Finding our way around the night sky

RAL Stargazing

4th February 2022

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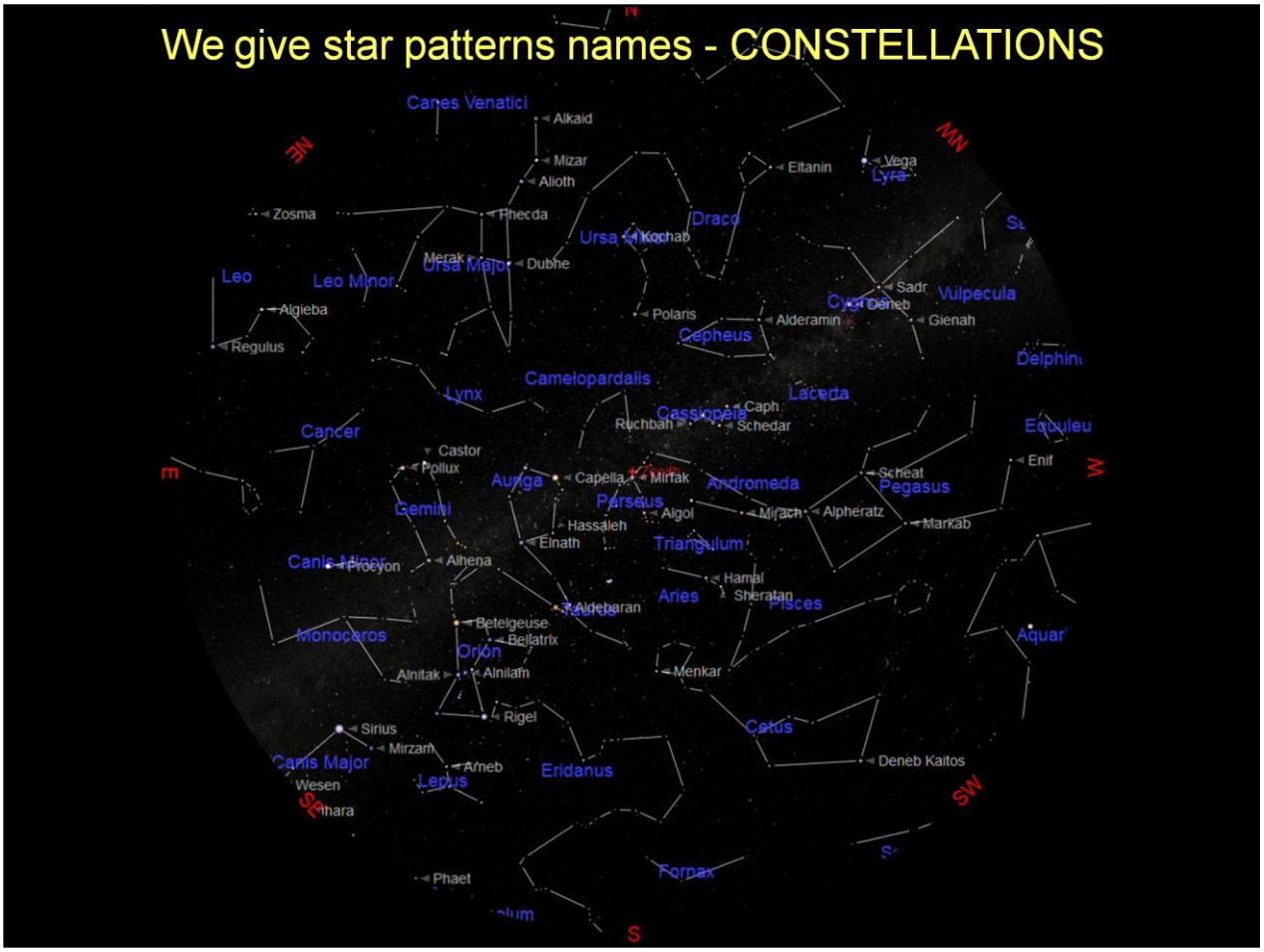
Newbury Astronomical Society

To the naked eye (the astronomical term for look without optical aid) all the stars look very similar. Some stars look brighter than others and some of the brighter stars may show a hint of colour but it is very subtle.

One thing we will notice, is some stars appear to form a loose pattern or group. We as humans do have an ability to make patterns, groups or shapes out as we look around us. Some examples are seeing rocks that look like an animal or a human head or face. We also se the shapes of animals in the clouds on a bright day. So it is not surprising that we see patterns in the night sky. The picture above shows the night sky with the ‘naked eye’ stars in their relative positions.



We give the internationally recognised constellations names.

The names of the constellations are mainly very old.

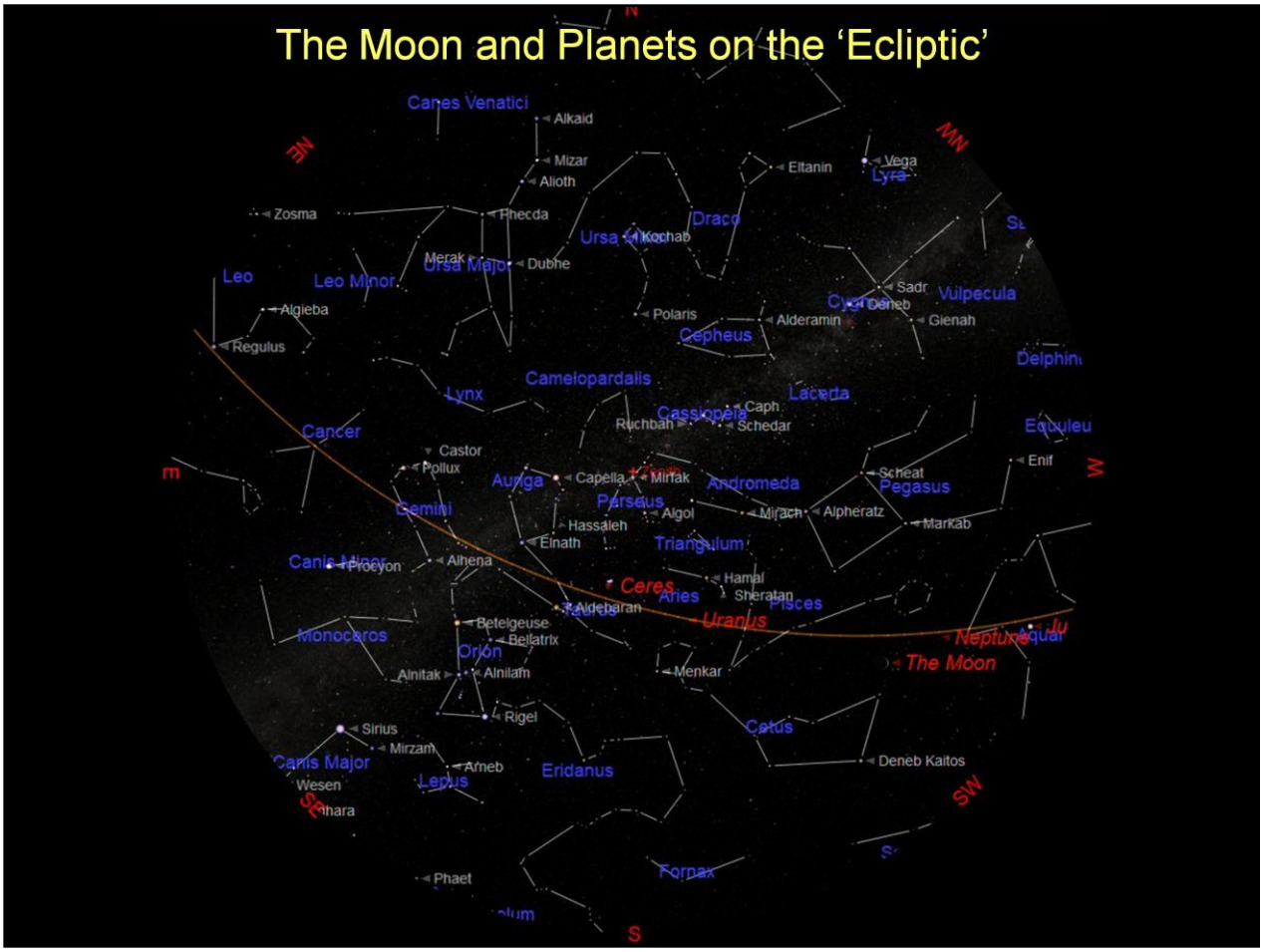
Constellations help us identify areas of the night sky.

They are rather like the counties on maps of England.

Ursa Major, shown at the top (North) of the chart above is one of the best known.

It is also called the ‘Plough’ or the ‘Big Dipper’ by the Americans.

However the main shape (asterism) does look remarkably like a Saucepan.



There is an imaginary line that the Sun, Moon and Planets appear to move along as they cross the sky due to the rotation of our planet Earth.

We call this imaginary line the 'Ecliptic' and it is also known as the Zodiac.

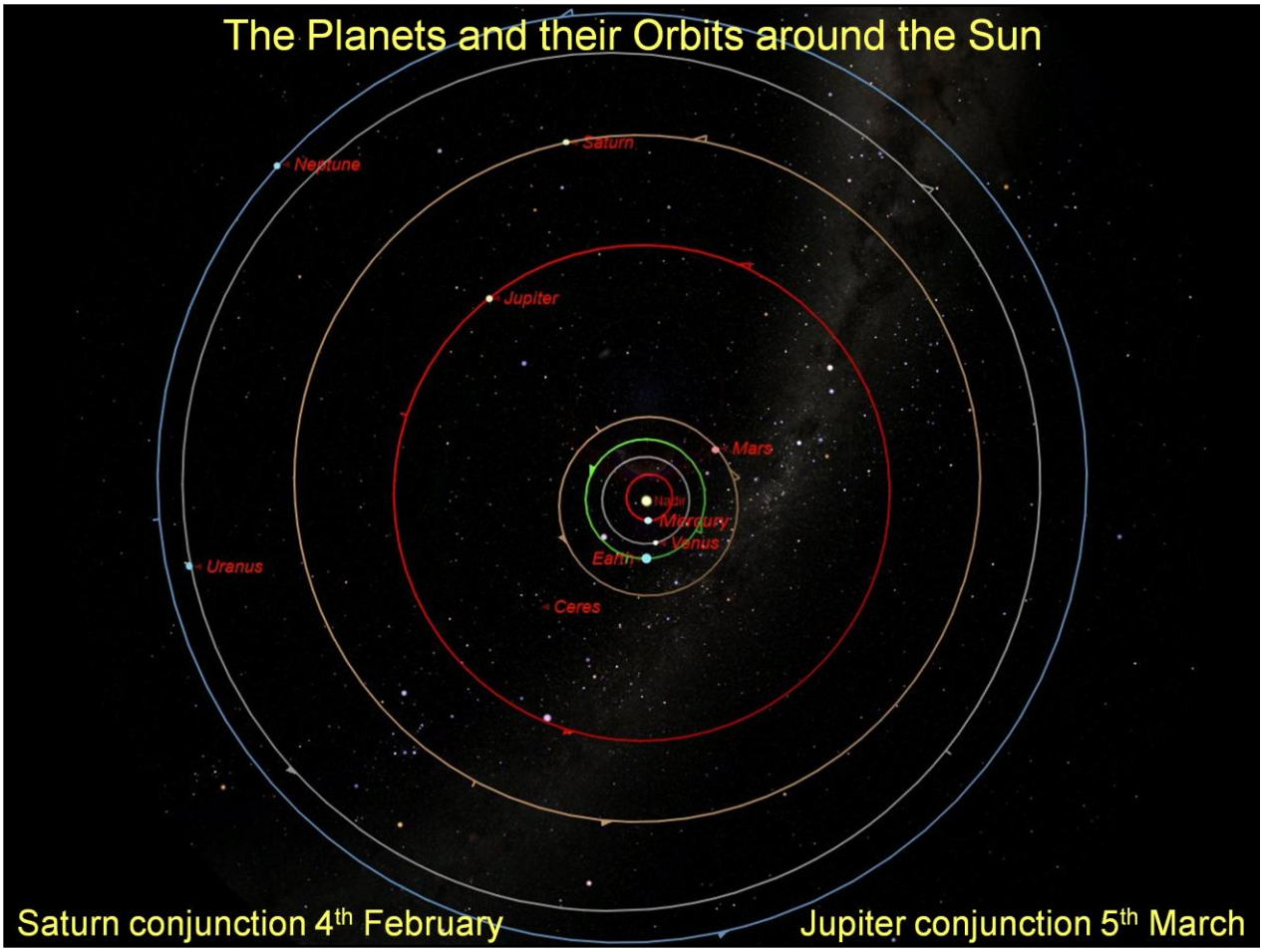
It is the line that represents the plane where the planets move around the Sun along their orbits.

Our planet Earth rotates on an axis (North and South poles) that is tilted over at 23.4º compared to the Sun's axis and the orbital plane of the planets.

So our view of the sky from Earth is tilted and this causes the Ecliptic to appear to move up and down as we orbit the Sun giving us our Seasons.

This is why the Sun appears higher in the sky during the summer and lower during the winter.

We can see the outer planets Jupiter, Neptune and Uranus and where they appear in the night sky on the chart above.



The planets orbit the Sun (our star) in two groups Inner and Outer planets.

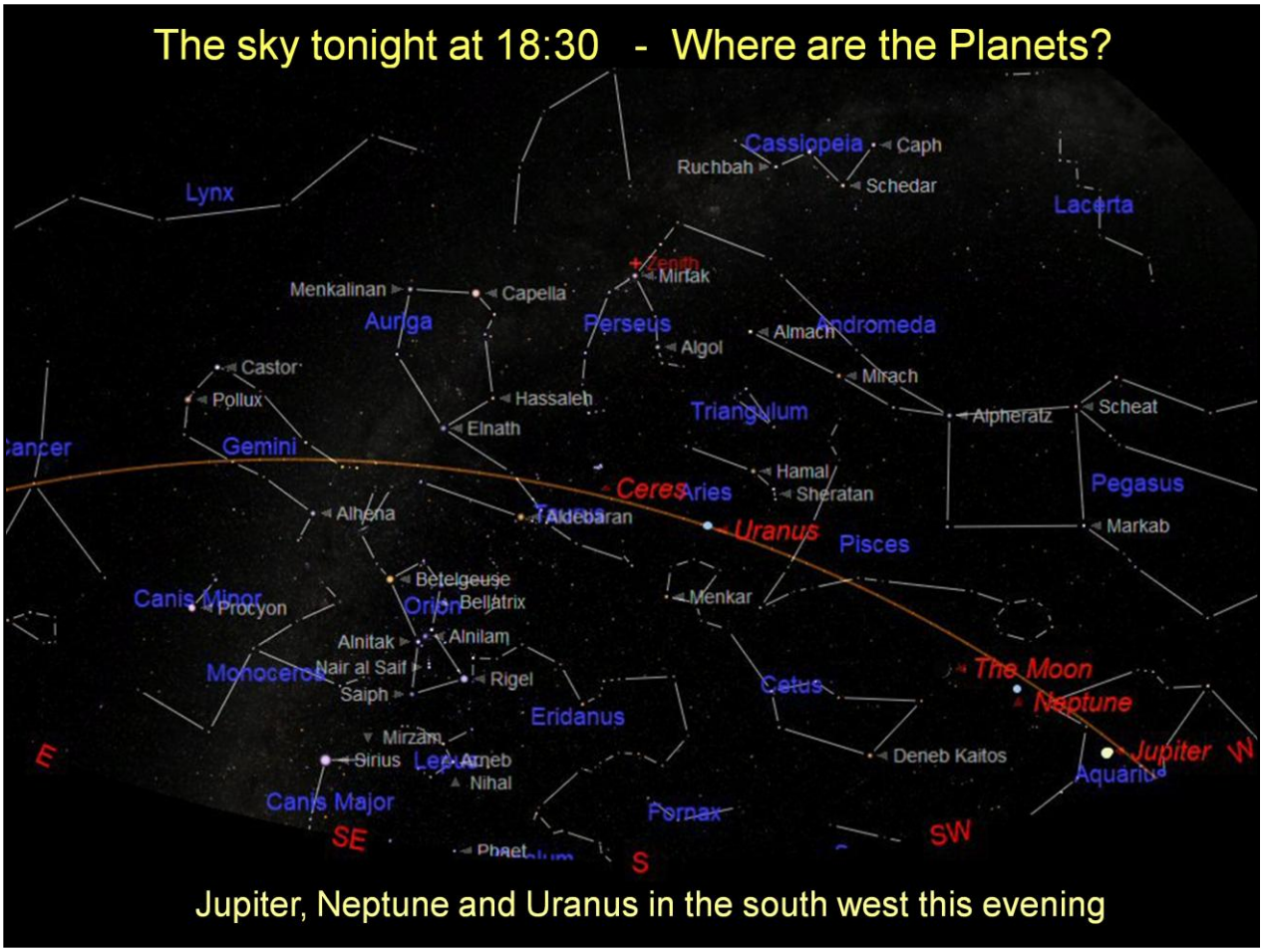
The chart above shows the orbits of the planets around the Sun.

Inner planets are Mercury, Venus, Earth and Mars.

These are the Terrestrial (rocky) Planets.

Outer Planets are Jupiter, Saturn, Uranus and Neptune.

These are the Gas Giants and Ice Giants.



There are three planets currently in the evening sky: Jupiter, Neptune and Uranus.

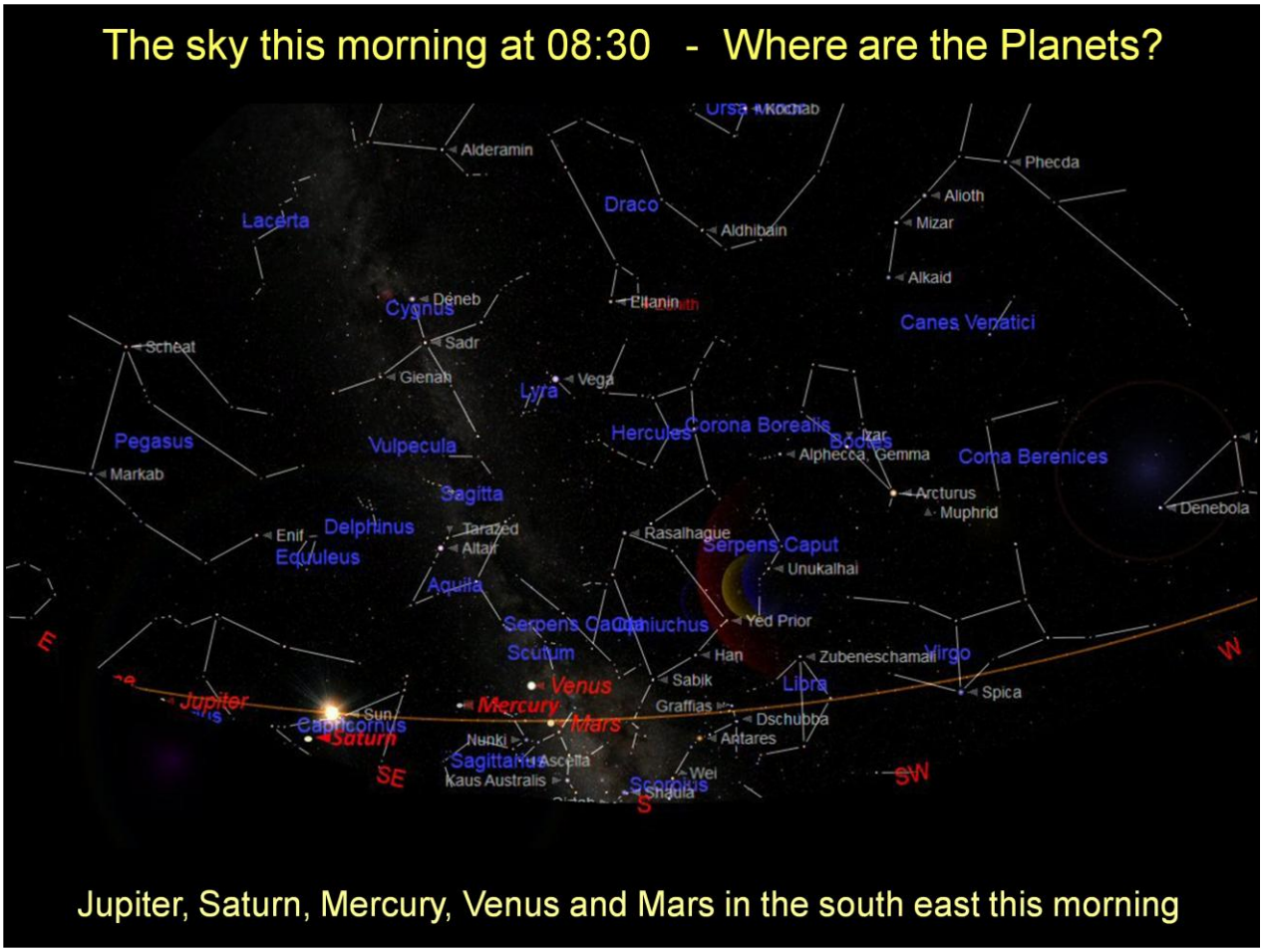
We can see Neptune, Uranus and Jupiter as they appear to move along the Ecliptic from east to west as Earth rotates from west to east.

This is rather like looking out of a train window as the train begins to move out of the station.

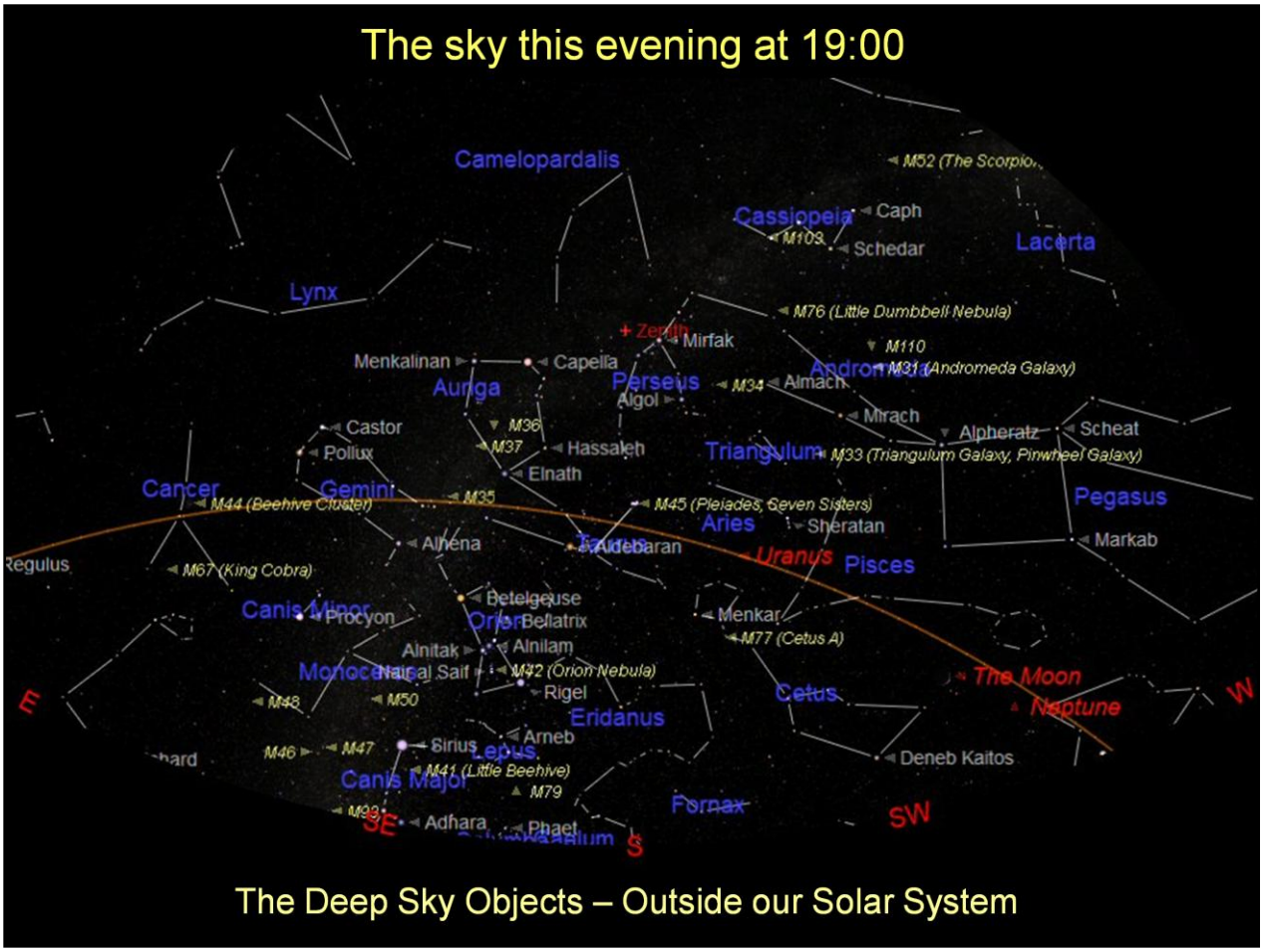
If you are not aware that the train is about to move then it may appear to be the station that is moving.

As we (on Earth) are moving from west to east (right to left) the sky appears to move in the opposite direction from east to west (left to right).

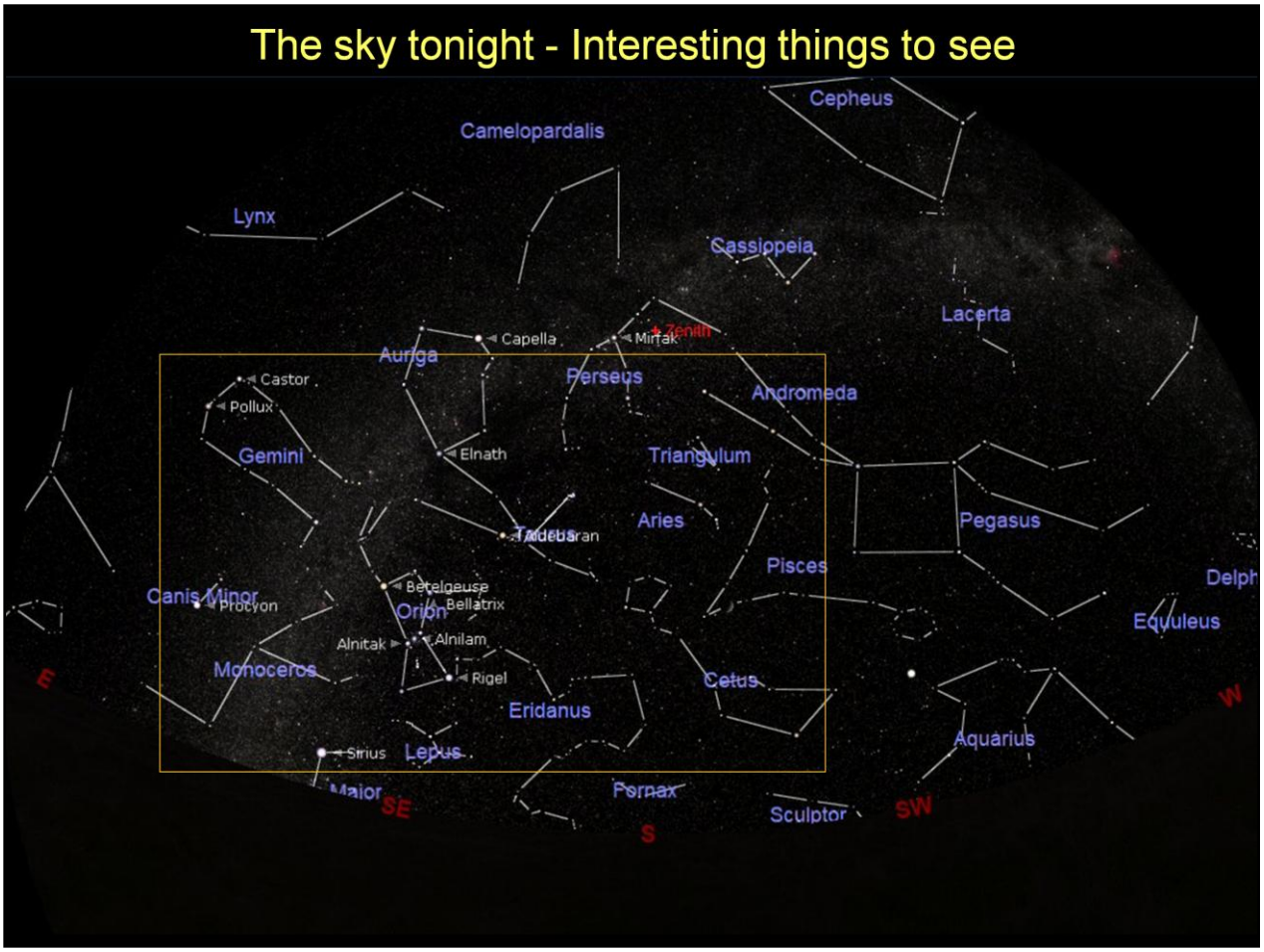
The planets will begin to disappear over the western horizon, Jupiter first soon after sunset followed by Neptune and Uranus later in the evening.



Mars, Venus and Mercury and Saturn rise before the Sun in the early morning.
They are quite difficult to see in the brightening dawn sky in the east.
Saturn is in conjunction with the Sun on 4th February and cannot be seen.
Jupiter will be in conjunction with the Sun on 5th March.
These planets will appear in the daytime sky until later in the year.
They will then gradually creep into the evening sky.



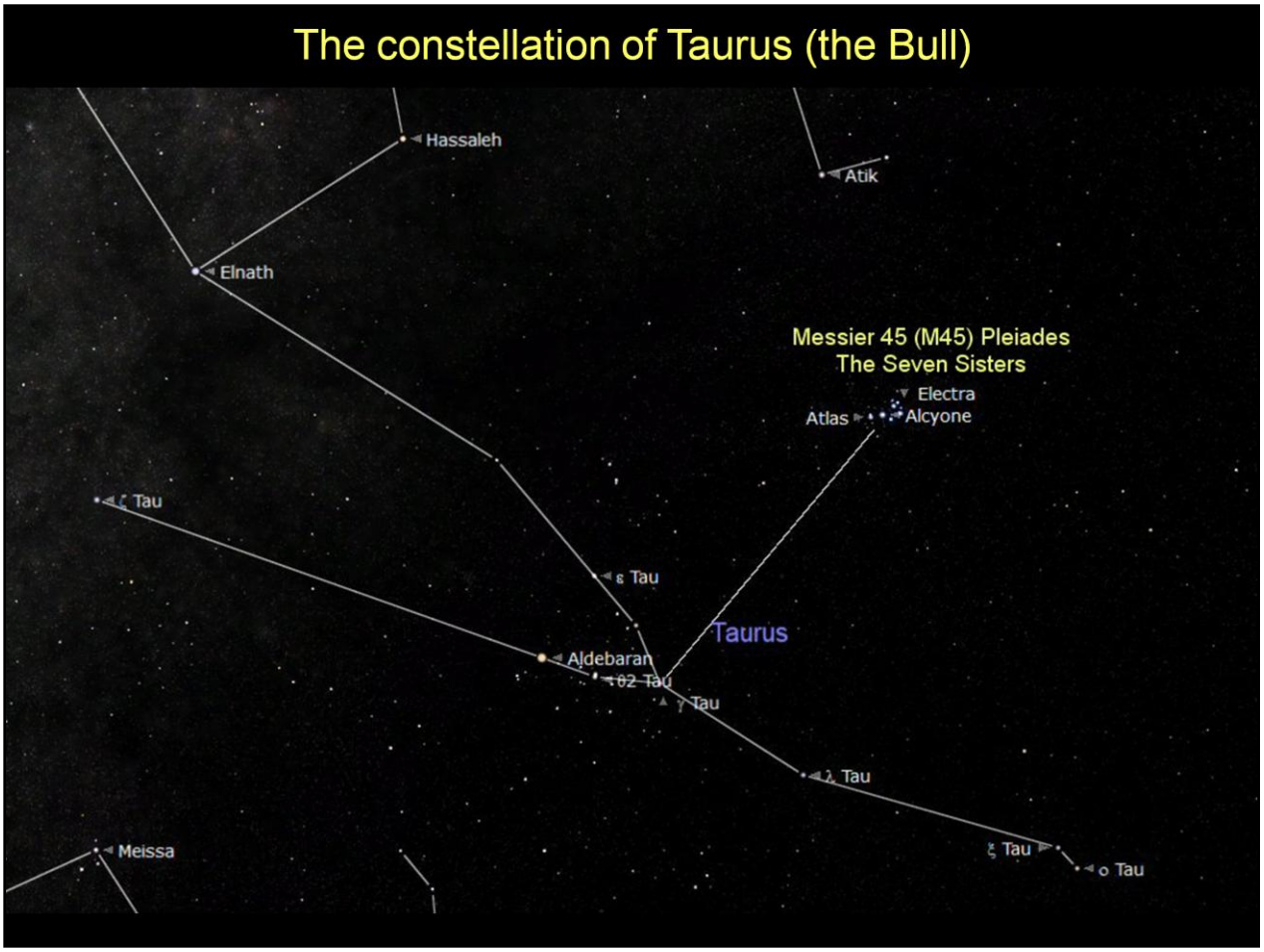
When we have access to a telescope we can see the Deep Sky objects.
These are the interesting objects that reside outside of our Solar System.
Most of these objects are faint so they do need a telescope to see them.
The first to look for are the Messier objects and are preceded by the letter ‘M’.
Messier 45 (M45) is a beautiful Open Cluster of stars called the Seven Sisters.
M45 can be seen with our ‘Naked Eyes’ without using binoculars or a telescope.



When we use the telescope we will be looking in this part of the sky.

We will be looking at the Taurus the Bull.

Orion (the Hunter) and his Hunting Dogs.



Taurus is shaped like a flattened cross with the bright star Aldebaran at the centre.

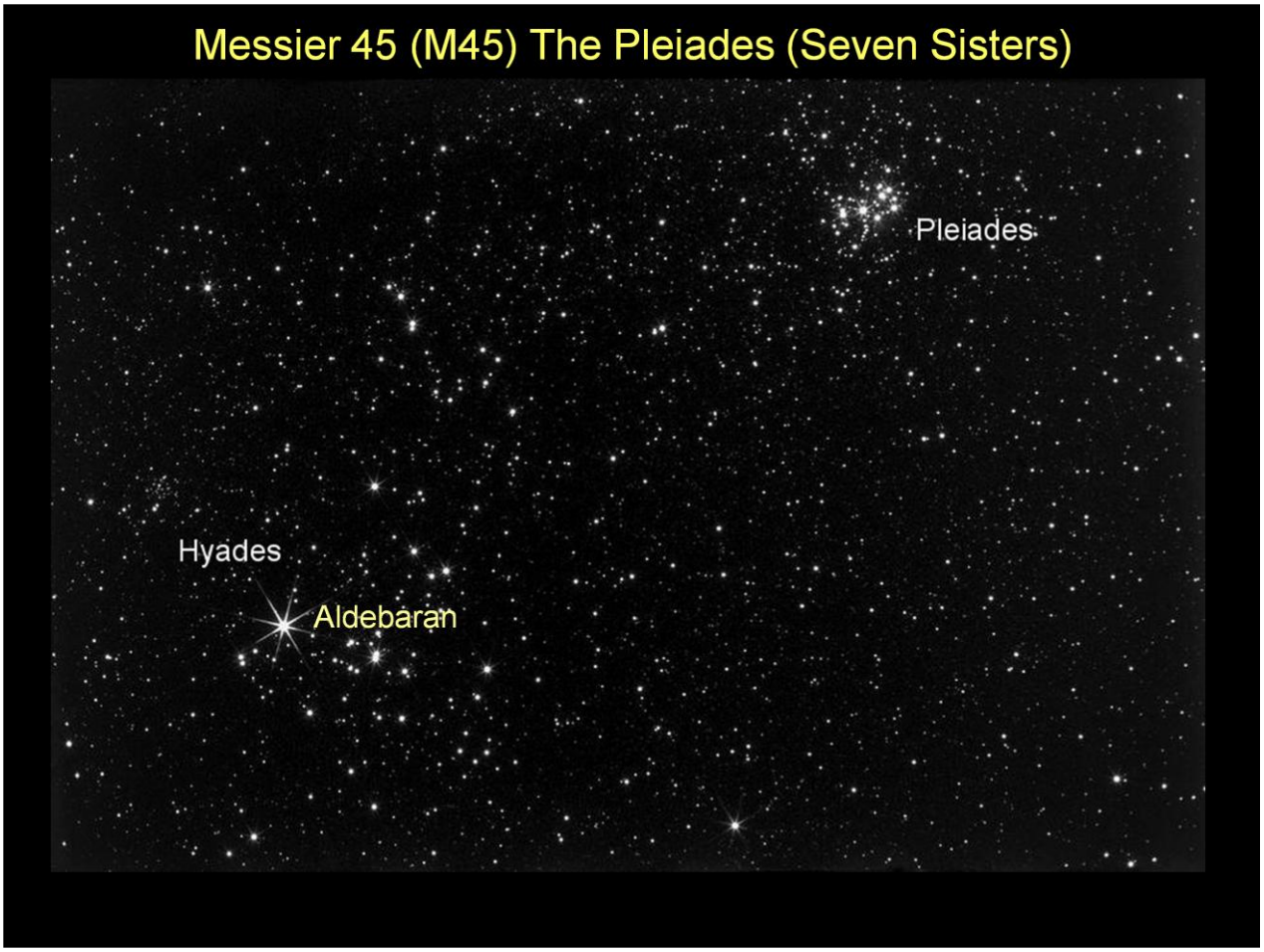
There are two ‘Naked Eye’ star clusters in the constellation of Taurus (the Bull).

At the centre there is a cluster of stars around the bright orange star Aldebaran called the Hyades.

The top right arm of the flattened cross points to a ‘fuzzy patch of light’.

If we look very carefully we can see it is a group of stars.

This is the open Cluster Messier 45 (M45).



There is a bright red star Aldebaran located at the centre of Taurus. It is easy to find and therefore helps to identify the constellation of Taurus.

It is in fact a Red Giant Star and that is why it appears distinctly orange.

A Red Giant is a star similar to our Sun (perhaps a little larger) that is approaching the end of life as a normal star.

Surrounding the bright red star Aldebaran is an Open Cluster of Stars known as the Hyades.

The real jewel of Taurus is without doubt the beautiful Open Cluster, Messier 45 (M45) also called the Pleiades or the Seven Sisters.

An Open cluster is created as stars form in a giant cloud of gas and dust called a ‘Nebula’.

The Open Cluster Messier 45 (M45) also called the Pleiades or the Seven Sisters

It is visible to the ‘naked eye’ (just using our eyes) initially looking like a patch of light.

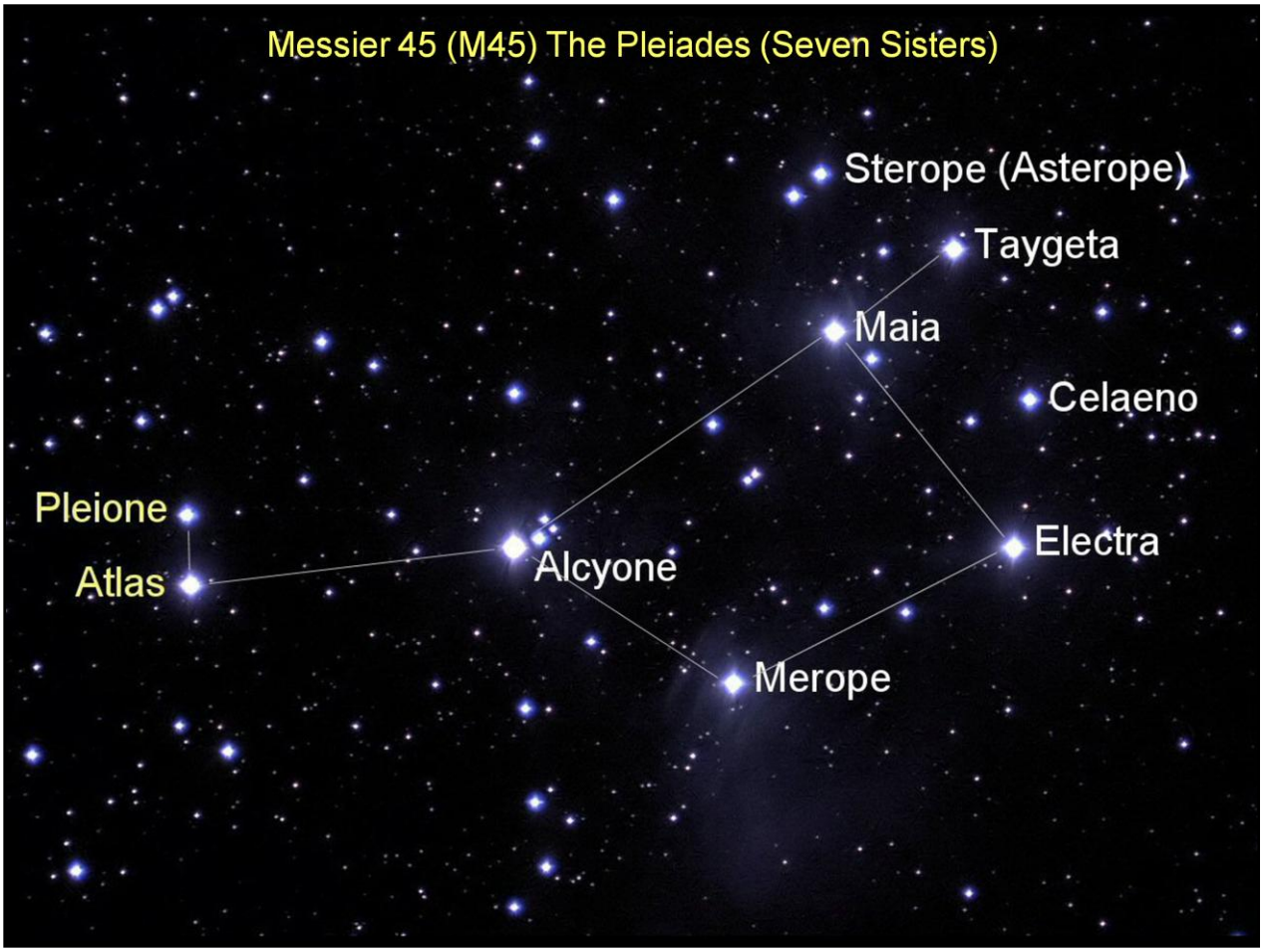
Closer observation will reveal a cluster of up to seven stars.

Using a good pair of binoculars many more stars will be seen (about thirty bright stars).

There are in fact about 300 young stars in the cluster that is estimated to be about 100 million years old.

M45 is one of the closest open clusters to us and is just 400 light years away.

M45 is close to us and therefore the stars do appear to move but so slow to us that it is imperceptible. However over a long period of time (for us) they will appear to be moving so after about 50,000 years they look completely different.



In Greek mythology the Pleiades (Seven Sisters) are the seven daughters of the Titan god called Atlas and his wife the sea-nymph Pleione.

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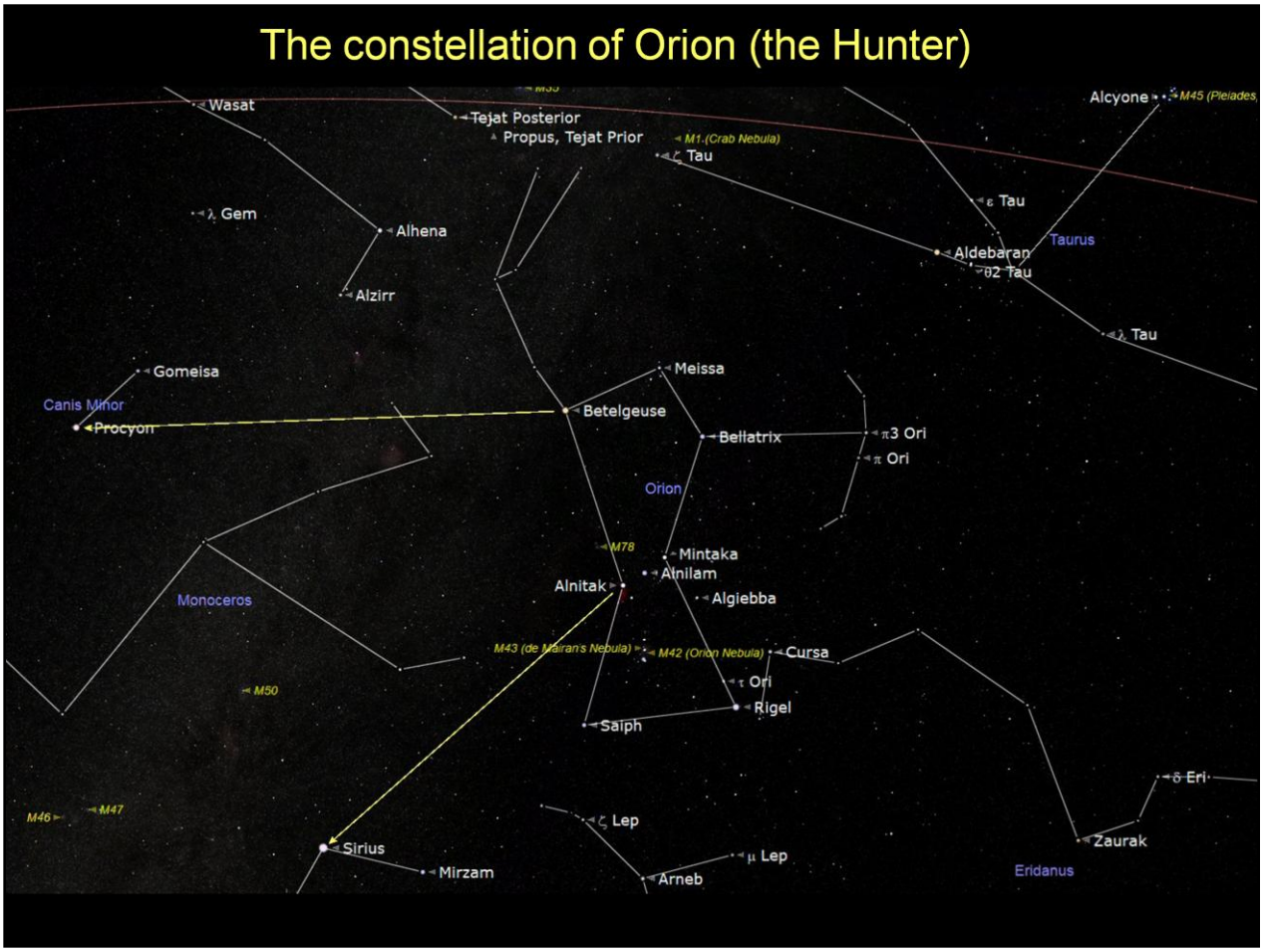
M45 is one of the closest open clusters to us and is just 400 light years away.

The seven brightest stars seen using our ‘naked eyes’ form the pattern shown by the lines above.

Father Atlas and Mother Pleione are included in the ‘naked eye’ pattern.

However the 6th & 7th sisters are actually Sterope (also called Asterope) and Celaeno.



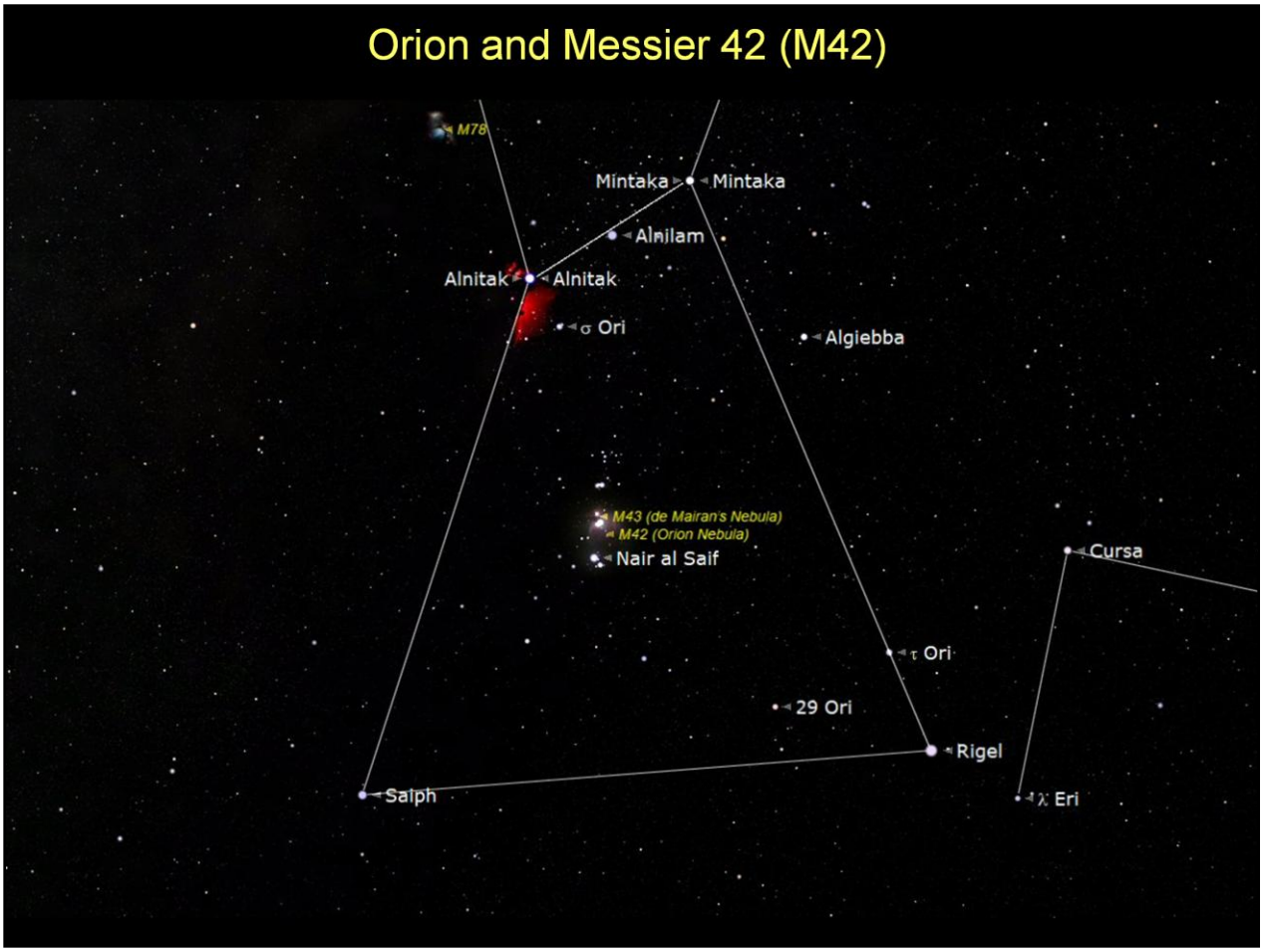
Orion is a famous Hunter in some very old stories.

He has a shield made of a lion skin held out in front of him.

In his other hand he is holding a club over his head.

It looks like he is fighting Taurus the Bull who is charging at him.

The photo of Orion above was taken by Nicky Fleet using a DSLR camera.
The stars are bright and easy to find and look much like the photo above.



The whole area around Orion is actually an arm of our Galaxy we call the Milky Way.

New stars are being created from the gas and dust in the spiral arm.

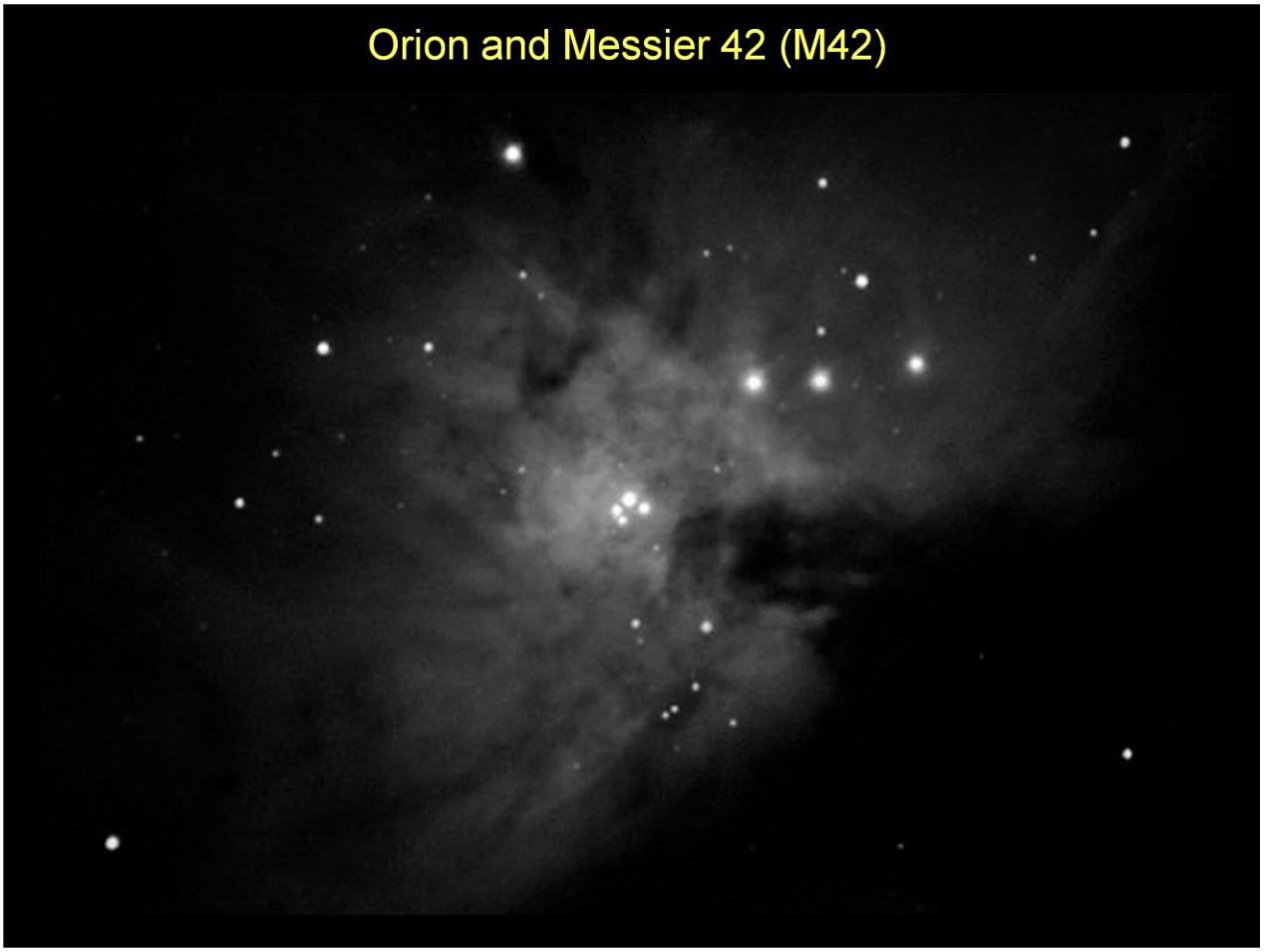
Most of the gas is dark but some areas are lit up by the forming stars.

There is a patch of red light at the lower end of the belt but this is very difficult to see.

At the bottom of the line of stars depicting Orion's sword is another 'fuzzy' patch of light.

This is Messier 42 (M42) the Great Orion Nebula that is easily seen using binoculars.

It can just be seen with the naked eye on a clear dark night.



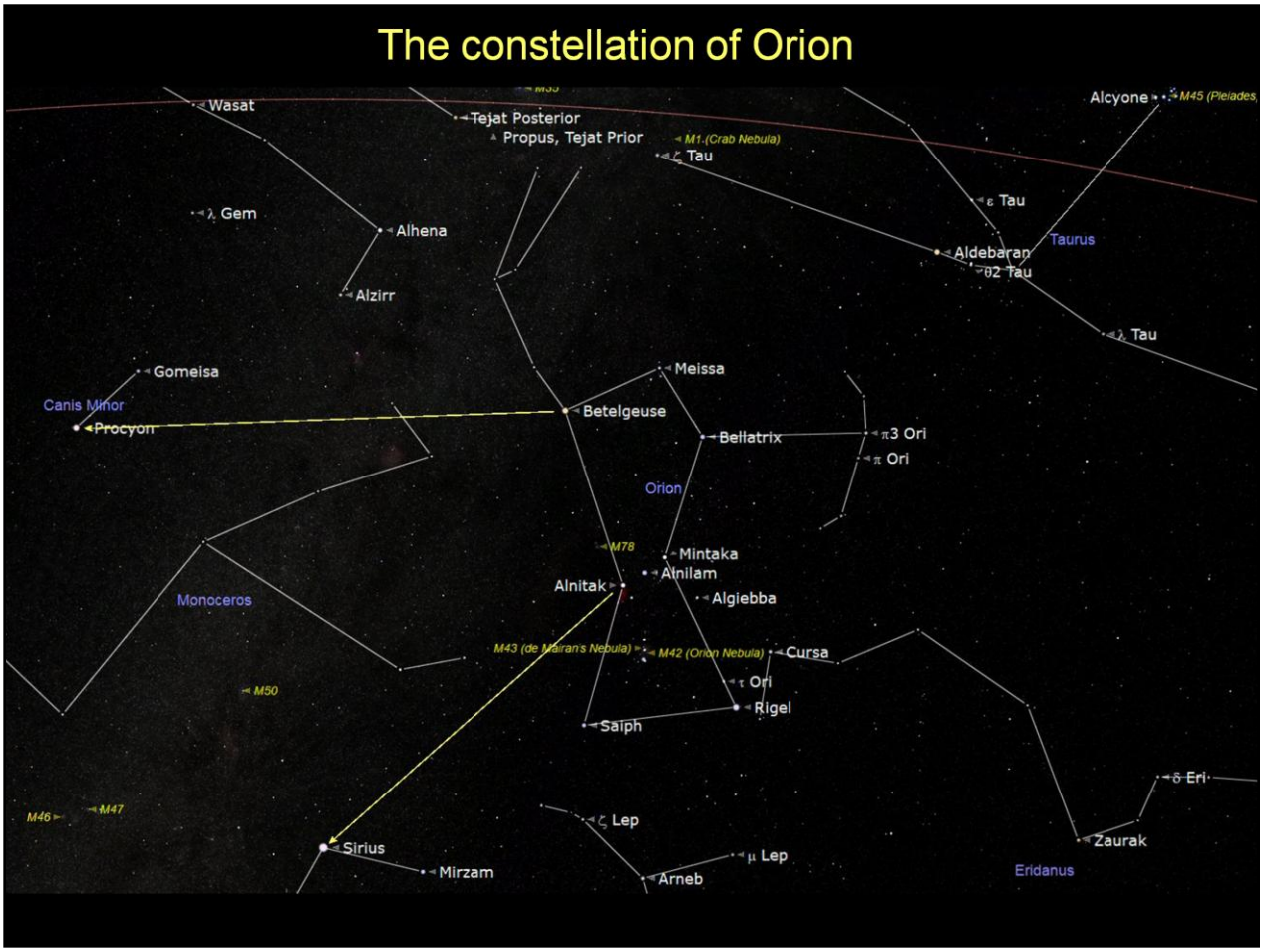
Using a telescope the fan shaped Nebula can be seen in detail.

Four stars at the centre are very bright young stars that are illuminating the gas around them.

The four stars are called the Trapezium and they are very bright and powerful.

They are lighting up the gas behind and there are swirls of dark gas silhouetted in front of the stars.

Eventually the stars will blow the surrounding gas away to reveal a cluster of new stars.



In mythology the story tells us Orion had two hunting dogs called Sirius and Procyon.

In the night sky Orion also has his two faithful dogs behind him.

If we follow the line of his belt to the lower east (left) we can find Sirius (the Big Dog).

If we follow an imaginary line from Bellatrix and Betelgeuse we can find Procyon (the Little Dog)

Sirius is the nearest and brightest star that we can see from our country.

The Star Sirius (the Dog Star)

Sirius Orion's Big Dog

Sirius is the closest and brightest star we can see from the UK.

It is always low in the sky and sparkles and flashes different colours.

The star is not actually sparkling it is the air turbulence close to the horizon that causes it to flash.

It is a bigger star than our Sun and much brighter.

Sirius is actually a double star but its companion is a star that has finished is life as a normal star.

It has used up all its Hydrogen fuel and collapsed to become a White Dwarf star.

It is now about the size of Earth (~12,000 km) but very hot.

This presentation is on the

Newbury Beginner's Website:

www.naasbeginners.co.uk