NEWBURY ASTRONOMICAL SOCIETY
MONTHLY MAGAZINE –SEPTEMBER 2020

ASTRONOMY FOR BEGINNERS

September brings the beginning of the new astronomy season, when the evenings begin to draw in and the skies are getting dark at a reasonable time. During the summer months it has been light until after 10:30 and sky has not been completely dark even at midnight. Now we can get out for a good look at all the interesting sights of the night sky and still get enough sleep to get up in time for the things we need to do the next day. So this month we will consider what we need to start out in astronomy, what we can expect to see, where and how to find it.

When starting out in astronomy it is not necessary to have a telescope to enjoy wonderful views of the night sky. All that is needed is to go to a dark location away from the glare of street lights. Somewhere comfortable to sit will make the observing more enjoyable so a simple reclining garden chair or deckchair is ideal. A star chart is a worthwhile purchase to help find your way around the sky although a simple chart like the one on the back page of this magazine will do fine to start with.

BINOCULARS

Once the new astronomer has become familiar with the night sky and the interest has begun to develop it is worth considering obtaining a pair of binoculars or a beginner's telescope. Binoculars are not as expensive as a decent starter telescope and can be obtained second hand. They will enable many more objects to be seen

The author's old 9 x 50 binocular

Binoculars for astronomy should have an aperture (lens diameter) of at least 50mm but it must be said binoculars over 50mm do tend to be more expensive and heavier so 50mm is a good size to start off with. An aperture of less than 50mm will not gather enough light to give a really good view of the night sky. A magnification of 7x or 8x is the best but up to 10x can be used. The 10x may be difficult to hold steady but if mounted on a tripod or supported on a wall or fence they can be used. So look for a 7 x 50 or 8 x 50. What about cost? Normally the old adage 'you get what you pay for' is true. About £50 should provide a good quality pair but spend as much as you can afford.

STAR CHARTS

The beginner to astronomy is unlikely to have a large telescope and may have no equipment at all. This does not mean that observations cannot be carried out. A star chart is the only other equipment that may necessary to get started.

The 'all sky' chart included on the last page of this magazine can be used as a simple guide to the sky for the current month. More detailed charts are available from bookshops and astronomy specialist shops. Star atlases are also very useful but may be a little complicated for the beginner to astronomy.

A planisphere chart is very useful and can be obtained from W. H. Smith and other large book shops or can be bought through the adverts in popular astronomy magazines such as 'Astronomy Now'.

Another option is to use a computer planetarium application. There a number of good applications on the market but some can be quite expensive. Another option is download a freeware sky chart application from the internet. A particularly good one is called 'Stellarium'.

SETTING UP

Make sure you start off dressed in warm clothes because once the cold has taken hold it is very difficult to warm up, even when extra clothes are put on. A small torch is needed to enable the chart to be read but this must shine with only with a dimmed light. A small cycle rear light or torch with a piece of red plastic secured over the lens will give enough light but will not spoil 'night vision'. It takes about 10 to 15 minutes for our eyes to become fully adjusted to the dark but a flash from bright light will spoil night vision in an instant. If the torch is still too bright fix a piece of cardboard, with a hole in it, over the lens to reduce the light.

Next find a dark area away from any lights. This may be difficult due to street lights but a strategically positioned screen made from a blanket or a garden umbrella may help. If all fails go out of town to a dark field or hill. If you are lucky enough to have an area in the garden that is sheltered from lights, a few comforts can be indulged. The first and most important would be a reclining chair to prevent neck ache from looking up for too long. On the following pages we will see some interesting things to look for in the night sky at this time of the year. In October we will consider buying a 'starter' telescope.

NEWBURY ASTRONOMICAL SOCIETY MEETING

4th September	Martin Radcliff (Zoom meeting)
Website:	www.newburyastro.org.uk

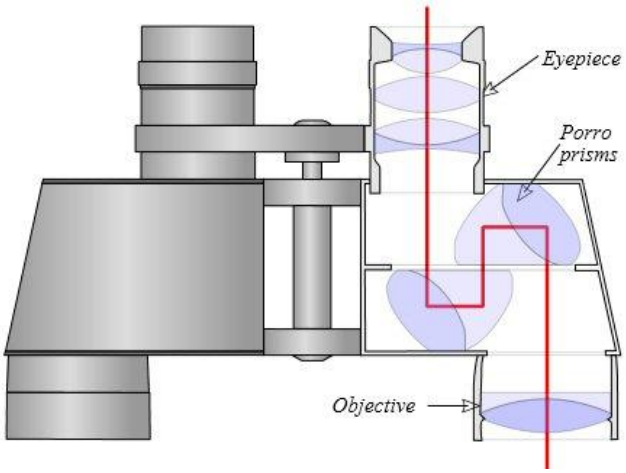
NEXT NEWBURY BEGINNERS MEETING

18th September	Mars at Opposition (Zoom meeting)
Website:	www.naasbeginners.co.uk

USING BINOCULARS

Binoculars 8 x 50 (left) 15 x 70 (middle) 10 x 25 (right)

Nearly all amateur astronomers will have a trusted 'pair of binoculars' and will often recommend to a beginner that it should be the first instrument to be purchased. This article will endeavor to give some guidance in purchasing binoculars and using them to observe the night sky.



The typical light path through a binocular

The objective lens gathers light and focuses it into an image. The eyepiece is used to magnify the image and direct the light into the eye. Prisms are introduced into prismatic binoculars to enable the body to be physically reduced in length compared to that of a telescope. Prisms also ensure that the image is orientated the right way up and the right way round.

Binoculars come in many different designs to suit the purpose or requirements of the user. The picture at the top of this page shows a small selection of the very large variety of the range of binoculars available.

Binoculars for astronomy use should have an aperture (lens diameter) of at least 50mm (the second number in the descriptions seen earlier). The 10 x 25 instrument shown on the right of the picture above is too small to be much use for astronomy. An aperture of less than 50mm will not gather enough light to give a really good view of the night sky. Binoculars over 50mm like the 15 x 70 example above do tend to be more expensive and heavier so 50mm is a good size to start with.

A magnification of 7x or 8x is the best but up to 10x can be used. The 10x may be difficult to hold steady but if supported on a wall or fence they can be used. So look for a 7 x 50 to 9 x 50. What about cost? Normally the old adage 'you get what you pay for' is true. About £35 to £50 will provide a fairly good quality second hand binocular but spend as much as you can afford.

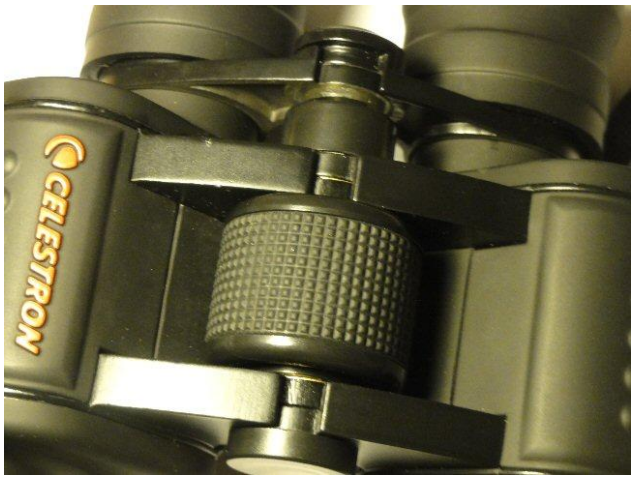
The binocular shown in the image below is a typical example of a good 10 x 50 instrument. Modern versions may be lighter than older versions but the important features are much the same.

A typical 10 x 50 binocular

The most important feature is of course the optical quality but most modern instruments costing around £70 (before special offer price reduction) are of a reasonable quality. Binoculars with an aperture of less than 50mm are not best suited for astronomy as they cannot capture enough light. Most binoculars have the following features that are designed into the instrument to allow it to be adjusted to suit the user and the purpose of use.

The two optical bodies are hinged together to allow them to be adjusted to the relative positions of the users eyes. By adjusting the angle of the hinge the eyepieces can be moved closer or further apart to achieve the most comfortable position to suit the user's eye spacing. See the image below.

Incorporated into the hinge between the two optical bodies is a focus adjuster often in the form of a rotating barrel. (The central focusing barrel can be clearly seen in the image below.) Rotating the barrel moves the two eyepieces in and out of the bodies. This allows the binocular to be focus on objects at different distances.



Focus adjuster

The right hand eyepiece can be rotated to adjust the focus of each optical body to suit both eyes this is called 'diopter adjustment'. See the image below.

Diopter 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 (for a star the smallest point of light) open the right eye and close the left.

Now adjust the right eyepiece by rotating the dioptre adjuster each way until the sharpest image is achieved. Open both eyes and adjust the focus to suit both eyes working together using the central focusing barrel to check the quality of the view.

Finally binoculars are usually supplied with a strap for hanging the instrument around the neck. It is very important to leave this on and use it all the time. It saves putting the binocular down when not being used, it may be difficult to find again in the dark. It is also useful for resting the arms after holding them up for some time. Most of all it stops the binocular falling to the ground and being damaged if accidently dropped.

Some binoculars may have rubber cups fitted to the eyepieces. These are good because they help by excluding unwanted light from street lights or other sources. Lens covers may also the supplied to prevent dust accumulating on the glass so if supplied they should be fitted when the binocular is not in use.

Some cheaper binoculars may display a flare or spikes around the stars but this is not a big problem as long as the effect is not too noticeable. Using binoculars will mainly be to show the positions and patterns of stars so some distortion of the star images can be acceptable. Binoculars can show the large features on the Moon but not fine surface details on the Moon or the planets. So let us move on to using the binocular for astronomy.

The first thing to consider is getting comfortable for observing. All the usual advice given to beginners to astronomy applies. That is: dress to keep warm, make yourself comfortable and avoid lights that shine directly into your face. Little needs to be said about dressing to keep warm except to start observing in warm clothes and don't wait until cold has set in before dressing up.

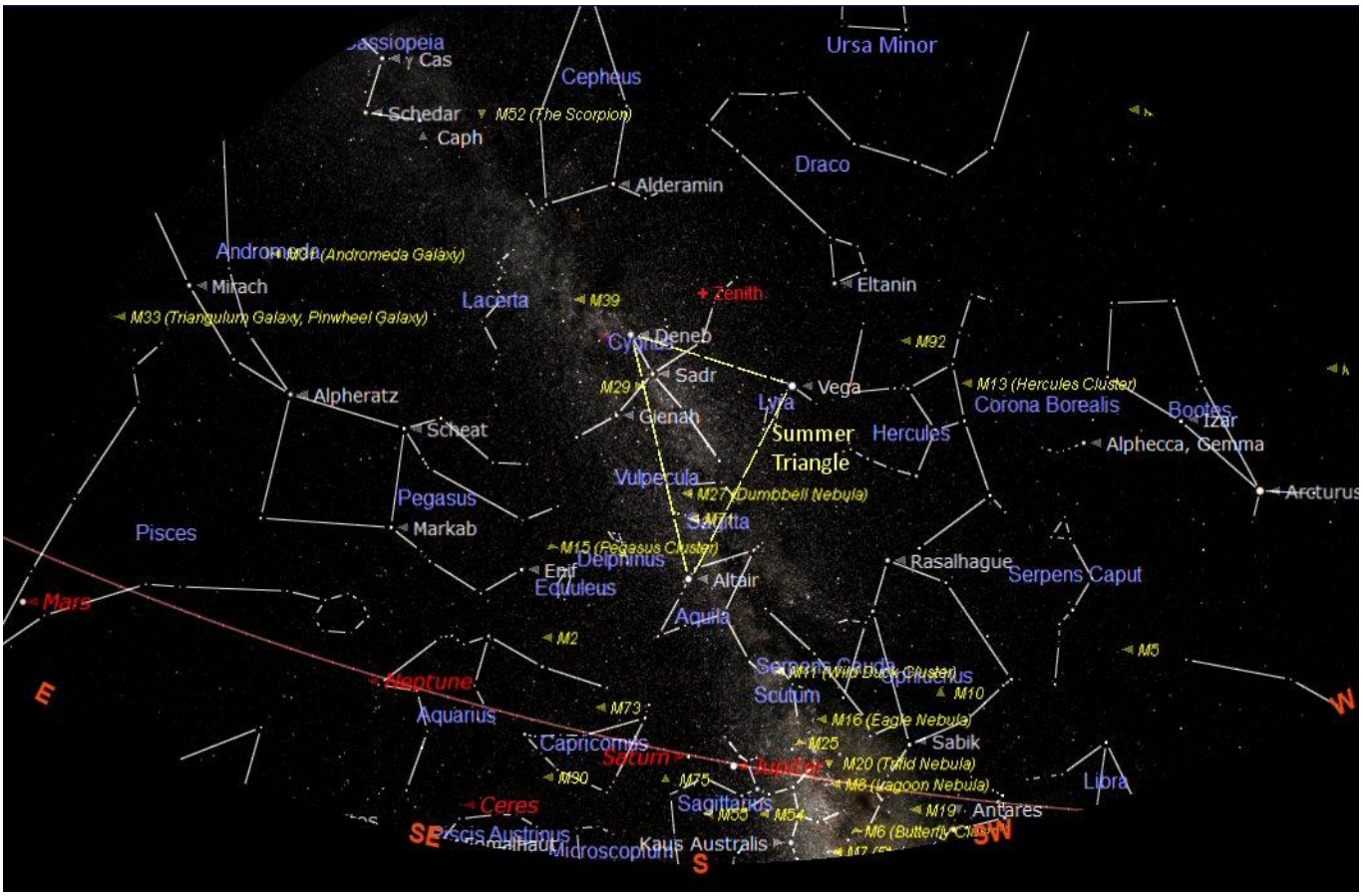
To be comfortable a reclining garden chair will allow views of the sky overhead to be obtained without a resulting neck ache. It also avoids the feeling of swaying or falling over when looking up into the sky for a while. It is also more comfortable. If a star chart is to be used in conjunction with the binocular a small side table is handy and a not too bright red light should be used to read it.

Before starting to use the binocular have a look around the night sky for a few minutes to allow your eyes to adapt to the dark. This will take at least ten minutes. Pick out the brightest stars and try to identify them. Familiarise yourself with the positions of those bright stars because they do appear to move quite noticeably from east to west as Earth rotates.

Start at one of the bright stars then try to identify the star patterns on the star chart. This could be difficult at first because more stars will be seen when using binoculars than are shown on the chart. It takes a while to match the slightly brighter ones to the stars shown on the chart.

The good thing is, binoculars always show the stars the right way up and in the correct orientation. Gradually work outwards from the bright stars and you will soon start to become familiar with that part of the sky. Do stop occasionally and just sweep across the sky and marvel at the thousands of stars. Do the same for other bright stars. The bright stars of the Summer Triangle or the constellation of Orion in the winter are a good place to start.

THE SOUTHERN SKY AND THE SUMMER TRIANGLE



The chart above shows the night sky looking south at about 22:00 BST on 15th September. West is to the right and east to the left. The point in the sky directly overhead is known as the Zenith or Nadir and is shown at the 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 brightest stars often appear to form a group or recognisable pattern; we call these 'Constellations'.

Constellations through which the ecliptic passes this month are Sagittarius (the Archer), Capricornus (the Goat), Aquarius (the Water Carrier), Piscis (the Fishes), Aries (the Ram) and Taurus (the Bull) is about to rise over the eastern horizon.

Just disappearing over the south western horizon is the constellation of Sagittarius (the Archer). It is really a southern constellation but we can see the upper part creep along the horizon during the summer. The central bulge of our galaxy is located in Sagittarius so the richest star fields can be found in the constellation along with many of the beautiful and interesting deep sky objects that we seek out.

The summer constellations are still prominent in the night sky lead by Hercules (the Hunter). Following Hercules is the **Summer Triangle** with its three corners marked by the bright stars: Deneb in the constellation of Cygnus, Vega in Lyra, and Altair in Aquila. The Summer Triangle is very prominent and can be used as the starting point to find our way around the night sky. See the following pages. The Milky Way (our Galaxy) flows through the Summer Triangle passing through Cygnus, down to the horizon in Sagittarius.

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).

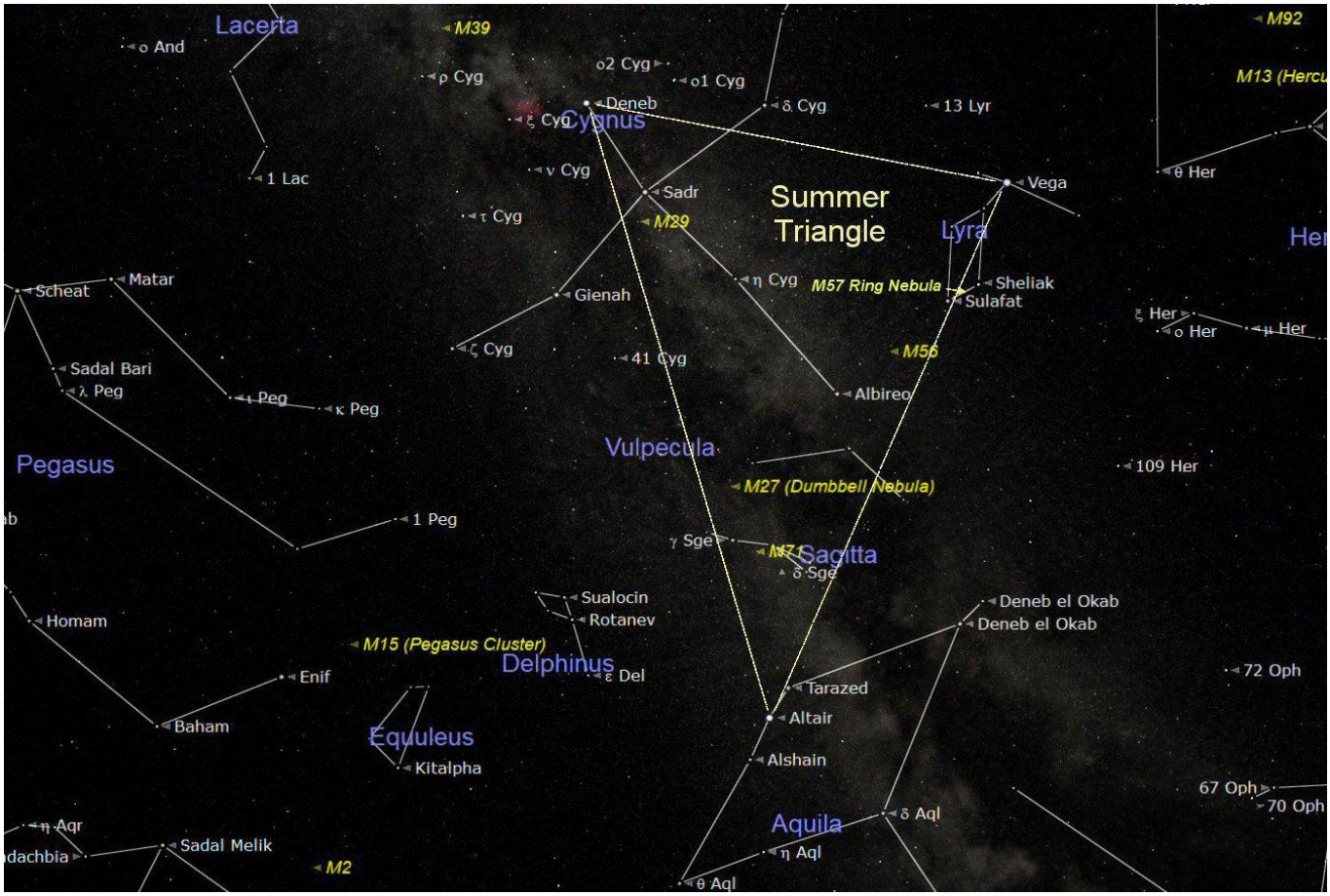
At the top, centre/right of the chart above is the fairly faint constellation of Ursa Minor (the Little Bear) also called the Little Dipper by the Americans. Although Ursa Minor may be a little difficult to find in a light polluted sky it is one of the most important constellations. This is because Polaris (the 'Pole' or 'North Star') is located in Ursa Minor. See the chart on the back page.

Polaris is the star that is located at the approximate point in the sky where an imaginary line projected from Earth's North Pole would point to. As the Earth rotates on its axis, the sky appears to rotate around Polaris once every 24 hours. This means Polaris is the only fairly bright star that appears to remain stationary in the sky.

Off the top right of the chart (North West) is the constellation of Ursa Major (the Great Bear). The saucepan shape of the constellation is often called the Plough in the UK but is also known as the Big Dipper in the USA. It does actually look remarkably like a saucepan. Four bright stars represent the pan and three stars represent the handle. An imaginary line drawn from the side of the 'pan' opposite the handle points to Polaris (the Pole Star). See the chart on the back page.

East (left) 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.

EXPLORING THE SKY AROUND THE SUMMER TRIANGLE



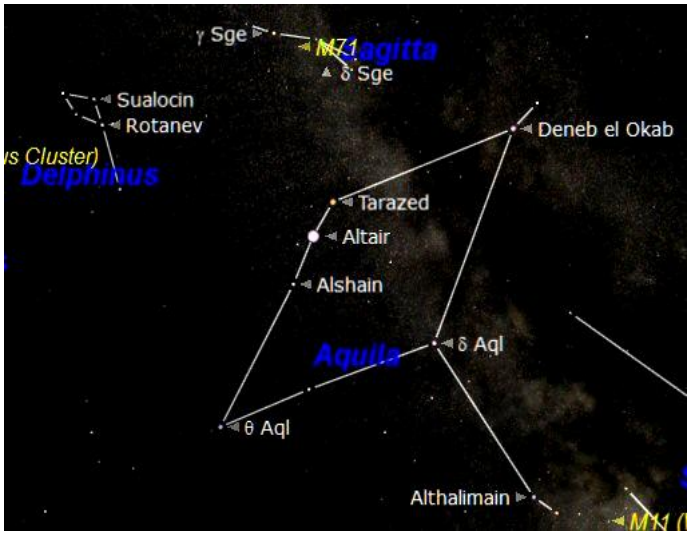
The chart above shows the sky around the Summer Triangle. The term 'Summer Triangle' was suggested by Sir Patrick Moore and has now become the best known feature of the summer night sky. The corners of the imaginary triangle are positioned on the three obvious bright stars: Deneb in the constellation 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.

THE CONSTELLATION OF AQUILA (the Eagle)

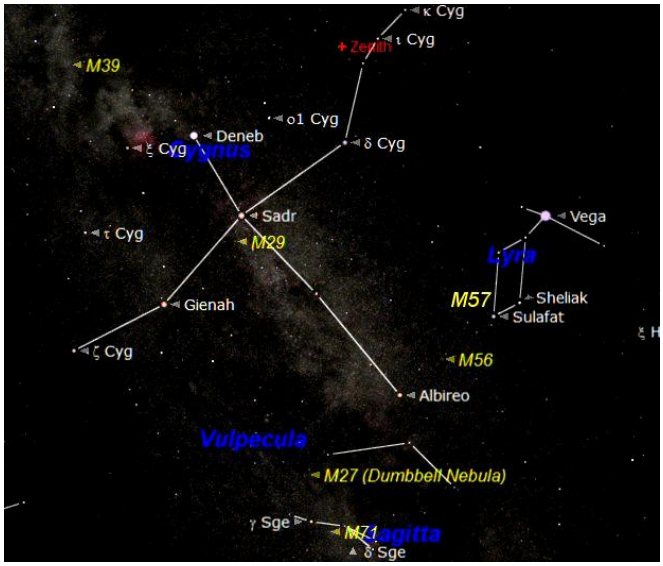
The constellation of Aquila (the Eagle) is found at the bottom corner of the Summer Triangle. There are no interesting objects in Aquila but the one bright star, Altair, has a fainter star above and below it that makes it quite easy to find.

THE CONSTELLATION OF CYGNUS (the Swan)

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. It is about 25 times more massive than our Sun and has a diameter 60 times that of our Sun. It is located 3000 light years away. As it is so much larger than our Sun it consumes its Hydrogen fuel much faster and consequently shines 60,000 times brighter.



The constellation of Aquila



The constellations of Cygnus and Lyra

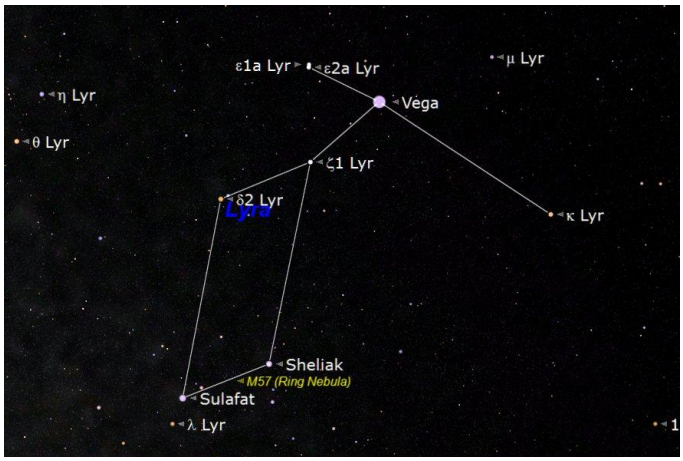
Cygnus (the Swan) does actually resemble the swan it is supposed to represent. We start at the bright star Deneb which marks the tail of the swan. From the fairly bright star Sadr the wings are spread out to each side and the long neck of the swan stretches on to Albireo.

Albireo 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 a common centre of gravity.

The double star Albireo in Cygnus

THE CONSTELLATION OF LYRA (the Harp)

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. Inferred detectors on the IRAS satellite have detected a ring of dust around Vega that may indicate planets are forming around the star.



The constellation of Lyra (small harp)

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 better known as the 'Lozenge'.

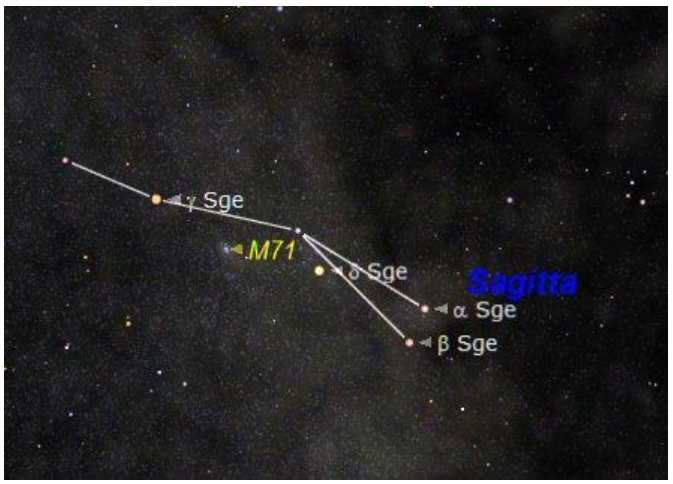
To the south east of the very bright star Vega is the lozenge shaped asterism comprised of four stars. Between the two lower stars: Sulafat and Sheliak is the Messier object M57. This is a 'Planetary Nebula' which has nothing to do with a planet. It is in fact a dying star that was similar to our Sun 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 normal binoculars.

Messier 57 (M57) the Ring Nebula

There are two other constellations that are located within the Summer Triangle. They are both small and comprised of relatively faint stars but are worth seeking out using binoculars.

SAGITTA (the Arrow)

Sagitta 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 the arrow and two stars that resemble the flight feathers.



The constellation of Sagitta

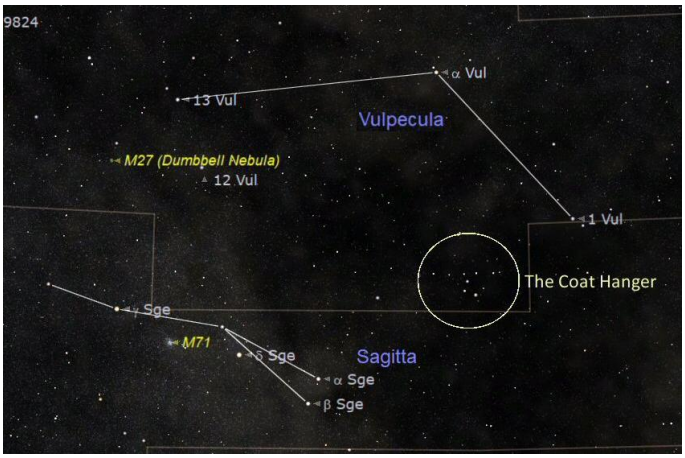
The real beauty of Sagitta is how it looks using binoculars but it does host one messier object this is M71 also known as NGC 6838. This is a rather nice but small and faint Dwarf Globular Cluster that does need a medium sized telescope to see well.

A telescope will show Messier 71 (M71) in Sagitta. It is not the most spectacular Globular Cluster but does look nice in a medium to large telescope.

Messier 71 (M71) in Sagitta

A Globular Cluster is thought to be the core of a small galaxy that has ventured too close to our Giant Spiral Galaxy (the Milky Way) and had its outer stars stripped away by the powerful gravity of the Milky Way. There about 100 Globular Clusters around our Galaxy.

VULPECULAR (the Fox)



The constellation of Vulpecula

Vulpecula is a quite indistinct constellation located in the Summer Triangle, see the chart above. It has a bright Planetary Nebula (M27) that can be seen using a good pair of binoculars. It is also known as the Dumbbell Nebula but looks more like a butterfly. It is a similar object to M57 but has two interesting lobes.

Messier 27 (M27) a planetary Nebula in Vulpecula

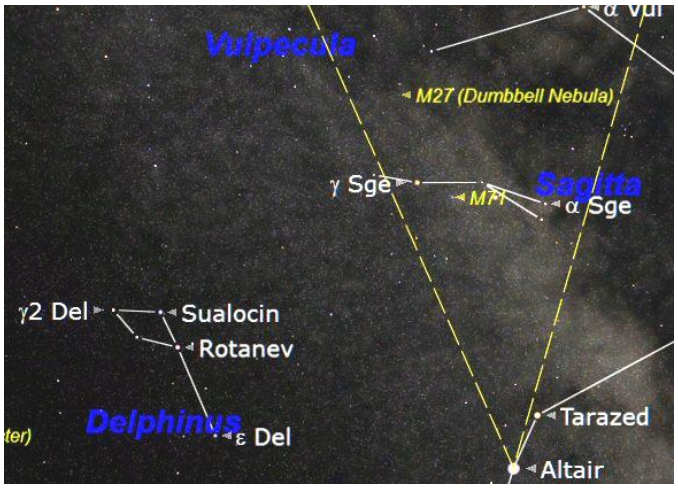
There is another interesting object to look for in the constellation of Vulpecula using binoculars. This is an asterism (a recognisable pattern of stars) called the Coat Hanger. It is also known as Brocchi's Cluster or Collinder 339. It is a random group or cluster of 10 fairly bright stars and about 30 fainter stars. They appear to be an associated group that does look like a Coat Hanger.

The Coat Hanger (asterism) in Vulpecula

The Coat Hanger can just about be seen with the 'naked eye' on a very clear night and from a very dark observing site but is best seen using binoculars. It is located half way between the 'tail feathers' of Sagitta (the Arrow) and the most westerly of the three stars that comprise the recognised shape of Vulpecula. See the chart in the opposite column. To find the Coat Hanger, use binoculars to find the tail feathers of Sagitta then slowly sweep up and right towards the right star of Vulpecula.

DELPHINUS (the Dolphin)

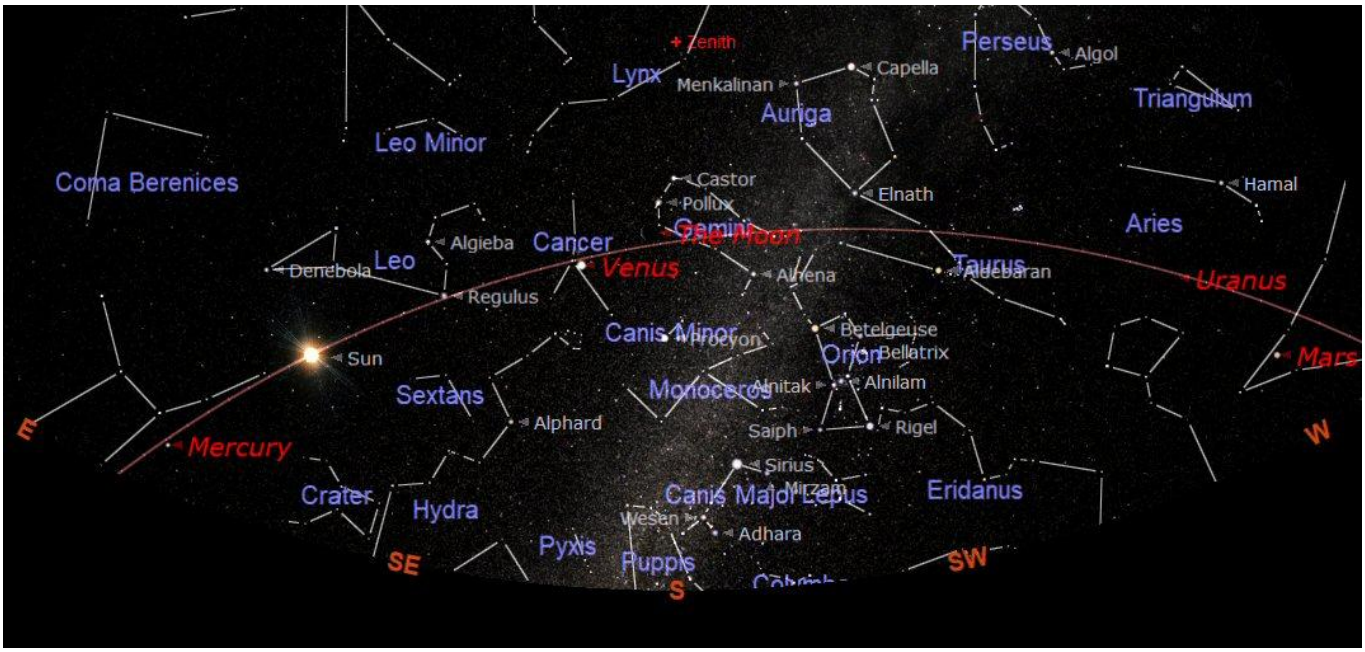
Just to the east (left) of the lower part of the Summer Triangle is the lovely little constellation of Delphinus (the Dolphin). It is small but can be seen easily with the unaided eye from a dark area when the sky is a clear.



Delphinus (the Dolphin)

The asterism (shape) of Delphinus is comprised of a four stars that form a neat diamond shape and a fifth star a short distance from the diamond shape that completes the dolphin's body and tail. With a little imagination it does look remarkably like a dolphin leaping out of the water. It can be easily seen with the naked eye or using a smaller pair of binoculars.

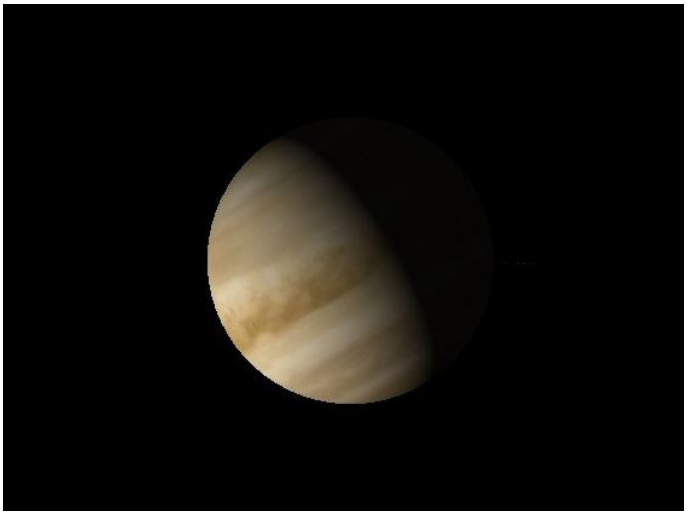
THE INNER SOLAR SYSTEM - SEPTEMBER 2020



The mid month morning sky at 09:00 (in the morning) showing the positions Mercury and Venus

MERCURY will not be visible this month as it is in the bright morning sky. See the chart above (the sky has been darkened to allow the planets to be seen).

VENUS will be observable in the east before sunrise. It rises over the eastern horizon at 02:30 so will be observable from 03:00 until sunrise. Venus passed through Inferior Conjunction (between Earth and the Sun) on 3rd June. It then appeared as a large narrow crescent that became wider and smaller as the planet moved away from the Sun. Venus reached its greatest western elongation (at its furthest apparent distance from the Sun) on 14th August.

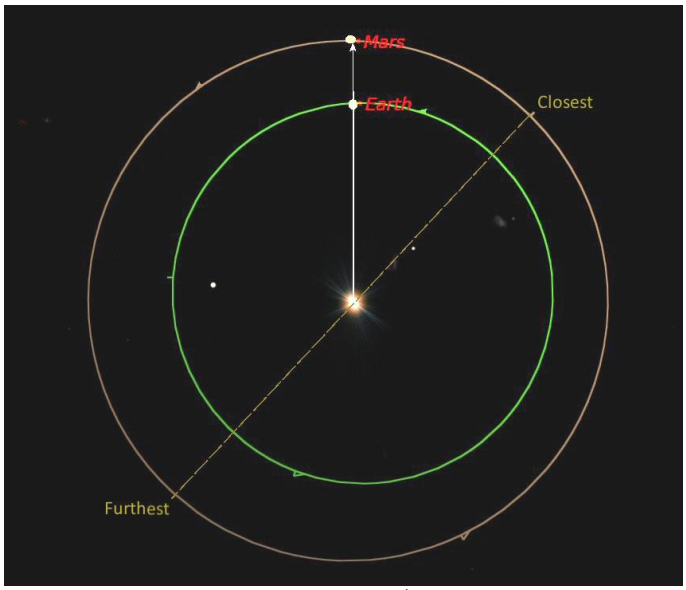


Venus as it will appear on 15th September

It is now moving back towards the Sun and will appear smaller but 'fuller' as it moves into Superior Conjunction (behind the Sun) on 25th March 2021. After passing through Superior Conjunction Venus will reappear in the evening sky in the west after the Sun has set.

It will first appear close to the Sun and will be round when viewed using a telescope. As it will be located on the other side of the Sun it will fully illuminated but will become larger and crescent shaped as it moves out from the Sun and towards us.

MARS rises in the east at about 20:30 and is starting to look larger at about 20 arc-seconds. Earth is catching up with Mars on their orbits around the Sun. This is because Earth's orbit is inside the orbit of Mars and is consequently travelling faster. Earth will catch up and overtake Mars on 13th October and this is called its Opposition. At opposition Mars will be in direct line with Earth and the Sun as shown in the chart below.

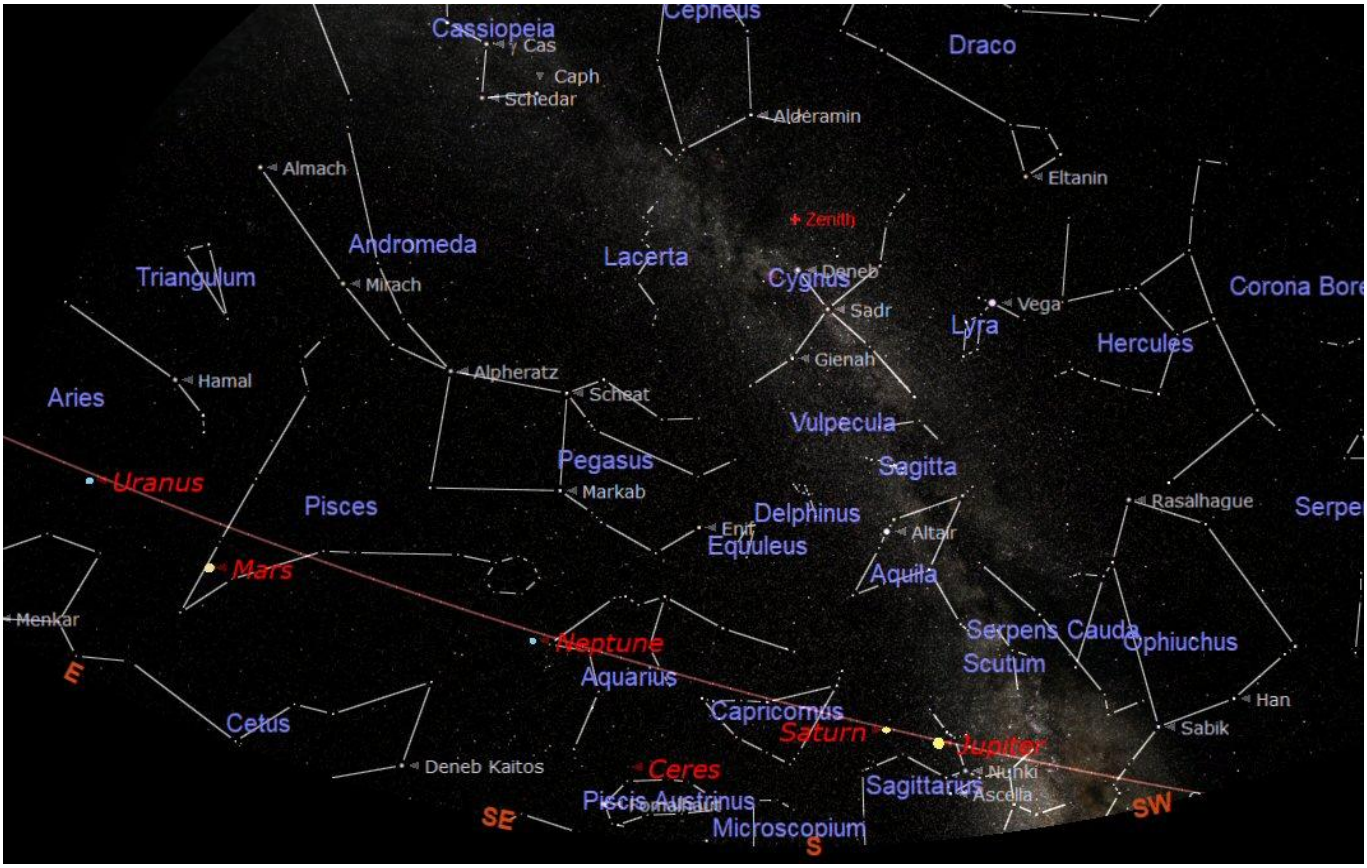


Mars at Opposition on 13th October 2020

At opposition Mars will be at it its closest point to Earth on this orbit. It can be seen on the chart above that the orbit of Mars is quite eccentric. The closest and furthest points possible are marked on the orbit. This opposition brings the two planets quite close together so Mars will appear significantly larger than it would appear at the 'furthest' possible point on its orbit. So Mars will be a good size for looking at using a telescope.

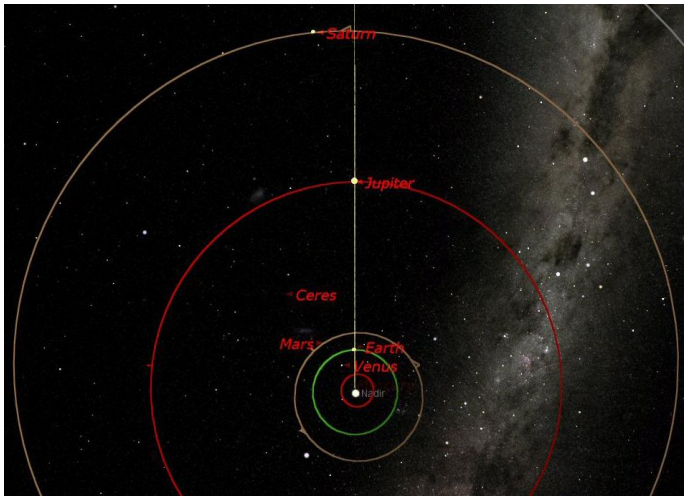
There is another bit of good news for this opposition. The Ecliptic (the imaginary line that the planets appear to move along) will be high in the night sky so this means Mars will also be in good stable air for viewing.

THE OUTER SOLAR SYSTEM – SEPTEMBER 2020



The chart shows the positions of the planets observable in the night sky this month. Jupiter and Saturn were both at Opposition in July, Jupiter on 14th July and Saturn on 20th July. Opposition was the exact time when Earth overtook (to be more precise 'undertook') Jupiter and Saturn on their orbits around the Sun.

When the planets were at Opposition they were due south at midnight 01:00 BST (00.00 GMT) during the night of the dates shown in the previous paragraph. At these times the planets were at the centre of the night sky in the south and at their maximum altitude on the Ecliptic above the horizon. Earth was located in a direct line between Jupiter (or Saturn) with the Sun on the opposite side of Earth at midnight. See below.



Jupiter at Opposition and Saturn approaching Opposition

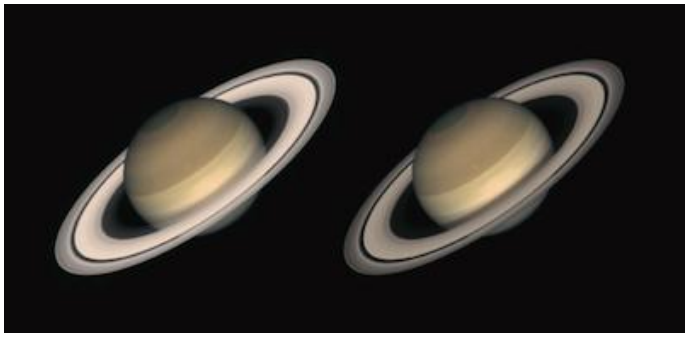
So on these nights the two giant planets were at their very best but unfortunately the Ecliptic is at its lowest at midnight in the summer (and highest at midday).

Therefore Jupiter and Saturn were low in the sky and close to the southern horizon where the air is thickest and most turbulent therefore appeared very unsteady.

At opposition Jupiter was 'in theory' at its best and brightest on 14th July but in reality it did not look any different. It always looks large and bright and will continue to look impressive for the rest of this year until it disappears over the western horizon.

However it was a different matter for Saturn on 20th July. At 23:00 BST (22:00 GMT) for about two hours the rings brightened. This was the exact time of opposition and the sunlight was reflected directly back towards the Sun and Earth. At this point the ice particles in Saturn's ring did not cast shadows on other particles because the Sun and Earth were in perfect line. The particles in the ring appeared fully illuminated and reflected all the light back making the ring brighter this is called the Seeliger Effect.

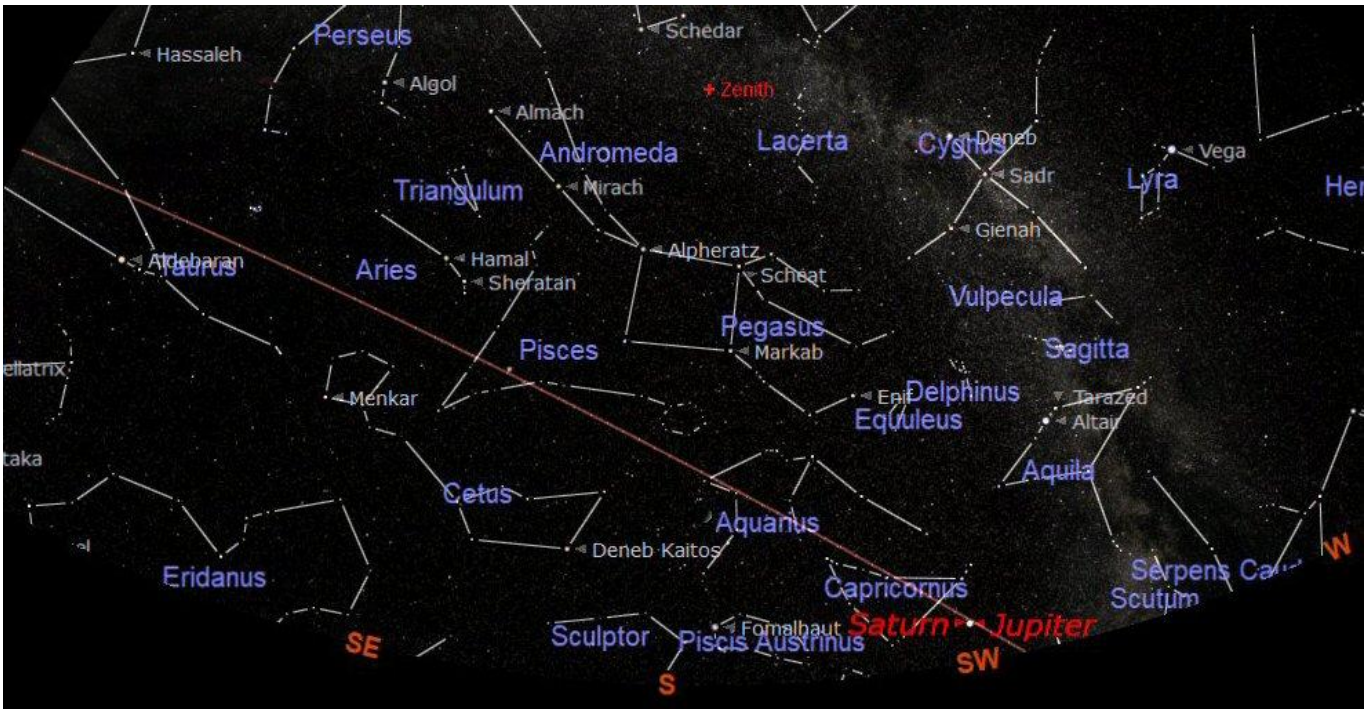
The image below shows the Seeliger Effect with the ring brighter at the time of Opposition shown on the left and how the ring system normally appears on the right.



Images showing the Seeliger Effect

The ring did actually appear noticeably brighter when viewed through a telescope this year.

THE OUTER SOLAR SYSTEM – SEPTEMBER 2020

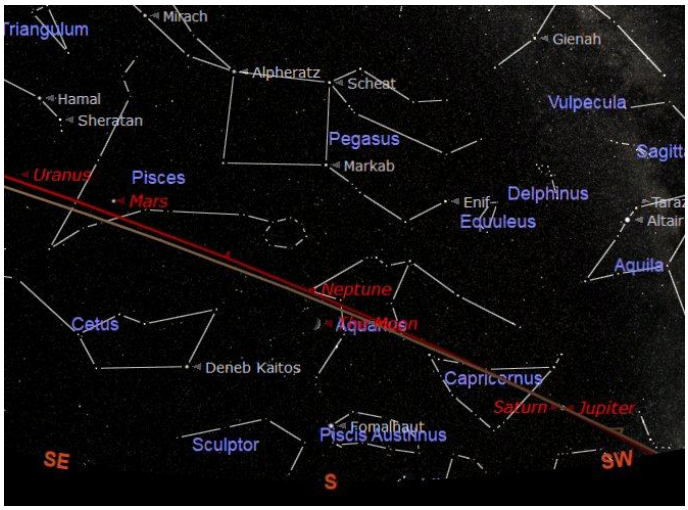


Jupiter and Saturn in conjunction 21st December 2020

The chart above shows the positions of the planets Jupiter and Saturn so close together in December that they appear to be one bright object with two names. This is because Jupiter and Saturn are moving into a very close 'Conjunction' at the end of this year.

This interesting event, involving Jupiter and Saturn, will develop and become even more interesting through the months from now until the end of this year. Jupiter and Saturn are located close together in the sky at the moment and this is what astronomers call a 'Conjunction'. This is a term used when two (or more) objects appear to move close together in the sky.

The two Gas Giant Planets have appeared close together in the sky all summer and will continue to move even closer together until the end of the year. The orbital paths of the planets are shown on the chart below.

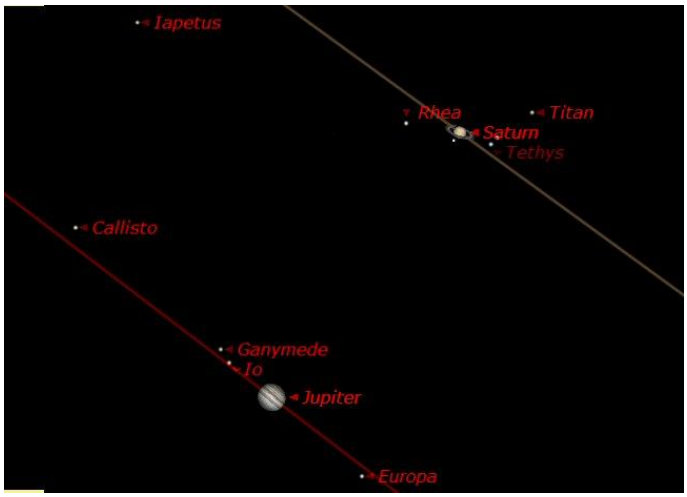


Orbital paths of Jupiter and Saturn 21st December

The orbital paths of the planets are show as red for Jupiter and brown for Saturn. It can be seen on the chart above that the orbital paths a getting closer towards the end of the year as the planets move west.

Jupiter and Saturn will not be any closer to each other than they normally are and will still be moving around their established orbits. This conjunction is just a 'line of sight' effect from our point of view on Earth. The two planets will actually be as far apart from each other as Earth is from Jupiter (about 750 million kilometres).

Jupiter is approaching Saturn as it is moving faster than Saturn along its orbital path and will overtake Saturn on 21st December. From our point of view they will appear very close together so at this time the two planets will be at their closest conjunction.

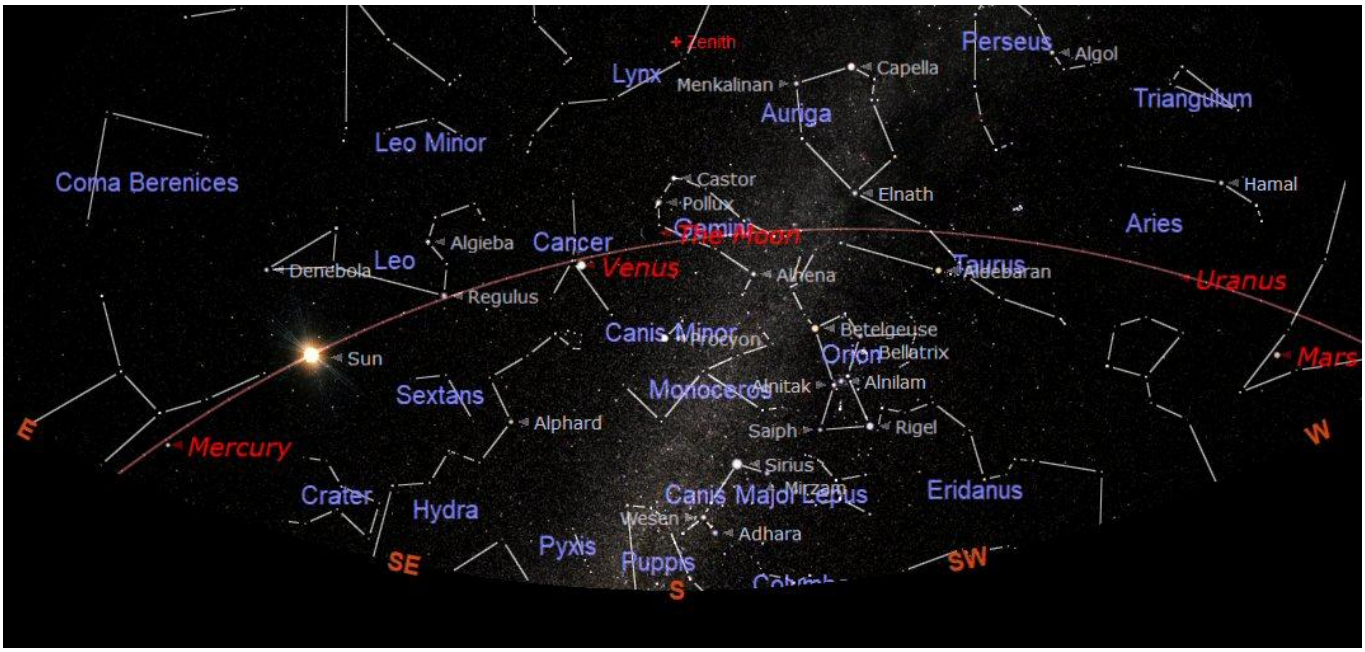


Jupiter and Saturn at their closest conjunction

The chart above shows how the two planets and their moons will appear using a telescope around the 21st December. They should fit into the field of view of most small telescopes and some larger telescopes using a low power eyepiece.

Like all astronomical events the weather must be kind to us and we will need a clear view towards the western horizon. The conjunction will unfortunately also be in the bright sky at sunset.

THE SOLAR SYSTEM SEPTEMBER 2020



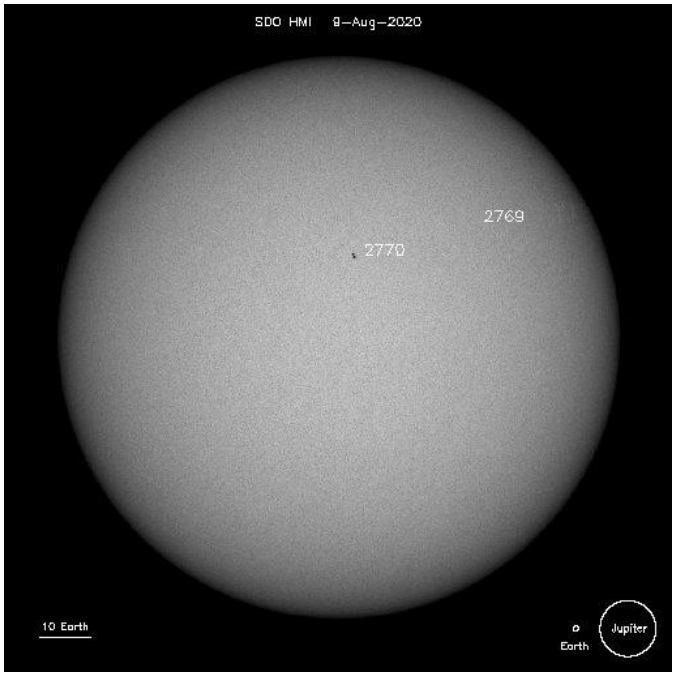
The mid month morning sky at 09:00 showing the positions Mercury and Venus

URANUS will not be easy to see this month as it will be close to the southern eastern horizon. It will rise at about 20:00 and be visible for the rest of the night. It will require a clear view to the horizon and modest telescope to see.

NEPTUNE will rise at about 19:00 but will not be easy to observe this month as it and will be close to the south eastern horizon and requires a larger telescope.

THE SUN

The Sun rises at about 05:30. A pair of small sunspots were seen around 8th August. These are the latest of the very small number of sunspots seen over the past couple of years since the Sun entered its minimum. Any activity on the Sun can be followed live using the day to day images of the Sun in detail by visiting the very good SOHO website at: http://sohowww.nascom.nasa.gov/.



A pair of small sunspots on 8th August image SOHO

THE MOON PHASES DURING SEPTEMBER

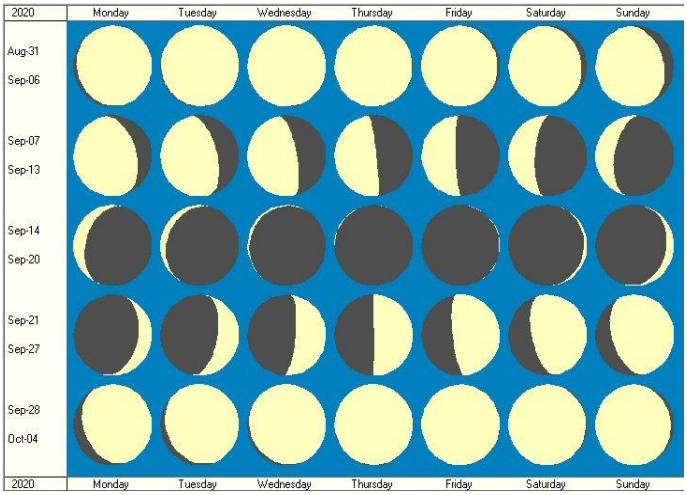
As the Moon orbits Earth about once a month the Sun illuminates different areas of the surface as we see it from our position on Earth. We call these different views 'Phases'.

When the Moon is in the same direction as the Sun the side facing us is dark and we cannot see the Moon. As the Moon moves away from the Sun we see a thin slither of the illuminated side, we call this phase 'New Moon'.

A week later the western (right) half of the Moon will appear to be illuminated we call this phase 'First Quarter'.

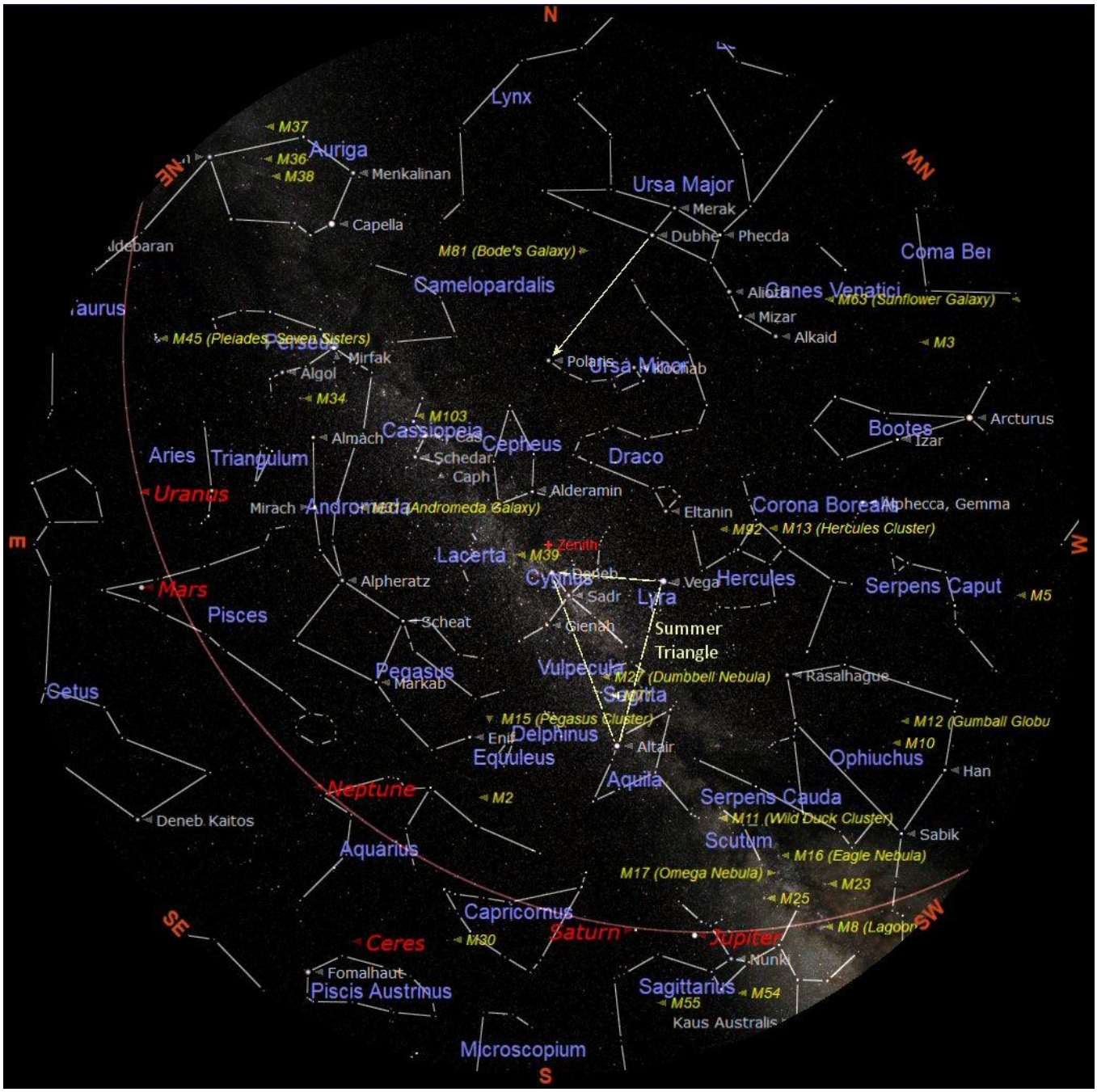
Two weeks after Full Moon the Moon will be on the opposite side of Earth to the Sun and the whole of the Moon is illuminated so we call this phase 'Full Moon'.

Three weeks after New Moon the eastern half of the Moon appears to be illuminated we call this phase 'Last Quarter'. Here the opposite side to the First Quarter is illuminated as the Moon moves back towards the Sun.



Full Moon will be on 2nd September
Last Quarter will be on 10th September
New Moon will be on 17th September
First Quarter will be on 24th September

THE NIGHT SKY – SEPTEMBER 2020



The chart above shows the whole night sky as it appears on 15th September 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: Jupiter, Saturn, Neptune, Mars and Uranus.