NEWBURY ASTRONOMICAL SOCIETY
BEGINNERS MAGAZINE - JUNE 2011

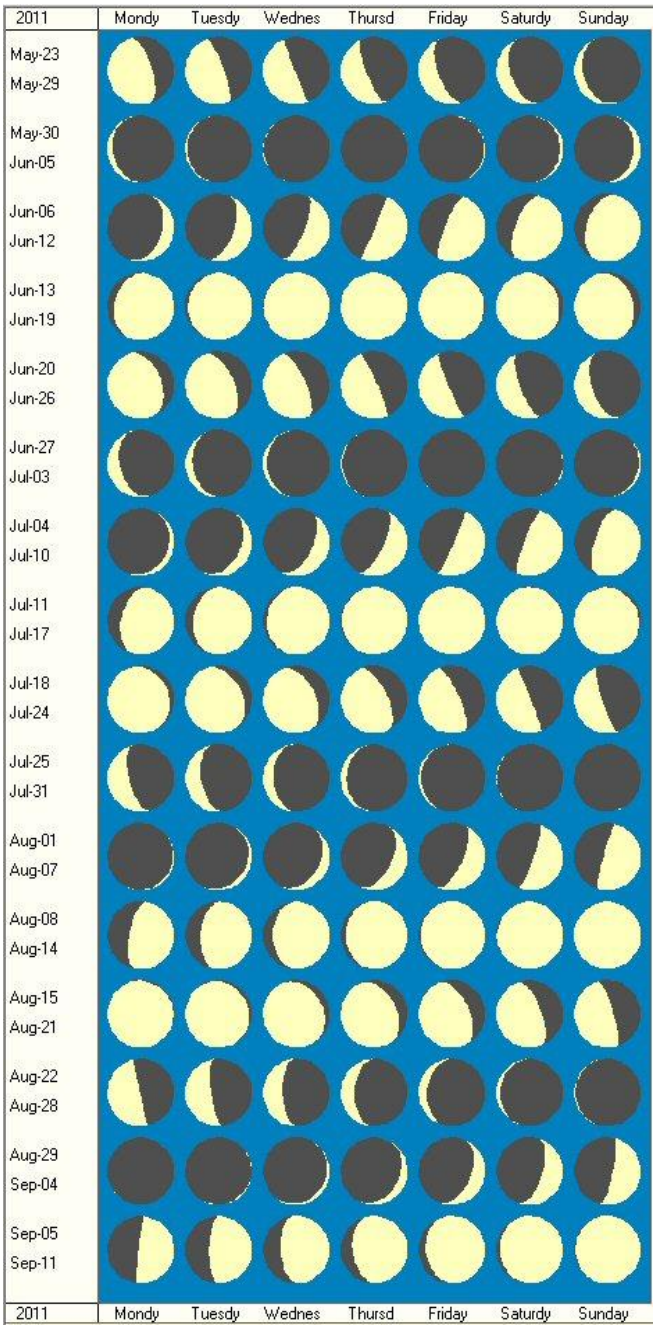
OBSERVING THE MOON DURING THE SUMMER

The Moon is observable throughout the year and can even be viewed in daylight. The full Moon is most impressive to the naked eye but is probably least rewarding through a telescope. At full Moon the Sun is shining straight down on the surface and casts very little shadow. The best time to see specific features is as the terminator (the line between day and night as shown on the chart opposite) passes over those features. The Moon can be so bright that it may be uncomfortable to the eye. Filters can be bought and attached to the eyepiece to reduce the brilliance and improve contrast. A cheaper option is to make a cardboard mask to cover the end of the telescope tube. Into this mask a hole of about 30mm to 50mm diameter can the cut to reduce the amount of light entering the telescope.

Depending on the 'seeing' conditions, high magnifications can be used. First centralise the object or region of the Moon to be observed using a low power eyepiece (~25mm) then carefully replace the eyepiece with a higher magnification (shorter focal length ~10mm) eyepiece and refocus. The object will appear larger and more detail will be seen. As the magnification is increased the size of the hole in the mask may need to be increased or the mask removed to allow more light into the telescope to improve contrast.

Maria or seas are not seas at all, they are large impact areas that have been covered by molten rock in the distant past at the beginning of the main crater forming era. To the naked eye the 'seas' appear as darker patches but through a telescope they are seen as relatively smooth plains with a sprinkling of craters. The Moon does not rotate, as seen from the surface of Earth and keeps the same face towards us. A terminator will therefore pass over a feature twice every month. Craters are especially spectacular on the terminator because sunlight will illuminate the outside of one wall and the inside of the wall on the other side of the crater, with the opposite side of the wall in shadow. Some craters have a central peak and may have terraced walls. Other craters have radial lines called rays stretching for many hundreds of kilometres where debris was thrown out by the impact of the meteor. Other interesting things to look for are craters inside larger craters and impacts that have created craters on top of earlier craters; double and even treble crater systems can be found.

Check out the best times to observe the Moon using the Moon Phase chart below and see the special article featured on Page 7 about the Total Lunar Eclipse on 15th June.



The phases of the Moon during the summer

NEWBURY ASTRONOMICAL SOCIETY MEETING

3rd June Hunting for Meteorites in Antarctica

Website: **www.newburyas.org.uk**

THE NEXT NEWBURY BEGINNERS MEETING

18th May Meteors, Meteorites and Meteoroids

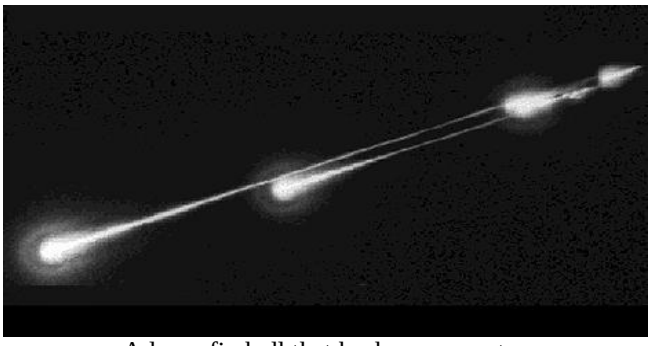
Website: **www.naasbeginners.co.uk**

METEORS, METEOROIDS AND METEORITES

On any dark, clear night if you sit back and look up into the night sky you will more than likely see a streak of light speed across the sky this will be a METEOR or shooting star. It is not a star at all but just a small speck of dust known as a METEOROID entering the Earth's atmosphere at very high speed. Just as the space shuttle or other space craft becomes very hot as it re-enters the atmosphere at about 30 thousand km/h these dust particles get even hotter at their re-entry speed of up to 270 thousand km/h. At this speed the dust is vaporised by the heat and the surrounding air is also heated until it glows much like a fluorescent light.

A large asteroid

There are two types of Meteor, the first is thought to originate from the large lumps of rock and iron left over when the planets formed. These are known as ASTEROIDS. Most asteroids orbit the Sun in a belt between Mars and Jupiter. The huge gravitational forces exerted by Jupiter may have pulled the rocks apart before they could accumulate into a planet. Very rarely two asteroids may collide but when they do, chips of rock and Iron are thrown off and occasionally head towards Earth. These may be a few millimetres across or up to tens or even hundreds of metres across. They are quite rare and are seen as individual 'fireballs' sometimes impacting the ground as METEORITES and if big enough may even cause craters.



A large fireball that broke up on entry

When the asteroids formed (at the same time as the planets) they were hot due to collisions and internal heat generated by the decay of radioactive materials. If an asteroid was big enough, it could become so hot that any metal would melt and sink to the centre. The only way this metal could get out from the centre of an asteroid is if the whole asteroid was to be blown apart in a massive collision with another asteroid. Some METEORITES (a lump from a meteor found on the ground) are almost pure Iron and Nickel. The outer parts of a broken up asteroid have very little metal because most will have drained away into the centre. Meteoroids from the outer parts of a large asteroid are rocky with almost no trace of metal. So we can tell that these types of meteor were part of a large asteroid. Those containing both rock and metal probably came from smaller asteroids that were not large enough to melt the metal or were at the edge of a metal core of a large asteroid.

If the lump is larger than two or three kilograms and depending on its composition it may survive the journey through the atmosphere and hit the ground. The smaller ones are slowed down by the friction of the air and fragments hit the ground at a few hundred kilometres per hour. Larger objects hit the ground much faster and with more energy and may form craters. Very large meteors weighing many hundreds or even thousands of tonnes vaporise on impact and produce a huge crater. The one at Flagstaff, Arizona in the USA shown in the picture below. Is the best example.

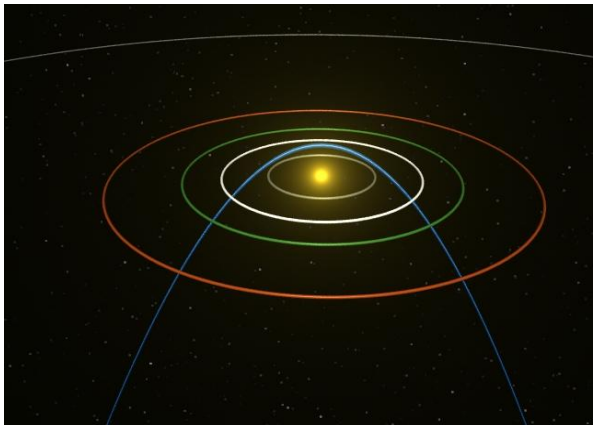
Large meteors are rare and very large ones are very rare. The last one to hit Earth was the one that caused the crater above 50,000 years ago. The Meteoroid was about the size of tennis court and was almost pure Iron. Its impact was nearly vertical and most of the Iron and the ground in the area of the impact was vaporised. The largest fragment of meteorite found was the piece shown below.

Finding a Meteorite on the ground is very rare especially in Britain. Any lump of space rock is likely to fall into an area with vegetation perhaps farmland, wild forest, grass or heath land. If the meteorite is small it will disappear immediately. Even if it is larger and produces a small crater the local vegetation will soon grow over and hide any evidence of its location. The only places where it is viable to search for meteorites are deserts, ice fields or glaciers. Any dark object with the indentations like those shown in the picture above will stand out as it rests on the sand of a desert or on white ice. Many very important discoveries have been made on ice fields and glaciers including a meteorite from Mars labelled ALH84001. This caused a lot of interest in 1996 when what appeared to be possible evidence of early life was found inside the rock.

The second type of meteor originates from a comet and is much more common. Comets are large lumps of ice, typically between ten and thirty kilometres across that reside beyond the orbit of the planets. There are millions of these objects just sitting there quietly orbiting around the Sun at enormous distances. Occasionally one of these objects may be nudged out of its orbit by a close encounter with another object and may begin to move in towards the Sun. As a comet, that can be thought of as being like a giant dirty snowball, approaches the Sun, the water and frozen gases begin to boil off and are blown away by the radiation from the Sun. This gas and dust forms the familiar twin tails associate with comets.

Comet Hale-Bopp

Dust particles released by the melt are heavier and therefore continue more or less on the same orbit. These particles spread out along the orbit path and may eventually form a complete ring around the orbit. Once or twice a year Earth may pass through this stream of particles that then collide with the atmosphere as Meteors. Meteoroid dust particles are usually small and very light as they have the consistency of cigarette ash. Travelling at between 11 and 76 kilometres per second they have a lot of kinetic energy and burn up in the thin atmosphere at a height of about 100 kilometres.



The path a comet might take as it loops around the Sun

Different particle streams may be inclined at different angles to Earth's orbit therefore meteors can enter the atmosphere at almost any angle. The speed of entry varies enormously depending on the angle of entry. Those entering the atmosphere head on to Earth's orbit have the highest combined speed and appear to streak across the night sky fastest.

Meteor showers occur at the same time each year and appear to radiate from the same point in the sky so each shower is named after the constellation in which the radiant point is located. The shower that occurs on the 15th - 19th November appears to radiate from the constellation of Leo For this reason it is called the Leonid Shower. Leonid meteors are associated with the periodic comet 55P / Tempel – Tuttle discovered in 1865.

The following table lists the main meteor showers and the date of the peak of activity. The summer showers are shown in bold.

PERIOD	SHOWER NAME	MAXIMUM
Jan 1 - 4	Quadrantids	Jan 3
April 10 - 22	Lyrids	April 2
May 1 - 8	Eta Aquarids	May 4
June 17 - 26	**Ophiuchids**	**June 19**
July 15 - Aug 15	**Delta Aquarids**	**July 27**
July 15 - Aug 20	**Piscis Aquarids**	**July 31**
July 15 - Aug 25	**Capricornids**	**Aug 2**
July 27 – Aug 17	**Perseids**	**Aug 12**
Oct 15 - 25	Orionids	Oct 21
Oct 26 - Nov 16	Taurids	Nov 3
Nov 15 - 19	Leonids	Nov 18
Dec 9 - 14	Geminids	Dec 13
Dec 17 - 24	Ursids	Dec 23

Occasionally there is a particularly heavy shower and this is known as a Meteor Storm. One such storm occurred over North America in 1966 and an even heavier storm occurred in 1833 when hundreds of meteors were seen every minute. Both these storms were attributed to the Leonids. Every 33 years or so the Leonids may produce a heavy shower and sometimes produce a storm. Showers and storms occur when Earth passes through a particularly dense clump of dust deposited by the comet. Heavy meteor storms are spectacular and sometimes a bit scary if there is a very heavy storm. These meteors originating from comets are completely harmless and seldom reach closer than 80 kilometres above the surface of Earth.

Meteor showers are best observed after midnight. The reason for this is the point on Earth where we are sitting starts to face toward the direction Earth is travelling around the Sun. At dawn we face directly forward. Earth is travelling at nearly 100,000 km/h in its orbit around the Sun. As Earth ploughs head on into the stream of dust particles (meteoroids) the combined speed of the collisions can be up to 270,000 km/h.

The reason the meteors appear to radiate from a point in the sky is because of the effect of perspective. It is rather like when a car is driven in a snow storm and the snowflakes seem to radiate from a point directly in front of the windscreen. When the radiant is below the horizon we will only see the meteors that head upwards and they appear to shoot up from below the horizon.

The Leonid meteor shower 2001

As can be seen from the chart above there are a number of meteor showers during the summer months. Although none are major showers they are still worth looking for and it is not so cold at this time of the year.

OBSERVING METEORS THIS SUMMER

Before rushing out into the garden to look for meteors, there are a few things to consider for your own comfort, the first a most important is clothing. The nights, even in summer, can be cold so it is essential to dress in warm clothes. A number of layers of clothes are often better than one overcoat. A vest or tee shirt, a second long sleeved shirt, one or two jumpers, perhaps a body warmer and then an outer jacket should be considered. Two or three layers on the legs are also necessary. Long leg thermal pants are excellent for men or women although tights will do but it must be said, tights look better on women. Track suit bottoms are also good as an under garment. Then jeans or a thick pair of trousers should be worn over the top. Water proof trousers and jacket are also good for keeping the damp and wind out. Two pairs of socks are a good idea and warm shoes. Most trainers these days are padded and are quite warm. A woolly or padded hat is essential because a lot of the body heat is lost from the head but peaked hats should be avoided. Finally a pair of gloves must be worn. It is always best to start warm and stay warm because once the cold has set in it is very difficult to get warm again.

A garden chair is an excellent piece of equipment especially the type that can be reclined into a near horizontal position. This will help avoid neck and back ache when looking up. When sitting in a garden chair a blanket or old quilt can be used for additional warmth. A sky chart, like the one on page 6, will be useful to locate the part of the sky where the meteor radiant will be located. To read the star chart in a dark garden will require a torch but a bright white light should be avoided. A red lamp such as a rear cycle lamp is better, to avoid ruining the dark adaptation of the eyes. Even this may prove too bright so adhesive tape and card can be used to shutter off some of the light. A 10mm hole in a card black out should provide enough light.

You may wish to take notes of what you have seen or even mark the positions of the meteors on your star chart so a pencil should be taken out to the observing spot. If you intend to have a long observing session, especially for a meteor watch, then a hot drink in a flask would prevent missing some of the show and avoid losing dark adaptation by going indoors to make a hot drink.

Most importantly ensure that you are comfortable before you start observing and have everything you need to hand. It is very irritating to have to keep getting up to try to find something you have forgotten especially if you need to go indoors to get it. Once you are comfortable and settled, with everything you need, then you are ready to start the meteor watch session.

Now on to where to position yourself. Use the patio or path if possible, they are more comfortable and less prone to dampness from dew. Obviously try to set up away from trees or buildings but this may not be possible so set up in the best place to view your intended target, you can always move to another position later. Make sure you have everything to hand, a small table or box by your side, will provide a convenient place to put your chart, torch, spectacles or even a hot drink and will save fumbling around on the ground for things.

To start viewing allow about five minutes for your eyes to become adapted to the dark. This period can be used to familiarise yourself with the sky and work out where everything is. Try to turn off all lights around you. If there is a street light bothering you, it may be possible to erect a screen around yourself using garden canes, step ladders, washing poles, string and old sheets, curtains, towels or even news papers. Even lights which appeared dim, when you first began your session, seem to get very bright when your eyes are fully adjusted to the dark.

It is useful if you can observe from your own back garden because you can quickly get used to the positions of stars from one night to the next. It is not always possible to use your own garden due to dazzling effect of street lights or perhaps trees or buildings blocking the view. It may be necessary therefore to go to a darker area away from lights. If this is the case it is much better to go with a friend, if possible, as it will be safer and more enjoyable. A remote observing site also has the disadvantage of having to transport any equipment. If it is decided to try a remote site always check the weather forecast first this might save a lot of travelling and anguish when the sky clouds over shortly after all has been set up.

After making yourself warm and comfortable and allowing enough time for your eyes to become adapted to the dark it is time to start observing. The first thing to do is to look around the sky to find familiar objects. The most common thing used is the constellation of Ursa Major also called the Plough. Use the instructions on page 6 to align the chart. Now position your star chart just above your eyes ensuring that the south position on the map is at the bottom. What you see represented on the chart should be what you see in the sky. Once the orientation is complete the chart can be lowered into a convenient reading position.

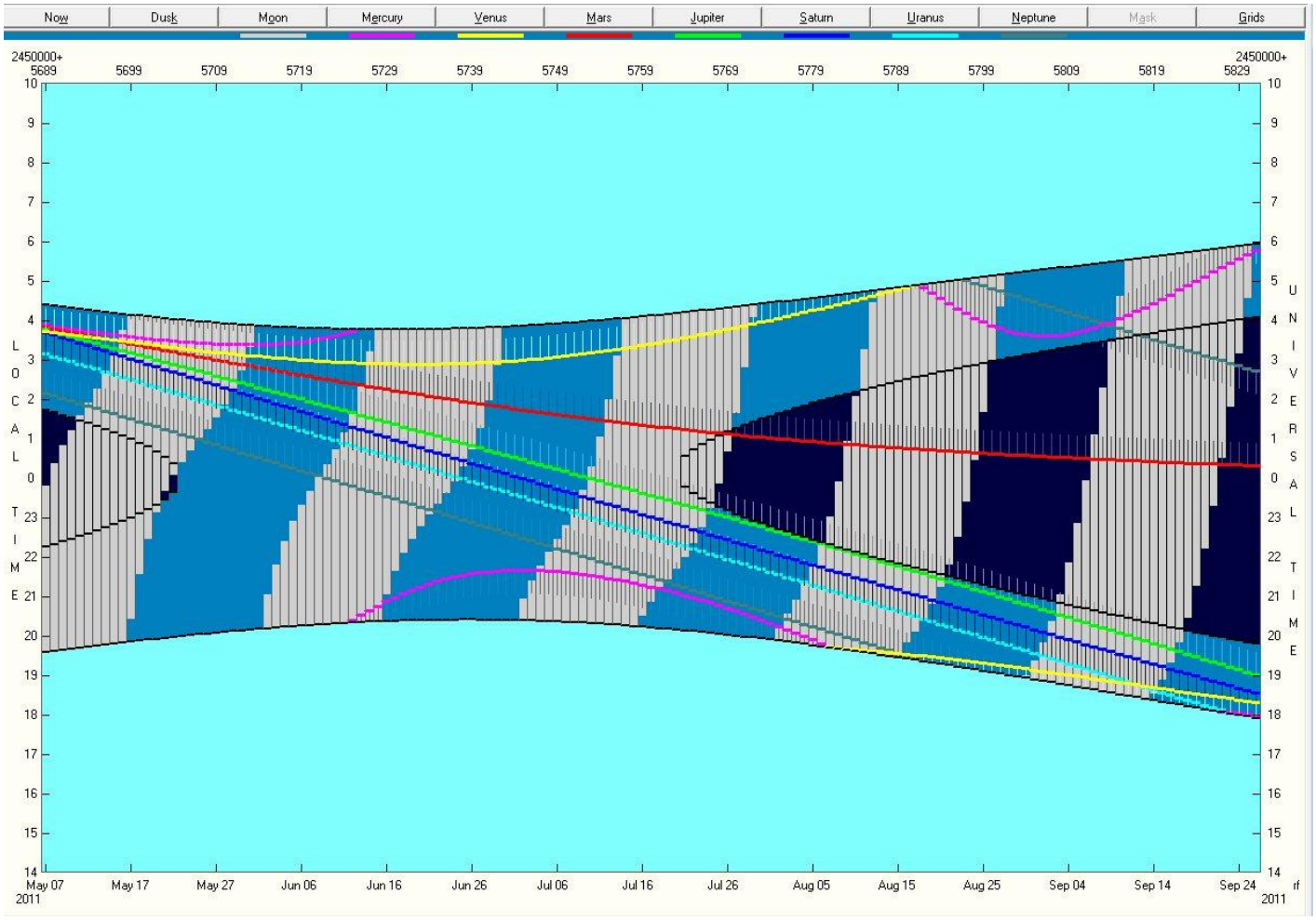
Observing can start before midnight but there will most likely be fewer meteors at this time. There are two reasons for this, first the radiant might be below the horizon so fewer meteors will appear above the horizon and secondly after midnight Earth will be ploughing head on into the main meteor stream. It is normally best to look up at an angle of around 45° above the horizon and 30° to 90° from the radiant point. It will also be useful to familiarise yourself with the positions of the constellations in the direction you are looking while you are waiting for the meteors.

If you feel quite enthusiastic about observing the meteors, you may wish to make a log of every one you see this can be done in two ways: Notes can be made on a pad detailing the time, direction and brightness. It will be necessary to note which constellations the meteor passes through or at least where it ended. These notes can then be plotted on to the chart later. You could alternatively draw the path on your chart and note the time and brightness on the line. The second should be more fun because if the shower is good you will soon see a pattern develop where the lines trace back to a common point. There may also be some sporadic meteors which are not members of the shower and do not originate from the same place. These are also interesting when marked on the chart.

The clarity of the sky will make a significant difference to the number of meteors that can be seen. Any mist or hazy cloud will severely reduce the chance of seeing the fainter meteors especially if observing from a light polluted area. If it is cloudy there is of course less chance of seeing any meteors at all. It is never possible to predict exactly when the maximum peak might appear and sometimes it may not appear at all. This it because the dust from the comet that produces the meteors moves through space in wisps and filaments. All depends on whether Earth passes through a filament and how thick that filament is.

The only thing that is predictable about meteor showers is they will always be unpredictable. Just hope for clear skies and a good shower.

THE SOLAR SYSTEM THIS SUMMER



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 May until September 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 (centre left and centre right) shows full darkness. The space between the two conical areas shows that the summer sky does not get fully dark (black sky) because the sun is only just below the northern horizon.

The curved blue / black vertical curved bands show the Moon phases (white the moon is in the sky, black / blue when it is not). The coloured lines show the times when the planets are visible. The vertical bars attached above or below the planet lines indicate when the planets a visible during the night. Above means form the time indicated by the line until dawn. Below means from dusk until the time indicated by the line.

MERCURY (pink) Is low in the east before sunrise during May but will be too low for meaningful observation. It reappears in the western evening sky during June and July.

VENUS (yellow) Is visible as the bright 'Morning Star' close to the eastern horizon until mid August. However it will be too close to the horizon for useful telescopic observation.

MARS (red) Will be in the sky from 04:00 in May and from 01:00 in September until dawn. However it will be in a light sky until the end of July. It will appear small as it is on the other side of the Sun so it will be difficult to observe.

JUPITER (green) Will be in the sky from 04:00 in May until dawn but will be in the sky all night from September. Being in a light sky will not lessen its magnificent appearance.

SATURN (dark blue) The bars are below the Saturn line indicating that it will be visible as the sky darkens and for most of the night during May and early June. By mid June it will be setting over the western horizon by midnight.

Saturn imaged by Steve Harris on 3rd May 2011

URANUS (light blue) Rises at 01:00 in the beginning of June so is an early morning object. By September it rises by a much more sociable time of 20:00.

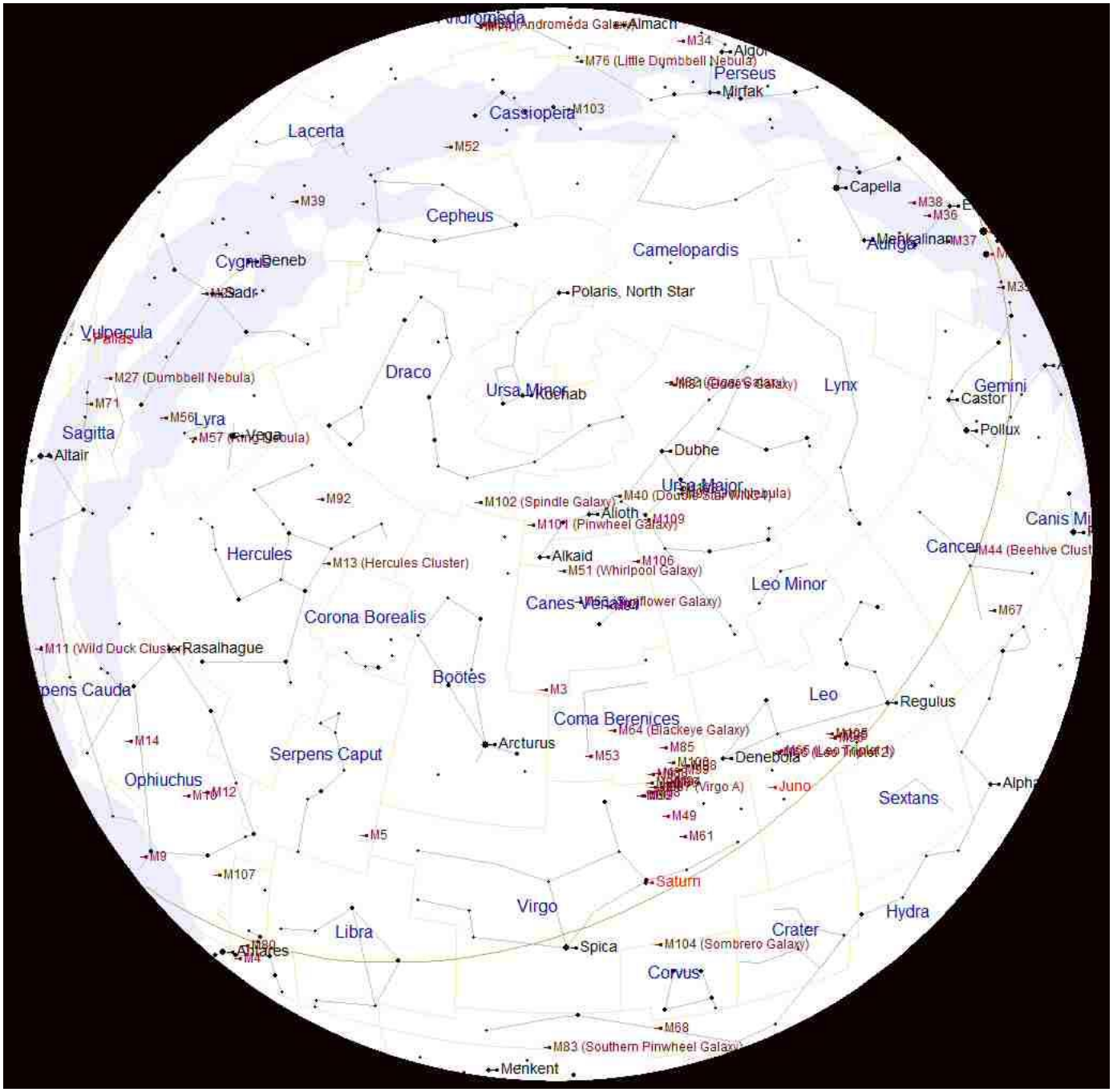
NEPTUNE (green) Rises at midnight by the beginning of June so is an early morning object and will be at its best at the end of July when is rises by 20:00.

METEORS. See page 3.

THE MOON. See Page 1 and 'Lunar Eclipse' on page 7.

THE SUN After an increase of sun spot activity during March and April activity fell off during May.

THE SKY THIS MONTH



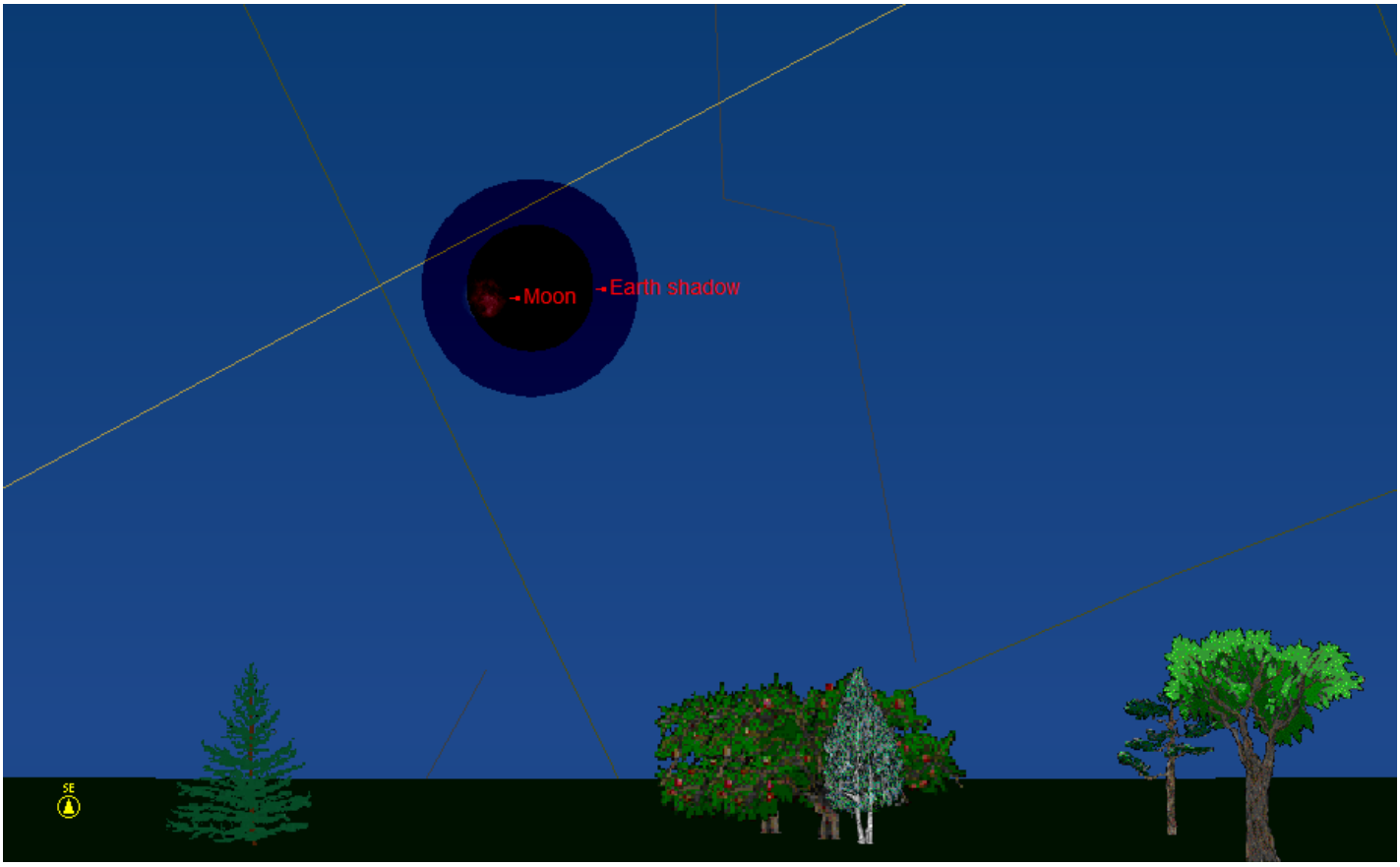
The chart above shows the night sky as it appears on 15th June at 9 o'clock in the evening British Summer Time (BST). As the Earth orbits the Sun and we look out into space each night the stars will appear to have moved across the sky by a small amount. Every month Earth moves one twelfth of its circuit 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. 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. During the summer it will be high in 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.

The planets in the evening sky are: Saturn.

The planets in the morning sky are: Mercury, Venus, Mars, Jupiter, Uranus and Neptune.

THE LUNAR ECLIPSE 15th JUNE 2011



Computer simulation of the lunar eclipse as totality ends at 22:10 on 15th June, low in the south east

On the evening of Friday 15th June there will be a total Lunar Eclipse. These events go largely un-noticed by the general public most of whom are probably totally unaware that the Moon is often eclipsed by the Earth's shadow.

At about 21:20 on 15th June the Moon rise over the eastern horizon fully eclipsed. The first phase, when the Moon moves through the penumbra (partial phase), will have occurred while the Moon was below the horizon. The Moon will be completely inside the umbra of Earth's shadow just as the Sun sets in the west and the sky darkens. The Moon will remain in the shadow until 22:10 when it will begin to emerge from totality into the 'partial eclipse' phase.

With the Moon completely in the shadow of Earth it would be assumed that the Moon would disappear from view but this is not always the case; sometimes an amazing effect can be seen. During totality the Moon often takes on a sinister red colour. This colour can vary considerably from an orange/reddish 'Copper' hue through to deep crimson.

All the light falling on the Moon from the Sun should be blocked by Earth but some does get past. The thin surface layer of our atmosphere acts rather like a lens and bends some sunlight around the curved surface of Earth. As the light is bent the colours are separated in the same way that a prism separates light into the spectrum. The red part of the sunlight is bent more and is able to illuminate the surface of the Moon. Most of the remaining colours in the sunlight miss the Moon so the surface becomes bathed in red light.

The effect can be quite spectacular as it was during the 2007 totality. The Moon appeared copper red and seemed to just hover in the clear cloudless evening sky. The effect does depend on the amount of dust and pollution in the atmosphere. Any recent volcanic eruptions can produce a stunning colour as in 2007. A clear view to the east will be required to catch the beginning of the event which could be quite spectacular and well worth a special barbeque if it is clear.

Lee Mcdonald caught this beautiful image in 2007

Chris Hooker captured this image at totality in 2007

FOR SALE MEADE ETX125 TELESCOPE

FOR SALE - ETX-125 AT 'Premium Edition' f/15 Maksutov Cassegrain UHTC

The seller writes:

I have many different 1.25" eyepieces, a 5 filter kit, a SLR camera adapter, a screw-on dewshield and erecting prism. I will also include Starry Night software package.

I am selling the telescope due to the lack of time I get to use it. I have only used it about 15 times.

I was going to put it on eBay but though I would first like to offer it to someone local or the local astronomy club.

The total value of all the items included in the sale if new is approximately £1200.

I would accept £500 from someone local.

Here is some information about this type of telescope:

Until now, the stargazer's two biggest challenges to enjoying the night sky have been aligning their telescope and finding objects. Meade's ETX125 eliminates these two challenges and makes astronomy as easy as pushing a button – right out of the box. Want to see a hard-to-find deep space galaxy? Simply push a button. The same goes for planets, stars, nebulae and more. Just pick an object you want to observe, press a button, and then AutoStar® will automatically point your telescope and put it right in your eyepiece.

The ETX125 AT is based around one of the finest optical designs ever produced. The Maksutov Cassegrain enables ultra high resolution and contrast from a compact design. The optics will routinely outperform those of larger apertures almost equalling the performance of fine Apochromat refractors costing many times that of the ETX125. Whether viewing fine Planetary detail such as Jupiter's red spot or polar ice caps on Mars or viewing the tenuous detail in the great Orion nebula you can be sure the ETX125AT will deliver the best views possible.

Don't know what you want to see this evening? Go to the "Tonight's Best™" tour in your AutoStar. It automatically selects the best objects in the sky for that particular time and location (from its database of over 30,000 celestial objects). All you need is a clear night, a dark sky and a little curiosity. Whether you already know the sky by heart or are just beginning your journey of discovery your Meade ETX125 will take you where you want to go. Astronomy has never been such fun and so rewarding.

Red Dot Viewfinder
#884 Deluxe Field Tripod
#497 Autostar (Go To) controller
Series 4000 Super Plossl Eyepieces (1.25")
AutoStar Suite - Astronomer's Edition
Instruction Manual

If anyone is interested in this telescope please contact:
Steve Harris on 01635860047 or
e-mail: steveharris234@aol.com