

NEWBURY ASTRONOMICAL SOCIETY

BEGINNERS MAGAZINE - JUNE 2012

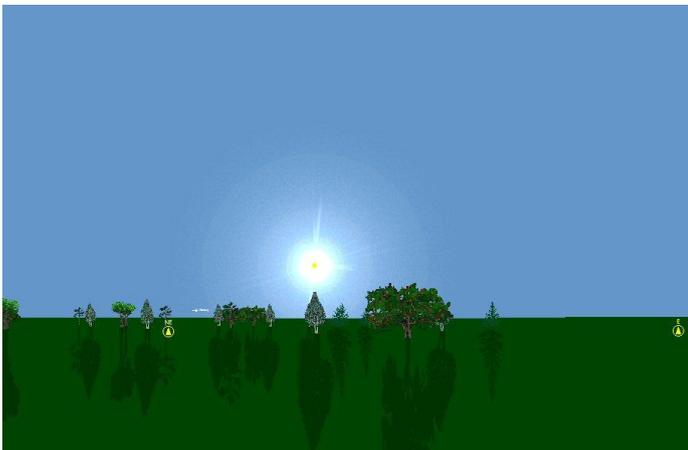
VENUS TRANSIT 6th JUNE

On the morning of the 6th of June there will be a transit of Venus. A transit occurs when a smaller object passes in front of a larger object. In this case Venus will be passing in front of the Sun. A planetary transit occurs when one of the two inferior planets, Mercury or Venus, appears to pass in front of the Sun. Mercury and Venus are the only two of the seven other planets that can appear to pass between Earth and the Sun to produce a transit. The outer (superior planets) cannot pass in front of the Sun when viewed from Earth to produce a transit.

Transits of Venus only occur as a pair every 130 years with the pair of transits separated by about 8½ years. The last pair of Venus transits occurred in 1874 and 1882. The last of the previous pair of transits of Venus was on December 16th 1882 which means that there is no one alive today who has seen a pair of Venus transits.

The first of this Venus transit pair occurred on 8th June 2004 and was observed in its entirety from the UK under a glorious clear sunny sky. The transit began just before 7 o'clock in the morning and finished at midday. Unfortunately this next transit will not be anywhere near as favourable. The UK will only just be able to catch the very end of the transit.

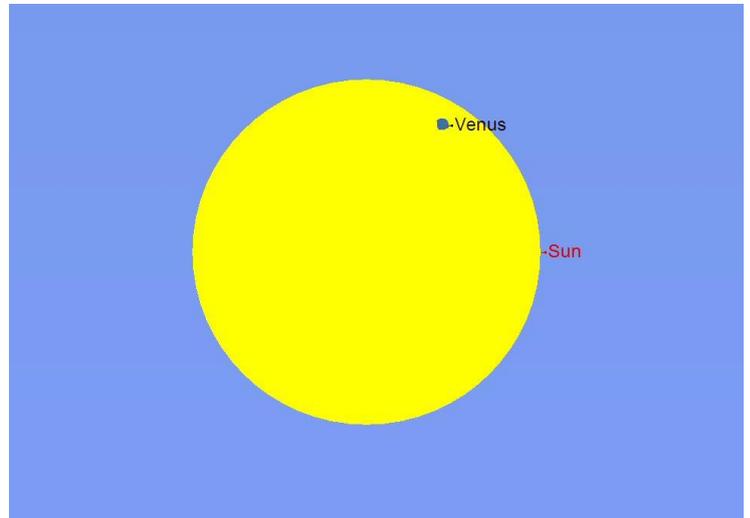
As the Sun rises over the eastern horizon at about 04:45 the silhouette of Venus will be approaching the edge of the Sun's disc at the end of the transit. It will not only be necessary to be up and ready for the event, the keen observer will need to have a clear view to the eastern horizon. A position on a hill with no obstructions to the east will be essential.



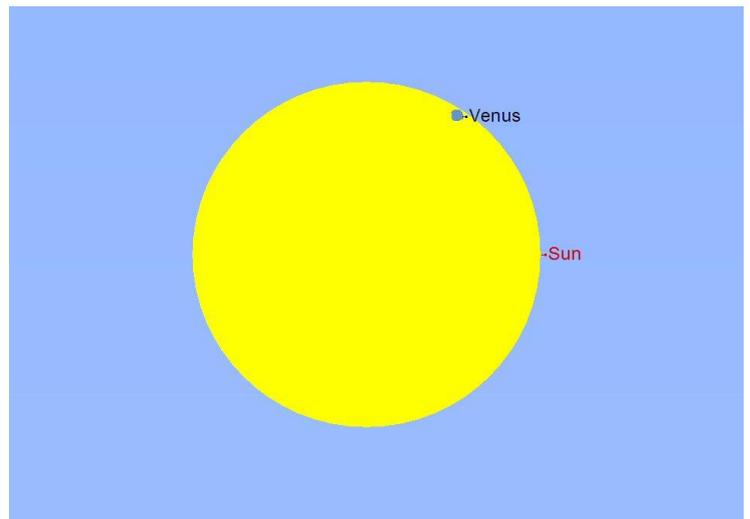
The image above shows the position of the Sun at 05:30 BST when Venus is just about to move out of the Sun's disc. At this time the Sun will be East North East. North East is marked in yellow to the left (north) of the Sun and East is marked near the right edge of the image.

Those early risers who wish to see the event must take all the same precautions as for observing the Sun. You must not look directly at the Sun with binoculars or a telescope as this will cause permanent damage to the eyes. Special solar filters must be fitted or the image of the Sun must be projected on to a card where it can be viewed safely. See the article in the May issue of this magazine.

The following computer generated images show what the transit should look like:



The position of Venus at 05:00 BST



The position of Venus at 05:30

Don't forget if we miss this event on 6th June 2012 due to clouds we might look forward to the next pair of transits of Venus in December 2117 and December 2125.

THE NEXT NEWBURY BEGINNERS MEETING

9th June Society Outing – Herschel Museum Bath
See Page 2 for details

Website: www.naasbeginners.co.uk

NEWBURY ASTRONOMICAL SOCIETY MEETING

1st June Exposed! The Molecular Universe

Website: www.newburyas.org.uk

THIS IS THE LAST MAGAZINE UNTIL SEPTEMBER

Newbury Astronomical Society Summer Outing June 9



By coach to Bath visiting
the [Fox Talbot Museum](#) at Lacock
and the [Herschel Museum](#) in Bath
with free time in Bath

Cost: £15 adults / £10 children – includes coach
and entry to Herschel Museum

Departure: 9am at south side of Newbury Railway Station

Return: leaving Bath 5pm

Contact Ann Davies on anndavies@dsl.pipex.com or 01635 30598

As the evenings are too light for effective observing during the summer months astronomers tend to lessen their activities during the summer. The Newbury Astronomical Society – Beginners Section do not hold their normal monthly meetings in June, July and August. For the past few years instead of the June meeting an outing with an astronomical theme has been arranged. This year the Society has booked a coach for an outing to the Herschel Museum in Bath.

There are still some spaces available on the coach so you are invited to join the Newbury Astronomical Society for this day out visiting Bath. If you would like tickets please contact Steve Harris on www.stevharris234@aol.com or telephone 01635860047.

William Herschel lived most of his life in Slough in Berkshire where he died and was buried under the tower of St Laurence's Church in Slough. Herschel is very much respected in the town as evidenced by a number of memorials to him and his discoveries. Herschel had an interest in mathematics and the manufacture of lenses. His interest in astronomy grew stronger after he made the acquaintance of the English Astronomer Royal Nevil Maskelyne. He started building his own reflecting telescopes and would spend up to 16 hours a day grinding and polishing the speculum metal primary mirrors. He made a number of excellent telescopes that he used to do state of the art astronomy. His workshop with some of the optics and telescopes he made are on display at the museum.

Sir Frederick William Herschel was born in Germany but changed the sound of his name from the German *Friedrich Wilhelm Herschel*. He was born on 15th November 1738 and died on 25th August 1822 and became one of the best known British astronomers. He was formally a musician and came to England to be an organist in Bath.

Born in Hanover, Germany Wilhelm first followed his father into a Military Band in Hanover but emigrated to Britain at age 19. Herschel became most famous for the discovery of the planet Uranus in addition to two of its major moons, Titania and Oberon. He also discovered two moons of Saturn and discovered infrared radiation. Herschel is also known for the twenty-four symphonies that he composed.

On the way to Bath the coach will stop at the Fox Talbot Museum at Lacock Abbey in Wiltshire for a couple of hours. Here the time can be spent looking around the museum. The museum celebrates the achievements of former Lacock resident, William Henry Fox Talbot who is famous for his contributions to the invention of photography. Alternatively the time can be spent exploring the Abbey and its extensive grounds. The Abbey is located at the heart of the village of Lacock within its own woodland grounds. It is a quirky country house with various architectural styles, built upon the foundations of a former nunnery. Visitors can experience the atmosphere of the medieval rooms and cloister court, giving a sense of the Abbey's monastic past. Lunches can be eaten in the grounds before moving on to Bath.

SATURN – LORD OF THE RINGS

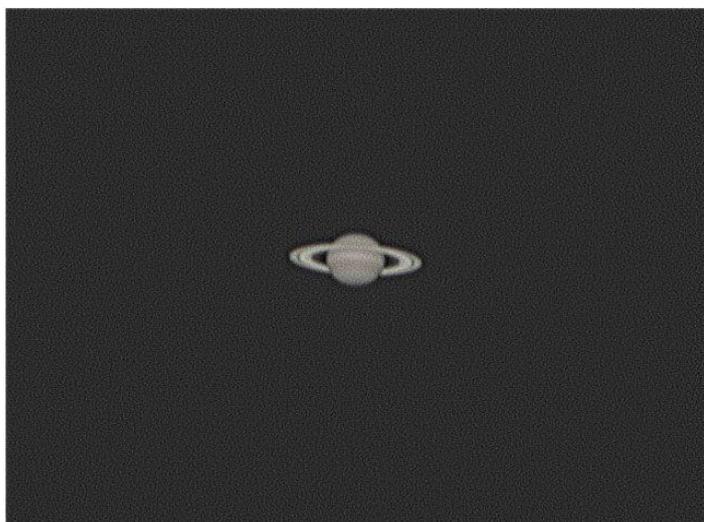
All the planets except Saturn are too close to the Sun or are rising just before the Sun in the very early hours of the morning. Saturn will not be at its best this year despite the rings beginning to open up now. The beautiful ringed planet will be quite low in the sky so will not be in the clearest air as it would be if it was higher.



Saturn at 10 o'clock BST on 15th June

The sky does not get dark until after 11 o'clock in June so the sky is not dark until nearly midnight. However Saturn is bright enough to see the ring system while the sky is still quite light. A small telescope will show the rings and on a good night it may be possible to see the gap in the rings called the Cassini Division. The brightest moon will also be visible and possibly a couple more on a very clear night. Do not be put off by the image being small and difficult to see with a small telescope. The longer the planet is studied the more detail can be teased out. The important thing is you are seeing this beautiful object with your own eye. Photons that have touched Saturn are actually touching the sensors in your eye and forming this image, it is the real thing not an image in a book.

A larger telescope will be needed to see any detail on the surface of the planet. The markings are much more subtle than the bands of Jupiter. The shadow of the planet may also be seen on the rings to one side of the planet. The image below was taken using a large telescope but with a simple cheap web camera in place of the eyepiece.



Saturn Imaged by Steve Harris on 14th April 2012

Saturn, with its magnificent ring system, is surely the easiest planet to recognise. Any poster or cartoon depicting a space scene will almost certainly have a planet with a ring system looking somewhat like Saturn. All the large outer planets also have ring systems but these are all feeble compared to Saturn's.



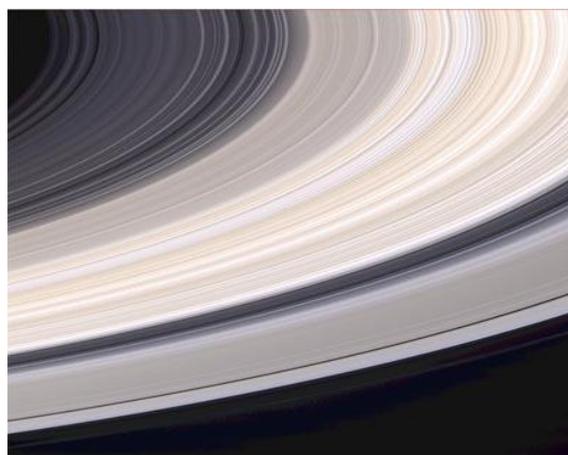
Saturn imaged in 2003 with the rings wide open

Since the very early days of telescope astronomy Saturn appeared to have something odd about it. Galileo thought it sometimes looked as it had 'ears' or handles like a jug. His first telescopes in the early 1600's were too small and too primitive to see any detail.



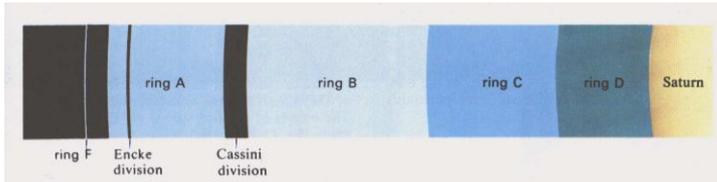
Galileo's sketch of Saturn with 'ears' 1610

In 1655 Christian Huygens recognised that Saturn had a ring. It wasn't until 1675 that Giovanni Cassini recorded seeing the gap in the rings that is now named after him. As the size and quality of telescope optics improved more detail could be made out. We generally think of Saturn as having 'a ring' but in fact it has a complex ring system comprised of hundreds of rings. Until the planet was visited by exploratory probes the finer details of the ring system could not be fully appreciated.



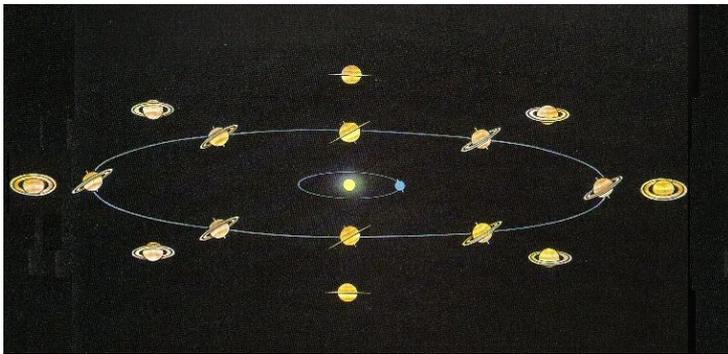
The rings imaged by the Cassini Probe in 2005

It has not been conclusively established how the ring system was formed. One theory is that a comet strayed too close to Saturn and the enormous gravitational forces pulled the comet apart. The lumps of water ice and dust were pulled into orbit around the giant planet. Until recently it was a mystery how the rings had lasted so long. Studies had estimated that the rings had been in existence for at least a million years and perhaps much longer. When the Pioneer II probe passed close to Saturn in 1979 it imaged two moons orbiting on the outside of the ring system. These moons named Pandora and Prometheus were found to be moving the particles in the rings and preventing them from straying out of their positions and falling into the planet. These moons became known as 'Shepherd Moons' because they appeared to be herding the ring particles like a shepherd looking after his flock of sheep.



The designations of the main rings

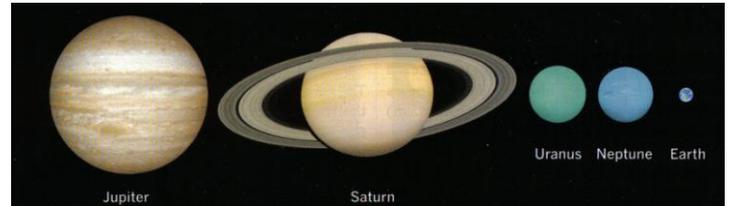
Although the rings are permanent, at least in terms of our lifetime, they do appear and disappear over a periods of about 15 years. This is because we on Earth view the rings from different angles as we and Saturn orbit the Sun. In 2003 we were looking at Saturn when it was tilted with its south pole towards us. (Shown at the extreme left position in the diagram below). We were therefore able to see the ring system tilted towards us. In this position we could see the underside of the rings that were wide open, as shown in the image at the beginning of this article.



After 7½ years Saturn will have completed approximately a quarter of its 30 year long orbit around the Sun and will be at the lower position shown in the diagram above. Therefore in 2009 we were looking at Saturn side on. As the rings were very thin they disappeared almost completely for a few months. Over the next 7½ years the rings will gradually open out again until in 2017 we will see the top surface tilted towards us as show in the position at the right of the diagram. The closing sequence will then continue until 2025 when we will again view the rings side on as shown at the top position in the diagram. Eventually in 2032 Saturn will return the same position it was in 2003 where the rings will be tilted towards Earth and wide open again.

The rings are beginning to look impressive again, even in a small telescope (100mm aperture). Over the next 5 years they will appear to open out fully. During 2009 and 2010 the rings were difficult to see even using larger telescopes now they are easy to see. If you do have a telescope first find and centre Saturn in the main telescope using a low power eyepiece. Then carefully change the eyepiece to a higher magnification or use a barlow lens.

Saturn is the second largest planet in our Solar System after Jupiter. The planet itself is 120,000 km in diameter at the equator but is flattened to 108,000 km at the poles due to its rapid rotation. Although Saturn is 10 times the diameter of Earth it rotates on its axis (1 day) in only 10 hours 14 minutes. The rings are 275,000 km (170,000 miles) across but may be less than a hundred metres thick. To put this in perspective, the ring diameter is almost the same as the distance from Earth to the Moon. The rings are made up of millions of small pieces of mainly water ice and possibly some rocks varying in size from a few millimetres to a few metres across.



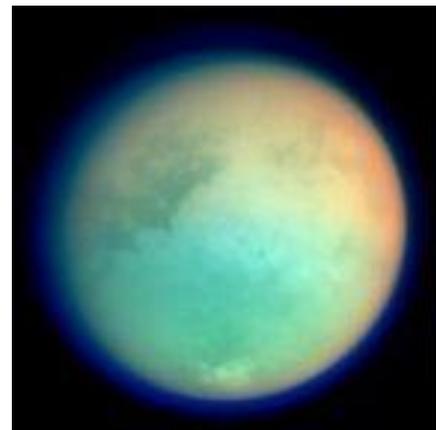
The sizes of the giant outer planets compared to Earth

Like Jupiter, Saturn is a gas giant planet. This means it has no solid surface that a probe craft could land on. The majority of the planet (96.3%) is made up of Hydrogen gas with 3.7% Helium and traces of Ammonia and Methane.

Despite being 1.4 billion kilometres from the Sun, huge summer storms erupt in the hemisphere facing the Sun. A few months ago the Cassini Probe observed a storm break out and spread all the way around the planet. The cloud markings are not as distinct as those on Jupiter but the storms are just as violent.

SATURN'S MOONS

Saturn has dozens of moons, both large and small. Titan is the largest at 5,150 km in diameter and is one of the most intriguing moons in our solar system. It has a thick atmosphere and appears to have oceans, clouds and rain, all comprised of Methane, rather than water as on Earth.



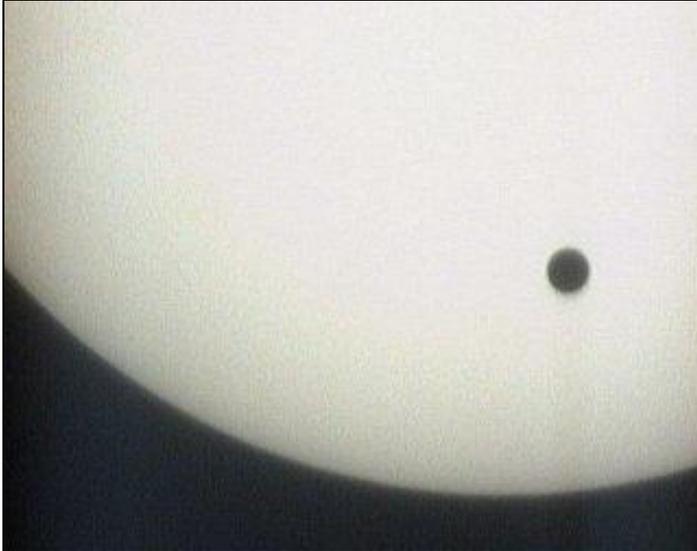
Titan imaged by Cassini in 2005

A space probe called Huygens, which was part of the Cassini - Huygens probe, landed on Titan in January 2005. The Huygens lander had a camera on board that took pictures as it descended on a parachute through the atmosphere. One image appeared to show a shoreline on the edge of a sea. The sea would not be water but liquid or frozen Methane gas at about -180°C. There also appear to be gullies or streams running from the frozen land towards the sea. These may be run-off channels formed by methane rain or where frozen Methane has melted and flowed down to the Methane sea.

THE SOLAR SYSTEM THIS MONTH

MERCURY will be very low in the west and lost in the glare of the Sun after sunset. However if it could be seen, it will be very close to Venus on the 1st of June. **DO NOT SEARCH FOR MERCURY WHILE THE SUN IS VISIBLE IN THE SKY.**

VENUS will not be observable this month except at sunrise on the 6th June. It will be visible at this time because it will be crossing the disc of the Sun in what is known as a 'transit'. See the special article on page 1.

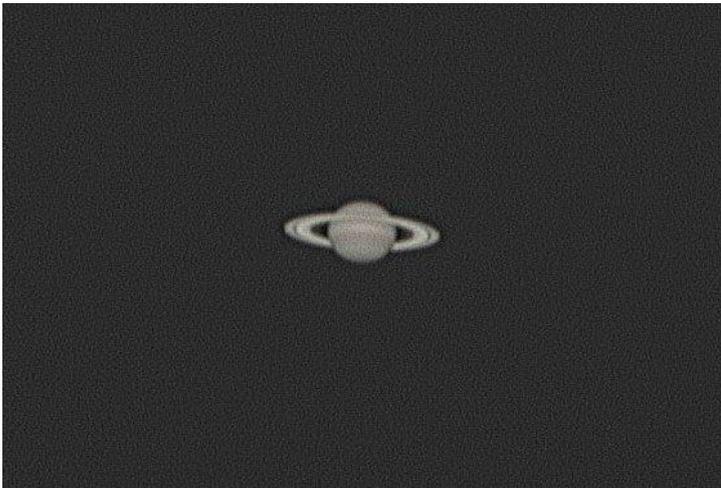


Venus as it appeared during its transit on 6th June 2004

MARS is starting to noticeably draw away from us and will be only 7.0 arc-seconds in diameter by the end of the month. It is starting to look small even in a larger telescope. The surface details are getting difficult to discern even when using a larger telescope. Mars is visible all night in the constellation of Leo.

JUPITER is very close to the Sun and will not be visible this month. Over the summer months Jupiter will emerge into the morning sky before sunrise.

SATURN is visible as soon as it is dark enough to see so it will be observable in the south west close to the bright star Spica in the constellation of Virgo. The rings are beginning to open and are looking impressive through a telescope. See Page 3



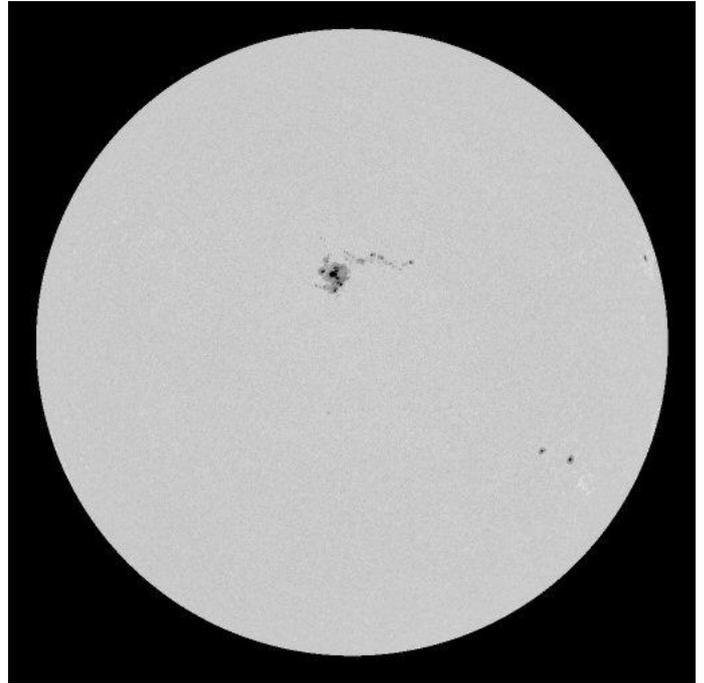
Saturn imaged by Steve Harris on 12th April 2012

URANUS will not be observable this month.

NEPTUNE will not be observable this month.

THE SUN

The Sun has been quite active over the past few weeks with many sun spots and spectacular prominences.



Spectacular Sun spots imaged on 10th May image SOHO

There will be a very special event this year at sunrise on the 6th June and it will be a really interesting time to observe the Sun. This is because Venus will be silhouetted against the surface of the Sun in a 'Transit'. Unfortunately we in the UK will just catch the end of the transit at sunrise unlike the transit in 2004 when we were able to watch the whole event. See Page 1 for details.

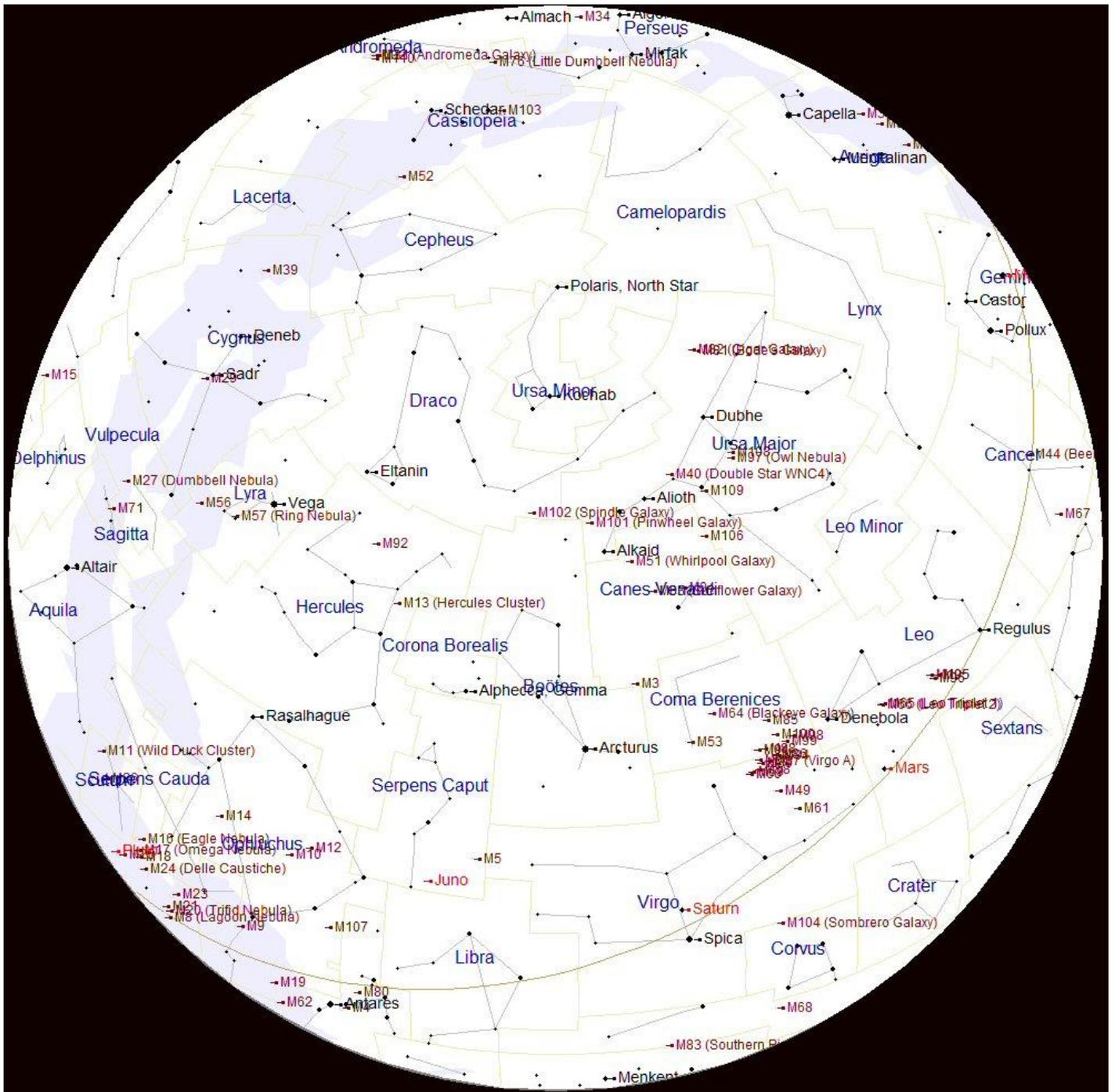
THE MOON PHASES THIS MONTH

2012	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
May-28							
Jun-03							
Jun-04							
Jun-10							
Jun-11							
Jun-17							
Jun-18							
Jun-24							
Jun-25							
Jul-01							
2012	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

OPHIUCHID METEOR SHOWER

There will be a minor meteor shower between 17th and 26th June with a peak on 19th June. This is a sparse shower with just a few meteors. The bright summer evening sky will also make it difficult to see the fainter of these meteors.

THE NIGHT SKY THIS MONTH



The chart above shows the night sky as it appears on 15th May at 10 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 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 15° (360° 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 to the west of overhead. Look for the distinctive saucerpan 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 50° 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.