NEWBURY ASTRONOMICAL SOCIETY
BEGINNERS SECTION MAGAZINE – SEPTEMBER 2009

NAS TWITTER HITS WORLD HEADLINES

Newbury Astronomy Society made the news around the world last month with its groundbreaking Meteor Watch on 'Twitter'. Twitter is the latest interaction application to hit the internet and Newbury was first to use it for live astronomical observations that could be followed by people all around the world.

The Perseid Meteor Watch was not the first event staged by Newbury Astronomy Society it followed the very successful Moon Watch a month before. Moon Watch paved the way by making contact with twitter followers ranging from professional astronomers, amateurs and people with little previous knowledge of astronomy. As twitter works by people following other people around the twitter sites the numbers following the Perseid Meteor Shower grew rapidly.

The base used for the Meteor-Watch was from Adrian West's garden shed, named 'The Astro-Bunker' for the event.

The 'ASTRO-BUNKER' (Adrian's shed)

Live video from a night-shot camera fitted with a Fish-Eye lens was relayed live to a lap-top in the Astro-Bunker. A clever computer programme automatically selected video sequences that recorded something move in the sky, such as a meteor or more commonly aeroplanes and satellites. The video sequences that had captured meteors were published on the internet for twitter followers to see. Soon after the twitter had started at 21:00 on 11th August hundreds of messages began to be received. It required six laptop operators in the Astro-Bunker to reply to the storm of messages coming in from all over the world.

To make things even busier interviews were from the Astro-Bunker to BBC TV South News, BBC Radio Live 5 and ITV News. Adrian also gave a live telephone interview to SKY.

Adrian West speaking live on Twitter

THE PERSEID METEOR SHOWER

The Perseid Meteor Shower was active throughout most of the first half of August with an expected peak from 11th through to 13th August. Sharp extra peaks were also expected during the evening of 12th and the early morning of 13th August. However the actual hourly rate on the night of 11th (the 1st night of the Meteor-Watch Twitter) were lower than expected but a very bright meteor was seen at about 02:15 on 12th August.

A Perseid Meteor imaged by Richard Fleet on 11th August

On the night of 11th / 12th August the Moon was low but being half and bright combined with a misty sky many of the fainter meteors were not detectable.

NOCTILUCENT CLOUDS

Noctilucent Clouds imaged by Mike Harrison 20th July

These special clouds are at the very top of the atmosphere up to 80 kilometres above sea level. When the Sun is below the horizon and all other types of cloud are in darkness, they may be seen against the lighter sky in the north after sunset and through the night. The Noctilucent Clouds are so high they remain in the sunlight and appear as silver wisps and ripples.

THE NEXT BEGINNERS MEETING WILL BE

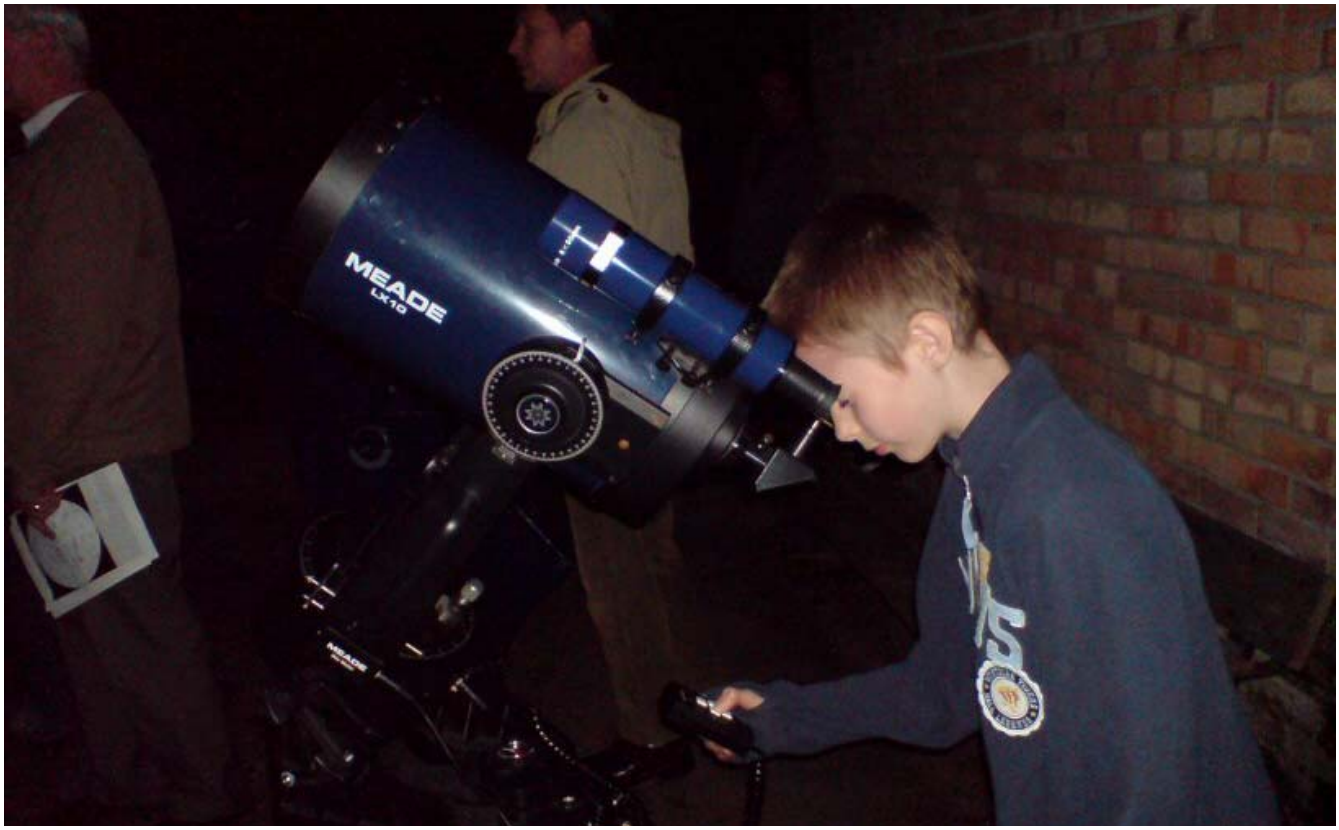
21st October Observing Meteors

THE NEXT SPEAKER MEETING WILL BE

2nd October Dark Matter Astronomy

For all the latest news, don't forget to visit our website on: **www.naasbeginners.co.uk**

SETTING UP TO OBSERVE



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. It is not necessary to have a telescope indeed many seasoned astronomers will spend time gazing into the night sky with just the equipment that nature has given them, 'their eyes'. A pair of binoculars can be useful to help pick out some of the fainter interesting objects so that could be the first step towards buying equipment. A star chart and a pair of binoculars if they are available are the only equipment that is necessary to get started.

The next prerequisite is a clear night. Unfortunately these are usually best in the winter so warm clothing is essential. Make sure you start 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 only shine with a dimmed light. A 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 20 – 30 minutes for our eyes to become fully adjusted to the dark but a flash of 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 towel 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. A garden lounger chair is ideal for this purpose but a plastic sheet and a blanket on the ground would do fine.

Now down to some serious observing. Allow at least 5 minutes for your eyes to become accustomed to the dark. This time can be used for setting up and getting comfortable. Get all of your equipment out first then turn any lights off and finish setting up using torch. Unless you are looking for something specific, position the chair so it is facing south but this is not essential. Have a look around the sky and pick out the brighter stars and see if any form what appear to be associated groups or patterns. Next get the star chart ready for use. If you do not have a chart the one included on page 6 of this magazine will do.

Star charts need to be orientated according to the time of year so that it can be aligned to the sky on the night it is being used. This is because the stars appear to change their position slightly from night to night due to Earth moving around the Sun on its orbit. It is rather like sitting on a round-about at the fair. As it turns and we look out on the fairground, we will see the other rides and attractions pass by. On Earth as we journey around the Sun we can look out into space at about the same time every night and see a different part of space passing by.

Earth takes 365¼ days (a year) to complete one orbit of the Sun. A circle (the approximate path of Earth's orbit) is normally divided into 360 degrees therefore we could say that the Earth moves approximately 1 degree around the Sun per day. This means that viewed from Earth, the patterns of stars in the sky appear to move approximately 1 degree from east to west every night. Put another way in 30 days (a month) the sky appears to move 30°. There is however an added complication caused by the rotation of Earth. Earth rotates once every 24 hours (1 day). Again we can say one rotation is 360 degrees so the sky appears to move 15° per hour (360° ÷ 24) due to Earth's rotation on its axis.

A star chart is the only equipment that is really necessary to get started. A planisphere chart is very useful and can be obtained from W. H. Smith and other large book shops. Planisheres can also be bought through the adverts in popular astronomy magazines such as Astronomy Now.

A Philips Planisphere

A planisphere has a rotating, transparent window that shows the view of the night sky for any day of the year. The time and date can be set by simply lining up the time (GMT) with the date on the calendar marked around the outside of the instrument. To use the planisphere hold it up when facing to the south. The oval shaped window shows the stars and the patterns that they form (constellations) for the set night.

The chart on page 6 shows the sky at 10 o'clock BST on 1st of the month. At 9 o'clock the sky will appear 15° to the east and at 11 o'clock 15° further to the west.

So what are constellations? Those bright stars we looked for earlier, that appear to form patterns in the sky, are the constellations. The chart on page 6 shows some of the internationally accepted constellations of which there are 88 covering the whole sky. The chart shows the brightest stars joined by lines to denote the grouping for each constellation. Many of the constellations in the northern hemisphere are named after characters from Greek mythology and mostly originate from ancient times.

Very few constellations look like the character they are named after. Cygnus the Swan, Leo the Lion and Orion the Hunter are perhaps exceptions and do (with a little imagination) look remotely like those characters. The stars making up the constellations are not generally physically associated but are simply formed by a 'line of sight' effect.

Astronomers use the recognisable patterns of the constellations to find their way around the sky. Constellations do have borders as shown in the chart on page 6 but they are not important because they can't be seen in the sky. The pattern of the brightest stars is the important thing. Once the familiar pattern has been found it can be used to find other constellations or an interesting object within the pattern or close by. It is important for an astronomer to be able to recognise at least the brightest and most familiar constellations. Time spent learning to find the way around the night sky will be of great benefit as the hobby of astronomy develops.

Now for some astronomy do's and don'ts.

Keeping warm has already been mentioned and needs mentioning again. Nothing takes the edge of enjoying a hobby than being uncomfortable and being cold can be very uncomfortable. Make sure that warm clothes are worn even on a summer night. A coat can be unbuttoned a hat or gloves can be temporarily removed if too hot but it is difficult to get warm again after the cold has set in.

Try to set up as much of the equipment you will be using before it gets dark. Things are much more difficult to do in the dark.

Make sure all your equipment is close to hand and you know where it is. Using a torch or having to go indoors to find something you have forgotten can ruin you dark adaptation for up to 20minutes. A fold up table is very useful to keep all you need in one place and easy to find.

Make sure you turn off all the lights that you can. A small gap in the curtains can seem insignificant when you first settle down to start observing. Once your eyes have fully adapted to the dark those little gaps gradually begin to feel like bright search lights and may reduce what you can see.

Always use a dimmed torch to read your star chart and to see if you need to make notes.

Above all make sure you are comfortable. There are many aspects about being comfortable to be considered but all will help to make sure the observing session will be enjoyable.

First of all let us consider the clothing to wear. Obviously this will depend on the time of year and the expected temperature. The best nights for observing are those clear, crisp and cold winter nights. The winter is best because the sky gets really dark and this gives the best contrast to pick out those elusive faint objects. However these nights tend be the coldest nights and can be frosty.

Always wear a hat because a lot of our body heat can be lost through the head. Then a warm coat is an absolute necessity. A lot of pockets are an advantage for keeping eyepieces warm, this helps to stop them misting up when they are being used. Depending on the expected temperature one or two jumpers can be worn then a thick shirt and a thermal vest.

Gloves should be worn even if the finger tips have been cut off to make it easier change eyepieces or adjust the focus. Two layers should be worn on the legs so don't be shy about wearing thermal underwear (long-johns) they really make a difference. Wear your warmest shoes and two pairs of socks or a pair of walking socks. The first part of the body to feel the cold is often the feet.

Secondly, a must is comfort in the viewing position. When possible observe in the seated position. It is better for the legs, back and helps stop wobbling around when trying to concentrate on what you are looking at through the eyepiece. If it is not possible to sit because of the type of telescope being used or the elevation of the object being observed then try to hold on to something. A small set of steps is very good for this. For low positions the bottom step can be sat on then the second to get a bit higher. If the steps have a hand rail then 'all the better'. The hand rail can be used to hold on to just to steady the observer. So the advice is: keep warm and avoid aches and pains.

JUPITER KING OF THE PLANETS

Jupiter has been in view throughout the summer months but unfortunately it has been very low in the sky and difficult to see in the light summer evenings. However now the evenings are drawing in we, have an opportunity to observe this the most colourful of the planets.

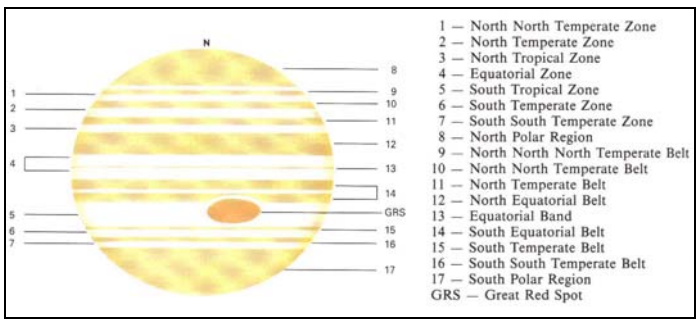
Jupiter is the largest of all the planets and is over ten times the diameter of Earth. Unlike the four inner planets Jupiter has no solid surface because it is comprised almost entirely of gas, although it may have a small rocky and metallic core.

As the fifth planet out from the Sun it has an orbit approximately 778 million km from the Sun and its diameter at the equator is 142,984 km (Earth 12,756 km). Its volume is large enough to swallow all the other planets. Despite being so large Jupiter rotates very fast, in fact, a day on Jupiter is equivalent to only 9.9 Earth hours. This is so fast that the centrifugal force of the spin causes the planet to bulge noticeably at its equator.

The surface of the planet has many bands or 'belts' of different colours some of which can be seen even in a small telescope. These belts are mainly different shades of browns with variations from white through orange to chocolate brown. There are even reds especially in the famous giant Red Spot although it is in fact more pink than red. The Red Spot is a massive storm larger than the size of the Earth that has been raging since before the invention of telescopes and observed by Galileo 400 years ago.

Jupiter imaged using a web camera

The darker bands on the clouds are known as 'Belts' and the lighter ones known as Bands. The belts and bands numbered 12 to 14 in the diagram below are the most prominent and can be seen using a small telescope. A larger telescope is needed to make out the details of the other bands.

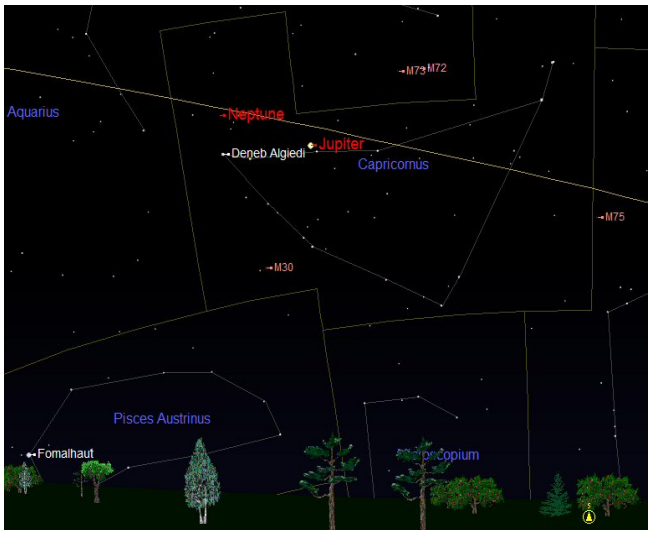


The cloud markings on Jupiter

Jupiter has a small tilt angle 3.07° compared to many of the other planets including Earth at 23.45°. Consequently its moons regularly appear to pass in front and behind the planet. This can make observing Jupiter very interesting. See Page 5.

OBSERVING JUPITER

Unfortunately Jupiter is positioned rather low in the southern sky this year, in the constellation of Capricornus. Being so near to the horizon it is seen at a low angle through the thickest part of Earth's atmosphere. The air close to the ground is also dirty and turbulent.



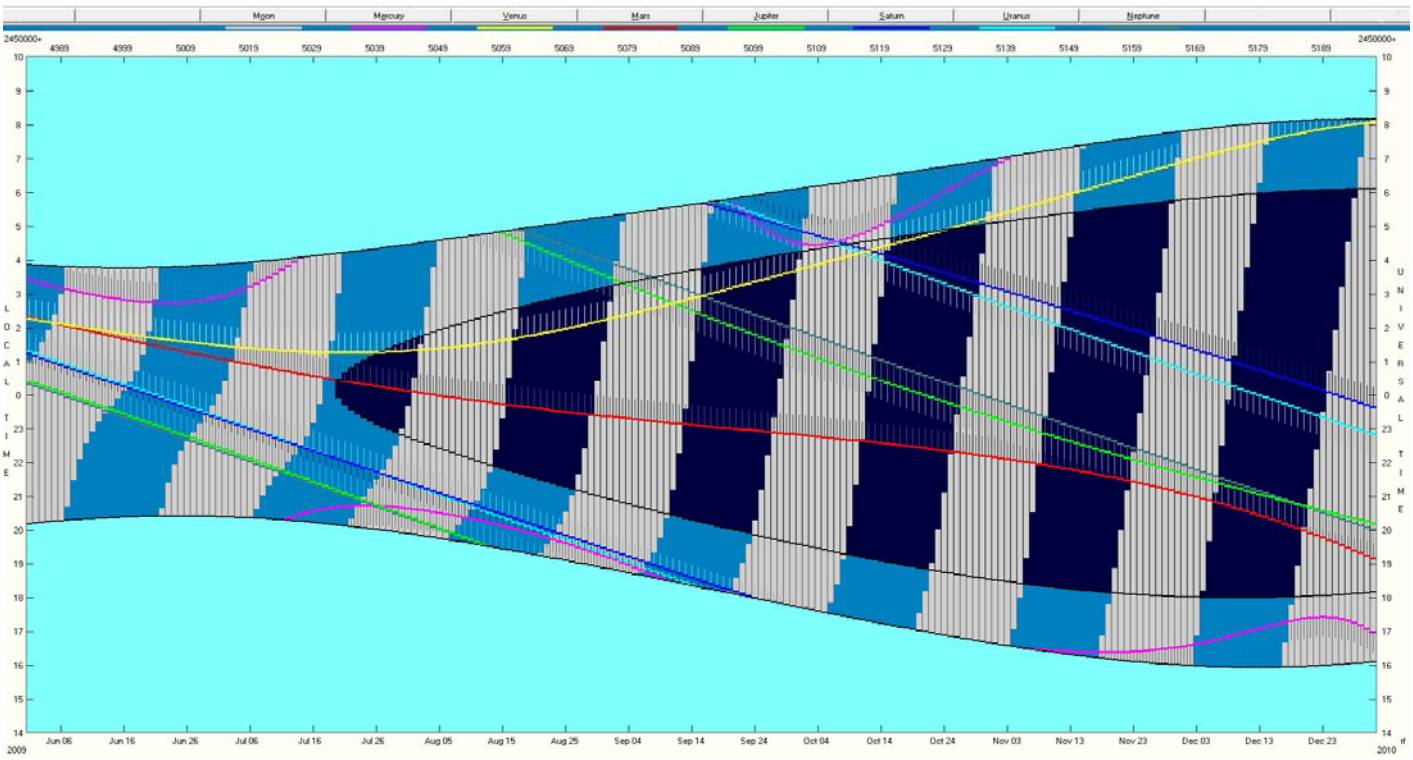
Jupiter and Neptune in Capricornus (See Page 6)

Despite being in an unfavourable position Jupiter will be easy to find. It is brighter than any other object in the southern sky and will be obvious to the naked eye. It will not be possible to see any detail with the naked eye but it will appear as a very bright star. Using binoculars the bright star like object will appear slightly yellow and larger than the stars. A powerful pair of binoculars will show the four brightest moons. The moons will appear in a line to either side of the planet but in different positions from night to night.

Jupiter and two the four Galilean Moons on 28th August

A small telescope will show the moons clearly and the coloured bands of clouds on the surface start to become visible. Larger telescopes will show more of the bands and even some of the swirls of gas in them. There are also spots within the bands with the largest and most famous being 'The Great Red Spot'. White spots often appear and move around the planet within the bands. Sometimes they merge to form larger spots or are swallowed up by the larger spots.

One of the most interesting things to observe is the positions of the moons from night to night. A computer planetarium application like Starry Night will show the positions of the moons in real time. The moons can be identified and transits (moons moving across the planet) and occultations (passing behind the planet) predicted then observed and timed.



THE SOLAR SYSTEM SEPTEMBER 2009

The chart above is from Richard Fleet's GRAPHDARK application that can be downloaded free from his website at: www.rfleet.clara.net .

The dates for the last six months of 2009 are shown along the bottom of the chart and the time up the sides. The areas shown light blue at the top and bottom indicate daylight. The lower thick curved line shows the start of dusk and the upper shows the end of dawn (full daylight). The conical curved black line shows full darkness and it shows that the sky did not become completely dark until the end of July. The thinner curved black lines show the legal 'lighting up' times. The curved vertical bands show the Moon phases (white when the moon is in the sky, black it is not). The coloured lines show the times when the planets are visible.

MERCURY may just be seen at the end of the month very close to the eastern horizon at dawn, will be better in October.

VENUS rises over the eastern horizon at about 03:50 and will be very bright until the sky brightens at dawn. Venus is moving away from us and will soon pass behind the Sun. Through a telescope it will appear gibbous (nearly full as with the Moon) but quite small at nearly 12 arcseconds in diameter.

MARS rises in the east at midnight. However it appears small and must be observed in the early hours before dawn.

JUPITER rises over the eastern horizon at 18:00 and is in view all night. However it will be very low in the sky for the whole of summer moving slowly through the constellation of Capricornus. The four brightest moons (Io (inner), Europa, Ganymede and Callisto (outer)) will be visible even in a small telescope and are very interesting to observe. The moons often pass in front of Jupiter in a transit and may cast a shadow on the planet causing an eclipse. Moons can also pass behind the planet (occultation) or disappear into its shadow. Occasionally the moons pass close to each other and sometimes even eclipse each other. At the top of the next column is a list of some of the more interesting events occurring this month on Jupiter.

INTERESTING EVENTS ON JUPITER

11th	20:30 Io, Eur, Callisto group		
12th	00:54 Io occult	01:48 Eur occult	03:12 Io shadow
12th	22:10 Io transit	22:50 Io shadow	
13th	00:23 Io re appear	01:00 Io shadow off	
13th	20:45 Eur transit	21:48 Io re appear	21:53 Eur shad
13th	22:42 Gan occult	23:14 Eur off	
14th	00:40 Eur shad off	02:20 Gan re appears	
19th	02:42 Io Transit		
20th	21:06 Io occult	22:42 Eur Transit	23:25 Io occ end
21st	01:35 Eur trans end	02:08 Gan occult	
21st	20:38 Io trans end &	Io shad mid Jupiter	21:29 Io shad off
24th	20:30 Gan Shadow	23:18 Gan Shadow off	
27th	22:18 Cal Transit	22:55 Io occult	
28th	01:10 Eur Transit	01:13 Io re appears	

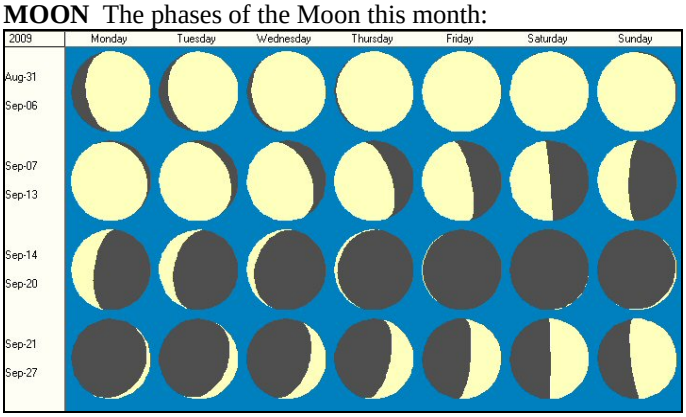
SATURN is in conjunction (behind) the Sun and not observable.

URANUS is fairly well placed in the south at midnight in the constellation of Pisces. A telescope of over 100mm aperture Uranus as a slightly out of focus blue disc.

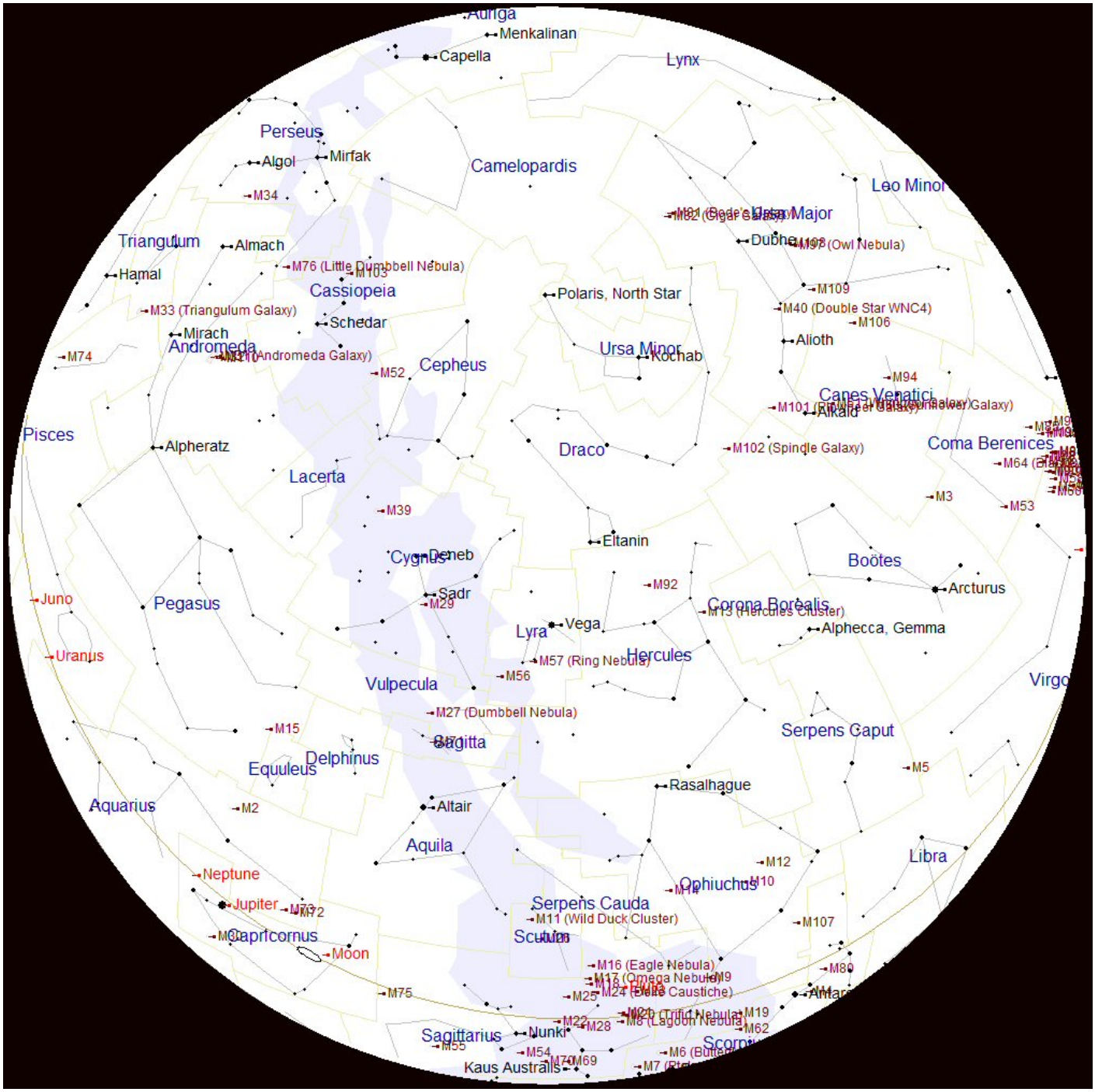
NEPTUNE is well placed close to Jupiter in the constellation of Capricornus. Viewed through a telescope of over 100mm aperture it appears as a slightly out of focus blue star.

SUN is still very quiet at the moment with no further sun spots.

MOON The phases of the Moon this month:



THE SKY THIS MONTH



The chart above shows the night sky as it appears on 1st September at 10 o'clock British Summer Time (9 o'clock GMT). 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 9 o'clock p.m. BST at the beginning middle the month and at 8 o'clock am BST at the end. Due to the Earth rotating once every 24 hours, the stars also appear to move 15º (360º divided by 24) each hour from east to west.

The centre of the chart will be the position in the sky directly overhead. 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 to the north 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.