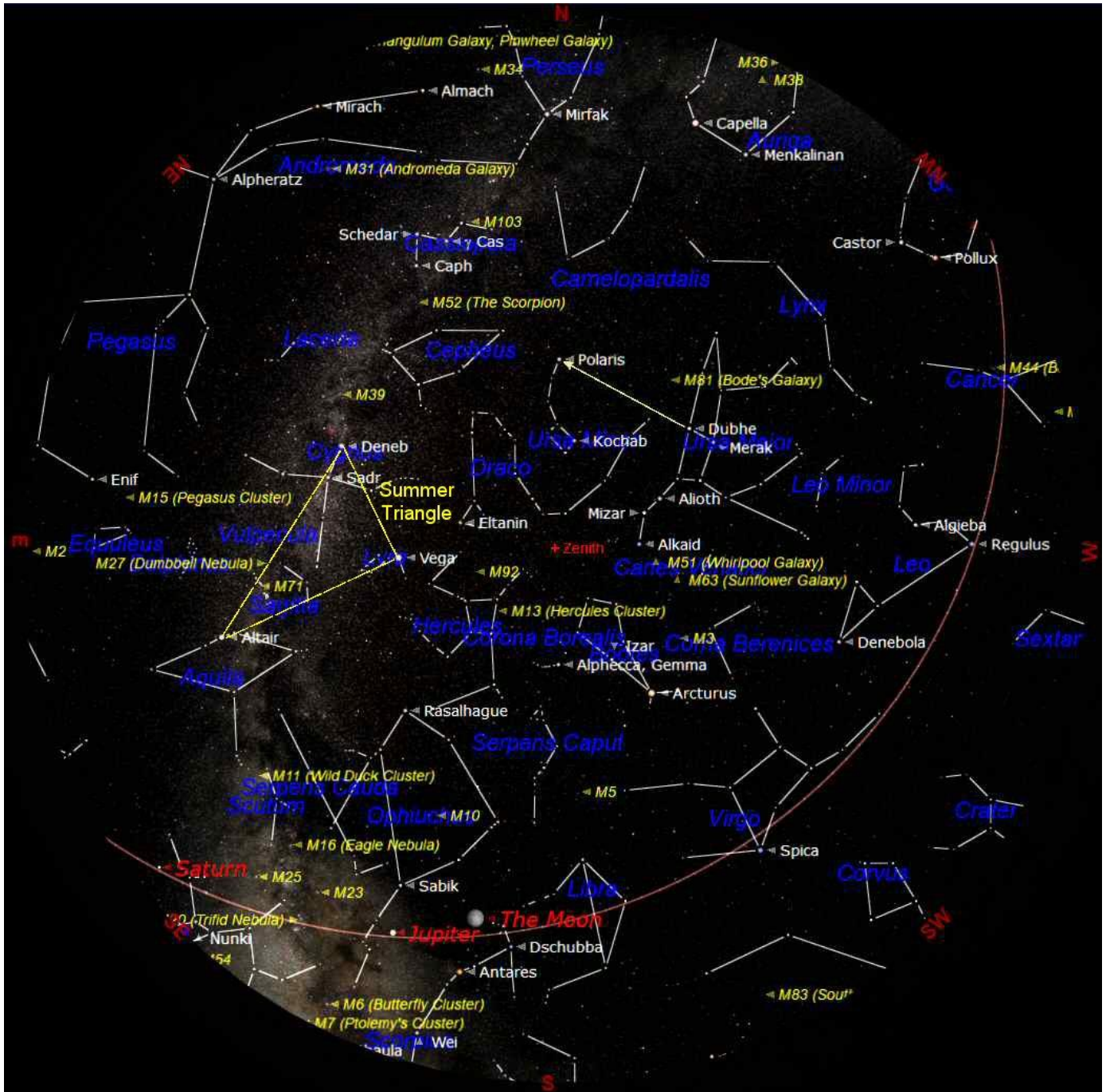


WHAT'S UP THIS MONTH – JUNE 2019

THESE PAGES ARE INTENDED TO HELP YOU FIND YOUR WAY AROUND THE SKY



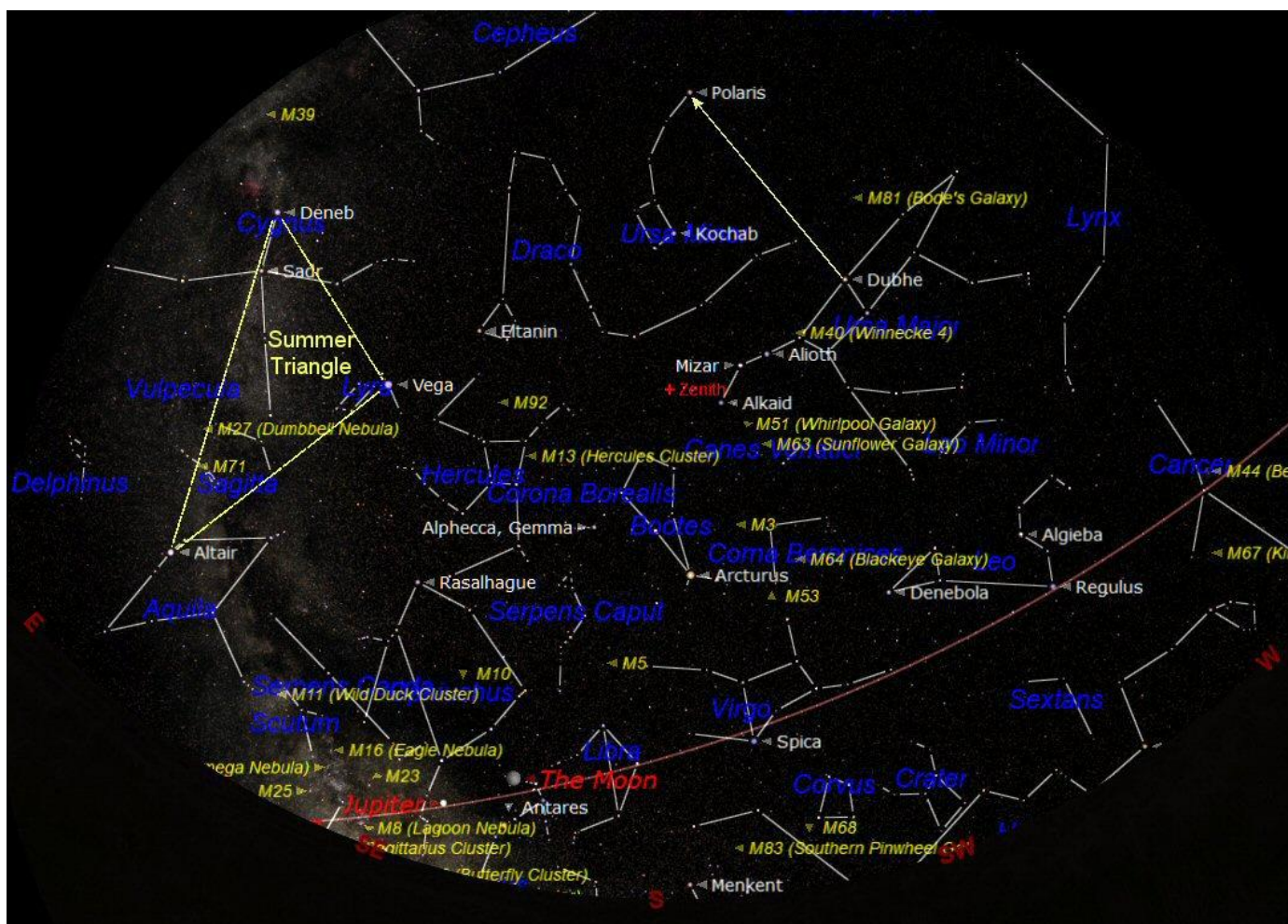
The chart above shows the whole night sky as it appears on 15th June at 22:00 (10 o'clock) in the British Summer Time (BST). As the Earth orbits the Sun and we look out into space each night the stars will appear to have moved across the sky by a small amount. Every month Earth moves one twelfth of its circuit around the Sun, this amounts to 30 degrees each month. There are about 30 days in each month so each night the stars appear to move about 1 degree. The sky will therefore appear the same as shown on the chart above at 11 o'clock BST at the beginning of the month and at 9 o'clock BST at the end of the month. The stars also appear to move 15° (360° divided by 24) each hour from east to west, due to the Earth rotating once every 24 hours.

The centre of the chart will be the position in the sky directly overhead, called the Zenith. First we need to find some familiar objects so we can get our bearings. The Pole Star **Polaris** can be easily found by first finding the familiar shape of the Great Bear 'Ursa Major' that is also

sometimes called the Plough or even the Big Dipper by the Americans. Ursa Major is visible throughout the year from Britain and is always quite easy to find. This month it is high in the west. Look for the distinctive saucepan shape, four stars forming the bowl and three stars forming the handle. Follow an imaginary line, up from the two stars in the bowl furthest from the handle. These will point the way to Polaris which will be to the north of overhead at about 50° above the northern horizon. Polaris is the only moderately bright star in a fairly empty patch of sky. When you have found Polaris turn completely around and you will be facing south. To use this chart, position yourself looking south and hold the chart above your eyes.

Planets observable in the evening sky: Jupiter and Saturn.

EXPLORING THE NIGHT SKY THIS MONTH



The Southern Night Sky during June 2019 at 22:00 BST

The chart above shows the night sky looking south at about 22:00 BST on 15th June. West is to the right and east to the left. The point in the sky directly overhead is known as the Zenith and is shown in the upper centre of the chart. The curved brown line across the sky at the bottom is the Ecliptic or Zodiac. This is the imaginary line along which the Sun, Moon and planets appear to move across the sky. The constellations through which the ecliptic passes are known as the constellations of the 'Zodiac'.

Constellations through which the ecliptic passes this month are: Gemini (the Twins), Cancer (the Crab), Leo (the Lion), Virgo (the Virgin), Libra (the Scales) and Sagittarius (the Goat) rising over the South Eastern horizon.

Ursa Major is very easy to find and because it is 'circumpolar' (never sets below the horizon) it is always somewhere in our night sky. As it is so easy to find it is a good place to start exploring the night sky. The two stars of the 'pan' opposite the 'saucepan handle' (known as the Pointers) can be used to find Polaris the Pole Star (or North Star) in Ursa Minor. Follow the 'Pointers' up

out of the pan to find Polaris. By following an imaginary line off the end of the saucepan handle will show the way to Arctaurus the bright red star (it looks more orange) in Boötes.

The constellation of Boötes does not have anything interesting to search out but the bright star Arctaurus is very beautiful. It is a Red Giant and appears distinctly orange to the naked eye and even more so when using binoculars or a telescope. If the binocular or telescope is moved slightly out of focus Arctaurus will look even more orange.

The chart above shows the sky around the Summer Triangle. The term 'Summer Triangle' was suggested by Sir Patrick Moore and has now become the best known feature of the summer night sky. The corners of the imaginary triangle are positioned on the three obvious bright stars: Deneb in the constellation of Cygnus, Vega in Lyra, and Altair in Aquila. The Milky Way (our Galaxy) flows through the Summer Triangle and passes through Aquila and Cygnus.

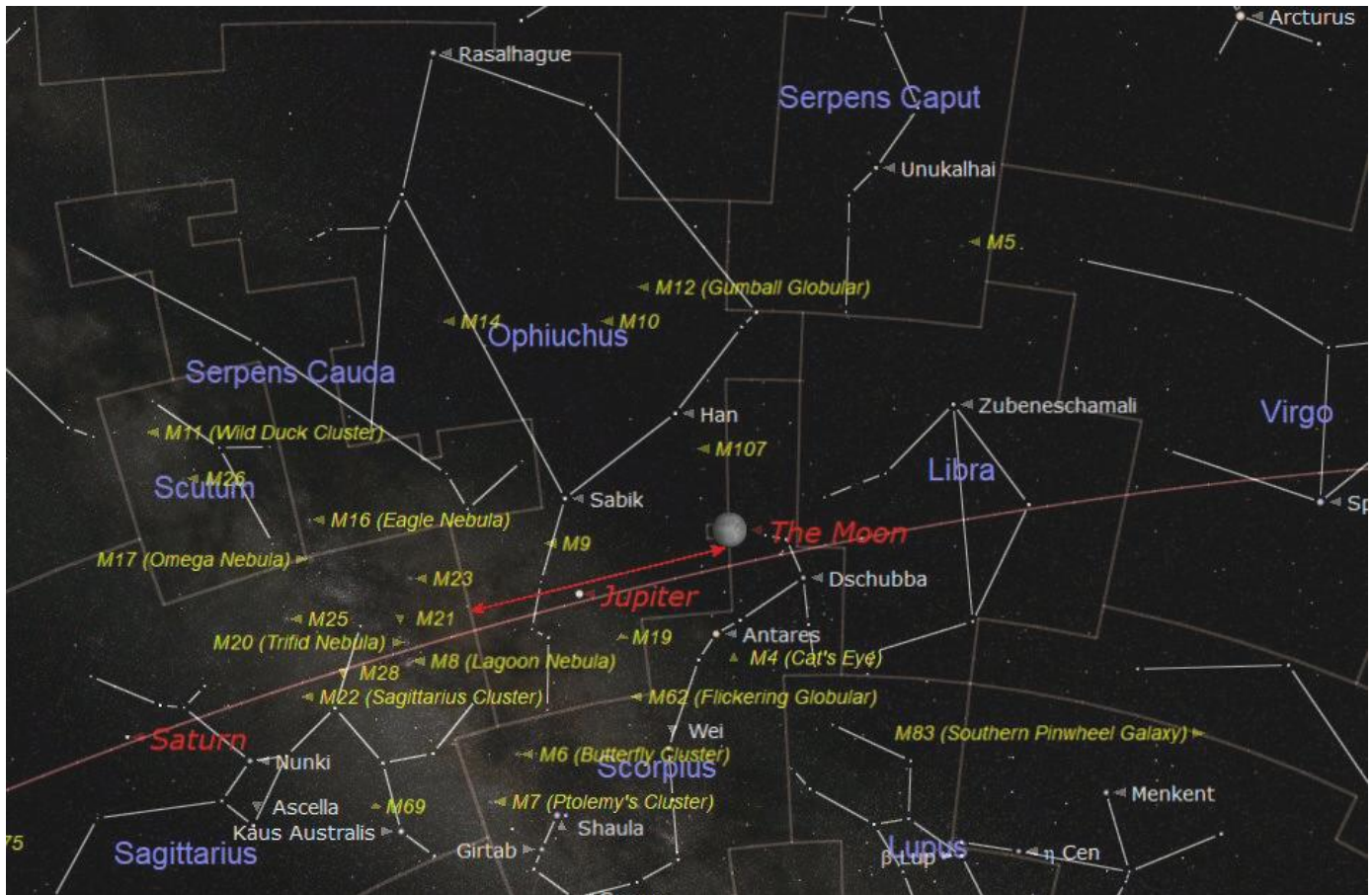
By following the 'Pointers' in Ursa Major down (instead of up for Polaris) they point the way to the constellation of Leo (the Lion). The stick figure of Leo does actually look a little like a lion. The bright star Regulus in Leo sits right on the Ecliptic and is often seen close to the Moon and sometimes the planets as they appear to move along the Ecliptic.

To the east of Leo is the quite indistinct constellation of Virgo. It does have one fairly bright star called Spica. It is classified as a Class B1 Giant but is in fact a very close binary star. The two stars are very close and orbit the common centre of gravity every four Earth days. Powerful gravity at close proximity is pulling on each star and has made them 'egg' shaped.

Following Leo to the east (left) is the constellation of Virgo with its lovely bright star Spica then following on is Libra. Just appearing over the horizon is Jupiter looking very bright and easy to find. The King of the Planets is in the constellation of Ophiuchus which is the 13th and normally unmentioned constellation on the Zodiac. See page 4.

Higher in the south east is the constellation of Hercules (the Strong Man). Hercules has a rather distinctive distorted square shape, at its centre, called the 'Keystone' due to its resemblance to the centre stone of an arch or bridge.

THE CONSTELLATION OF OPHIUCHUS (the Serpent Bearer)



The constellation of Ophiuchus

The chart above shows the constellation of Ophiuchus and its location to the east (left) of Libra and to the west (right) of Sagittarius. Ophiuchus is not very distinct and has no bright stars. However it does have a rather odd claim to fame. It straddles the Ecliptic but it is not one of the recognised constellations of the Zodiac and is not included on Astrological Charts as one of the signs of the Zodiac. The section of the Ecliptic that passes through Ophiuchus is indicated by the red arrowed line on the chart above. We should not be too worried about this, the signs of the Zodiac have been used by Astrologers for thousands of years but the 88 constellations recognised by Astronomers were standardised by the International Astronomical Union in 1922. So the constellation borders we use today are for astronomical use but are not compulsory for astrological use.

There are many deep sky objects in the direction of Ophiuchus as can be seen by the number of Messier Objects (marked in yellow) in this area of sky. This is not surprising as the centre of our Galaxy 'the Milky Way' is in the neighbouring constellation of Sagittarius. The centre of the Milky Way has been faded on the chart above to make it easier to identify the Messier objects.

Ophiuchus is of interest at the moment because Jupiter is positioned within its borders as the planet appears to move along the Ecliptic. Saturn is currently in Sagittarius the neighbouring constellation to the east (left) of Ophiuchus.

THE SOLAR SYSTEM JUNE 2019

MERCURY will be very difficult to see in the bright sky after the Sun sets over the western horizon. It will be very close to Mars in mid June. See the chart below.

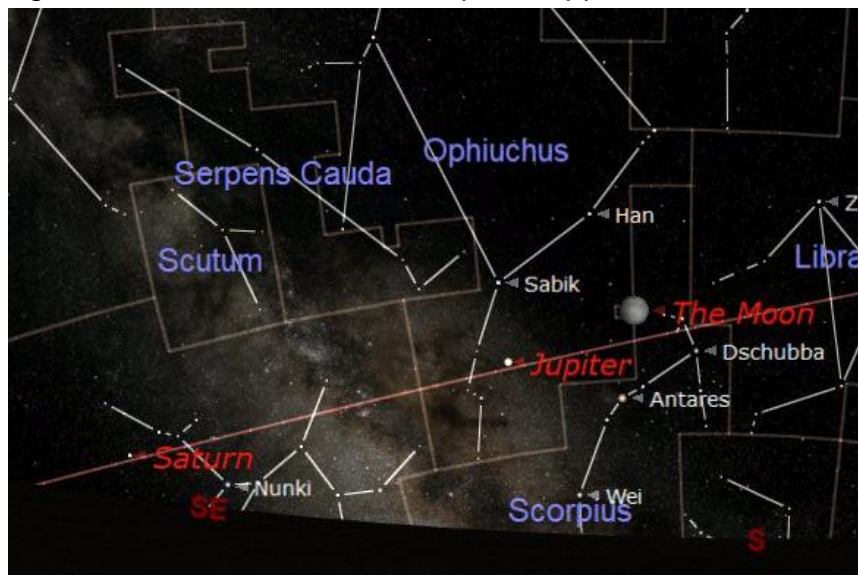


Mercury and Mars at sunset on 15th June

VENUS will be very low in the east as the sky brightens and before the Sun rises but will not be easy to observe.

MARS is now looking rather small as Earth moves further ahead of the Red Planet along their separate orbits. Mars is also moving closer towards the Sun as we view it from Earth and will become increasingly difficult to see. See the Mercury chart above.

JUPITER is now a good late evening object in the east. It rises over the eastern horizon at about 20:30 mid month and will be observable in the south east from 21:30. See the chart below. A pair of binoculars will reveal the four brightest of Jupiter's moons, Io, Europa, Ganymede and Callisto. A small telescope will allow the moons to be seen very clearly. Jupiter is observable all night and in the early morning sky until the sky brightens. It actually sets in the west at about 05:00 as the sky brightens in the east. See the Jupiter supplement at the end of this article.



Jupiter and Saturn at 23:00 on 15th June

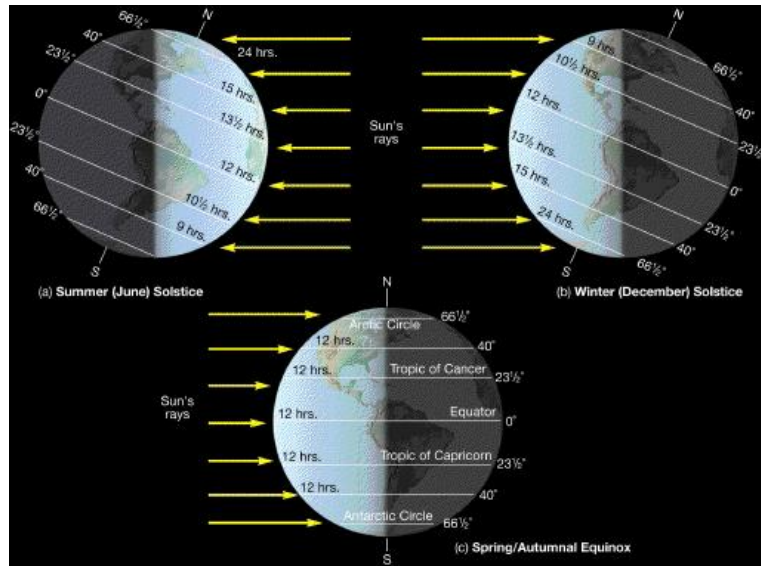
SATURN will be visible in the late evening rising over the eastern horizon at 23:30 at the beginning of June and 22:00 at the end of the month. See the chart above. It will be best observed about one hour after these times as it rises higher above the horizon. The view of Saturn will not be good this year as it (and Jupiter) will be close to the horizon. Both of the gas giants will be in the thick, murky and turbulent air close to the horizon. Saturn will be observable, in the south, through the rest of the night until sunrise.

URANUS will not be observable this month as it is too close to the Sun and close to the horizon at sunrise.

NEPTUNE will not be easily visible this month as it will also be very close to the horizon before sunrise.

THE SUN

The Sun rises at about 04:45 throughout the month as it will be midsummer. Midsummer Day (the Summer Solstice) will be on 21st June. This is the time when the Sun appears to reach its maximum height above the southern horizon. The Summer Solstice will actually occur at 16:00 on 21st June. Until this exact time the Sun will appear to be getting higher in the sky and then after 16:00 it will appear to start to get lower as we begin to head back towards WINTER (What! already? We may ask).



The diagram above shows how the length of the day changes due to the tilt of Earth's axis of rotation. The top left diagram shows how the north is tilted towards the Sun in summer making the days longer (up to 16 hours long for us). During the winter the north is tilted away from the Sun (top right diagram) and days are shorter. The day will be as short as 8 hours for us on midwinter day 21st December.

THE MOON PHASES DURING JUNE

2019	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
May-27							
Jun-02							
Jun-03							
Jun-09							
Jun-10							
Jun-16							
Jun-17							
Jun-23							
Jun-24							
Jun-30							
2019	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

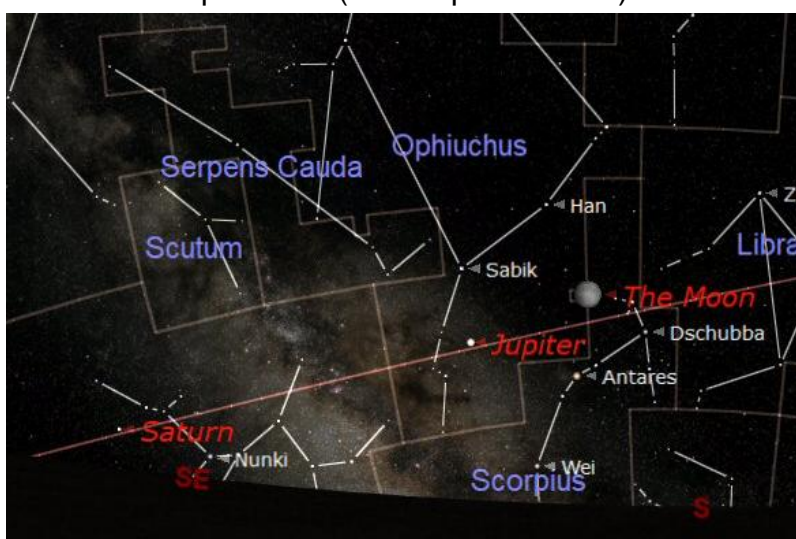
New Moon will be on 3rd June
 First Quarter will be on 10th June
 Full Moon will be on 17th June
 Last Quarter will be on 25th June

Jupiter is coming into view

Jupiter is now moving into view in the late evening and will be in perfect position for observing. Jupiter will reach Opposition on 10th June when it will be at its very best. Opposition is the exact time that Earth will be overtaking Jupiter on the respective orbits of the two planets. Earth's angular speed is much greater so travels faster on its smaller orbit around the Sun. It therefore catches up and overtakes Jupiter about every 13 months.

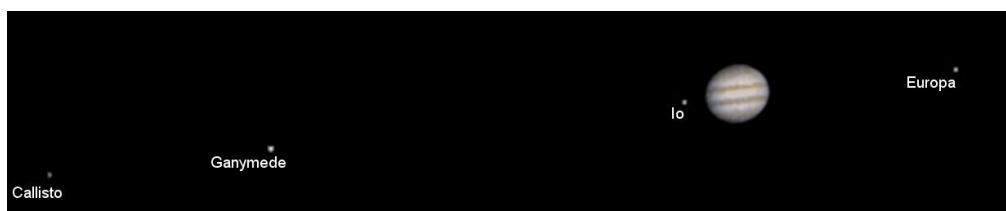
At this time of year the 'Ecliptic' (the imaginary line along which the Sun, Moon and planets appear to move across the sky) is low in the sky during the night due to the 23.4° tilt of Earth's axis. The ecliptic is high during the day which is why the Sun appears high in the summer sky. With the ecliptic low at night Jupiter appears low in the sky and in the relatively thick, misty and turbulent air closer to the southern horizon.

Jupiter is visible most of the night, rising in the east at about 20:30. It will be observable in the east about an hour or so later at around 21:30 when it is higher in the sky. Jupiter is easy to find as it is very bright, in fact it is the third brightest object in the night sky after the Moon and Venus. By about 22:30 Jupiter will have risen high enough in the south to be in a good position for observing in the constellation of Ophiuchus (the Serpent Bearer).



Jupiter and Saturn at 23:00 on 15th June

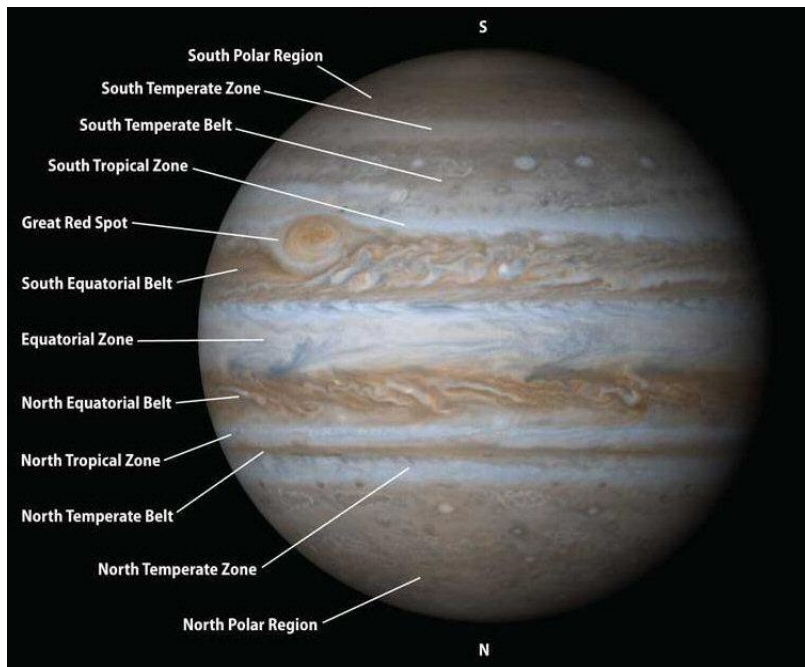
A good pair of 9 x 50 binoculars will just about show the four bright moons known as the Galilean Moons. These four bright moons are called the 'Galilean Moons' after Galileo who first recorded seeing them.



Jupiter and the Galilean Moons imaged by Steve Harris

Jupiter always displays an almost full disc but can lose a tiny amount from the edge when it is at greatest elongation (at 90° from the Sun as we view it from Earth). However Jupiter will appear full to the untrained eye. For these reasons Jupiter will be as good as it gets, subject to clear skies, from midsummer until later in the year.

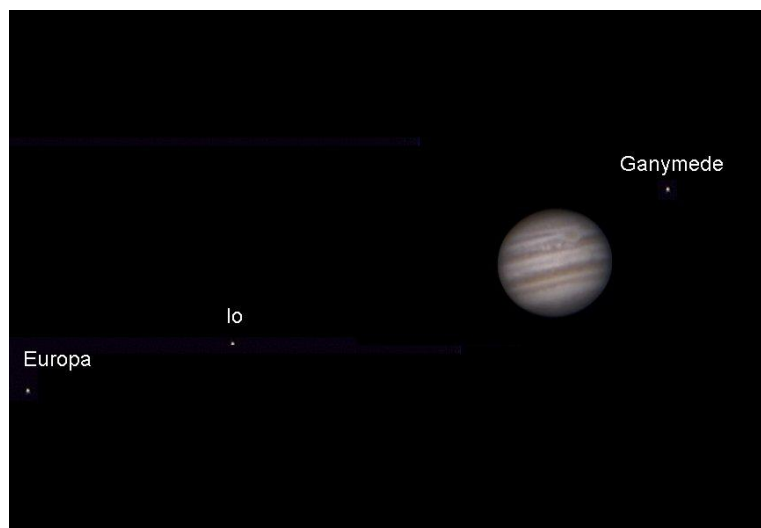
The Belts and Zones are regions of higher and lower atmospheric pressure. The lighter coloured 'Zones' are regions of rising gas caused by convection of heat from the core of Jupiter. The darker 'Belts' are regions of falling gas and are approximately 20 kilometres lower in altitude than the Zones. In the regions where the belts and zones meet, huge storms are created. This is due to the friction as the belts and zones move at different speeds and directions. A larger telescope will allow some detail of the storm patterns to be seen.



The cloud markings on Jupiter

The most famous feature in the cloud system is the 'Great Red Spot' (GRS). This huge storm has been raging for over 350 years. We know this because it was recorded by astronomers in 1664 using some of the earliest telescopes. The GRS does change its colour, size and shape but it is always there. Its colour may fade from the normal pink to nearly white when it may almost disappear. The colour is thought to be caused by Phosphorus welling up from deep regions in Jupiter's atmosphere.

The GRS is not the only storm feature to be seen. There are white spots, dark spots and even mini red spots. These tend to be transient and last from just a few days to weeks but others may persist for up to fifty years. Spots can combine with other spots as they move along the boundaries between the belts and zones. Some larger spots have even been swallowed up by the GRS. Over the last few years there was a lot of turbulence around the GRS with eddies running along the South Tropical Zone and around the GRS.



Jupiter and three moons imaged on 14th November 2012 by Steve Harris

Sometimes we can see the moons pass in front or behind Jupiter on every orbit and not above or below as they do for a lot of the time. This makes observing Jupiter very interesting. We can watch the moons approach the planet to disappear behind or in front of Jupiter and then watch them reappear an hour or two later. We can also see their shadows as they pass in front and project their shadow on to the planet. These events can be predicted using a planetarium application and the events can then be followed and timed using a fairly modest telescope.

Eclipse occurs when a moon casts its shadow on to Jupiter. It is quite easy to see because the eclipse shadow looks like a black full stop against the bright glare of the surface of the planet. Moons can also be eclipsed and disappear as they pass through the very large shadow cast by Jupiter.



Jupiter and Io's shadow Imaged on 15th January 2012 by Steve Harris

Transit occurs when a moon passes in front of Jupiter. The moon is actually very difficult to see while it is in front of the planet as it is lost in the glare from the surface.

Occultation occurs when a moon passes behind the planet. An Occultation or Transit is easy to follow with a telescope as the moon approaches Jupiter. Observing an occultation can be quite interesting and fun to watch especially when watching Io or Europa as they move noticeably over periods of ten to fifteen minutes. Using an accurate clock the event can be timed and compared to the predicted times given by a planetarium application or from the internet.