NEWBURY ASTRONOMICAL SOCIETY

MONTHLY MAGAZINE – JUNE 2020

THIS MAGAZINE WILL BE PUBLISHED IN JULY AND AUGUST

SOCIETY MEETINGS DURING THE SUMMER AND IN THE FUTURE

It was with great sadness that the Committee of the Newbury Astronomical Society had to cancel the March, April May and June Beginners Meetings and the Main Speaker Meetings. The safety and health of our members was, is and will always been the prime concern of the committee so it soon became obvious that the meetings had to be cancelled to protect our members.

The Committee is already planning the next session that will officially start on the 1st September. Our first meeting is intended to be the Main Speaker Meeting on 4th September followed by the first beginners meeting on 16th September. This will obviously still depend on the national and global situation at that time and the directives issued by the government. The committee will plan for the first meetings to go ahead but will make the necessary decisions closer to that time. The decisions will again be made primarily with the safety of our members in mind.

This magazine will continue to be published every month including July and August. As usual copies will be published on the Beginners website and the NAS main website. The latest news about the Society and the situation regarding the meetings will also be posted on the websites to keep everyone up to date.

A Society Committee Meeting was held on Tuesday 12th May but due to the national lock-down the meeting was held on-line using the 'Zoom' application.

A 'screenshot' taken during the committee meeting

The meeting worked very well (after a few minor teething troubles) and was ably chaired by George. An outline of how we proposed to continue to hold future meetings is included below with extracts from Georges' letter to the Society members.

Despite early reservations, the virtual committee worked really well and allowed us to get some loose ends sorted out from our sudden postponement of NAS's meetings. We also discussed the future. The minutes of that meeting will been published on the websites so thanks to Kath for doing the honours there.

As can be seen in the committee minutes, we managed to suspend NAS's activities without any major financial impacts. We also discussed what we could do for our membership even though we can no longer meet in person. The British Astronomical Association (BAA) has started to use Zoom to provide members with virtual on-line meetings.

The BAA has also been showing virtual presentations that are working well. Some other astronomical societies have also started to provide on-line meetings for their members. We have therefore decided to start Newbury Astronomy Society's on-line meetings. To join our Zoom Meetings please sent a request to George Sallit at this special Zoom registration email address: georgesallit3@gmail.com. You will also need to download the Zoom app on your phone, tablet or PC. See the Beginners website for Zoom Help.

As this arrangement is relatively new for NAS, we thought it best to start gently and see where we go from there. We are therefore arranging to put together members' presentations for our first on-line meeting, titled What Did You Do During the Lockdown? This meeting will present the latest results/observations and images from our members on Thursday 28th May.

Due to the present circumstances it is unlikely that we will be able to hold physical meetings for the rest of this year and perhaps for the foreseeable future. Current members and any new members will be asked to register their membership for next session 2020 – 2021 on-line in September.

We will also be asking external speakers to present on line talks at the main meetings so we will try to reinstate two meetings a month, our Main Speaker Meetings and the Beginners Meetings. Steve Harris will continue producing this monthly magazine during the summer months. Given the current restrictions we will try to keep these on-line meetings going through most of the summer.

There will be many details to resolve and we are now busy setting up our on-line meetings. As soon as possible details will be published on our websites including how to use the Zoom on-line meeting app. It is appreciated that not everyone is on-line but we are trying to get the best outcome for most members.

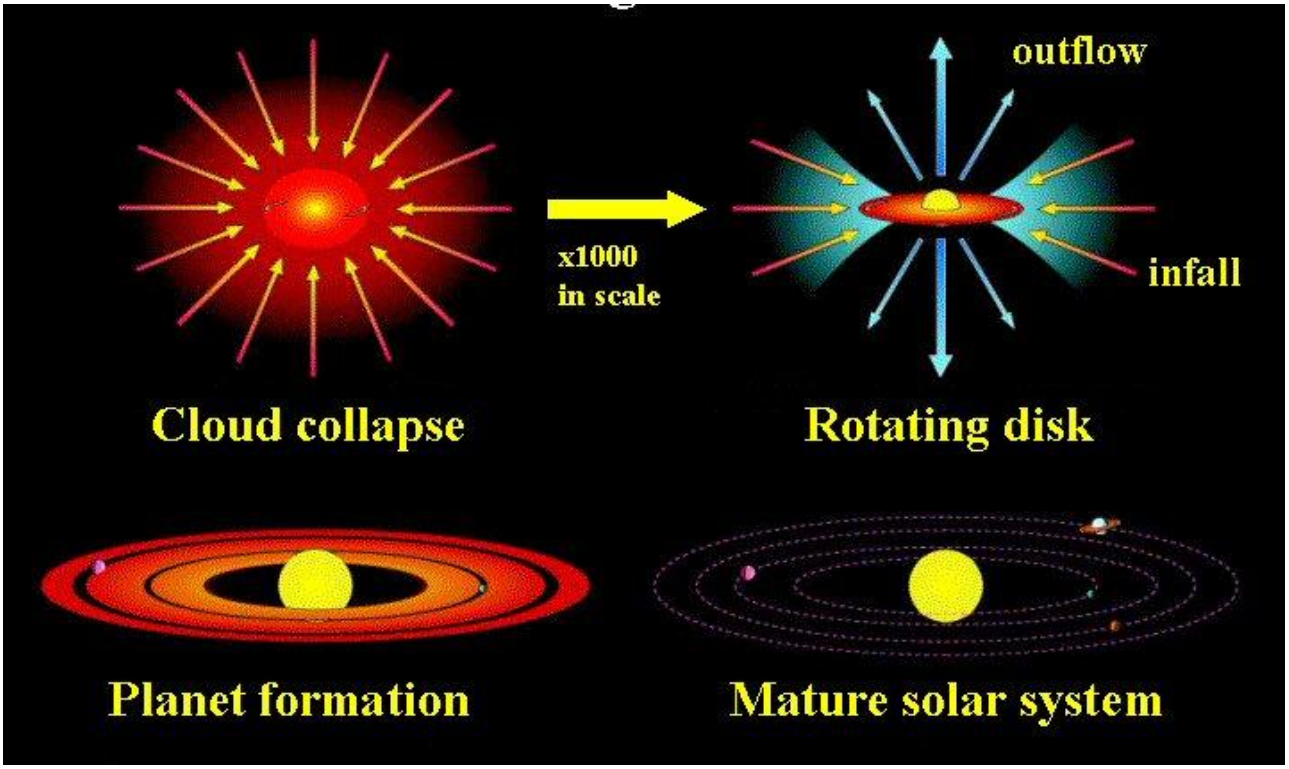
NEWBURY SOCIETY MEETINGS (on-line)

6th June 19:30 The Gaia Revolution & AGM
Website: www.newburyastro.org.uk

NEXT NEWBURY BEGINNERS MEETING (on-line)

28th May 19:00 George and Chris' summer images
Website: www.naasbeginners.co.uk

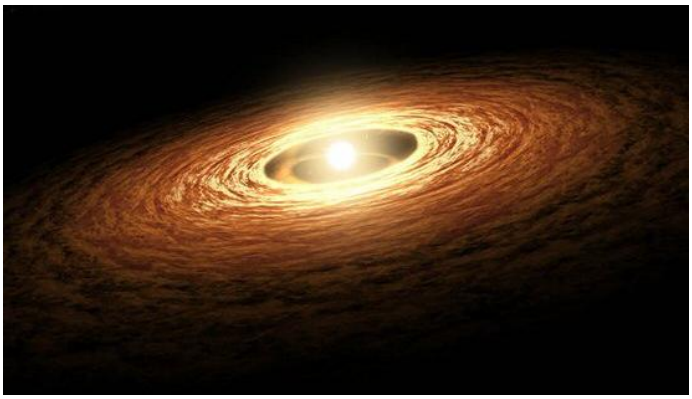
OUR STAR – THE SUN



Stars from in vast clouds of Hydrogen Gas

Starting with the absolute basics we have to say our Sun is a Star. So perhaps we should just consider what a star really is. At the fundamental level we could say a star is just a cloud of gas and that is exactly what it is. All stars are created in vast clouds of Hydrogen gas that constitute a large proportion of what Galaxies are made of. Hydrogen gas is drawn into a flat disc as the galaxy rotates and more material was drawn in by gravity.

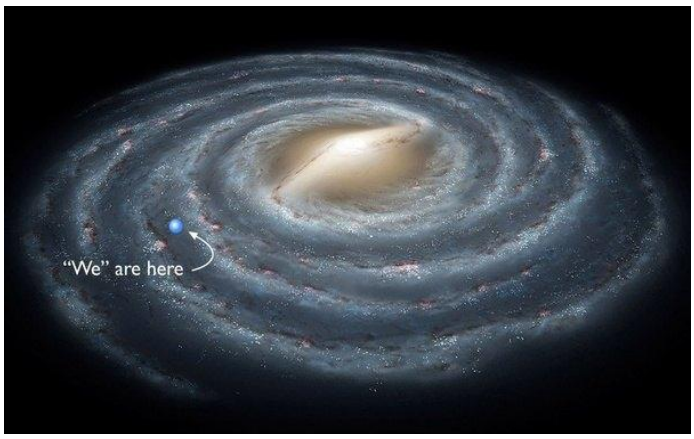
Denser clumps of gas form in the disc as the gas is pulled in by the increasing gravity and this process increases as the clumps accumulate more mass. Eventually gravity compressed the clumps of gas into the smallest possible volume and they became a sphere.



The formation of our Sun from a Nebula

Ever more gas is pulled in as the mass and gravity of the sphere increases. Enormous pressure in the core of the sphere causes the temperature to increase to millions of degrees. The pressure and heat force the Hydrogen atoms together and they combine (fuse) to create larger and heavier atoms of Helium gas. In the process of this Nuclear Fusion, a vast amount of energy is produced in the form of X-Rays. All this additional energy heats the huge sphere of gas and it begins to shine and a star is 'born'.

All stars have been created by this process in galaxies throughout the Universe. So our Star (that we call the Sun) is just one of over 200 billion stars in our Giant Spiral Galaxy that we call the Milky Way.



The location of our Sun in the Milky Way Galaxy

All stars are created as described above and all stars are made basically the same. However they develop differently depending how big (massive) they are. Larger stars use up their Hydrogen faster and shine very much brighter. Big stars use their fuel up very quickly. Small stars use less fuel and survive for much longer.

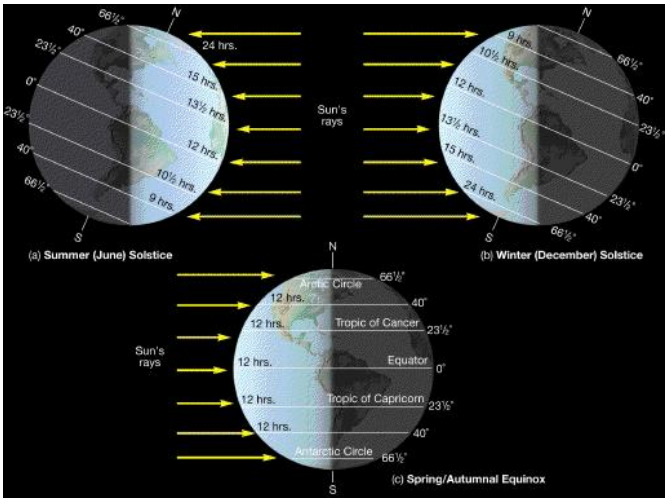
The most common stars are the small and very small ones because they 'live' much longer (some for trillions of years). Larger stars consume their Hydrogen fuel very fast and may survive for only around a billion years. The very largest stars use up their fuel so fast that they may survive for only a few million years then they explode as a Supernova and destroy themselves.

Our Sun is classed as a Yellow Dwarf and will last for about 10 billion years. It is already 4.3 billion years old so it has about 4 to 5 billion years of fuel left.

The Sun changes position in our sky in two ways. First it appears to move across the sky every day due to the rotation of Earth. The Sun rises in the east in the morning and sets in the west in the evening. It appears to follow an arc across the sky so if we trace an imaginary line along its path the arc becomes apparent. We call this arc of the Sun's path 'the Ecliptic'. This arc is caused by Earth being tilted over at 23.4º compared the plane of the Solar System. The planets have their orbits on this plane and the Moon's orbit around Earth on this same plane despite Earth's tilt. Therefore all the planets, the Moon and the Sun appear to move alone this Ecliptic arc.

Our seasons are caused by the 23.4º tilt of Earth's axis of rotation. As Earth orbits the Sun (once per year) the axis of rotation remains pointing at the same angle and direction. This has the effect of the poles being tilted towards the Sun for half of the year and tilted away for the other half of the year. When the north pole is tilted towards the Sun the Ecliptic and the Sun appear higher in the sky during the day so it will be summer. During the summer nights the Ecliptic will be lower in the sky so the Moon and planets will be low and closer to the horizon.

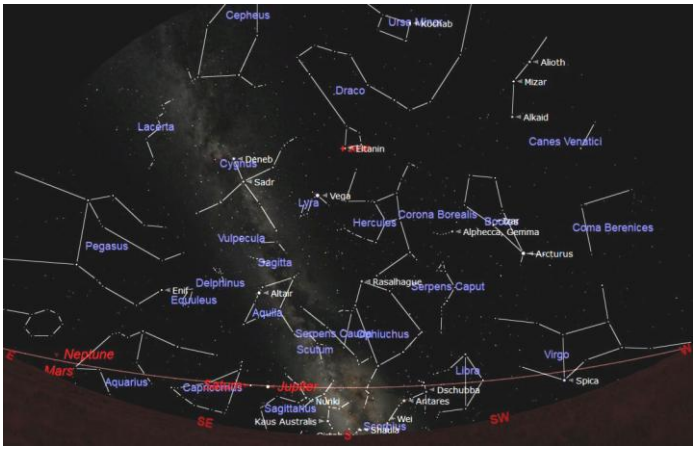
The Sun rises at about 04:45 throughout this month as it will be midsummer. Midsummer day (the Summer Solstice) will be on 20th June. This is the time when the Sun appears to reach its maximum height above the southern horizon, it will actually occur at 22:00 (UT/GMT) on 20th June. Until this exact time the Sun will appear to be getting higher in the sky and then after 22:00 it will appear to get lower as we begin to head back towards WINTER.



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 and the days are 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. As short as 8 hours for us in the UK on midwinter day 21st December (UT/GMT).

So the Summer days are good for observing the Sun during the warm days. The summer nights are short and the sky does not get completely dark from mid May to mid August so observing faint deep sky objects is quite difficult. Summer nights might be short but they are warmer so night time observing can be more comfortable and some observing can still be done.

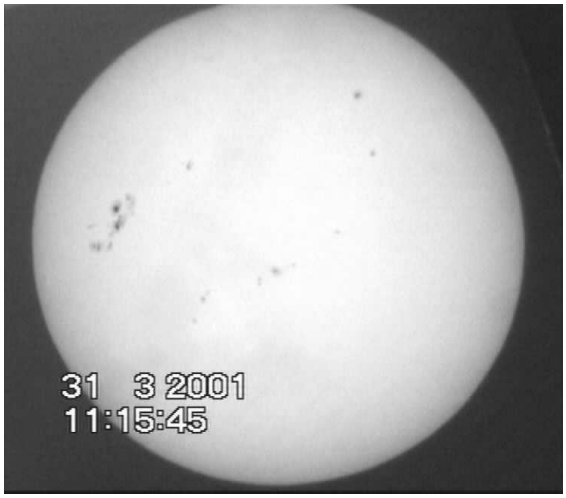
In midsummer the Ecliptic appears low in the south at midnight and appears high during the day. This can be seen by the Moon and planets being close to the horizon at night and the Sun being high in the sky during the day. The first chart below shows the night sky in midsummer. The second chart shows how the Sun is high in the south, on the Ecliptic on the same day at 12:00 (GMT).



Midnight on 20th June 2020 Midsummer day

It can be seen on the midnight chart (above) the planets are located on or near the Ecliptic so they are in the more turbulent and contaminated air close the horizon. Therefore they will be difficult to observe due to movement of the air and its poorer quality. We would also be looking at them through much more thick air close to the horizon (about 300 km) compared to the relatively shallow thickness of the atmosphere directly overhead (our Zenith) marked in red on the charts.

Midday on 20th June 2020 Midsummer day



Sunspots photographed using the telescope on page 4

OBSERVING THE SUN 'SAFELY'

The ideal thing to observe during the summer is the Sun. Of course we must take great care in how we observe the Sun as it can be very dangerous if not done correctly. A telescope or binocular must never be used to look directly at the Sun. The instrument is designed to gather as much light as possible from faint objects and direct that light into our eyes. However the Sun produces a lot of light and heat so directing all this extra light and heat into the eye will cause permanent damage to the eye and blindness.

There are two ways to observe the Sun safely these are to use a special Solar Filter or to project an image of the Sun on to a screen. If we do have a telescope or binoculars we can use a piece of white card as a screen and project the light from the Sun on to the card.

If binoculars are to be used, cover one of the lenses with the dust cap. Place the card in a suitable supported position so its flat surface is facing the Sun. Hold the binoculars about 300mm above the card in the direction of the Sun. Move the binoculars around until the projected image can be seen on the card. The process can be improved by supporting the binoculars using a stool or improvised stand to support the binoculars and screen.

A simple rig can be assembled to support a screen and attach it to a telescope to allow the image of the Sun to be projected on to a screen. The picture below shows such a homemade rig fitted to the author's refracting telescope.

A Solar Observing Screen attached to a telescope

There will probably be too much light so the Dust Cover can be fitted over the lens of the telescope and the small light reducing cap removed. This will reduce the glare on the screen and help protect the eyepiece from overheating damage.

Venus Transit 8th June 2004 imaged using the rig above

For those who are fortunate to have access to a telescope, observing the Sun can be taken a step further. The telescope can be used 'safely' to observe the Sun in more detail. The telescope must be fitted with a fail-proof Solar Filter. This can be bought ready made from an astronomy shop or can be made at home using a sheet of special Mylar Solar Film.

Mylar Solar Filter fitted to a Reflecting telescope

The 'Solar' filtered telescope shown above will allow just a tiny amount of sunlight over the full aperture to enter the telescope. It will be the full spectrum (all wavelengths of light) so it will be white light. This will allow any sunspots to be seen in very good detail. It will also show the 'mottled' surface of the Sun, looking like the texture of orange peel.

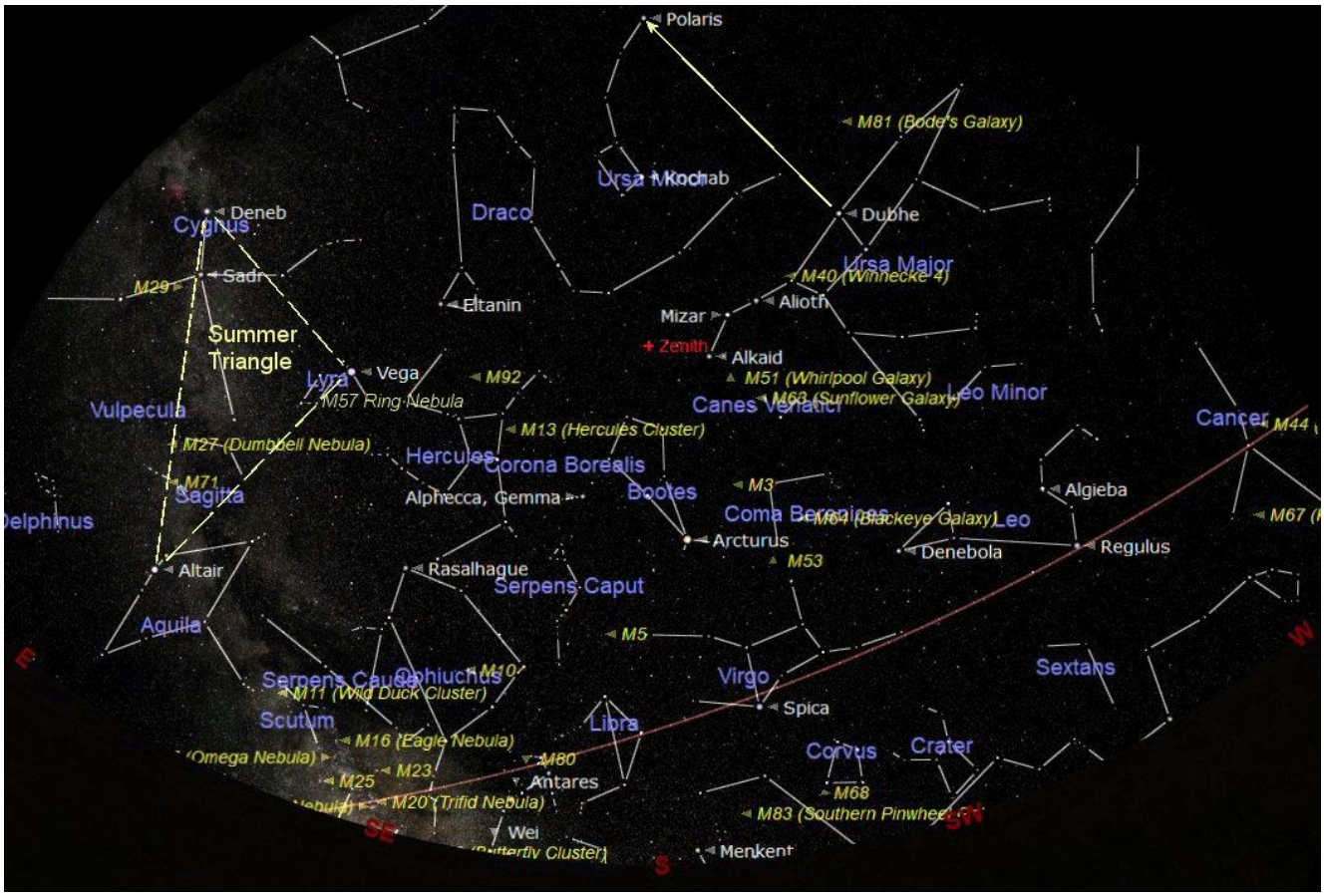
A word of warning. If the telescope has a finder fitted, it must be securely covered or the finder completely removed to avoid accidental burns.

A more advanced type of filter can be bought that will show the activity on the surface and in the atmosphere of the Sun to be seen. These are called Hydrogen Alpha filters. They will allow just one very narrow wavelength of light to pass through. This is the red light emitted by excited Hydrogen gas on the Sun.

The Hydrogen atoms are able to absorb photons (mainly Ultraviolet light) but this causes the electron in the atom to jump out of its orbit into a higher orbit. The electron will quickly jump back to its natural orbit but to do this it must release the energy from the photon. It does this by releasing a flash of light that is at a discrete wavelength and is always deep red in colour. This is called Hydrogen Alpha (Hα) light.

A Personal Solar Telescope (PST) Hα telescope
Approximate purchase price £800

THE SUMMER NIGHT SKY - JUNE 2020



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 from east to west. The constellations through which the ecliptic passes are known as the constellations of the 'Zodiac'.

June is not the best month for looking at the night sky for two reasons. Firstly the Summer Solstice occurs on 20th June so this is Midsummer Day. This day will be the longest day of the year which means it is also the shortest night of the year. As a consequence the night sky does not get completely dark. So the Sun sets late and twilight lasts all night and it will not be fully dark.

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. Just 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.

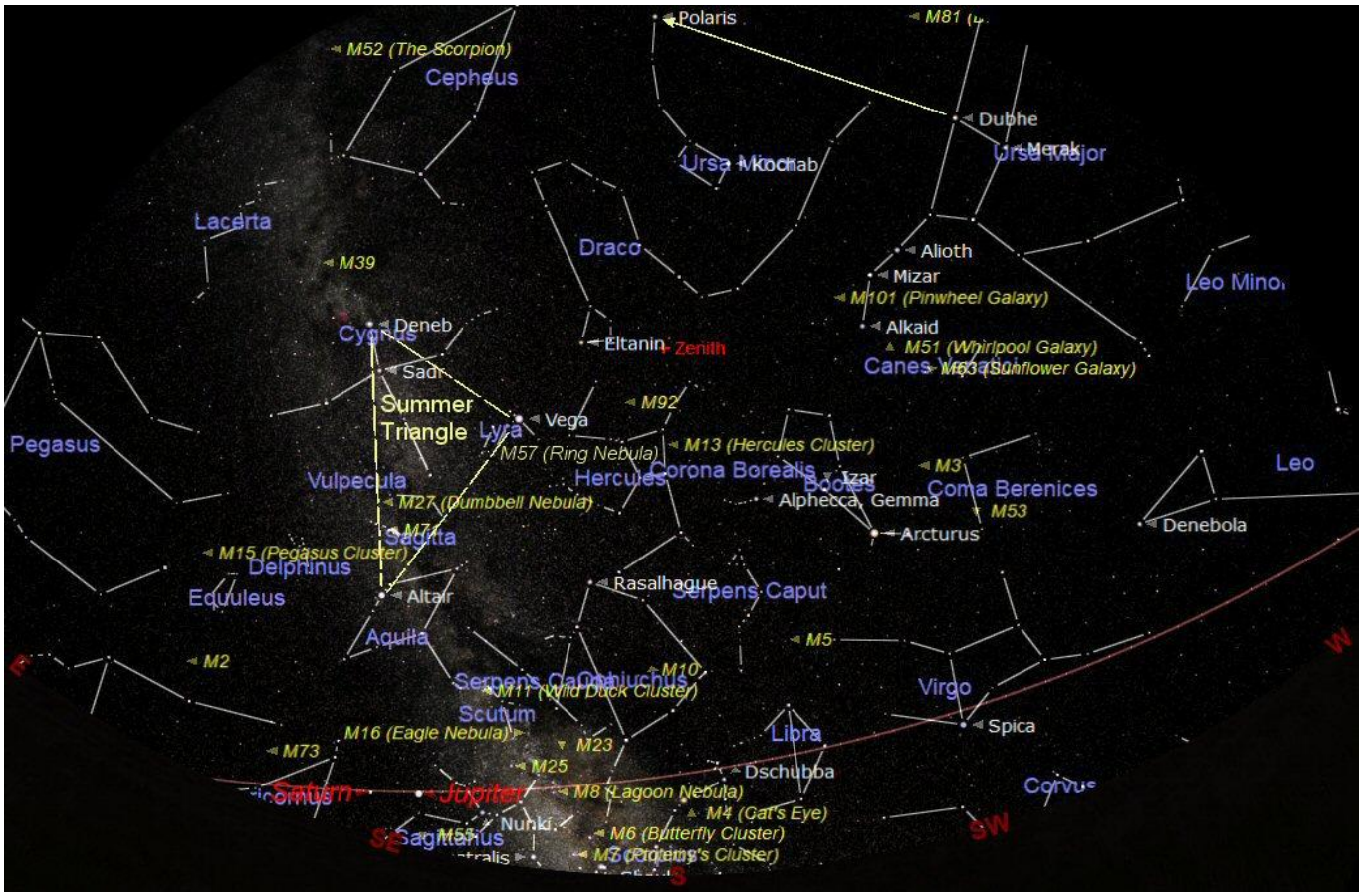
The constellation of Boötes does not have anything interesting to search out but the bright star Arctaurus is very beautiful. It is a Red Giant and appears distinctly orange to the naked eye and even more so when using binoculars or a telescope. If the binocular or telescope is moved slightly out of focus Arctaurus will look even more orange. Arctaurus is bright and easy to find in the sky so it can be used as the starting point to begin exploring the night sky.

Marked on the chart above is the 'Summer Triangle' which is the most prominent feature in the summer sky. The term 'Summer Triangle' was suggested by Sir Patrick Moore and has now become the starting point for exploring 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 (or the Sphinx in Egypt). 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.

THE SUMMER NIGHT SKY - July 2020



The chart above shows the night sky looking south at about 22:00 BST on 15th July. 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.

The 'Summer Triangle' is now the most prominent feature in the summer sky and can be used as the starting point for exploring 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.

Aquila appears as just a line of three stars with the bright star Altair in the centre and has no interesting objects.

The constellation of Cygnus (the Swan) is located at the top of the Summer Triangle. The brightest star in Cygnus is Deneb which denotes the upper point of the Summer Triangle and represents the Swan's tail. The wings spread from the star Sadr and the head is marked by Albireo. Deneb is one of the largest and brightest stars in our vicinity in our galaxy the Milky Way and is classified as a Supergiant.

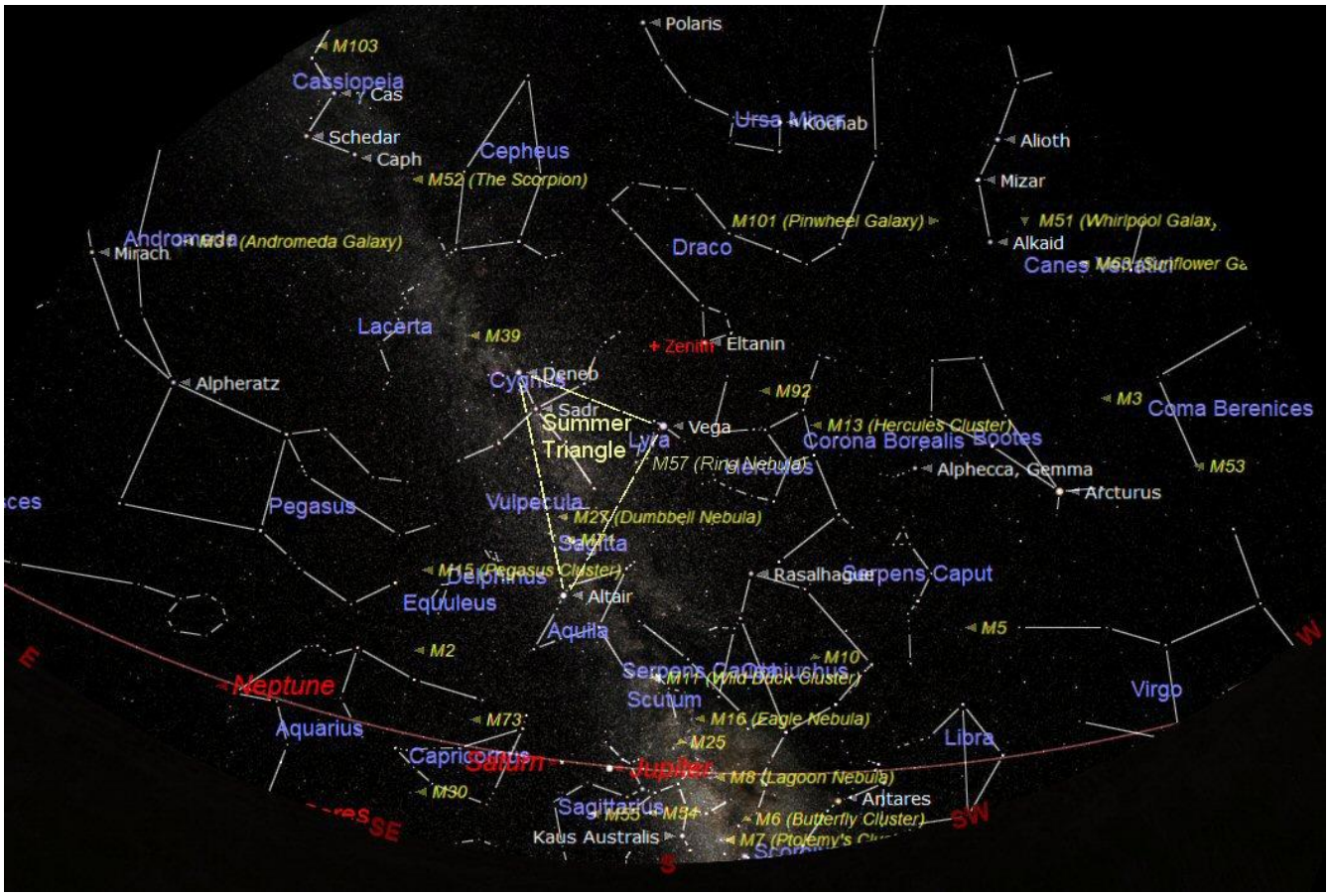
Albirio can be seen as a beautiful double star when viewed through a telescope. One star is bright and gold in colour the other is fainter and distinctly blue. This is not a true pair they just happen to be in the same line of sight. Although the blue star is much bigger and brighter than the golden coloured star it is a lot further away from us. This type of double star is much rarer than a pair of stars that are associated and linked by their common gravity and orbiting their common centre of gravity.

The constellation of Lyra (the Harp) is located to the west (right) of Cygnus but is much smaller. The most obvious feature of Lyra is the very bright star Vega that is located the top right corner of the Summer Triangle. Vega is the fifth brightest star in our sky with a magnitude of +0.4. It is located at a distance of 25.3 light years from us and is thought to be 3.2 times the diameter of our Sun and 58 times brighter. The main asterism (shape) of Lyra is composed of a line of three stars with Vega in the centre and a group of four fainter stars that form a parallelogram shape that is known as the 'Lozenge'.

Between the two lower stars: Sulafat and Sheliak is the Messier object M57. This is a 'Planetary Nebula' which has nothing to do with a planet. It is in fact a dying star that was similar to our Sun but older. The star had used most of its Hydrogen fuel and expanded to form into a Red Giant. After passing though that red giant phase it gently collapsed to become a White Dwarf. The very thin outer mantle of the red giant drifted away into space as the star collapsed. The white dwarf is now surrounded by a bubble of gas and dust. It looks like a small 'smoke ring' when seen through a telescope but can't be seen using binoculars.

There are two small constellations called Vulpecula (the Fox) and Sagitta (the Arrow) that are located within the Summer Triangle. They are both small and comprised of relatively faint stars. Vulpecula is rather indistinct but Sagitta is worth seeking out using binoculars. It is located at the bottom of the Summer Triangle and is good fun to find using binoculars because it really does look like an 'arrow'. It is composed of three stars that look like the shaft of an arrow and two stars that resemble the flight feathers.

THE SUMMER NIGHT SKY - August 2020



The chart above shows the night sky looking south at about 22:00 BST on 15th August. Constellations through which the ecliptic passes this month are: Virgo (the Virgin), Libra (the Scales) Sagittarius (the Goat), Aquarius (the Water Carrier) and Pisces the Fishes) on the eastern horizon.

The 'Summer Triangle' is still the most prominent feature in the summer sky and dominates the southern midsummer 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.

The constellation of Cygnus (the Swan) is located at the top of the Summer Triangle. The brightest star in Cygnus is Deneb which denotes the upper point of the Summer Triangle and represents the Swan's tail. The wings spread from the star Sadr and the head is marked by Albireo. Deneb is one of the largest and brightest stars in our vicinity in our galaxy the Milky Way and is classified as a Supergiant.

The constellation of Lyra (the Harp) is located to the west (right) of Cygnus but is much smaller. The most obvious feature of Lyra is the very bright star Vega that is located the top right corner of the Summer Triangle. Vega is the fifth brightest star in our sky with a magnitude of 0.4. It is located at a distance of 25.3 light years from us and is thought to be 3.2 times the diameter of our Sun and 58 times brighter.

Aquila is the hosts the third star comprising the Summer Triangle appears as just a line of three stars with the bright star Altair in the centre.

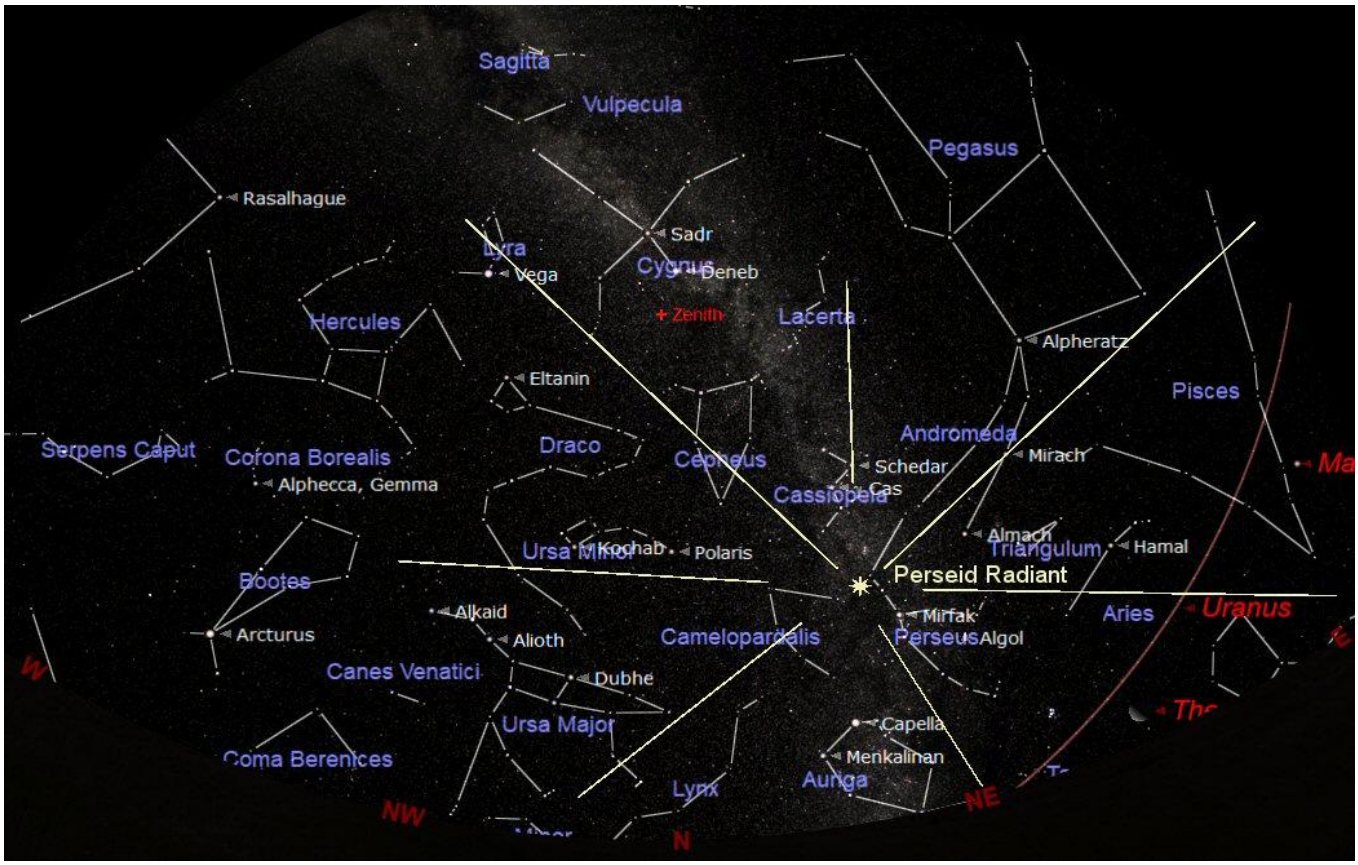
The small constellation called Sagitta (the Arrow) is located within the Summer Triangle and is a must to search out with binoculars. It is small and comprised of relatively faint stars. It is located towards the bottom of the Summer Triangle and is good fun to find using binoculars because it really does look like an 'arrow'. It is composed of three stars that look like the shaft of an arrow and two stars that resemble the flight feathers. Just to the east of the star Altair is the small constellation Delphinus (the Dolphin). It can be seen with the naked and does look like a Dolphin leaping out of the water.

The Milky Way flows north from the Summer Triangle through the rather indistinct constellation of Lacerta (the Lizard), past the pentagon shape of Cepheus and on through the 'W' shape of Cassiopeia (a Queen).

To the west (right) of the Summer Triangle is the constellation of Hercules (the Strong Man). Hercules has a rather distinctive distorted square shape, at its centre, called the 'Keystone'. This is due to its resemblance to the centre stone of an arch or bridge. The jewel of Hercules is without doubt is the Great Globular Cluster, Messier 13 (M13). M13 can be found in the western (right) vertical imaginary line of the 'Keystone'. It is just visible using a good pair of 9 x 50 binoculars. The cluster, of about a million stars, can be seen using a 90mm *f*10 telescope but will look even more impressive when using a larger telescope.

To the East of the Summer Triangle is the constellation of Pegasus (the Winged Horse). The main feature of Pegasus is the square formed by the four brightest stars. This asterism (shape) is known as the Great Square of Pegasus. The square is larger than might be expected but once found is easier to find again.

THE PERSID METEOR SHOWER



The Perseid Meteor Shower Radiant at Midnight on 12th August

Meteor showers are notoriously unpredictable. The exact time of any spectacular increase in numbers or if the meteors will be bright is almost impossible to predict as is the clear weather needed to see them. However every year on the evening of the 12th August there is a spectacular display from the Perseid Meteor Shower.

Fortunately this year there will be no bright Moon on the 12th August so even the fainter meteors should be visible. The meteors of a shower appear to radiate from a point in the sky that is called the 'Radiant'. The meteors of this particular shower appear to originate from a 'Radiant' point in the constellation of Perseus. If the trail of any meteor that is seen can be tracked back and found to have originated from this Radiant Point it will be a Perseid. A few meteors might appear to originate from other directions so these are the meteors that might be seen randomly and not part of any named shower. These are known as Sporadic Meteors.

No special equipment is required to see meteors but it does pay to make sure you are comfortable for a meteor watch. It is essential to dress to keep warm. A warm coat should be worn along with a good thick pair of trousers or perhaps an extra pair of trousers or long legged underwear can be worn for additional comfort. It can get very cold during the night even in the summer. A garden lounger will make the observer much more comfortable and avoid getting a stiff neck from looking up for too long. It will also allow an extra blanket to be used if it is chilly.

The bright star Capella in the constellation Auriga will be twinkling noticeably close to the northern horizon. The Radiant will be above Capella.

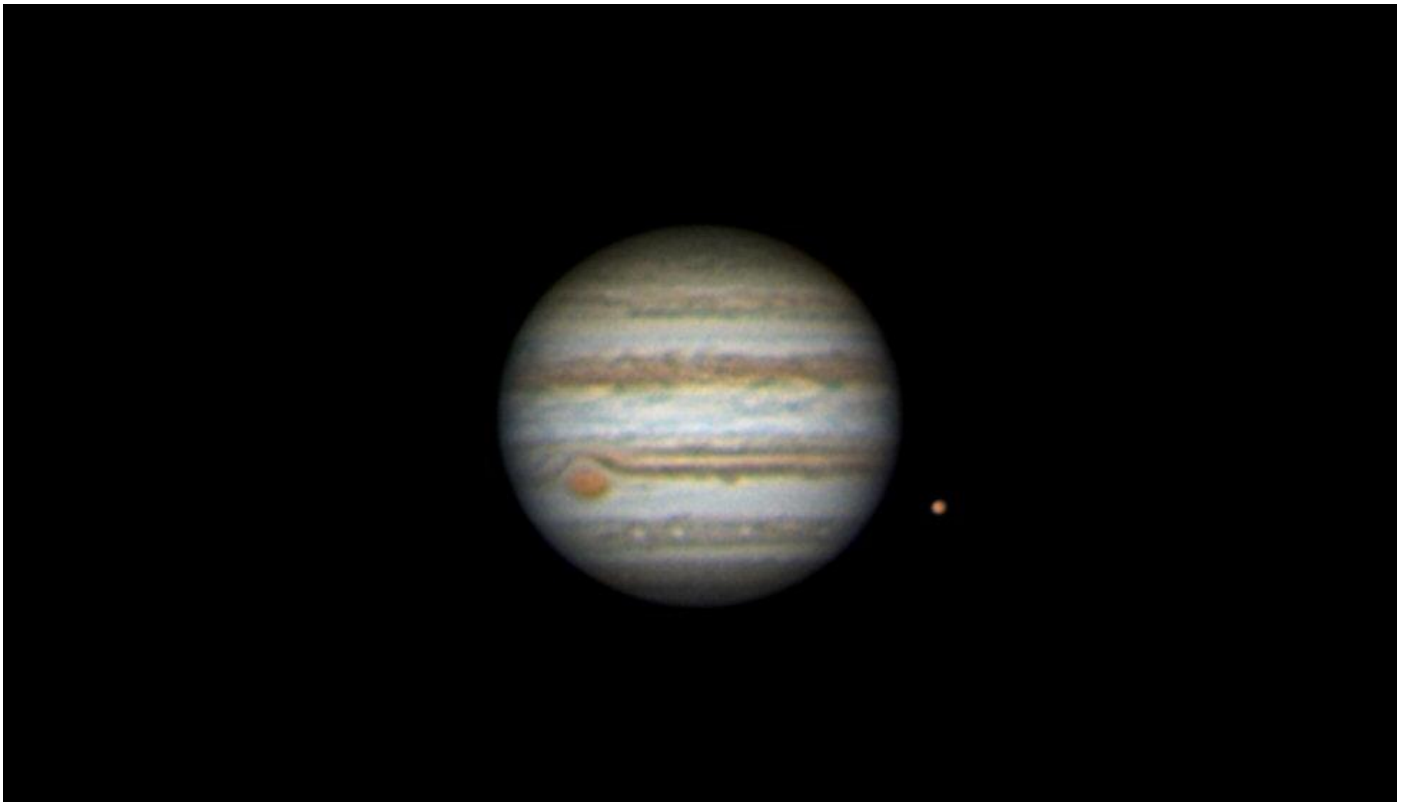
Observing can start as soon as it is dark but there is likely to be more meteors during the hour or two after midnight. Position the lounger so that the northern horizon can be seen. Look at about 45º above the horizon and anywhere between west, through north and to the east. Meteors will appear as a fast streak of light flashing across the sky.

One or two meteors every five to ten minutes may be seen. Some might be quite faint and may be difficult to see from a well-lit area in the towns. Some quite bright meteors will be seen even from fairly light polluted skies. These may appear any anywhere in the sky from close to the radiant in the north to directly overhead.

Richard Fleet from the Newbury Astronomical Society captured many of the Perseid meteors in 2014 on his DSLR camera from his home in Pusey, Wiltshire. Here is one of Richard's pictures:

A composite of all Richard's images

THE KING OF THE PLANETS IS COMING INTO VIEW



Jupiter imaged by John Napper (Newbury Astronomical Society)

Jupiter is now moving into view just after midnight and will be in position for observing in the early hours. Jupiter will reach Opposition on 14th July 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 23.4º 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 in the early morning, rising in the east around midnight in June. It will be observable in the east about an hour or so later at around 01:30 BST 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 02:30 Jupiter will have risen high enough in the south to be in a reasonable but low position for observing in the constellation of Sagittarius (the Archer).

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 Galilei who first recorded seeing them.

Jupiter and the Galilean Moons imaged by Steve Harris

OBSERVING JUPITER USING BINOCULARS

Using binoculars to observe Jupiter is better if you prepare first. There are two things that can help improve the view. The first is to set up the binocular to suit your eyes.

The right hand eyepiece can be rotated to adjust the focus of each optical body to suit each eye this is called 'dioptre adjustment'. The way to do this is to find a bright star in the binocular (or any distant object can be used during the day). Close the right eye and adjust the focus to suit the left eye using the central focusing barrel. When the sharpest image is achieved (a star is the smallest point of light) open the right eye and close the left. Now rotate the right eyepiece by turning the dioptre adjuster [on the right eyepiece] each way until the sharpest image is achieved in the right eye. Now open both eyes and adjust the focus to suit both eyes, using the central focusing barrel only, to check the quality of the view. The binocular is now adjusted to suit both your eyes and it should look clearer.

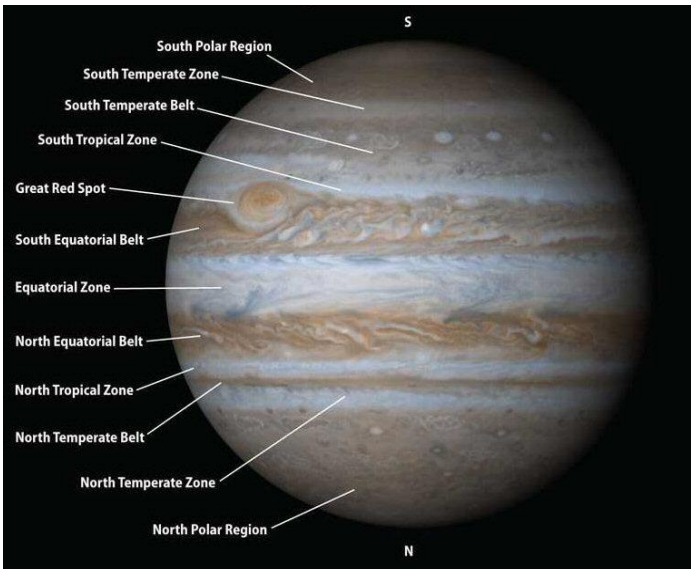
The second thing to try is to provide extra support for the binoculars. Resting your elbows on a solid object such as a wall or fence. If this is not possible stand against a wall and steady the binocular or your hand against the wall to stop shaking movements.

The best possible answer is to support the binocular on a stand of some sort. Even a cheap camera tripod can be used perhaps utilising an elastic strap (Aerolastic) or any other means to secure the binocular to the support. This will help steady the binoculars. It may even be found that the view is improved by sitting in a reclined garden lounger and somehow supporting the elbows.

Binoculars will just about show the moons and may just reveal the two darker equatorial belts if using larger binoculars.

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 as the gas in the belts and zones moves at different speeds and directions. A larger telescope will allow some detail of the storm patterns to be seen.



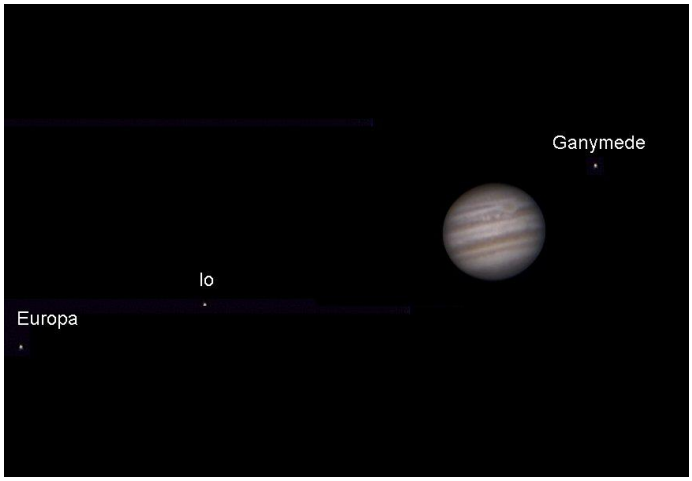
The cloud markings on Jupiter

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.

As Jupiter is so large (for a planet) it is the easiest planet to image through a telescope. The cheapest way to do this is to use a modified computer web camera. This used to be done by removing the lens of the webcam and replacing it with a special adaptor but can now be bought ready to use. These webcams can be mounted in place of the eyepiece. With the webcam connected to a computer via a USB port a short video of Jupiter (1 to 2 minutes) can be recorded on to the hard drive.

It is then necessary to download a piece of free software from the internet called 'registax'. This application can automatically align each frame of the video then stack all the images from each frame on top of each other. The result is all the features on the surface of the planet that are in the same place on the images are added and the features become clearer on the finished single image. The final image can even be enhanced using the built in processing screen in registax. The image below was taken using a webcam on 14th November 2012 and shows some of the turbulence around the Great Red Spot in the South Tropical Belt. The Tropical Belts are mentioned on the previous page (South is at the top of the image). The moons Europa, Io and Ganymede are labelled and can be seen to the right and left of Jupiter.



Jupiter imaged on 14th November 2012 by Steve Harris

Another computer application that can be downloaded free from the internet is a computer planetarium application. The events happening around Jupiter can be predicted using these applications and then followed using a telescope. One of the best and most popular free computer planetarium applications to download is 'Stellarium'. This and other applications can be used to predict what is going to happen around Jupiter during any clear night before observing is started.

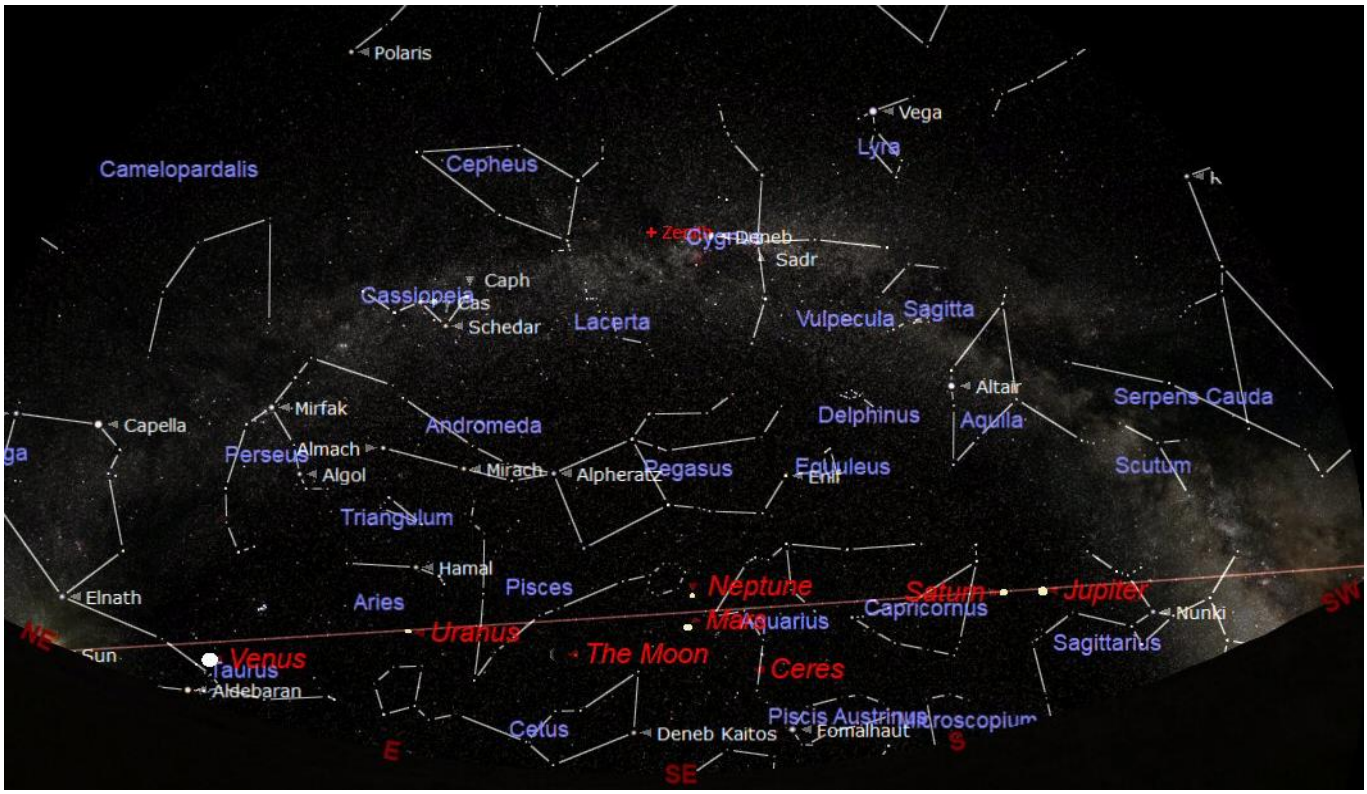
Sometimes we can see the moons pass in front or behind Jupiter on every orbit and not above or below as they do for a lot of the time. This makes observing Jupiter very interesting. We can watch the moons approach the planet to disappear behind or in front of Jupiter and then watch them reappear an hour 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.

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.

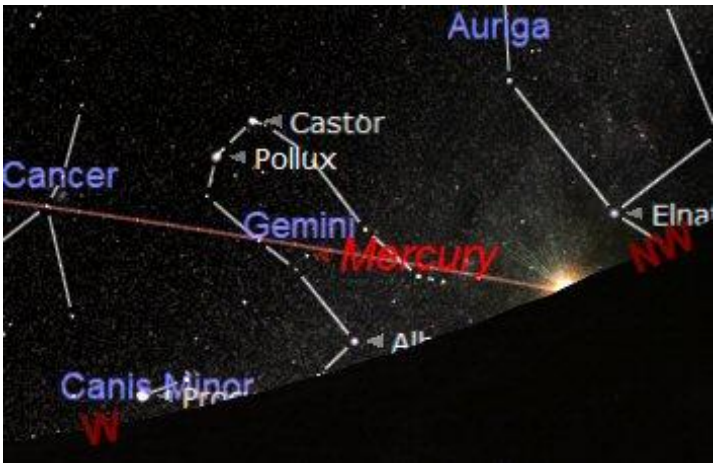
Occultation occurs when a moon passes behind the planet. An Occultation or Transit is easy to follow with a telescope as the moon approaches Jupiter.

THE SOLAR SYSTEM JUNE 2020



The planets observable in the early morning sky

MERCURY will be difficult to see in the bright sky after the Sun sets over the western horizon. See the chart below.



Mercury at sunset on 15th June

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

MARS is looking rather small as it is still a long way from Earth but is gradually getting closer. See the chart at top.

JUPITER rises over the eastern horizon just before midnight and will be observable in the south east. 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 in the early morning sky until the sky brightens at about 04:00. More details on pages 9 and 10.

SATURN will be visible in the early morning sky before sunrise rising over the eastern horizon at 23:30 at the beginning of June and 22:00 at the end of the month. 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.

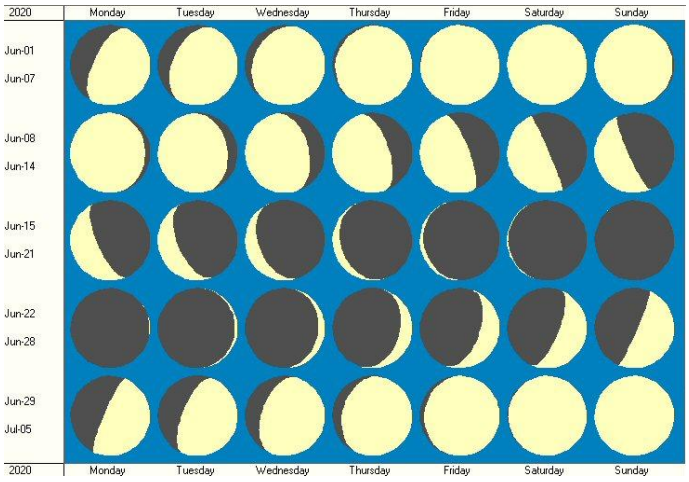
URANUS will not be easy to see this month as it will be close to the southern horizon in the early hours before sunrise. It will require a clear view to the eastern horizon and the alarm to be set very early.

NEPTUNE will not be easily visible this month as it will also be close to the southern horizon in the early hours of the morning. Being close to Mars will help find it.

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 at midday 13:00 BST (12:00 GMT).

THE MOON PHASES DURING JUNE



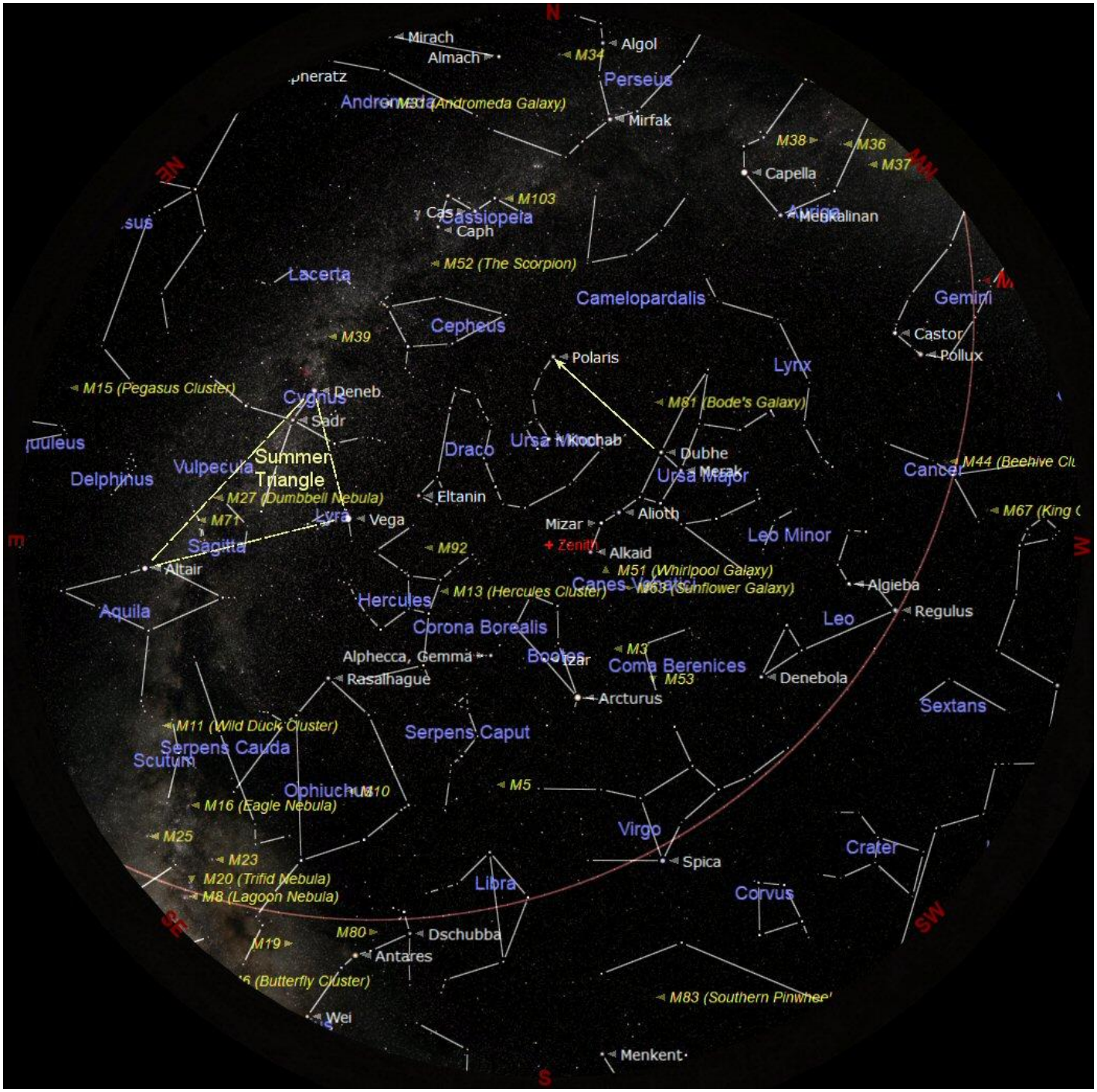
Full Moon will be on 5th June

Last Quarter will be on 13th June

New Moon will be on 21st June

First Quarter will be on 28th June

THE NIGHT SKY THIS MONTH



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 15º (360º 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 50º 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: None.