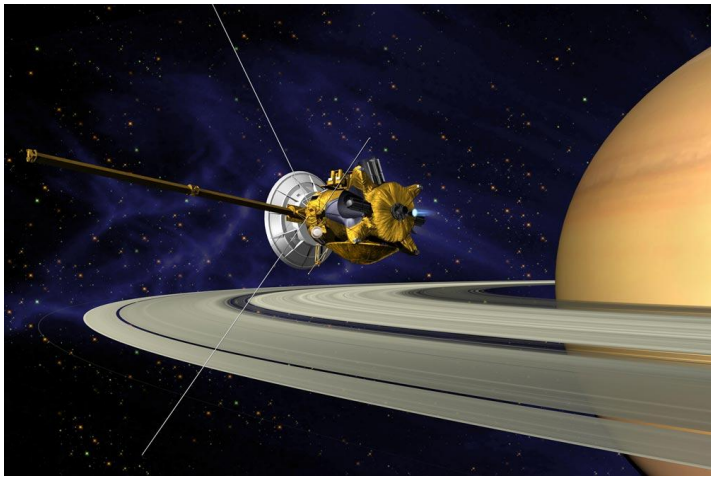
NEWBURY ASTRONOMICAL SOCIETY
MONTHLY MAGAZINE – OCTOBER 2017

CASSINI'S LAST MISSION COMES TO AN END

An artist's impression of Cassini's last moments

At 12:55 BST on 15th September the joint NASA and ESA's Cassini probe finally went silent. It burnt up as the mission control team sent the aging space craft speeding into the upper atmosphere of the giant ringed planet Saturn. Cassini hurtled into Saturn's upper atmosphere at tens of thousands of kilometers per hour recording the event and transmitting it live back to Earth.



Cassini studying Saturn

The orbiter was battered by the dense atmosphere so it fired its thrusters to keep its antenna pointed towards Earth and transmitted live data about the unexplored territory.

The atmospheric forces quickly became too powerful and Cassini began to tumble. It deployed emergency procedures to try to stabilise itself but it started to break apart and disintegrated over Saturn's cloud tops, like a meteor streaking across the sky. The probe lasted about 45 seconds in Saturn's atmosphere before it was torn apart. About 84 minutes later Cassini's final signals reached Earth. The spectacular end of the spacecraft's was played out on computer screens in the mission control room. One display resembled a heart monitor with a thin green spike signalling the strength of Cassini's signal against a black background. At 11:55 GMT (12:55 BST) after 13 years orbiting Saturn, the spike vanished from the screen and Cassini's 20 year journey was over.

The 13 years of data that Cassini sent back from Saturn will take scientists decades to analyse so even though Cassini has now been destroyed the work continues.

NEWBURY ASTRONOMICAL SOCIETY 2017 - 2018

6th October ExoMars 2016 and 2020
Website: **www.newburyastro.org.uk**

NEXT NEWBURY BEGINNERS MEETING

18th October Berkshire Astronomers
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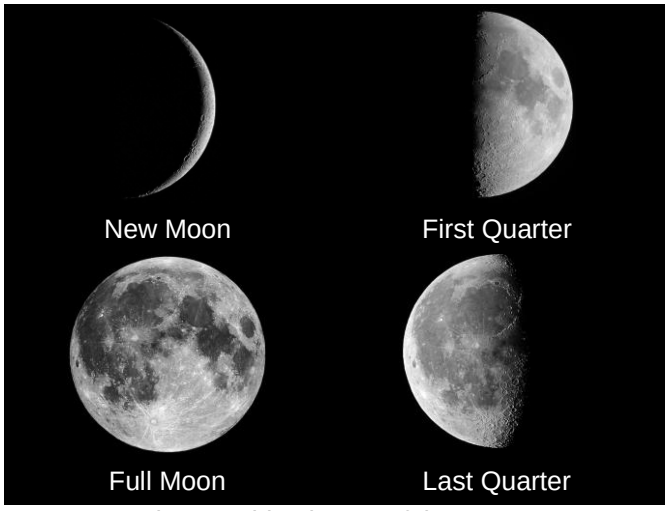
OBJECTS TO SEE IN THE NIGHT SKY

When we look up into a clear dark night sky we see the familiar objects that we expect to see. These are the Moon, stars and the planets but if we have access to a telescope or even a good pair of binoculars we can then see other fainter objects that we cannot se with our un-aided eyes (our naked eyes) In this article we will have a look at some of these interesting objects.

THE MOON

First let us consider the most familiar night sky objects and the most familiar of all is the Moon. We do perhaps expect to see the Moon but it is not always easy to find. It is always in the sky somewhere but not always in the night sky. For half of the month the Moon will be in the daytime sky so it is difficult to see especially when it is close to the Sun.

The Moon orbits Earth once every month (about 30 days) so it moves across the sky 360° ÷ 30days = 12° per day (approximately). As the Moon moves around the Earth at 12° per day it will appear in the evening on one day as a thin crescent just above the western horizon after sunset and is called 'New Moon'. Every consecutive day it will appear a bit further (12°) from the western horizon at sunset and the crescent shape will appear thicker. This is because we will progressively see more of the illuminated daytime side of the Moon, we call this the 'Waxing Moon' phases.



The monthly phases of the Moon

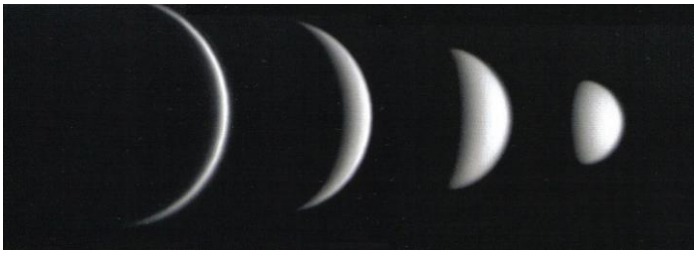
After about a week the Moon will appear as a 'Half Moon' (or First Quarter). It will have moved about 90° across the sky (eastward) and will appear towards the south as the Sun sets in the west. After another week the Moon will have moved another 90° across the sky and will be appearing over the eastern horizon as the Sun sets in the west. It will now be fully illuminated by the Sun and will appear as the 'Full Moon'.

During the third week the Moon will rise later and appear over the eastern horizon later in the evening. After three weeks se see a half Moon (Last Quarter). We are less likely to see the Moon in the fourth week when the Moon will not appear over the eastern horizon until after midnight. During the last week the Moon will appear as a progressively thinner crescent as less of the illuminated side is visible to us on Earth. We call these last two weeks the 'Waning Moon' phases. It is there in the pre-dawn sky but we don't normally see it.

THE BRIGHTER PLANETS

Planets are the other worlds that orbit around our Sun in the same way that our Earth orbits the Sun. The four brightest planets are easy to find if you know where to look. Venus, Mars, Jupiter and Saturn are brighter than any of the stars so they do stand out in the night sky. They are not always visible in the night sky, at times they may be in the daytime sky and very difficult to see against the bright blue sky. Other times they may be too close to the Sun in the early morning or evening.

VENUS is the closest planet to us and is shrouded by thick impenetrable white clouds. The cloud reflects most of the sunlight so Venus always appears very bright. As Venus has an orbit closer to the Sun than Earth it always appears close to the Sun in the sky. It rises before the Sun or will set soon after the Sun so it is often referred to as the Morning Star or the Evening Star. The main interest for amateurs looking at Venus is it shows phases like the Moon.



The phases of Venus

In the image above the view at the right was taken as Venus was emerging from behind the Sun in the west after sunset. It appears smaller because it is further away. The Sun is illuminating a little more than half because Venus is still slightly behind the Sun. As Venus orbits the Sun it moves towards us so it appears larger and the Sun will be illuminating more of the far side and less of the near side so the crescent shape will look thinner. Finally Venus passes in front of the Sun and will not be visible. It will then remerge from the Sun in the early morning and the phases will be reversed as Venus moves back behind the Sun.

MARS occupies the next orbit out from Earth so it can be quite close and can look quite large at times. Mars has a significantly elliptical orbit so it moves closer and further away from the Sun as it travels around its orbit. Earth overtakes Mars approximately every 2½ years. At its closest approach to Earth it can appear quite large but when it is on the opposite side of the Sun to Earth it will look rather small.

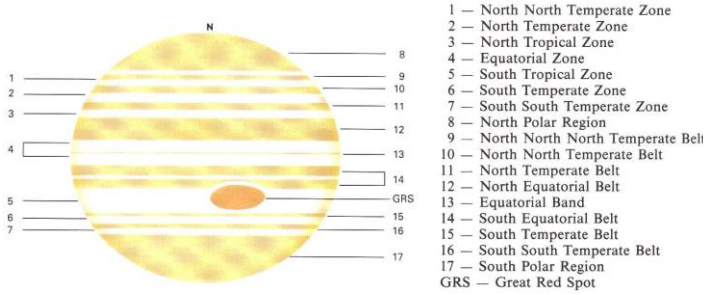
An amateur's image of Mars

Mars has surface features that can be seen using a moderate sized telescope (100 to 150mm). There is an overall rusty colour but darker areas can be made out especially when Mars is at its closest to us. It is even possible to see to see the white polar regions.

JUPITER is the first of the Gas Giant Planets and occupies the next orbit position out from Mars. Jupiter is the largest of all the planets and the most dynamic to observe. Its four largest moons can be seen using a good pair of binoculars or a small telescope. The planet has multicolored cloud bands that continuously change.

Jupiter with three of its brightest moons

Jupiter is large (for a planet) when viewed through a telescope at high magnification. It has darker cloud bands called Belts with lighter Zones between the belts. The two equatorial belts can be seen using almost any telescope but larger telescopes will reveal the other Belts.



Jupiter's Belts and Zones

Jupiter's four brightest Moons can be seen to have moved from night to night. The inner moons Io and Europa can be seen to move over periods of 15 minutes especially when they are positioned close to Jupiter.

SATURN is the most distant planet that can be easily found and seen in detail using a moderate telescope. The surface markings are much more subtle than those on Jupiter but can be seen in a larger telescope. However it is the beautiful ring system that sets Saturn apart from the other planets.

Saturn Imaged by Chris Dole

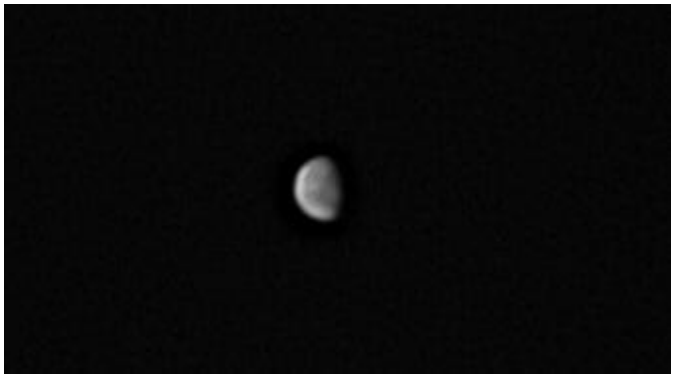
A small beginner's telescope should enable the ring to be seen but detail will be elusive. A telescope with an aperture of 100 to 150mm will reveal some banding on the planet and on a good observing night the Cassini division in the ring may be seen, see the previous image.

Saturn is just moving out of view for this year and is moving ever closer to the south western horizon. It is still just visible at the beginning of this month but the view is not very good. The ring is visible but the image is appearing rather blurred due to the air turbulence close to the horizon and the colours appear separated due to refraction.

THE OTHER PLANETS

The other planets Mercury, Uranus and Neptune are more difficult to find and display very little detail to the beginner using a small to moderate telescope (up to 150mm aperture). These planets appear small and a little uninteresting compared to the planets previous discussed.

MERCURY is the closest planet to the Sun and is at times difficult to find. Mercury is quite elusive because it can only be seen in the twilight sky just before dawn or just after sunset. The keen eyed observer will be able to spot Mercury with unaided eyes even when it is in the bright twilight sky but binoculars should only be used after sunset. Being an 'Inferior' planet (inside Earth's orbit) it does show phases like our Moon and Venus.



Mercury imaged by Chris Hooker

URANUS can be seen in any good quality telescope but does appear small. It looks like a bluish / green 'fuzzy' star-like object. If a high magnification (100x) is used on a 100mm to 150mm telescope, it can be seen as a small disc but no detail will be seen.

NEPTUNE is almost a twin to Uranus but is twice as far away from us so it looks smaller and fainter and more difficult to find initially. It also looks like a bluish / green 'fuzzy' star-like object. Again if a high magnification is used on a 100mm to 150mm telescope it can be seen as a very small disc but no detail will be seen.

Uranus

Neptune

STARS

On a clear night we see the brightest 6000 or so stars but a pair of binoculars will reveal many more. To the naked eye most of the stars appear white with just a few looking a little orange. A telescope will allow us to see some more colour in the stars. A telescope will not make the stars look bigger, they will still appear as a point of light but brighter. If a star appears bigger and can be seen as a disc then the telescope is out of focus.

Larger stars (by mass) are hotter and may appear blue and the smaller and cooler stars may appear red (or more precisely orange). However these smaller stars are very faint so although they are the most common they are very rare to see. Larger stars consume their Hydrogen fuel much quicker and therefore deplete their fuel supply in a much shorter time. When they reach the end of their fuel supply they become 'Red Giant Stars'. They are naturally very bright and some can be seen using a modest sized telescope.

The beautiful double star Albirio in Cygnus

The brighter stars appear to form groups or patterns in the night sky, we call these patterns 'Constellations'. The constellations are used to identify areas of the sky to make it easier for us to find our way around. The brightest members of constellations are shown joined up with lines on star charts to help make them more recognisable. They are also given names generally from ancient mythology. For example Hercules, Orion and Perseus. The double star Albirio in the image above can be found in the constellation of Cygnus and another called Almach in Andromeda. See page 8.

DOUBLE AND MULTIPLE STAR SYSTEMS

Stars often appear as associated double stars also known as 'Binary Stars', triple star systems and higher multiple stars systems can be found. These star systems are attracted by their mutual gravity and orbit about a common centre of gravity. Most stars are thought to reside in multiple star systems and single stars like our Sun are in a minority.

Double stars almost certainly formed together at the same time and from the same cloud of gas and dust known as a 'Nebula'. The stars can be approximately the same size and will rotate around a common centre of gravity half way between the two stars. Some may not be the same size so the centre of gravity will be closer to the larger star and the smaller star will appear to be orbiting the larger star. Rigel in Orion is a good example of this type of double star.

One of the most beautiful 'twin' type double stars is Castor in the constellation of Gemini (the Twins). The two stars are almost identical and are so close together they do need a telescope to separate them. The pair, known as Castor A and B, have a third star orbiting them some distance away which is called Castor C.

A telescopic image of Castor A and B

The image above shows Castor A and B but Castor C is smaller and fainter and off the edge of the image. There is more to Castor than may be thought. All three stars in the Castor system have a smaller companion orbiting very close to them making this a six star system.

STAR CLUSTERS

It is thought that all stars are formed in vast clouds of gas and dust called Nebulae (singular Nebula). These Nebulae are found in the spiral arms of Spiral Galaxies. We will have a look at Nebulae later in this article. The atoms and molecules of the gas and dust are drawn together by gravity and compressed into dense spheres that heat up and begin to radiate as stars. Clusters of stars forming in a Nebula typically number between 30 and 300. The intense radiation from the young stars blows away the remaining unused gas and dust and the new cluster is revealed. These clusters are known as Open Clusters. See page 8 for M11 Open Cluster.

The Pleiades (Seven Sisters) in Taurus

The Pleiades (Seven Sisters) Messier 45 (M45) is a beautiful naked eye Open Cluster that is just coming into view in the east. See the chart on page 10..

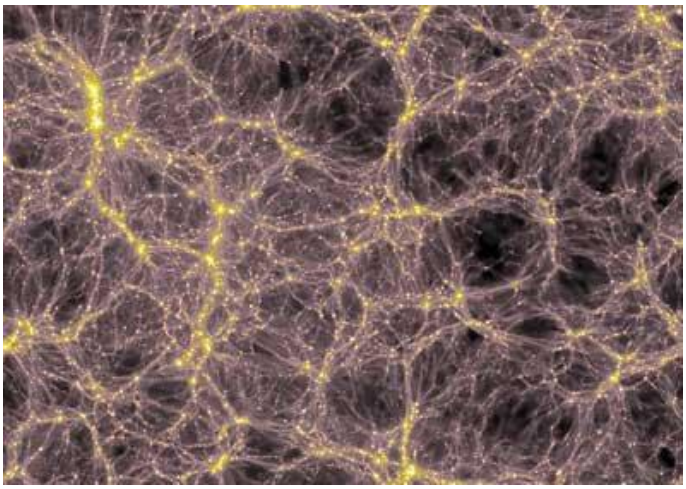
There is another type of star cluster that has a very different origin to an Open Cluster these are known as Globular Clusters. These clusters are not created during the formation of stars they are mainly comprised of very old stars. They are found in a halo surrounding our galaxy and other similar galaxies. Our galaxy is a large spiral Galaxy with about 200 billion stars. This type of galaxy has smaller satellite galaxies surrounding it. When the smaller galaxies stray too close to the giant galaxy its outer stars are pulled off by the powerful gravity of the giant galaxy leaving just the dense core of mostly very old stars. The stars in the centre 'bulge' of spiral galaxies are predominately very old stars just like those found in Globular Clusters.

Messier 13 (M13) a Globular Galaxy in Hercules

Globular Clusters typically have between 100,000 and a million stars in a tight spherical cluster. M13 is one of the 100 or so Globular Cluster to be found around our Galaxy. M13 is the best placed and closest that is visible from the UK and has about 1 million stars. It can just be seen using binoculars and is easily seen using a small telescope but does look best in a larger telescope.

GALAXIES

These are the largest accumulations of stars with the very largest comprised of over a trillion stars. There are three main types of galaxies: Elliptical, Spiral and Irregular. The largest are Giant Elliptical Galaxies, Spiral Galaxies are the most common and Irregular Galaxies are small (as far as galaxies go) with no discernible shape. There are trillions of galaxies in vast filaments filling the Universe as far as we can see.

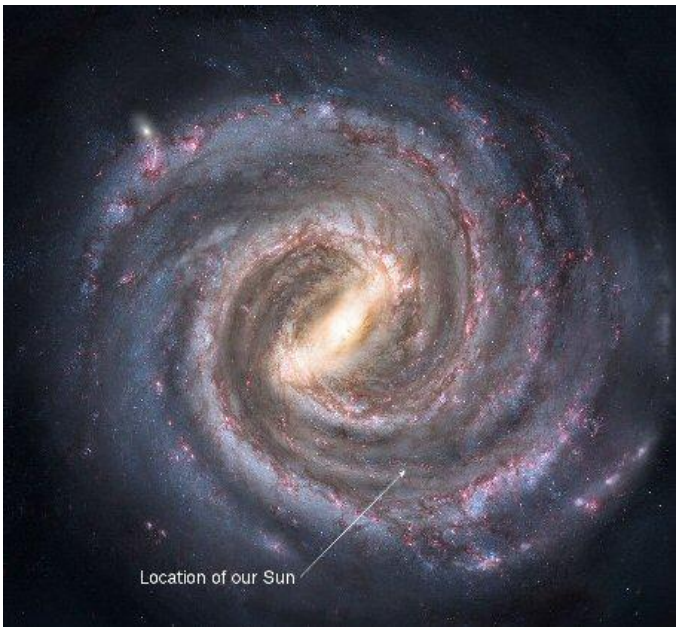


Vast filaments of Galaxies fill the Universe.

Galaxies are the main building blocks of the Universe. On the largest scales of the structure of the Universe, Trillions of galaxies form 'spider web like' filaments that transverse the whole Universe. All the known matter of the Universe appears to be concentrated in these vast filament networks with huge voids between them where there is virtually no matter.

There are concentrations of galaxies at the intersections of the filaments where there are Super Clusters of Galaxies. See the computer generated image showing the structure of the universe on the previous page.

Our Galaxy is a Giant Barred Spiral comprised of about 200 billion stars. Barred spiral galaxies are a subdivision of spiral galaxies where the curved arms spread out into a flat disc from the ends of a bar of stars concentrated at the centre of the galaxy.



An artist's impression of our Galaxy the Milky Way

There a three local galaxies that can be seen with the naked eye. These are: the Great Spiral Galaxy in the constellation of Andromeda (M31) and the Large and Small Magellanic Clouds. The Magellanic Clouds are two small irregular galaxies that are satellite galaxies of our Milky Way Galaxy. The Magellanic Clouds can only be seen from the southern hemisphere. The Great Spiral Galaxy in Andromeda (Messier 31) is a sister of our own Galaxy located 2.4 million light years away. It can be seen with the naked eye on a clear night, looks good using binoculars and great using a telescope. See page 8.

The Great Spiral Galaxy in Andromeda (Messier 31)

All the other galaxies that can be seen in our sky do need a medium sized telescope to see well (100mm to 150mm aperture). Looking at galaxies does require a dark sky away from light pollution. This provides a good contrast that will enable us to see the faint structure.

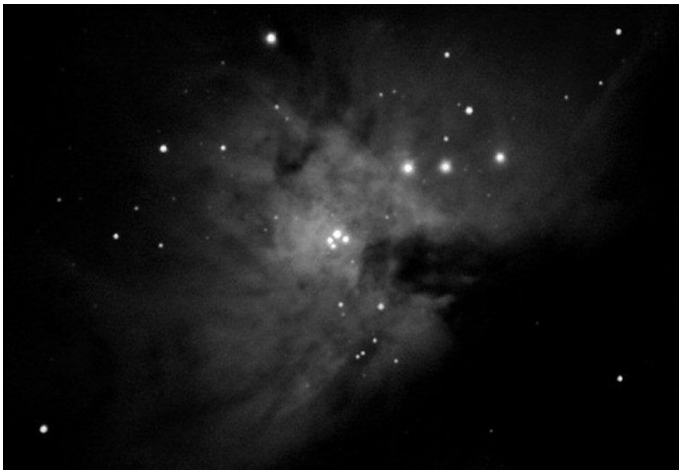
NEBULAE

A nebula is a general term for objects that appear 'fuzzy' when observed using a telescope. They are generally gaseous objects and come in two wide ranging types: clouds of gas and dust, the remains of extinct stars.

GAS CLOUD NEBUAE

Spiral Galaxies are composed of huge amounts of Hydrogen gas and stars that have formed from the Hydrogen gas, predominately in the spiral arms of the galaxy. Galaxies do contain huge amounts of 'Dark Matter' but that is a subject to be discussed elsewhere.

The best known gaseous nebula is the Great Orion Nebula known as Messier 42 (M42). This is the closest large bright nebula to us, from our view point in our galaxy. In the image of the Milky Way Galaxy on the previous page, M42 is located just to the left of the location in our Solar System indicated by the point of the arrow. Orion is a beautiful winter constellation.



The Orion Nebula Messier 42 (M42)

Messier 42 is located in the line of stars that represent Orion's (the Hunter) sword that appears to hang from his belt represented by the line of three bright stars. A hazy patch can just about made out with the naked eye but is easy to see using binoculars.

The Great Orion Nebula is in fact just a small portion of a vast cloud of Hydrogen gas, mixed with some dust, in a neighbouring spiral arm known as the Orion Arm in our galaxy. We can see this part of the greater nebula because it is being illuminated by young stars forming in the nebula. The four brightest stars, known as the Trapezium, are superimposed on the image above.

As stars form in the nebula they produce very powerful ultraviolet radiation. This behaves like a powerful wind that drives any free gas away and the young stars are revealed. The powerful light radiation illuminates the surrounding gas to produce the glowing part of the nebula that we see. Parts of the nebula in front of the stars block some of the light and they appear as dark clouds silhouetted against the brighter parts of the nebula. A telescope is required to see the structure of the Nebula and it is best seen when the sky is clear and dark away from street lights.

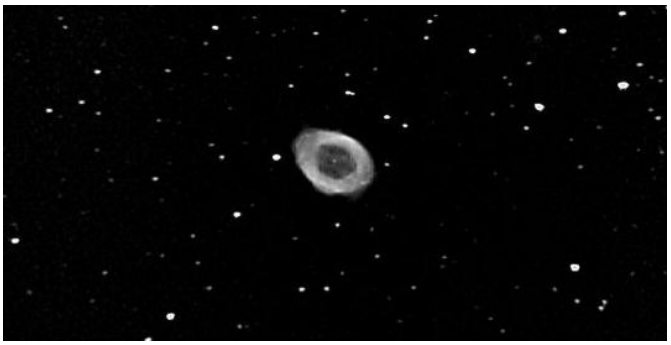
PLANETARY NEBULAE

Contrary to what the name implies, Planetary Nebulae are nothing to do with planets. They are actually the remains of dying stars. We use the terms 'born', 'life' and 'death' to describe to help describe the creation and destruction of stars but they are not living entities in the same way as us living creatures. However the existence of stars does follow closely the life pattern of living creatures.

Stars are 'born' in a Nebula (a cloud of Hydrogen gas and dust) as we have previously discussed. They 'live' out the bulk of their 'lives' shining as a relatively stable star then 'die' as their Hydrogen fuel runs out.

The life span of a star is very much dependant on the size (mass) of the star. Small stars use their fuel slowly and 'live' long but large stars 'guzzle' their fuel and are short 'lived'. The 'death' of a star is also very dependent on its mass.

Smaller stars and those up to about three times the mass of our Sun 'die' a gentle 'death'. As they start to exhaust their fuel supply they become bloated and grow into a 'Red Giant'. When their fuel eventually runs out the Nuclear Fusion process that has powered the star for 10 billion years or more stops. As there is no longer radiation energy to resist the force of the star's own gravity it slowly collapses to become a tiny and highly compressed White Dwarf Star. The tenuous outer regions of the Red Giant drift off in a gas bubble to form a beautiful Planetary Nebula around the White Dwarf.



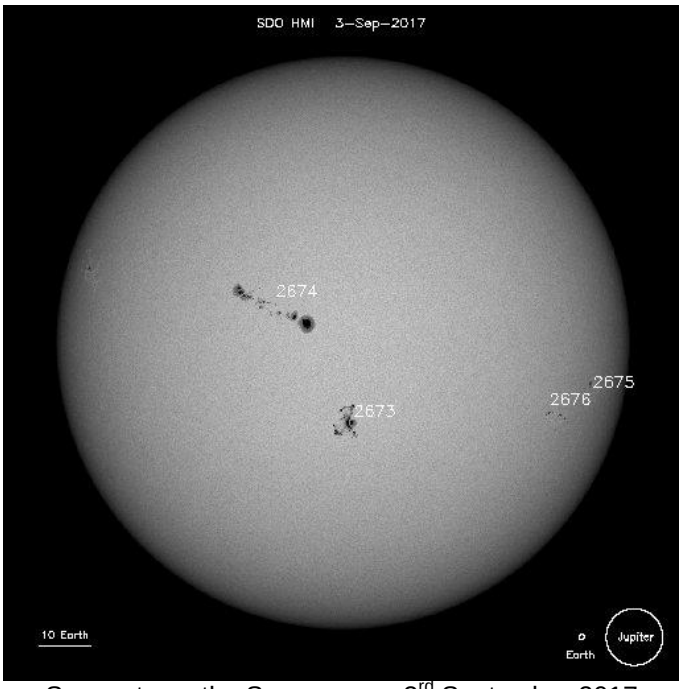
M57 the Ring Nebula a Planetary Nebula in Lyra

Massive stars use their Hydrogen fuel much quicker and 'die' young. They also expand to become a Red Giant but their 'death' comes suddenly. In an instant the giant bloated star will suddenly collapse under its own massive gravity. As it collapses the pressure and heat very rapidly increase until a runaway Thermonuclear detonation destroys the star in a Supernova Explosion.

M1 the Crab Nebula a Supernova Remnant

GIANT SUNSPOTS IN SEPTEMBER 2017

During the period over late August and early September Solar observers were surprised to see a magnificent display of sunspots. The surprise was due to the Sun being at Solar Minimum when there should not have been any significant sunspots.



Sunspots on the Sun seen on 3rd September 2017

The Sun does have many cycles in its activity but the most significant is the 11 Year Cycle. This is a periodicity where there is a noticeable increase in solar activity that is particularly evident by the appearance of an increase in the number of Sunspots on the Sun.

Sunspots are caused by the magnetic field of the Sun as it affects the visible surface. Put simply the lines of magnetic force cause a hole to appear and the slightly cooler layer below to become visible. As this lower layer is about 1000°C cooler so it appears less bright and a darker spot appears.

The Sun is predominately composed of Hydrogen gas and is therefore fluid. With the enormous pressure inside the Sun the hydrogen deep beneath the surface behaves like a metal and is known as Metallic Hydrogen. As the various layers down through the Sun are turbulent and move at different speeds and direction a very powerful magnetic field is generated. Like all magnets the Sun has a North and South Pole with the magnetic lines of force connecting the north and south poles.

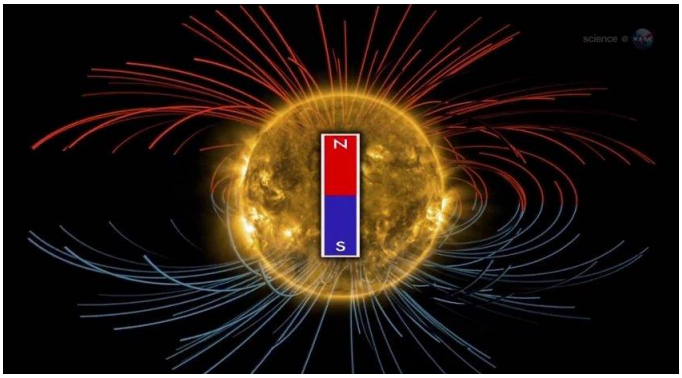


Diagram showing the magnetic field of the Sun

As previously stated the Hydrogen gas and molten Metallic Hydrogen are fluid and are able to move freely around and through the Sun. The Sun is rotating as a body about once a month but the equatorial region rotates faster than the poles. This has a major effect on the lines of magnetic force between the poles.

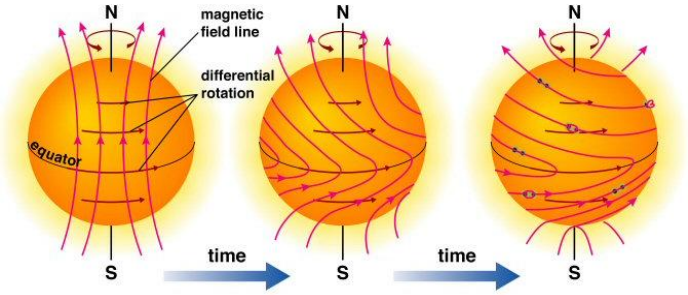
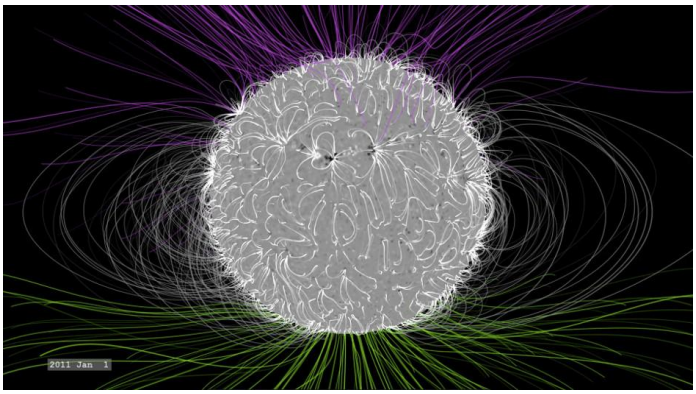


Diagram showing the movement of magnetic forces

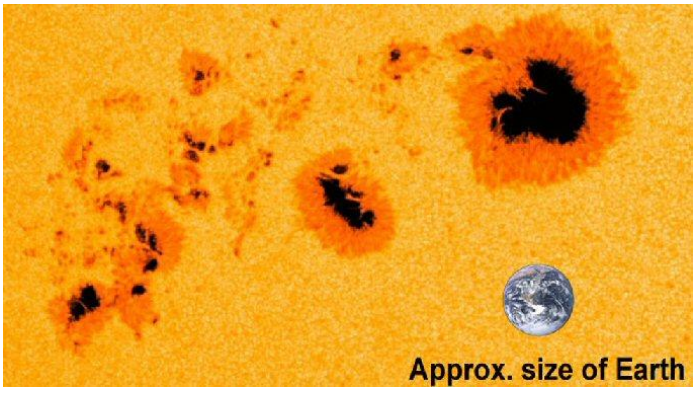
As the equatorial region moves faster than the polar regions the magnetic field is pulled along with the equatorial region. Over a period of about five years the magnetic field will have been distorted so much that the magnetic force lines begin to break and disrupt the surface layers of the Sun.

The magnetic field begins to break up causing major disturbances on the Photosphere (the visible surface of the Sun). The diagram below shows how the disrupted magnetic forces erupt all over the upper layers of the Sun.



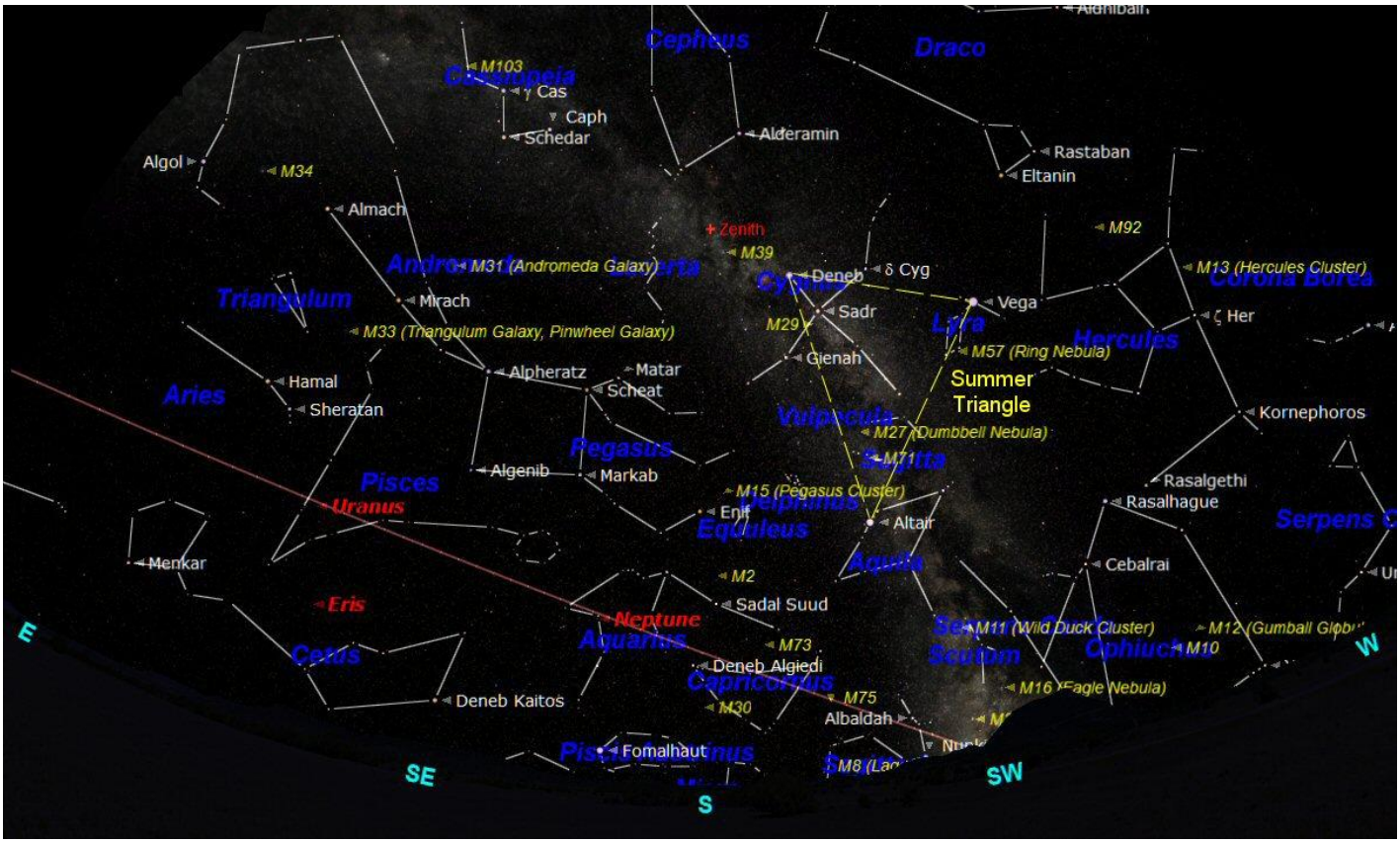
Disrupted magnetic forces on the Sun

Activity on the Sun builds for about five years then breaks down over the following five years. Solar activity decreases and the magnetic field begins to rebuild to end this cycle. We should be in a quiet period now so the sunspots seen last month were unusual.



Large sunspots compared to the size of Earth

THE NIGHT SKY - OCTOBER 2017



The chart above shows the night sky looking south at about 22:00 BST on 15th October. 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 Open Cluster M11 the Wild Duck Cluster is well worth searching out with a telescope.

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. The Milky Way (our Galaxy) flows through the Summer Triangle passing through Cygnus, down to the horizon in Sagittarius. See the 'SW' point on the horizon on the chart above.

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 (the Queen).

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 Great Square can be used to judge the condition of the sky for observing. If five or more stars can be seen within the square then the sky should be good enough for some serious observing. If only two or three stars can be seen it should be alright for observing. If no stars can be seen it might be an evening to do something else.

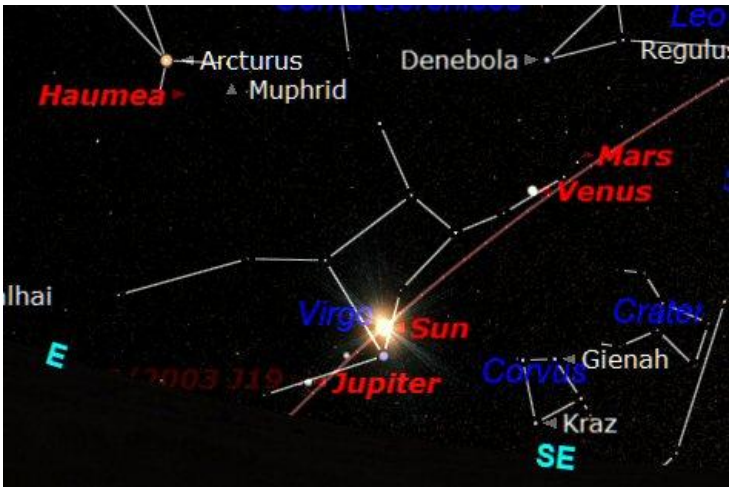
Using the stars of the Great Square as a starting point there are a few interesting objects to search out. From the star Markab at the bottom right corner follow the 'kinked' line of stars to the right (west) to the star Enif. Using binoculars follow the line up from Enif about the same distance as Enif is from the previous star in the line and a small 'fuzzy' patch will be seen, this is a nice Globular Cluster M15. From the upper left star Alpheratz follow the lower line of stars in Andromeda to the 2nd star Mirak. From Mirak move up two stars and to the upper left of the second star is another 'fuzzy' patch, this is the M31 the Great Spiral Galaxy in Andromeda.

If we continue along the lower line of stars of Andromeda we come to the star called Almach. This is a beautiful double star. It is not a true associated double star the two stars are just a 'line of sight' double. One star is golden colour and the other more distant star is blue similar to Albirio in Cygnus. See page 4.

THE SOLAR SYSTEM THIS MONTH

MERCURY rises in the east at 05:40 at the beginning of the month and at 06:45 at the end of the month. The smallest planet will be too close to the Sun and will not be visible this month.

VENUS is moving back towards the Sun and will just be visible above the eastern horizon before the Sun rises. It rises at about 03:45 at the beginning of the month and 04:55 by the end of the month. It will be rising an hour before the Sun so will need a clear view towards the eastern horizon before the sky begins to brighten at about 05:30. See the chart below. The sky has been darkened so the positions of the planets and the Sun can be seen.



Venus, Mars and Jupiter in the east after sunrise

MARS will be rising east at about 04:00 this is two hours before the Sun rises. The Red Planet appears small at just 3.8 arc-seconds in diameter but is quite bright at magnitude +1.8. Mars will be very difficult to see just above the eastern horizon especially as the sky brightens. See the chart above.

JUPITER is moving into conjunction with the Sun on 26th October so it will not be visible this month. For the rest of this year Jupiter will be in the daytime sky and will not be observable. See the chart above. The sky has been darkened on the chart to show the location of the planets

SATURN will be giving us our last chance to see it at the beginning of the month as the Sun is setting. The Ringed Planet appears small at 16.0 arc-seconds in diameter but is quite bright at magnitude +0.5. It is now moving towards the western horizon so it will have to be found as soon as it is dark enough because it sets at 20:00. See the chart below.

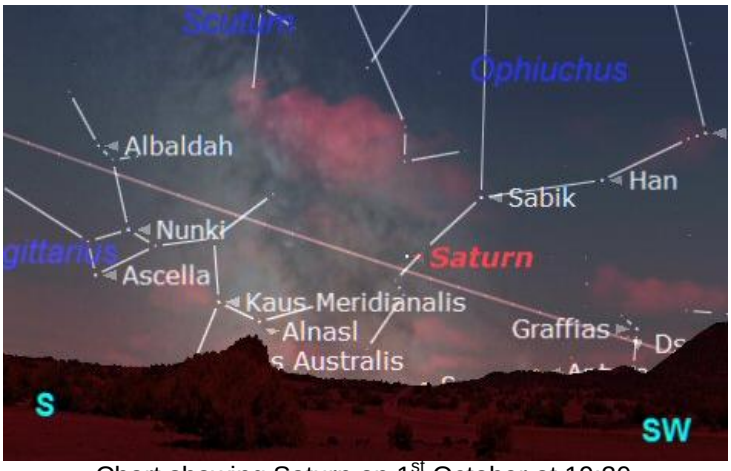
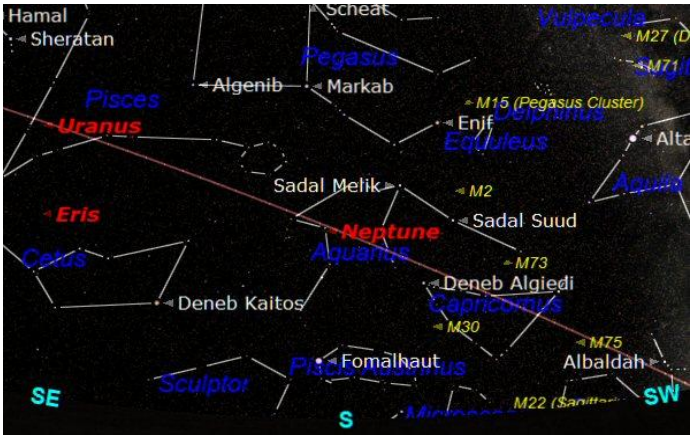


Chart showing Saturn on 1st October at 19:30

URANUS will be in a very good observable position this month as it will be at opposition on 19th October. This means it will be due south at midnight (01:00 BST). It will be quite high in the east soon after the sky is dark. It will be better placed at around 22:00 in the evening. Using a good pair of 10x50 binoculars a slightly fuzzy blue, star like, object can be seen. A telescope at a magnification of 100x will show it as a small blue/green disc.



Uranus and Neptune at about 22:00

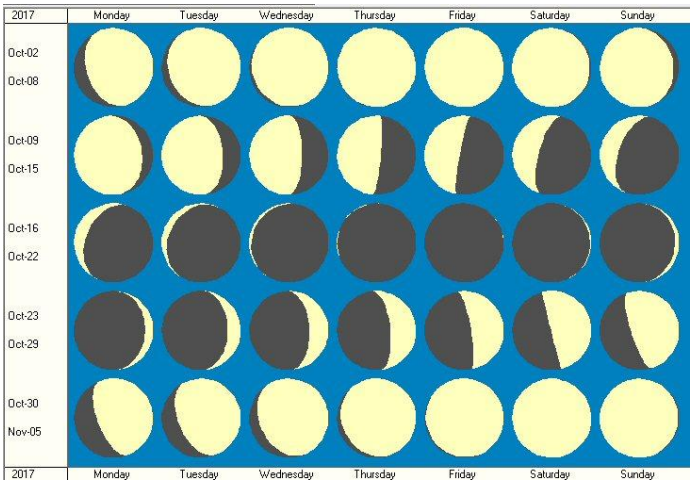
NEPTUNE will be visible in the south as soon as the sky is dark. It was at opposition (due south at midnight – 01:00 BST) on 2nd September so was at its best position for observation this year. A telescope will be needed to show Neptune as a small blue/green disc using a magnification of 100x but it is small and difficult to find.

THE SUN

The Sun has been quite active over the last couple of months some very nice sunspots even though the active phase of the Solar Cycle is drawing to a close.

The Sun rises at 06:00 at the beginning of the month and at 06:45 by the end of the month. It will be setting at 17:25 at the beginning and 16:45 by the end of the month. Sunspots and other activity on the Sun can be followed live and day to day by visiting the SOHO website at: http://sohowww.nascom.nasa.gov/ .

THE MOON PHASES IN OCTOBER



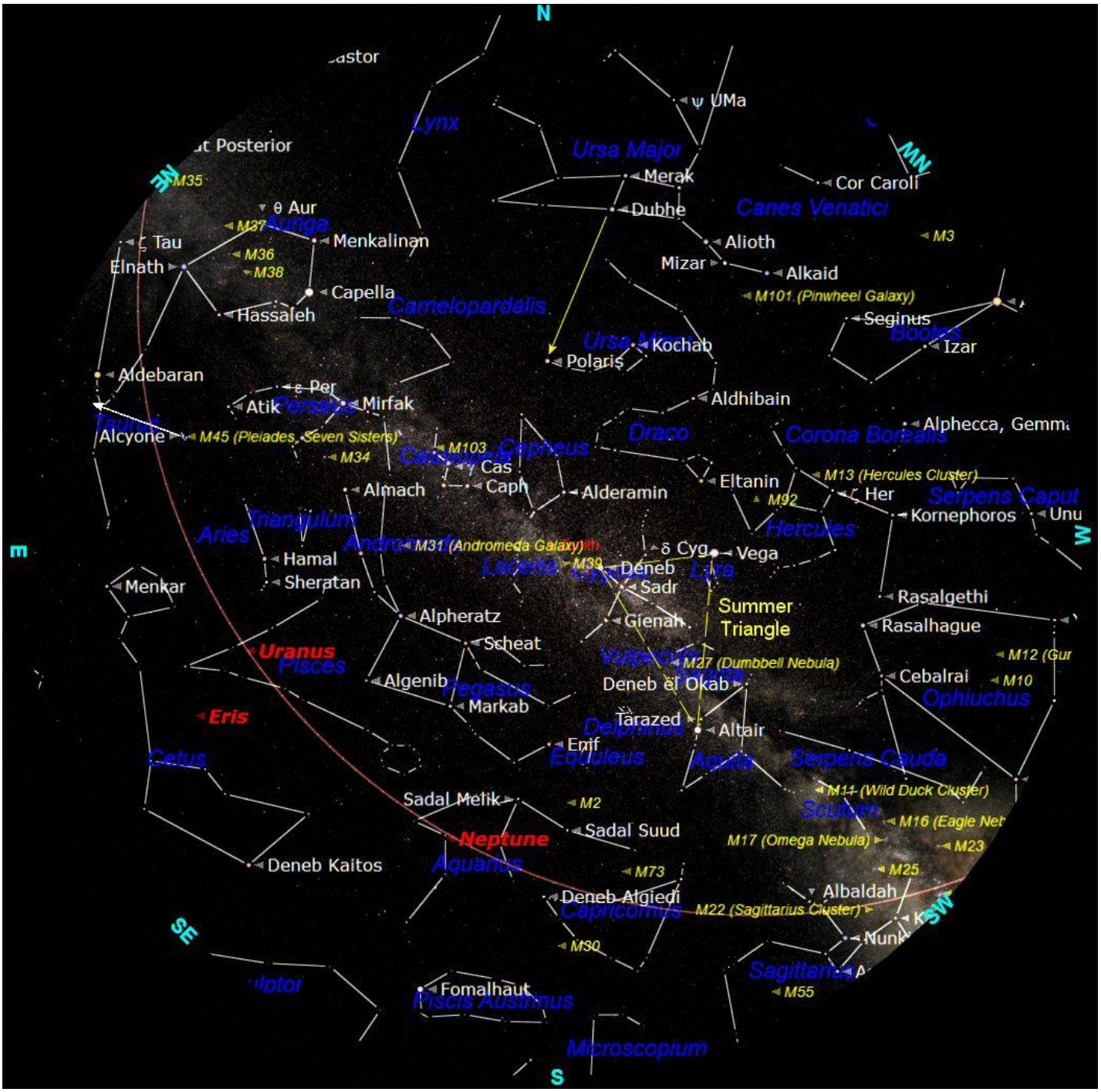
Full Moon will be on the 5th October

First Quarter will be on 12th October

New Moon will be on 19th October

Last Quarter will be on 27th October

THE NIGHT SKY THIS MONTH



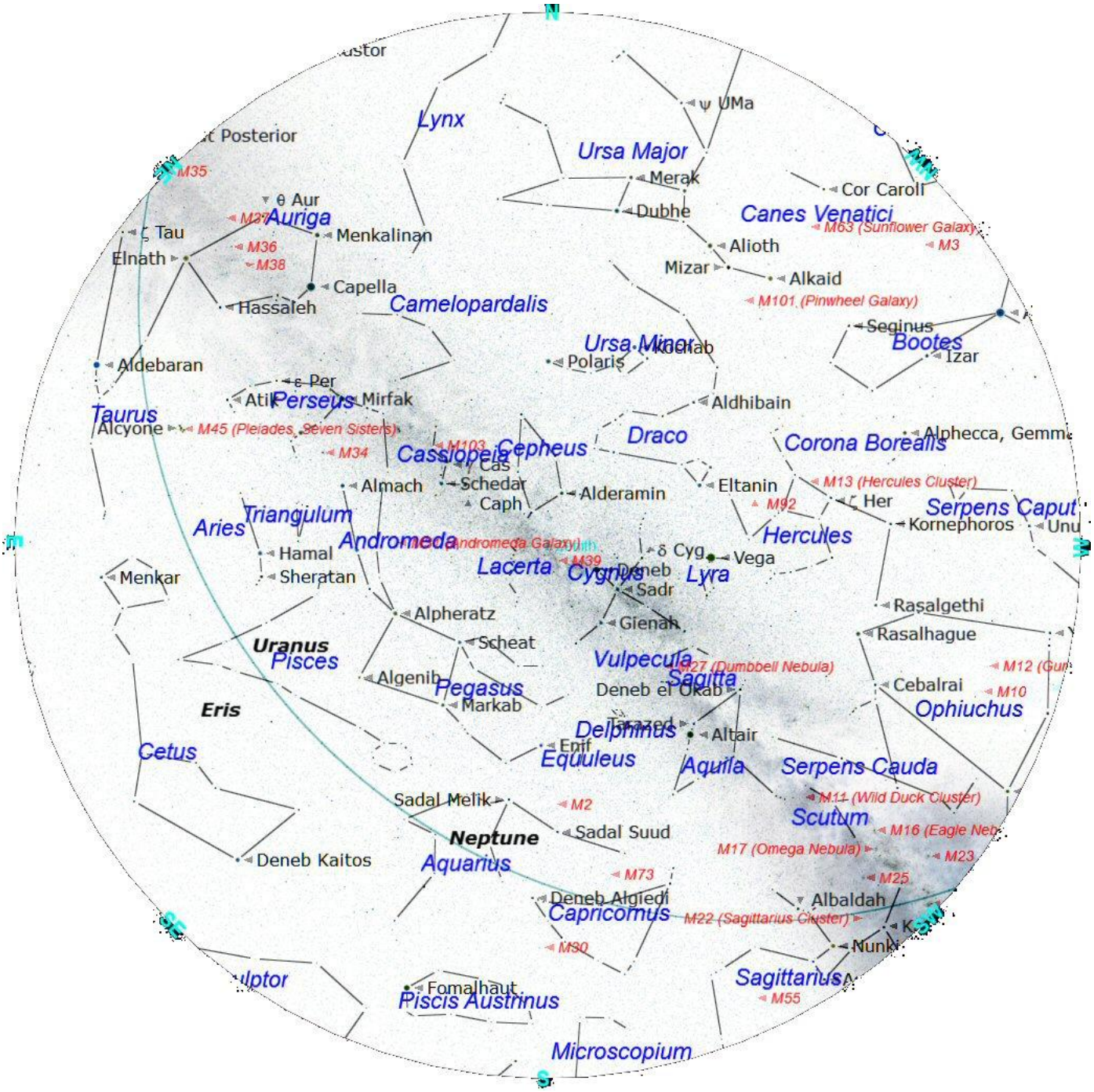
The chart above shows the night sky as it appears on 15th October at 21:00 (9 o'clock) in the evening British Summer Time (BST). As the Earth orbits the Sun and we look out into space each night the stars will appear to have moved across the sky by a small amount. Every month Earth moves one twelfth 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 10 o'clock BST at the beginning of the month and at 8 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 easy to find. This month it is close to the northern horizon. 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 this month: Saturn (very early evening) with Uranus and Neptune throughout the night.

THE NIGHT SKY THIS MONTH

This chart below is included for printing off and use outdoors



Position yourself looking south and hold the chart above your eyes with south at the bottom.

The chart shows the sky at 22:00 on 15th October 2017