

The Night Sky in October, 2020

The Sun and Moon

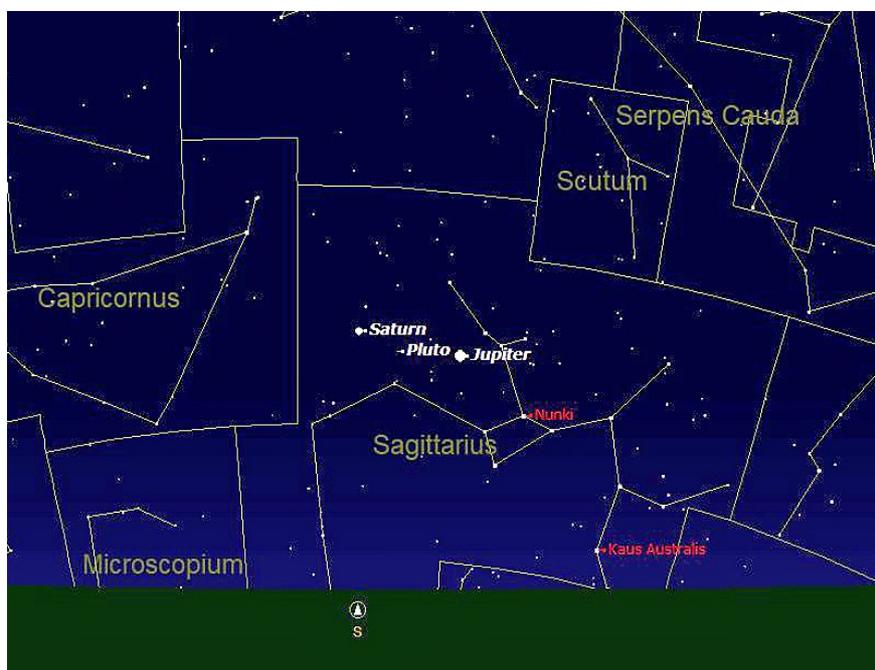
Welcome to the October Newsletter. Not many shopping days to Christmas now! Let's hope we all manage to have a good one! More importantly for now is what is going to be happening in the night sky in October? There are two **Full Moons** this month, one on October 1st and the other on October 31st. The Full Moon on October 1st is known as the “**Harvest Moon**” since its bright light helps the farmers to get the harvest in. The second Full Moon in any month is often popularly known as a “**Blue Moon**”. However this is mistaken. A Blue Moon is actually defined as the third Full Moon in a 3 month season of 4 Moons, say from the winter solstice to the spring equinox. Whichever way it is defined, once in a Blue Moon is not very long!!

There will be a **New Moon** on October 16th so the middle of the month will be the darkest for stargazing. On October 1st the **Sun** will rise at 07:12 BST and set at 18.46 BST. Sadly, **British Summer Time** will end on October 25th and we must put our clocks back from BST to GMT (Greenwich Mean Time which is the same as Universal Time UT). We will now have to suffer shorter days and longer dark evenings. On the other hand this is good for astronomers! By the end of the month sunrise will be at 07:08 and sunset at 16:39 GMT.

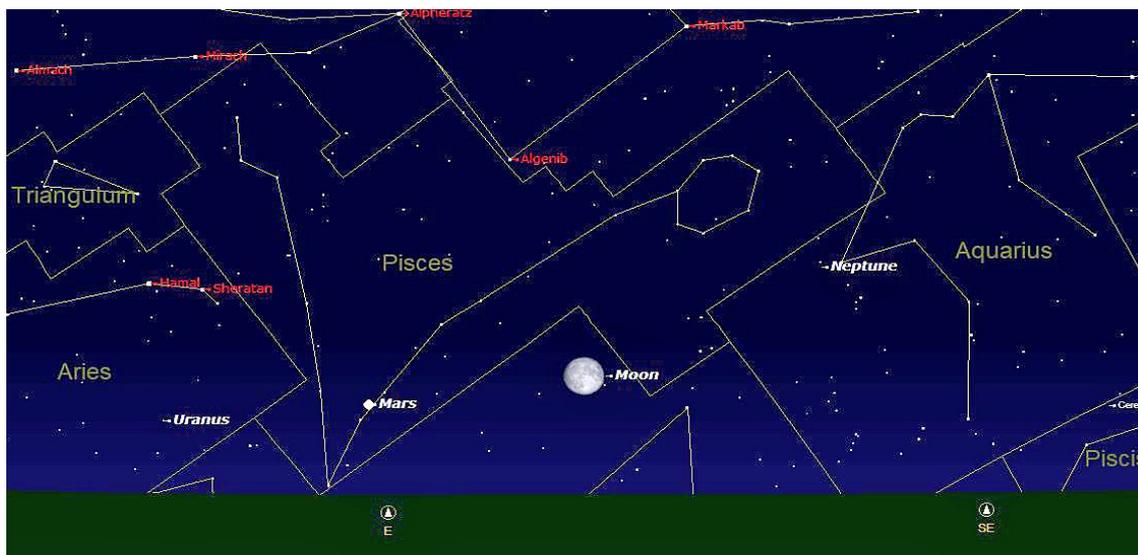
The Planets

The best placed planet this month is **Mars** and the best time to see it is at 00:30 BST on October 6th. You will find it in the south in the constellation of **Pisces the Fish**. It will be at **opposition** on October 13th which means that it will be on the opposite side of the Earth from the Sun and so will be very bright. However technically it is at its best when it is at its closest to Earth which will be on October 6th. This difference in dates is caused by the fact that Mars's orbit is elliptical. All the planets go around the Sun in elliptical orbits but the orbits of all of them except Mars are almost circular. Since Mars's orbit is elliptical then it is closer to us sometimes than it is at other times depending on where it is in its orbit.

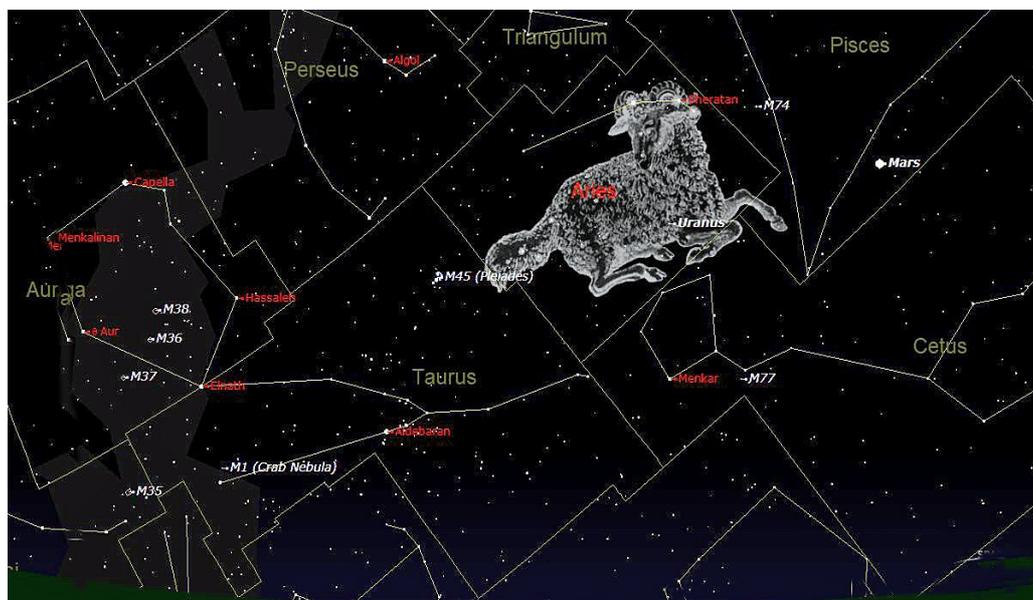
Jupiter and **Saturn** are close together this month and the best time to see both is at 20:00 BST on October 1st as shown in the star chart below. You can find them in the south in the constellation of **Sagittarius**.



If you look to the east of these two planets around the same time as the above, you may be able to find **Neptune** in **Aquarius** but you will need a telescope or powerful binoculars. To the east of that is the Moon and then to the east of that is **Mars** in **Pisces**. Finally to the east of Mars is **Uranus** in **Aries**. This is all shown in the star chart below.

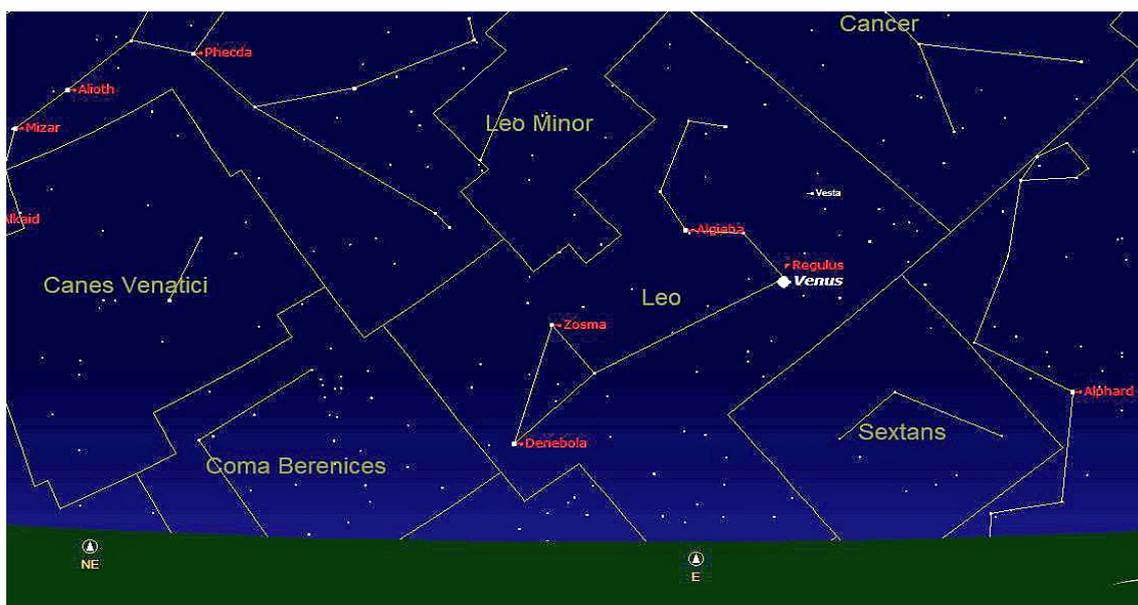


This is a particularly good month to observe Uranus since it will be at opposition on October 31st and will shine at magnitude +5.7. This is too faint for naked eye visibility from my location but it should be visible in binoculars or a small telescope. It is also well placed high in the sky in the south in the constellation of **Aries the Ram**. The chart below shows the sky in the east at 22:00 on October 15th. Aries is not a very distinctive constellation with only 4 bright stars and so I have highlighted it for you. The brightest star is **Hamal** which is the third star along from the right and is near the right ear of the Ram. Uranus is below it close to the front right leg. On the 15th there is no Moon to lighten the sky so I hope you manage to spot it.



Venus is a spectacular morning object this month. The best time to see it is 05:30 BST on October 3rd as shown in the star chart below. You can find it in the east in the constellation of **Leo the Lion**. Leo is a large and distinctive constellation. The head of the lion is known as the **Sickle**. It is shaped like a backwards question mark. You can see that Venus is close to the star **Regulus** which is the brightest star in Leo and so is known as **Alpha (α) Leonis**. Also in the

chart you can see the handle of the **Plough** in the top left corner and the constellation of **Cancer** in the top right corner.



I have learnt something new this month. Just to the right of Regulus is a faint, fuzzy region. This is the **dwarf galaxy Leo I**. Those of you who have heard my “Tour of the Universe” talk may remember that the Milky Way Galaxy is one of about 54 galaxies which form our **local group**. Many of these are dwarf galaxies and Leo I is one of them. It is 820,000 light years away and wasn't discovered until 1950. Under dark skies you may be able to find it with an amateur telescope of 6 inch diameter or more. An image of it is shown below.



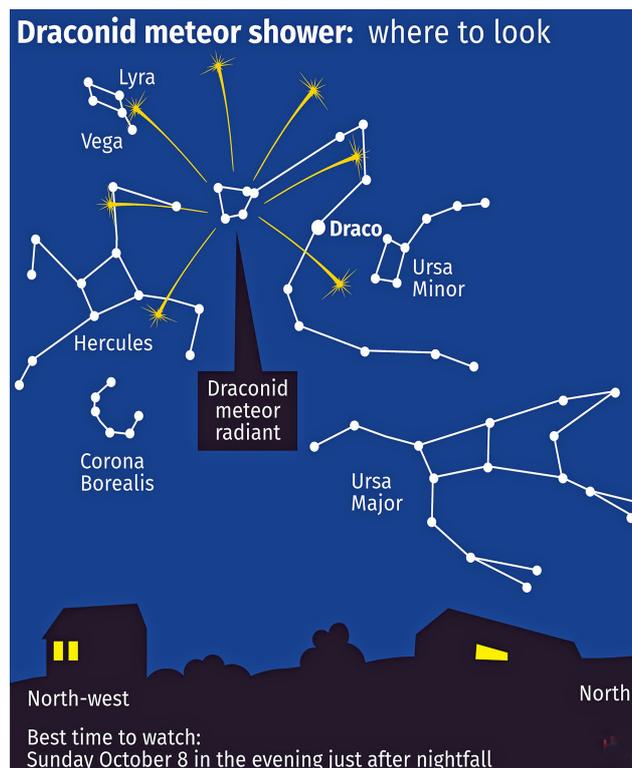
Meteor Showers

October is a good month for meteor showers. The show of the month is the **Orionids**. The radiant for this is near the star **Betelgeuse** in **Orion**. The shower starts around October 2nd but will peak on the night of October 20th/21st. Fortunately on the night of the peak, the Moon will have set by 20:00 but unfortunately, Orion does not start to rise in the east until about 23:00. But if you stay up late and have clear, dark skies you may enjoy a show of about 10 to 20 meteors per hour (mph). However, this shower has reached peaks of 70 mph in the past so it is not at its most active at the moment. The Orionids are caused by the Earth passing through the dust of **Halley's comet** which last visited us in 1986 and won't be back again until 2061. It is currently out beyond Neptune! The chart below shows the position of the radiant of the

Orionids (courtesy of Sky and Telescope). This is the point in the sky where all the meteors seem to appear from.



The other meteor shower this month is the **Draconids** and this reaches its peak on the night of October 8th. The radiant of this is near the constellation of **Draco the Dragon**. Draco is a circumpolar constellation which I have been describing in “Constellations of the Month” in recent Newsletters. The diagram below shows you the location of the radiant of the Draconids. The Moon will start to rise around 22:00 and will interfere with the show. It is better to look out high in the north around 20:00.

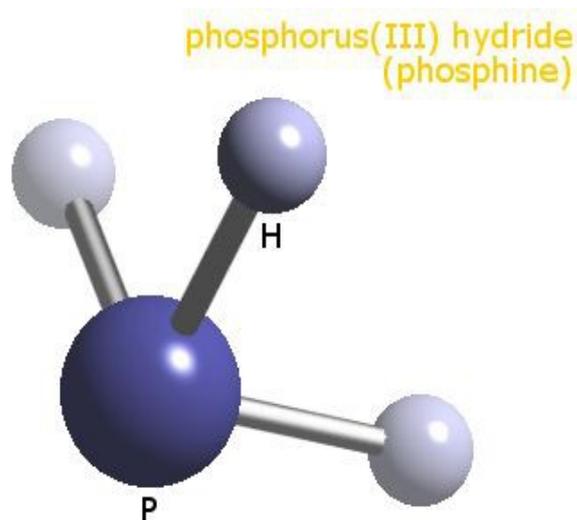


Astronomy for Dummies

I have received 2 questions this month. The first is from **Harry Das**. We met Harry in Switzerland last year together with his partner Dani and her son Ryan. Harry says:

“I am intrigued with the news that Venus could have life. What are your thoughts? ”

Thank you for this question Harry. Life on Venus has not been discovered yet but they have found **Phosphine** in the atmosphere of Venus. This is a colourless, flammable, and explosive gas. It is very toxic and is often used in rat poison. A molecule of it consists of 1 Phosphorus atom and 3 Hydrogen atoms as shown below.

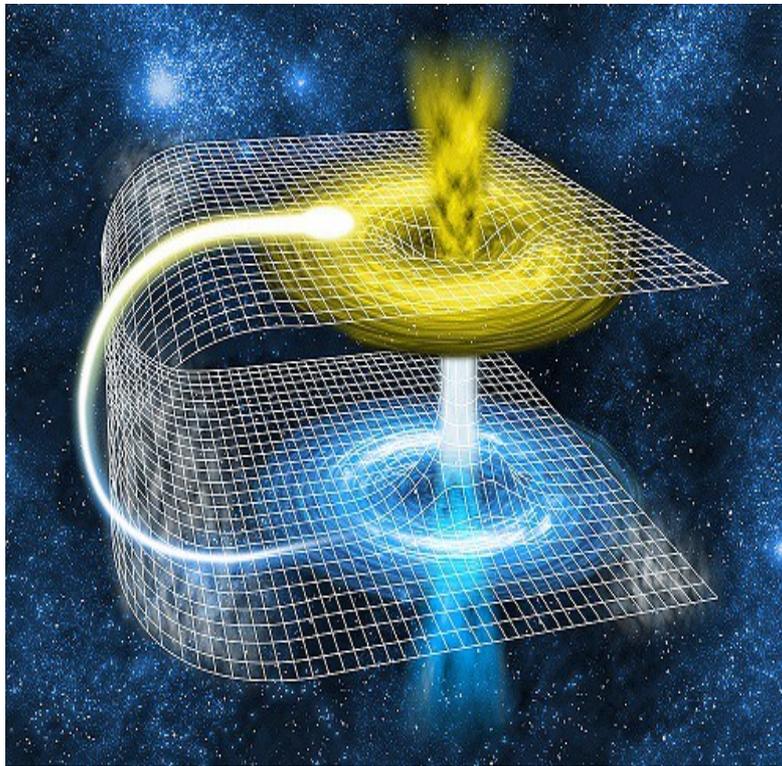


Phosphine occurs on Jupiter, Saturn and Earth in smaller quantities than found on Venus. On Jupiter and Saturn it is thought to be produced by chemical processes. On Earth it is produced by tiny microbes which live in regions where there is no Oxygen. They have been found in sludge and sewage stations for example. Venus is a volcanic, rocky planet which is shrouded in a dense, noxious atmosphere consisting of Carbon Dioxide laced with Sulphuric Acid. Phosphine has been found in the outer regions of this atmosphere. It is a mystery how so much Phosphine can be produced and survive in this highly acidic atmosphere without it being produced by microbial life. However a lot of work has to be done to prove this. So “watch this space”!

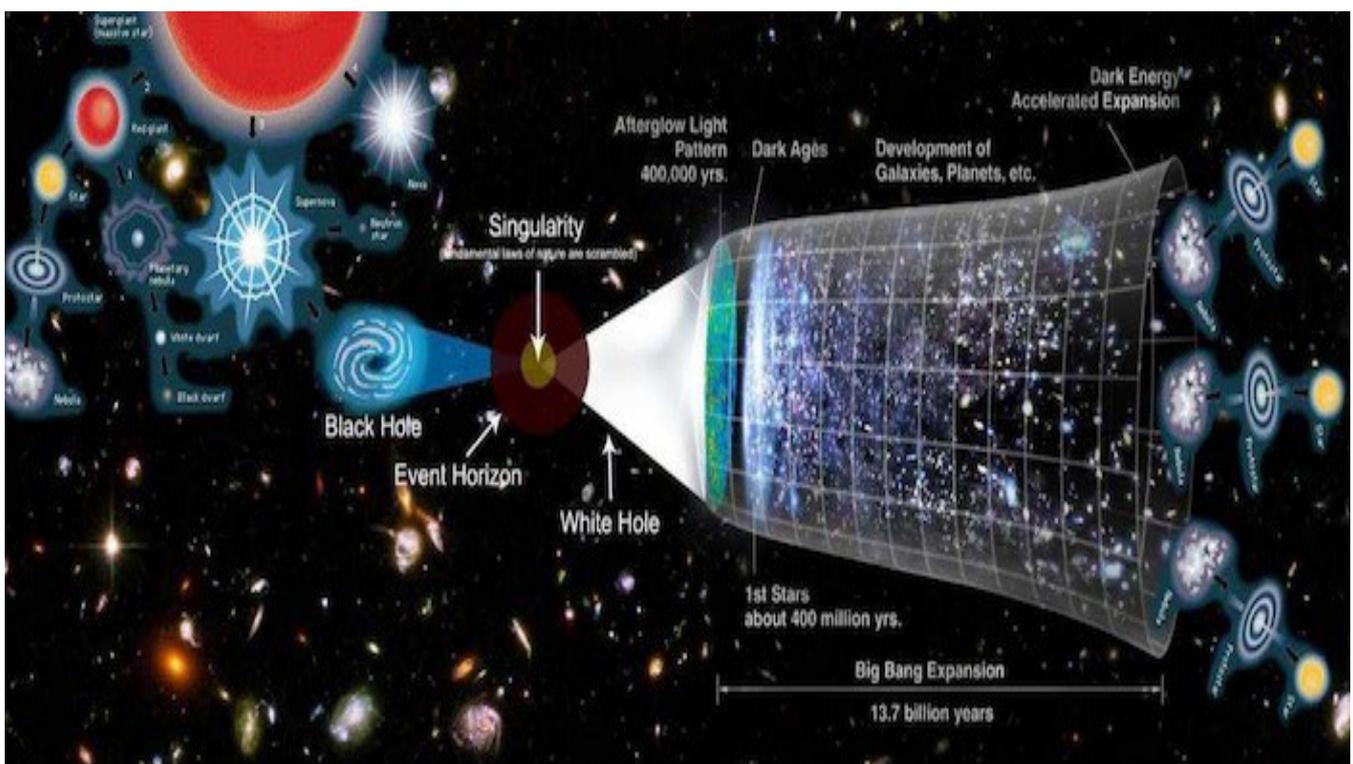
The second question is from Jeet who was in the audience when I gave a Zoom presentation to Hitchin U3A in August. Jeet says:

“I have a question, please. What happens to all the matter that The Black- Hole, gobbles up? Is a Black- Hole a shortcut to distant Stars ? ”

The simple answer to your question Jeet is that no-one knows what happens inside a Black Hole. However people have theories of course. Einstein's Theory of General Relativity predicts the existence of **White Holes** and **Wormholes** as well as Black Holes. The image below shows a folded region of space-time within a Universe. There you see the intriguing possibility of an entire galaxy disappearing down a Black Hole. But then the matter and radiation from the galaxy travels along a Wormhole which is connected to a White Hole. The galaxy then emerges from the White Hole as a new galaxy in a different part of the Universe. Alternatively it could emerge as a new galaxy in a different Universe!



This raises the intriguing possibility that what we call the “Big Bang” in our Universe could in fact be a White Hole! This is illustrated in the second image below. On the left, a Universe such as ours is disappearing down a Black Hole, travels along a Wormhole and emerges from a White Hole as a new Universe on the right of the image. So in answer to Jeet's second question, this could indeed open up the prospect of a fast way of travelling from one Universe to another or to a different part of the same Universe! However there are some problems with this!! First of all, no Wormholes or White Holes have been found even though they are predicted by Einstein's Theory. Secondly Wormholes are very tiny. Thirdly if we want to travel this way, we need to work out a way of not getting spaghettified when we enter the Black Hole! These are all problems for the generations that follow us to solve!! Thank you for this question Jeet. By the way I do cover all of this in my “Big Bang” talk!



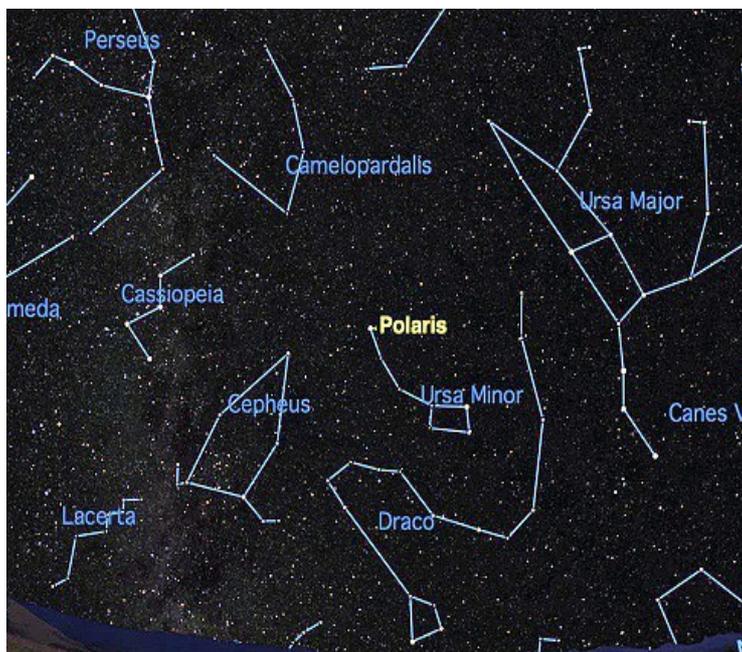
Images of the Month

I have received no images this month.

Constellation of the Month

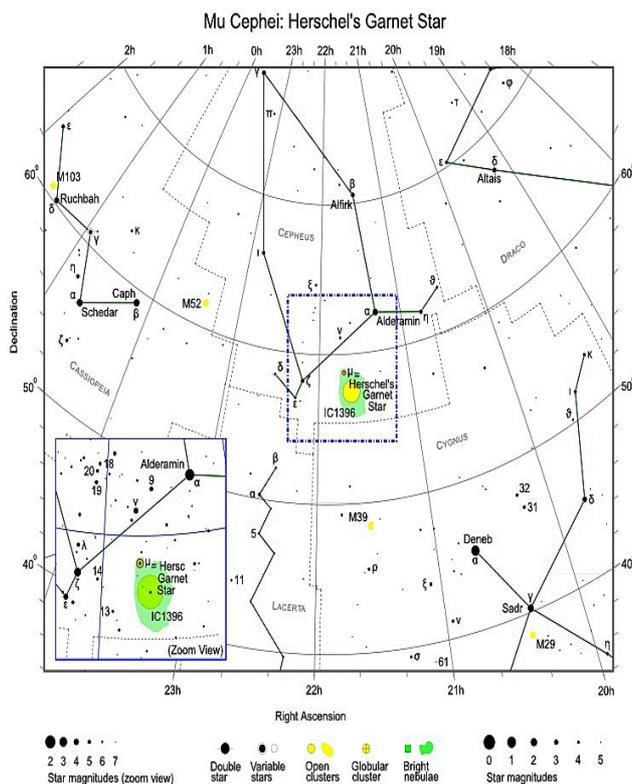
In recent Newsletters I have been describing the **circumpolar constellations**. These 6 constellations are close to the north pole and are in the sky all night and also all the year round. They are shown in the chart below.

If we go round the pole in an anticlockwise direction starting at the top in the diagram, then at the top is **Camelopardalis the Camel**. Next to this is the W shaped constellation **Cassiopeia** and then **Cepheus**. Next is the meandering constellation of **Draco the Dragon** and finally **Ursa Major, the Great Bear**. In the centre is the pole star **Polaris** and nearby is the constellation of **Ursa Minor, the Little Bear**. The other constellations in the chart, such as **Perseus**, are not circumpolar. Draco and Camelopardalis are both very faint constellations so we can focus in on the other 4. Note that as the night goes on these appear to us to be rotating round the pole and will seem to have a different orientation at different times. People wonder why the Plough is sometimes upside down and that is the reason!

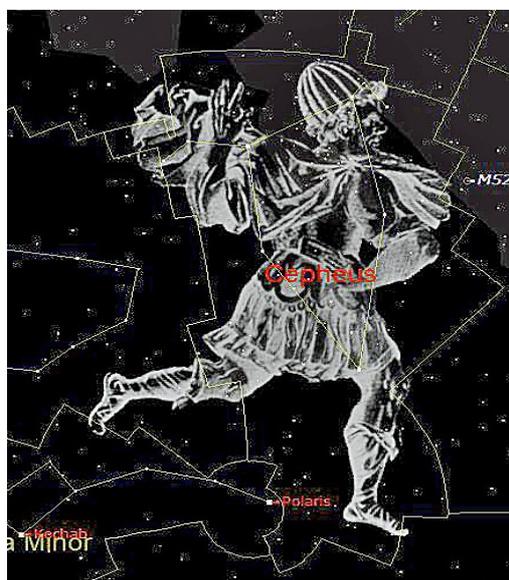


So far in these Newsletters, I have described Ursa Major, Ursa Minor and Cassiopeia. This month I am going to zone in on the constellation of **Cepheus the King of Ethiopia**. You will always be able to find the King to the right of Queen Cassiopeia! As shown in the star chart below, Cepheus looks like the gable end of a house. The brightest stars in any constellation are labelled with Greek letters. The brightest is alpha (α), the next is beta (β), then gamma (γ), delta (δ) and epsilon (ϵ). These are used to identify the star. For example, the brightest star in Cepheus is referred to as **alpha Cephei** but is also named **Alderamin** which in Arabic means “the right arm”. It is only 48 light years away from us. **Delta (δ) Cephei** is a triple star named **Alfirk** which means “the flock”. Its brightest component is a blue giant star which is also a variable star. In 1908 the astronomer Henrietta Swan Leavitt discovered a relationship between the period of pulsation of variable stars in Cepheus and their brightness. These stars and others like them became known as **Cepheid variables**. They are now used as **standard candles** since by measuring the period of pulsation it is possible to determine the actual brightness of the star.

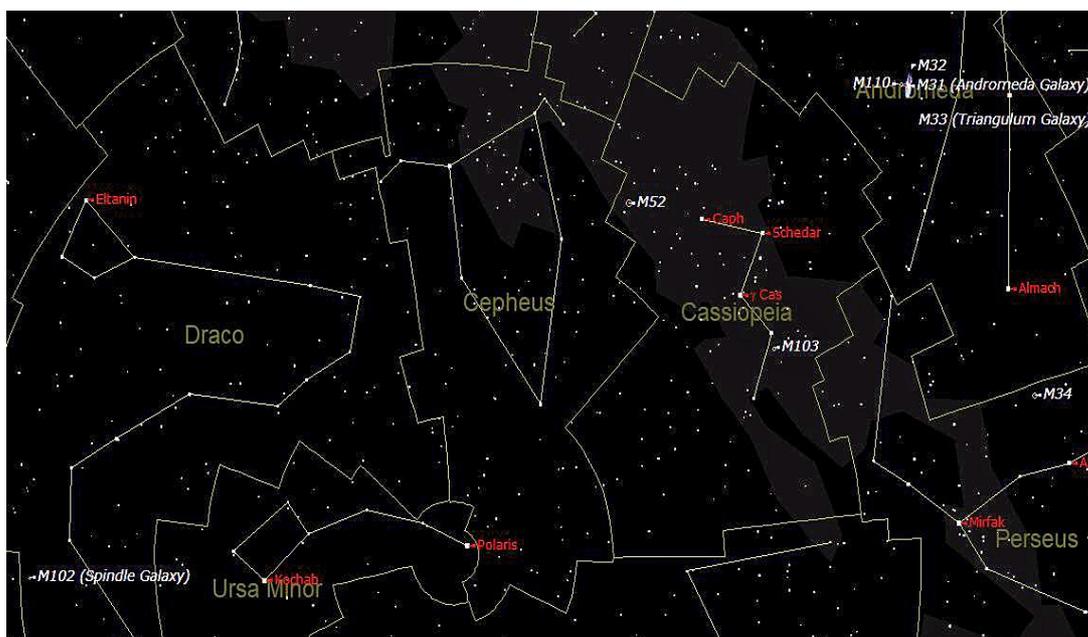
I would like to point out one other interesting star in Cepheus and that is **Mu (μ) Cephei** which is known as **Herschel's Garnet Star**. When Sir William Herschel observed Mu Cephei in 1783 he described it as “a most beautiful object of a very fine deep garnet colour, that's exceptionally striking when compared to nearby white stars”. Mu Cephei is an extremely luminous red supergiant and is one of the reddest known stars of all. It may be the largest star visible to the naked eye with an estimated radius of 710 million miles or 1,650 times that of the Sun. The star is twice the size of **Antares in Scorpius** which is generally considered to be a massive star! I found the garnet star by accident one night many years ago when I was searching for something else. Its stunning colour amazed me. You can see it in the star chart below to the left of Alderamin. Believe me it is well worth hunting for it!



Cepheus is also the location of a number of deep sky objects such as M52 which is an open cluster of stars and listed in the Messier catalogue. Also **NGC 7023** which is the “**Fireworks Galaxy**” can be found in that region. It was imaged by Roland Gooday and I published it in my August Newsletter. The image below shows the mythical King Cepheus superimposed on the constellation.



Finally the star chart below shows you where Cepheus will be at 22:00 on October 1st .

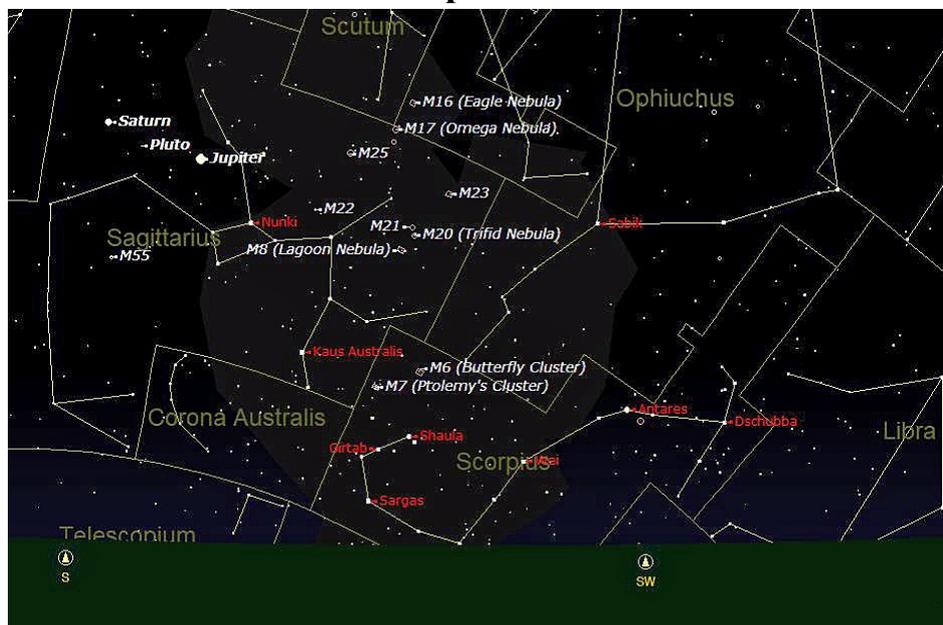


If you are interesting in finding out more about this constellation then there is a lot of information available on the internet.

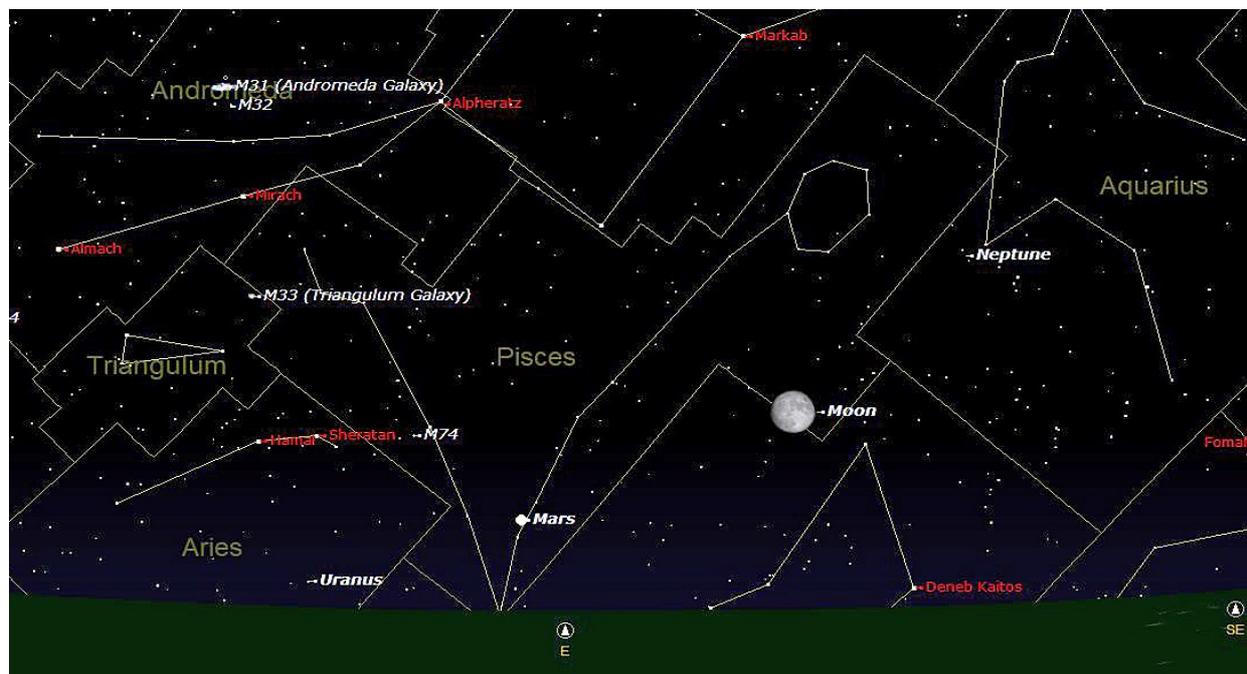
Now off to our friends in Dalian, China!

What's Up in Dalian, China?

As always, most of what I have written in the previous section applies to you. Since you are in the Northern Hemisphere, the sky you see is very similar to ours except that you are further south so you can see further down into the Southern Hemisphere. Also, objects that are low down on the horizon for us, are higher in the sky for you. This is a great advantage since they will be well above the horizon and will be clearer to see. Dalian time is 7 hours ahead of British Sumer Time so you will see things before we do. The star chart below shows you what you will see if you look in the south and southwest at 19:00 on October 1st. There you have the pleasure of seeing **Saturn** and **Jupiter** close together in the constellation of **Sagittarius**. Also you can see all of the **Messier objects** which can be found in that region. On the horizon you can see the whole of the constellation of **Scorpius** about to set.



The following star chart shows what you will see if you look in the east around the same time. There you can see **Neptune** in **Aquarius**. To the east of that is the Moon. Then you can see **Mars** in **Pisces** and further to the east is **Uranus** in **Aries**. Above Mars is the **Great Square of Pegasus** and to the east of that you can find the **Andromeda Galaxy**. Quite an amazing display!

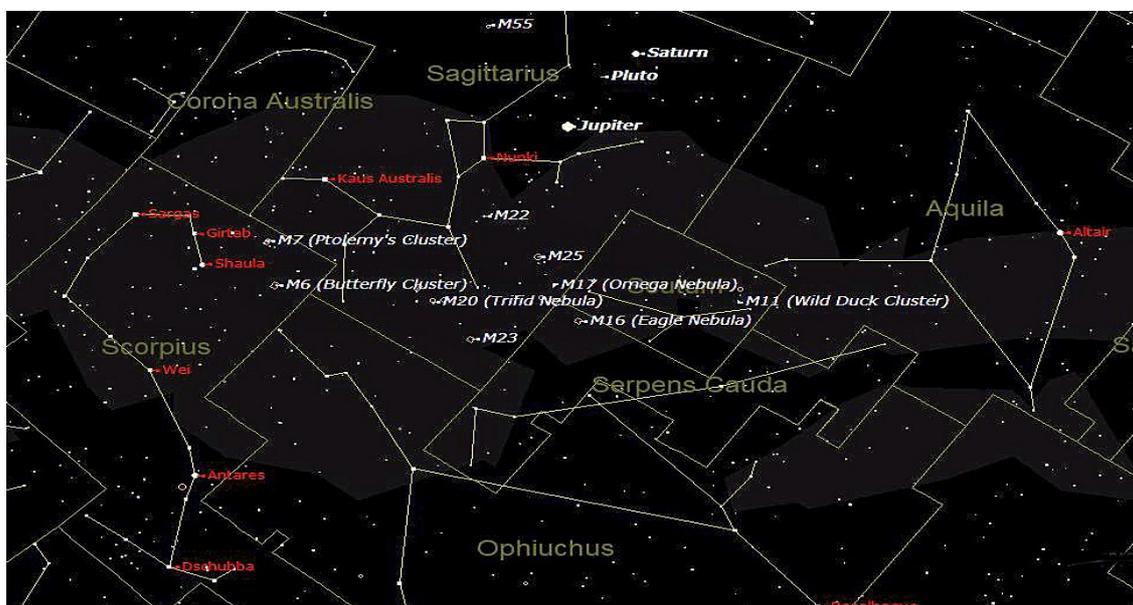


Of course if you look to the north you will be able to see the **circumpolar constellations** including **Cepheus** and the **Draconids** as described in the first section. If you wish to see the **Orionids** then you must look in the north around 23:00 when you will see that **Orion** is just rising above the horizon.

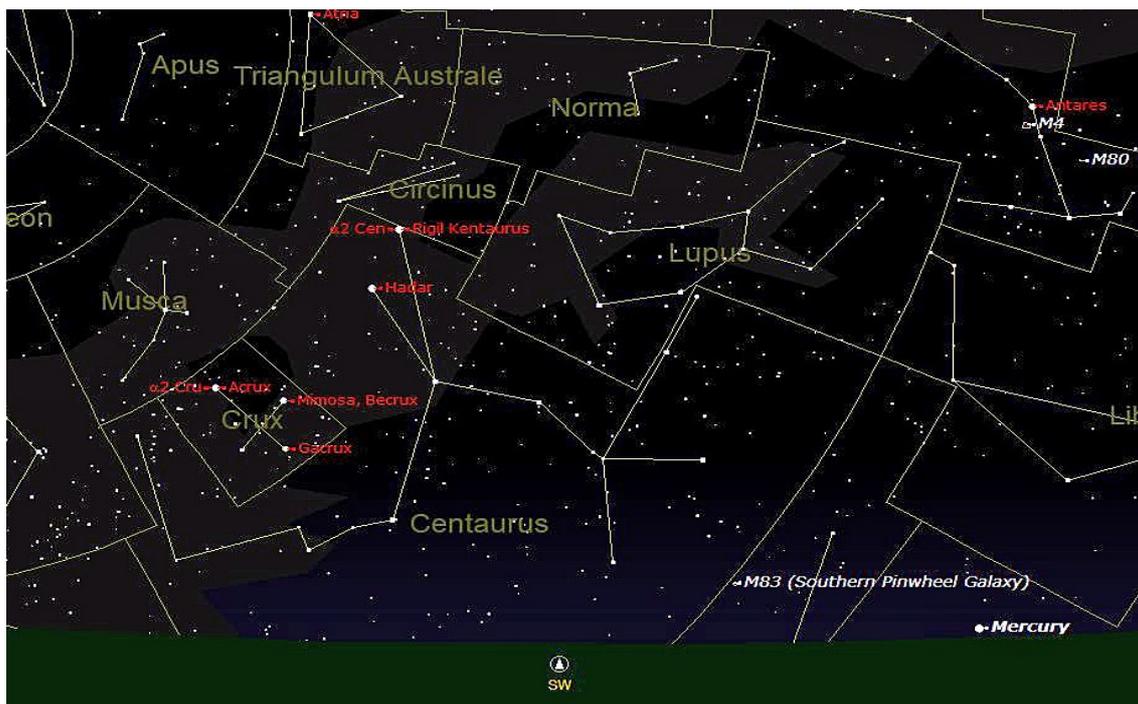
Now to the Southern Hemisphere!

What's Up in the Southern Hemisphere?

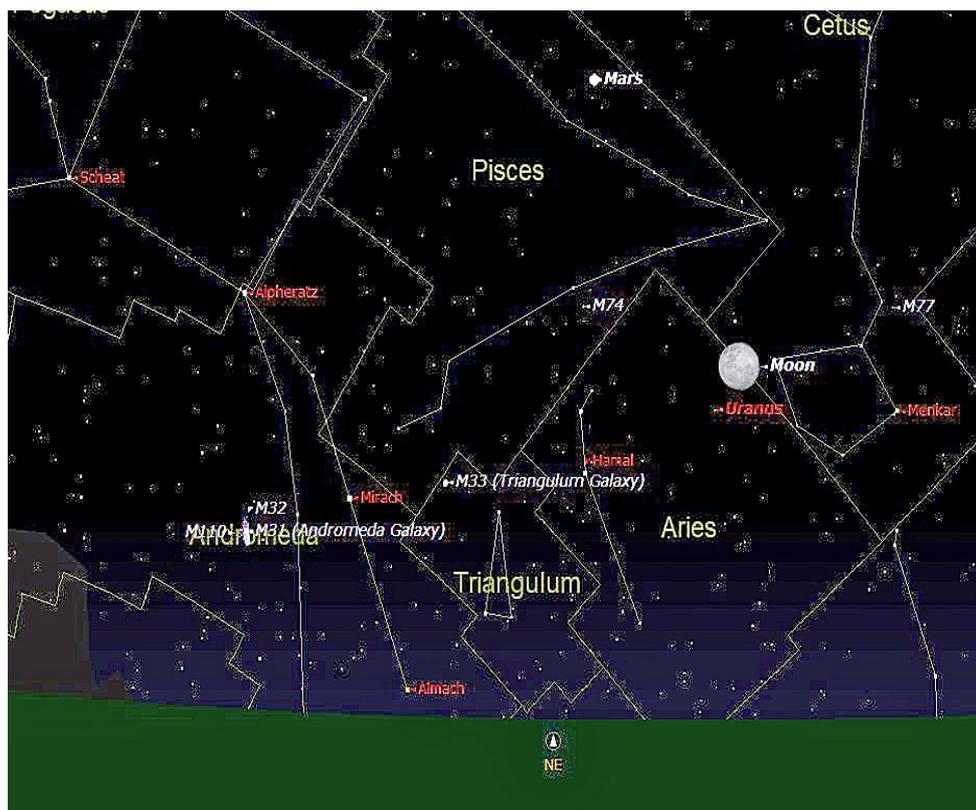
The star chart below shows the sky in the northwest over Sydney at 20:00 on October 1st. There you can see **Saturn** and **Jupiter** very high in the sky in **Sagittarius**. You can also see the Messier objects in that region. To the west is the whole of the constellation of **Scorpius**.



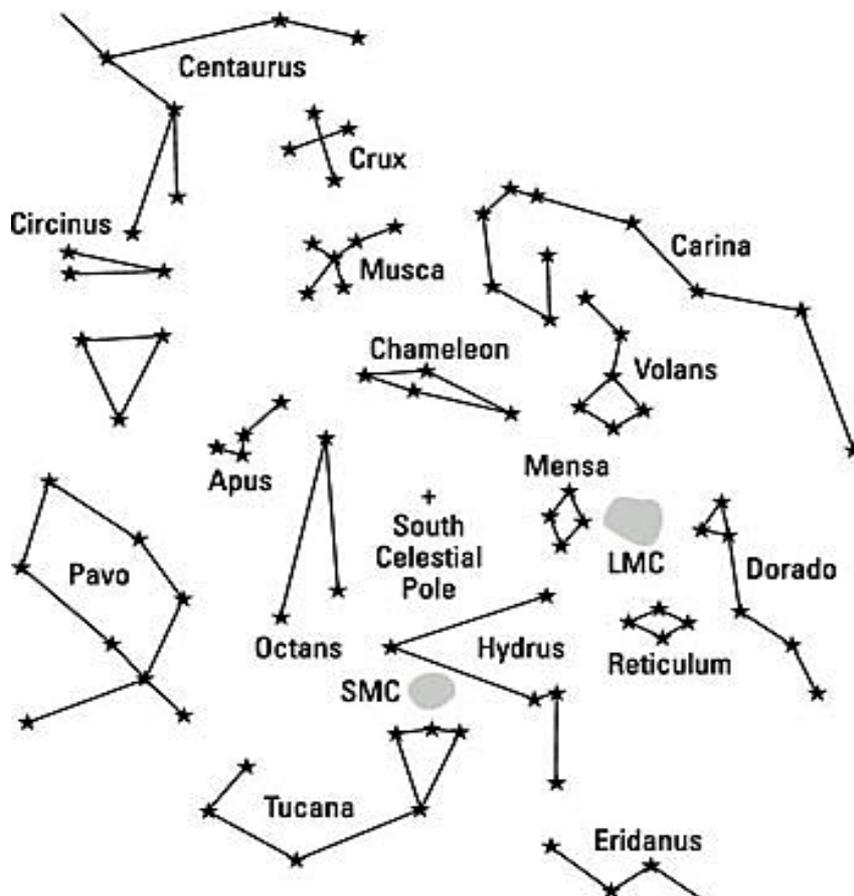
If you look further to the west you can see the **pointer stars** (alpha and beta Centauri) and **Crux** close to the horizon. If you look out around 19:00 and if you have a flat horizon in the southwest then you may be able to spot **Mercury** before it sets.



Uranus is at opposition on October 31st. The star chart below shows the sky in the northeast at 20:00 on that date. There you can see Uranus in **Aries** and very close to a bright Moon which may make it difficult to find the planet. Above it is **Mars** and to the left of this is the **Great Square of Pegasus** with the **Andromeda constellation** and **galaxy** just rising in the east below it. You may prefer to look for Uranus in the middle of the month when there will be no Moon to spoil it. If you look in the northeast around 22:00 you may be able to spot it in binoculars. **Neptune** can be spotted in the east throughout October in the early evening. **Venus** will be a brilliant “morning star” in the pre-dawn sky throughout October.



I will finish for this month by reminding you how I finished last month. You don't need a telescope or binoculars in order to stargaze. You can learn quite a lot simply by sitting outside and trying to identify constellations just using the naked eye. Below is a chart which will show you the constellations close to the south pole. This chart also shows the position of the **LMC** (Large Magellanic Cloud) and the **SMC** (Small Magellanic Cloud). These are easily seen with the naked eye on a dark night. They are irregularly shaped galaxies which are currently being absorbed into the Milky Way!



Until next month – happy stargazing and dark skies!

Valerie Calderbank FRAS