Hello all! Welcome to the September Newsletter! September is usually recognised by Astronomers as the beginning of the observing year. Here’s hoping for some warm nights and clear, dark skies!

The total eclipse of the Sun which should have been a partial eclipse for us was a non-event for most of us because of cloudy skies. The Perseid meteor shower was also a non-event for many people, especially those who stayed up late bravely hoping to see something and saw nothing! However, Laura Morrey who reads this Newsletter, succeeded in getting some good shots of the meteors as can be seen below. To use her own words: “I am very pleased to report that this year’s efforts from a very light polluted back garden have proved far more successful!! In fact, I had focused the camera on a nearby street lamp (see- they can be useful), pointed it at a spot somewhere to the right of Cassiopeia with the only intention of seeing how well the focusing was and as I hit the button a meteor flew straight through my field of view (Pic. 512)! How many nights have I sat out freezing bits I never knew existed, taking hundreds of pics n never getting one?? Ah the joys of Astrophotography!!!! Anyway, I think the whole evenings total was seen: 9 / Photographed: 4. 3 of which are attached for you to have a look at - hope you like them - I was delighted!” For those who are interested, Laura used a Canon EOS 1100D camera and a Tamron lens 17-50mm. Image 512 is the first one below. Well done Laura!

In case you are fed up with the lack of clear, dark skies in the UK then you may be interested in this email I have received from Raoul van Eindhoven who also reads my Newsletter: “I just wanted to let you all know what I did last week. I had a little holiday to France (Confolens) and spend a few days on an Astronomy Farm (AstroFarm)
http://astrofarmfrance.com. What a great place this was with amazing clear and dark skies. This place is geared for any astronomy enthusiast (from beginner to experienced). You do not need to bring any equipment as they have it all for you to use under guidance. I only took my camera with a standard lens and took some amazing photos of the night sky. Including this one, a panorama of the Milky way. https://www.flickr.com/photos/raoul42/35433369673/. I went with a small group of friends and we have already started planning our next visit in August 2018. If you want to know more, please let me know”. Raoul sent me the JPEG file of his image shown below. It was a very large file and so I have resized it. If you are interested in finding out more then let me know and I will put you in touch with Raoul.

September is usually a good month for observing the sky since the nights are drawing in but it is still quite warm. You don’t have to stay up late or get freezing cold to enjoy the night sky. At the beginning of the month, sunset will occur at 19.59 BST and by the end of the month it will be at 18.46 BST.

There will be a Full Moon on September 6\textsuperscript{th} and a New Moon September 20\textsuperscript{th}. The second half of the month will therefore be the best time for observing. If you are an early riser then September 16\textsuperscript{th} will a good time to see Mars, Mercury and a crescent Moon in the pre-dawn sky. The star chart below shows the sky in the east at 05:30BST on September 16\textsuperscript{th}.

You can see that Mercury and Mars are just rising and are very close together in the constellation of Leo the Lion. Above them and slightly to the right is the planet Venus which
is also in Leo. Between Venus and Mercury is the bright star **Regulus** which is at the bottom of the head of Leo the Lion. The head looks like a backward question mark and is usually called the **sickle**. High above Venus and further to the right you can see a slender, crescent Moon in the constellation of **Cancer** which looks like an upside down “Y” shape. To the right of this you can see the smallest of Orion’s hunting dogs – **Canis Minor**. The sight of Orion and his hunting dogs rising early in the east is a definite indication that we are leaving the Summer behind! At the top left of the chart is the constellation of **Ursa Major** and its bright asterism – the Plough. An **asterism** is a bright pattern of stars which is not a recognised constellation.

The sight of the five objects (Mars, Mercury, Regulus, Venus and the Moon) all more or less in a straight line is going to be beautiful either to the naked eye or with a pair of binoculars. It is also an excellent photographic opportunity. Mars is small and not very bright and so it is not a particularly good object for the telescope. Venus will be a beautiful morning star all month and will be quite close to the waning crescent Moon on September 18th.

You might just be able to see **Jupiter** near the southwestern horizon at the beginning of the month but then it will be lost in the twilight. **Neptune** is going to be at opposition on September 5th. This is when it is at the opposite side of the Earth from the Sun. It therefore reflects the maximum amount of sunlight from its disc and will be at its brightest. Unfortunately, the Full Moon will be close to it on September 6th. The star chart below shows the sky in the southeast at 22:00 on September 16th. You can see that Neptune is near the top right of the chart on the constellation of **Aquarius**. You need powerful binoculars and a dark sky to see it and a telescope is required to observe its blue disc.

To the east (or left) of Neptune is the constellation of **Pisces the Fish**. You can clearly see the famous asterism called the **circlet** which is the head of the fish. Further to the east is **Uranus** which is well placed for observation. You should be able spot it easily with binoculars and a small telescope will show its blue-green disc. Even further east on the far left of the chart is the **Pleiades**, the beautiful open star cluster known as the **seven sisters**. It is in the
constellation of **Taurus the Bull** and is always worth another look even if you have seen it many times before!

I have left the best until last – that is the beautiful ringed planet **Saturn**. The best time to see it is at the beginning of the month but there is a bright Moon in the way. The star chart below shows the sky in the southwest at 20:30 on September 8th. This is before the Moon rises and you can see Saturn low on the horizon in the constellation of **Ophiuchus**. Sadly, Saturn is now past its best and will gradually dim throughout the month.

This leads me to the big event in space this month and that is the end of the **Cassini spacecraft** mission. This will no doubt be featured widely in the media since the spacecraft is being flown between Saturn’s rings and the planet which has never been done before. It will then finally be crashed into the planet to avoid any damage to Saturn’s moons and rings. The image below is an artist’s impression of Cassini flying between the rings and the planet. If you would like to see a terrific video of the end of the mission then go to the JPL website “https://saturn.jpl.nasa.gov/mission/grand-finale/overview/”. There you will find several videos about the end of the mission and some of its achievements.
In summary, Cassini was launched from Cape Canaveral on October 15th, 1997. It was named after an Italian astronomer, Giovanni Domenica Cassini who first worked at the University of Bologna but then went to Paris to help set up the Paris Observatory. He remained director of that observatory until the end of his life.

The flight path of the Cassini spacecraft is fascinating. In 1998 and in 1999 it received gravitational boosts by flying past Venus. It then returned to Earth to receive a gravitational slingshot which sent it to the outer solar system. In December 2000, it sailed close to Jupiter and then headed for Saturn. In May 2004 Cassini observed two new moons of Saturn even though it was months away from the planet. These are now called Methone and Pallene. On June 11th, 2004 Cassini passed close to Saturn’s moon Phoebe and on June 30th went into orbit around Saturn. On board Cassini was the Huygens probe developed by ESA (the European Space Agency). The plan was to land Huygens on the surface of Titan - Saturn’s largest moon. On October 24th Cassini made a close fly-by of Titan and Huygens began its fall towards the moon. Huygens landed on Titan on January 14th, 2005 and to this day is still the only spacecraft launched from Earth to land on such a distant object. It is probably still there on the surface but its batteries have died and so it can’t communicate anymore.

Since then, Cassini has passed by other moons of Saturn such as Enceladus and Iapetus. It also discovered a faint new ring around the planet. In 2008 the original 4year mission came to an end but was extended into the Equinox mission. It made its closest fly-by of Enceladus and this moon is now considered to be one of the most likely places to find life in the ocean under its icy surface. Once NASA realised what an interesting moon Enceladus was, they completed 22 fly-bys of the moon with Cassini. In 2010 the spacecraft’s mission was again extended into the Solstice Mission. It observed violent storms in Saturn’s atmosphere, it studied other moons such as Dione, Tethys, Rhea and Pan. Over the years Cassini has collected a vast amount of valuable data which will take years to analyse fully.

On April 26th, 2017 Cassini passed through the gap between Saturn and its rings for the first of 22 times. Finally, on September 15th Cassini will plunge into Saturn’s atmosphere and then break up. Its atoms will become part of the planet – a fitting end to a tremendously successful mission. Cassini will be missed. It has brought the beautiful planet Saturn to us all. NASA hopes to visit the planet again especially with the prospect of finding life on Enceladus. However, it may be in the 2020s or 2030s before this next mission is launched.

If you would like to read more about the Cassini mission and its achievements, then I recommend the September edition of “Astronomy Now”. They cover this very well.

Now to the Southern hemisphere!
What's Up in the Southern Hemisphere?

Observers in the southern hemisphere will continue to get a good view of Saturn in September. The star chart below shows the night sky in the west over Sydney at 20:30 on September 8th, 2017. You can see that Saturn is high up in the sky in the constellation of **Ophiuchus**. Immediately above it is the rich constellation of **Sagittarius** with all its magnificent **Messier objects**. These are either **star clusters** such as M7, M6 and M11 or they are **planetary nebulae** such as M8, M16, M17 or M20. These faint, nebulous objects were catalogued by the 18th century French astronomer Charles Messier.

Star clusters are groups of millions of stars all born out of the same cloud of gas at the same time. One of my favourites of these is the **Butterfly Cluster**, M6 shown in the image below. Through powerful binoculars or a small telescope, it really does look like a butterfly. Note that the stars in the cluster are all the same colour indicating that they are the same age.
Planetary nebulae are clouds of gas which are left when supergiant stars explode in a supernova. They are also thrown off by small sun like stars as they approach the end of their lives. They are beautiful objects to image because of the colours in them. The image below was taken by the Hubble telescope and shows the **Eagle Nebula, M16** one of my favourites not least because you can see the so-called **“pillars of creation”** in this nebula. These are pillars of gas rising up out of the cloud as you can see in the image.

![Eagle Nebula Image](image)

The star chart below shows the sky in the east over Sydney at 06:30 on September 16th, 2017. There you can see Mars, Mercury, Venus and a crescent moon in alignment. The head of Leo the Lion is beginning to appear on the horizon.

![Star Chart 1](chart1)

The star chart below shows the sky in the northeast over Sydney at 23:00 on September 16th. There you can clearly see Neptune high in the sky in the constellation of **Aquarius**. Below it is the **circlet** in Pisces and at the bottom left is **Uranus** also in the constellation of Pisces. In the middle bottom of the chart you can see the **Great Square of Pegasus**. Below this (but off the chart) the **Andromeda constellation** and the **Andromeda galaxy** are just rising.
There is one other event which being highlighted for September 18th throughout Australia and New Zealand. That is the Moon will occult Venus in the daytime! An **occultation** is when one body is hidden behind another one. In this instance, Venus will disappear behind the Moon at 10:48 in Sydney and will reappear on the opposite side of the Moon at 12:17 (all times local). A pair of binoculars or a small telescope will easily show this. But please beware! The Sun is very close by and you must make sure that you don’t look directly at it. If you do, then in an instant you could suffer irreparable eye damage.

That’s all for now. Until next month, happy stargazing! Dark skies!

Valerie Calderbank FRAS