said to have good eyesight.

Historically, Mizar is a most interesting star; it was the first telescopic double discovered. In 1650 when the Italian Giovanni Riccioli aimed his primitive Galilean telescope at the 2nd mag. star he found it to have a 4th mag. companion (other than Alcor). Today we know Mizar is a double binary; a quadruple system, and that Alcor is itself a spectroscopic binary star system.

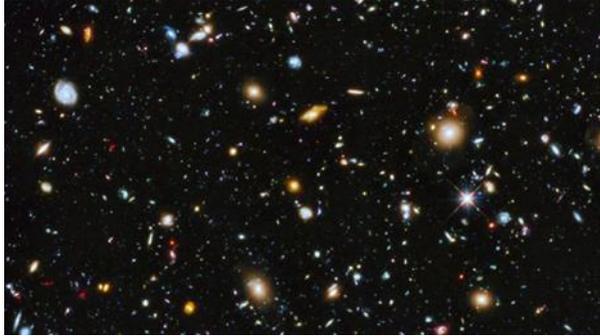
For extra-solar planet hunters there is a naked-eye star in the back leg of Ursa Major that has an eccentric giant planet. It is unlikely to support life due to its size, orbit and proximity to its star called HD 89744, but it can still teach us a great deal



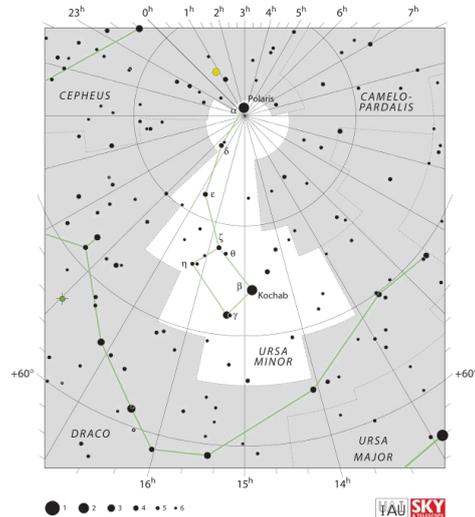
about the possibilities of extra-terrestrial life.

The bright planetary nebula, Owl Nebula (M97), can be found along the bottom of the pan of the saucepan, south-east of Merak.

Ursa Major encloses a number of bright galaxies. One of the brightest, the spiral galaxy M81, can be found north of the bear's head, and close by and just a little further north, is the brightest infra-red galaxy M82, an irregular galaxy. These galaxies interact gravitationally and are members of next nearest galaxy cluster to our own Local Group of galaxies.



The position of the famous Hubble Deep Field (O) lies to the northeast of Megrez ( $\delta$  Ursae Majoris).



At our latitude **Ursa Minor** too can be seen each clear night, all year round, circling the pole star and is also a circumpolar constellation. The seven brightest stars make up another, smaller, bear, and in the UK it is commonly called the Little Bear or Lesser Bear. In the USA it is 'the little Dipper', and in Wales it is known as *Y Sosban Fach*, 'the Little Saucedpan' also *Arth Fach* literally meaning 'Little Bear'.

At the end of the of the 'handle' or 'tail' is Polaris,  $\alpha$  Ursae Minoris, the brightest star in the constellation. Its importance is that it is almost immediately above the northern pole of the Earth and as the Earth spins it maintains its position within  $0.75^\circ$  of north and lends itself to navigation. Polaris is a yellow-white supergiant and also the brightest Cepheid variable in the sky, with an apparent magnitude range of 1.97 to 2.00 during a 3.97 day period.

The second brightest star is Kochab, ( $\beta$  Ursae Minoris), which is just a little fainter than Polaris at 2.08. The Celestial North Pole just about rests on a line between Kochab and Polaris and is only 43' from Polaris, which is useful to those observers who need to set up a polar-aligned telescope.

Disappointingly, there are very few deep-sky objects of note in this constellation.

However the Ursids, a meteor shower associated with Comet 8P/Tuttle, can be seen emanating from a radiant near Kochab in Ursa Minor, on the 17th to 25th December each year. This shower is quite weak with a ZHR  $\sim 5$  but in some years occasionally  $\sim 50$ .

### Greco-Roman Myths

Zeus, the supreme deity of the Greeks, had many lovers, both mortal and immortal. The Roman equivalent was Jupiter. His wife, Hera, the Roman Juno, spent most of her time persecuting these lovers and their children.

Artemis, or Diana, the goddess of the moon and mistress of the hunt surrounded herself with beautiful nymphs who accompanied her on her expeditions. One such companion was Callisto, who was such a beauty, Zeus fell instantly in love with her. He disguised himself as the brother of Artemis, Apollo and overwhelmed the unsuspecting Callisto, becoming her lover. In due course she bore him a son who Zeus named Arcas, after the Greek for bear *arktos*.

Zeus may have been a philanderer but he realised that he would have to protect Callisto from the wrath of both his wife, and the vengeful rage of Artemis who would brook no violation of chastity taken by her followers. In order to protect the young beauty, he turned Callisto into a bear.

Many years later Arcas, who had grown up to become an accomplished hunter, was hunting in the forest with a bow and arrow and happened across a great bear. The bear was none other than his own mother, Callisto who was constantly forced to flee all the other beasts and hunters. Recognising her son, she was overjoyed and paused in a forlorn attempt to greet him. Arcas, ignorant of his mothers' transformation, took aim with his bow.

Zeus, full of compassion for his erstwhile lover and their son, took pity upon them and changed Arcas into a little bear so that he might recognise his own mother. He then transported them to the heavens where they could enjoy a safe life together. Henceforth they have been known as the Greater and Lesser, or Great and Little Bears.

Hera, however, was far from satisfied with this turn of events. In their new stellar domain the Bears brightened the heavens and illuminated the pole that they now guarded. Hera beseeched the ocean god never to permit Arcas and Callisto to bathe themselves in his oceans' immortal waters. This spiteful wish was granted and the two bears are fated to circle the pole without ever descending to join the other constellations in reviving themselves in the oceans.

### Myths from around the world

#### Babylon

The Babylonians knew Ursa Minor as the "Wagon of Heaven".

#### **Aztec**

To the Aztecs Ursa Major represented one of their Gods, Tezcatlipoca (Tez-cat-lee-poka). He was a dark God associated with death. They saw him with three limbs, one of which was thought to have been devoured by a heavenly monster. Due to the Aztec Empires position on the globe, (South America), part of Tezcatlipoca's feet would, at times, be below the horizon so they would not be able to see it. This may be why they thought a limb was missing.

#### **China**

The Chinese considered the seven brightest stars as the seven openings of the heart or the Seven Astronomical Rectors, the masters of heavenly influences.

#### **Finland**

The Finns sometimes call the asterism 'Otava', an old Finnish name which means 'Salmon Weir'.

#### **India**

In Hindu mythology the seven brightest stars of Ursa Major represent the homes of the seven Rishi, primordial sages.

#### **Italy**

The Italians call it 'il Grand Carro', the Big Cart and they call Ursa Minor 'Piccolo Carro', the Little Cart.

#### **Scandinavia**

A Norse legend calls Polaris the 'World Nail' that holds the heavens together.

#### **North America**

The **Iroquois**, a native North American tribe, also see Ursa Major as a bear, *Okouari*, who once terrorised local people. Three young braves set out to hunt him (the three stars that make up the handle of the Plough). The bear began to run in circles around Polaris which they called 'the star that never sets'. They kept chasing the bear but never got any closer. However, eventually they managed to shoot the bear with an arrow and some of the blood dripped onto the trees and turned the leaves red. The Iroquois believe this is why leaves change colour in the autumn.

To the **Pahutes (Paa-hoots)** another native North American tribe, Polaris was known as *Qui-am-i Wintook*, translated as the 'North Star'. They believed it to be a sheep, which one-day had reached the peak of a high mountain. The rest of the flock couldn't follow their leader; try as they might, because the path had collapsed behind it. They continue to walk around the slopes to this day, pursuing *Qui-am-i Wintook*. A Great Spirit saw this and placed the animals into the heavens, as a guide for all living things on Earth. The flock can be seen as circumpolar stars.