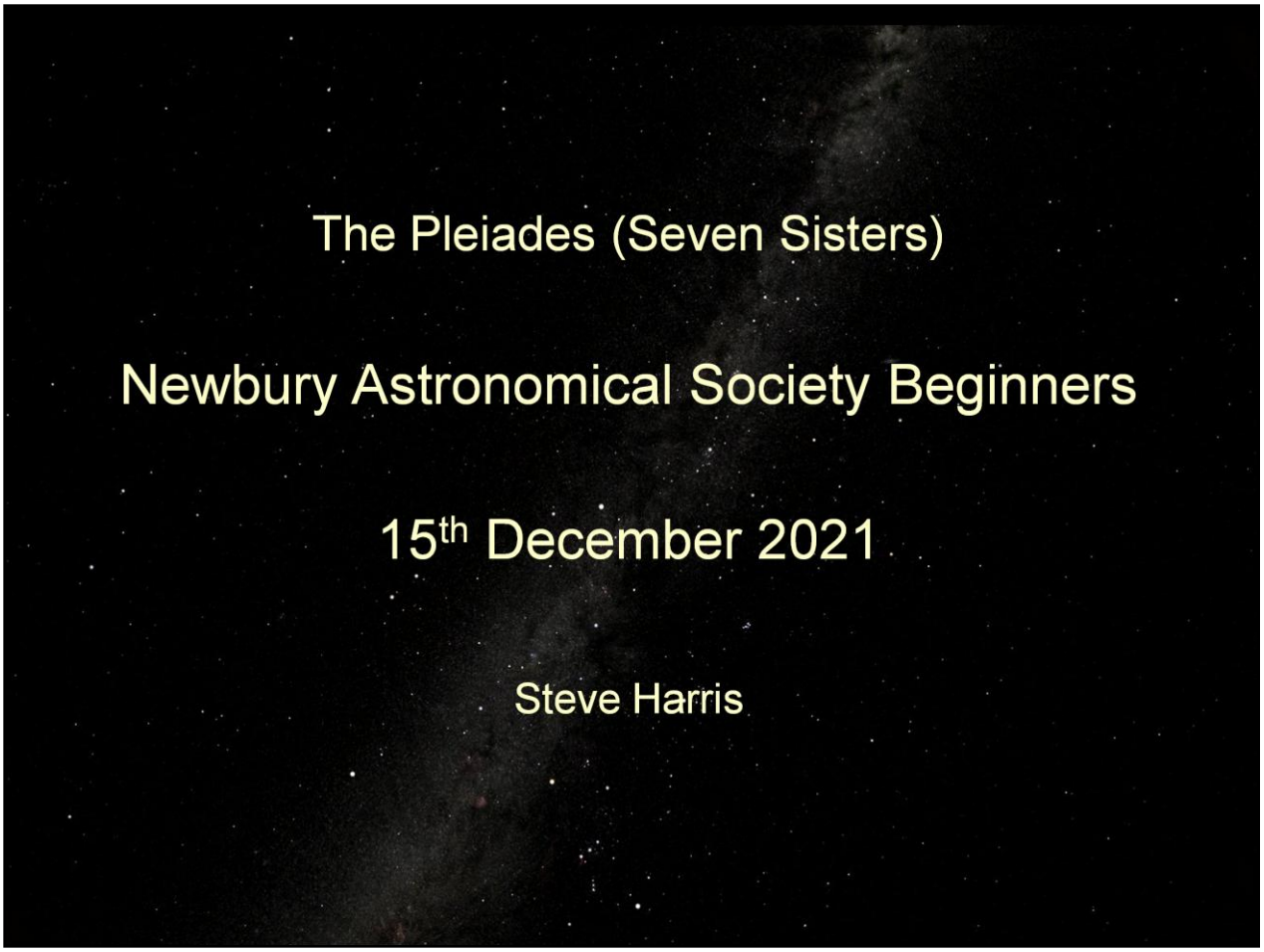
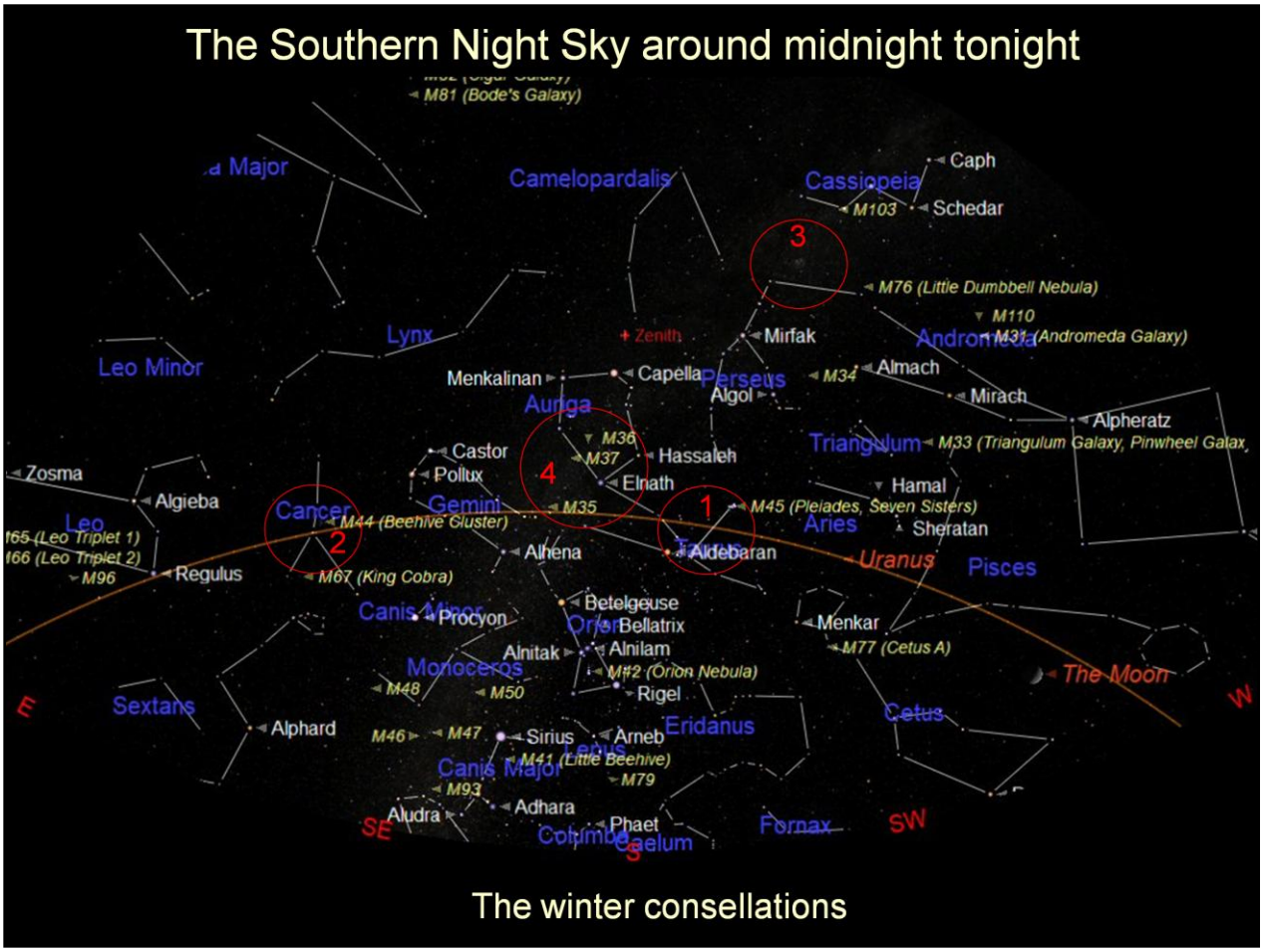

The Pleiades (Seven Sisters)
Newbury Astronomical Society Beginners
15th December 2021
Steve Harris

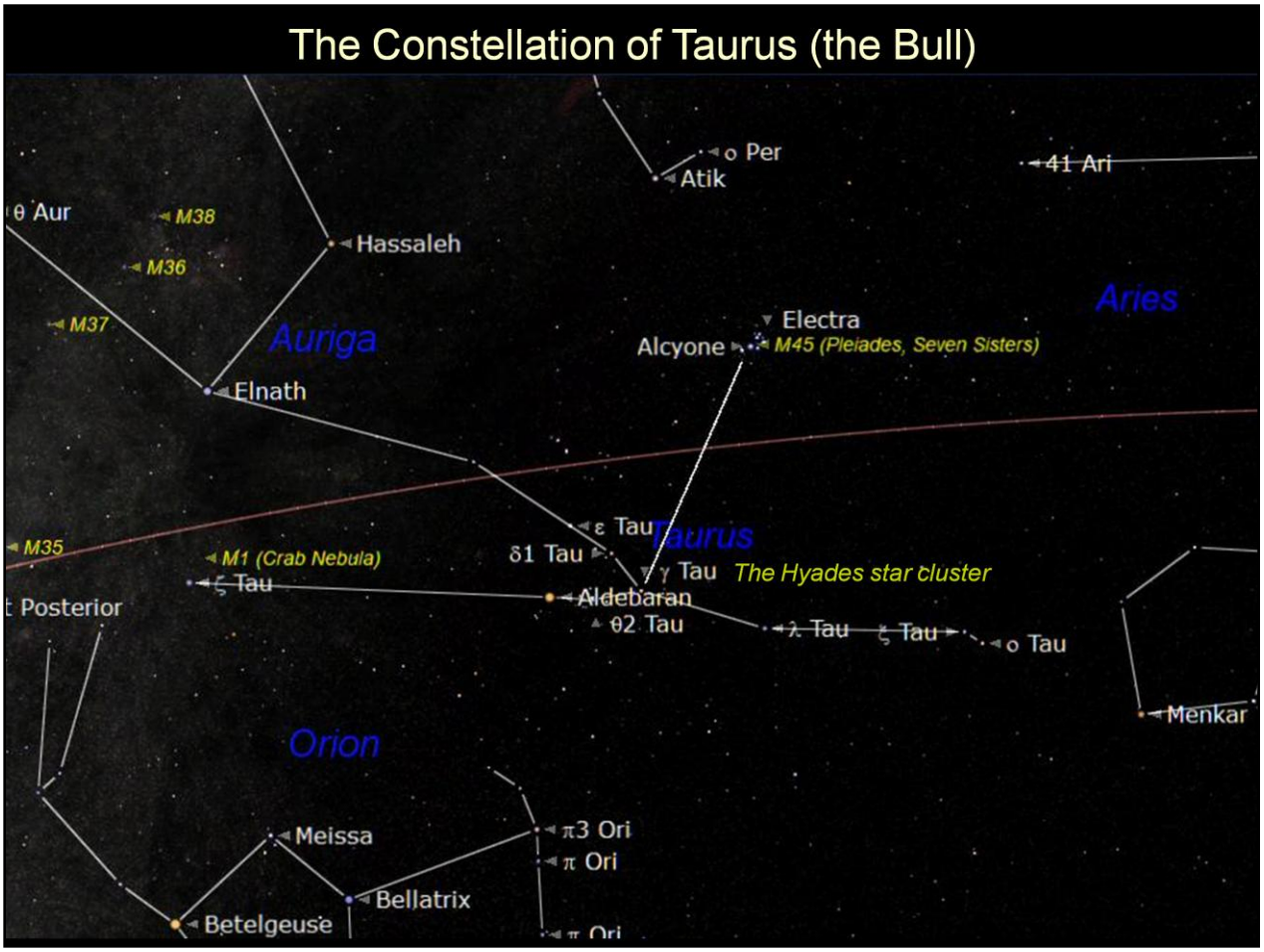


The chart above shows the winter constellations of Taurus (the Bull), Auriga (the Charioteer), Gemini (the Twins) and Cancer (the Crab).

These are interesting constellations to search out and have some very interesting objects to see even when using just a pair of binoculars.

Gemini and Cancer are located on the Ecliptic and therefore are occasional hosts to the Sun, Moon and Planets as they appear to move along this imaginary line.

Also highlighted is the area of sky between Perseus and Cassiopeia.

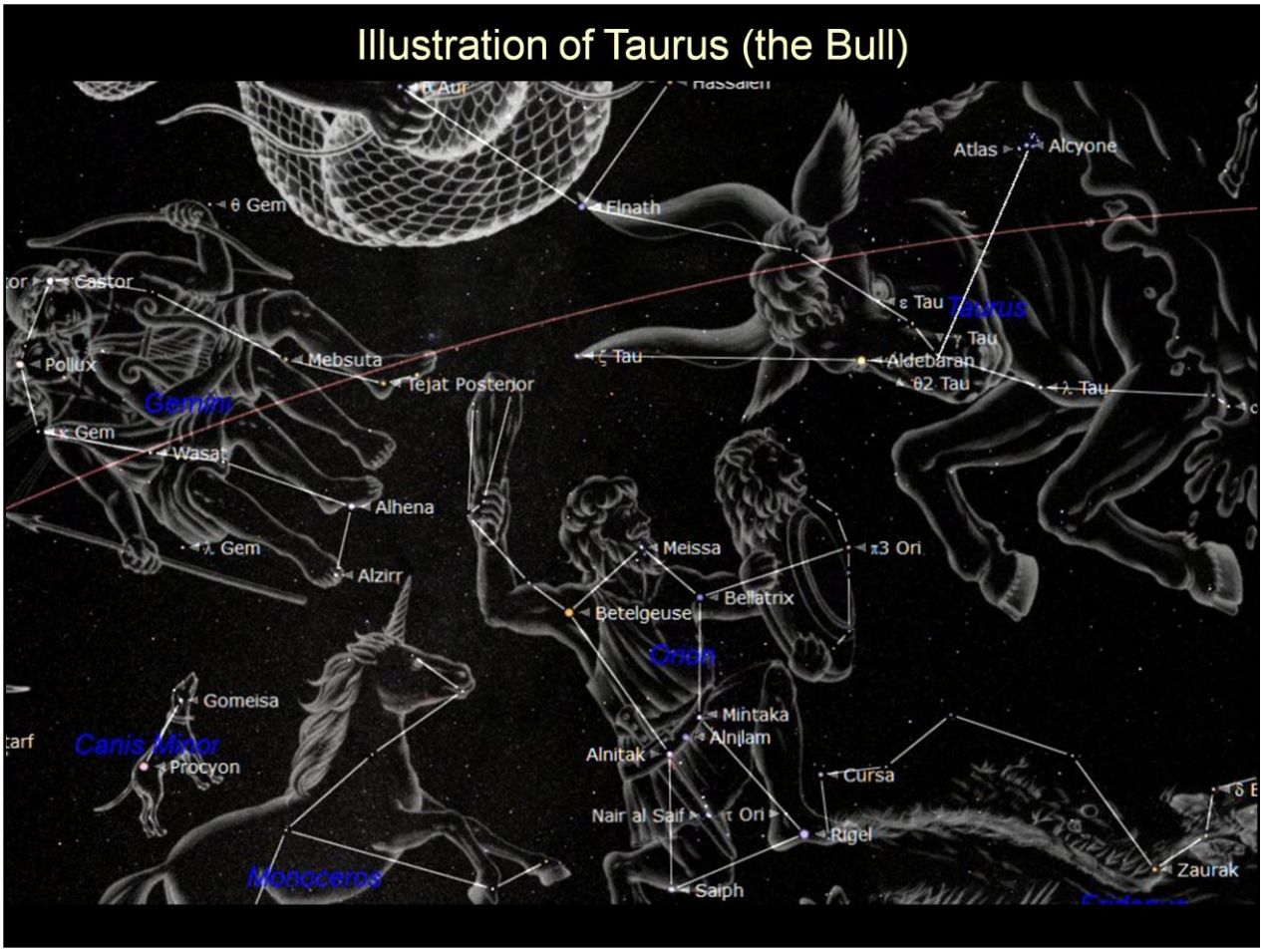


The chart above shows the constellation of Taurus the Bull. There are many different representations of Taurus but he is generally shown with his horns tipped by the stars at the end of the obvious '>' shape.

The bright red star Aldebaran is 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.

It has used up most of its Hydrogen fuel and has expanded into a Red Giant. Its outer layers are now stretched over a larger area so the available heat is also spread over this larger area so the surface is cooler and appears orange in colour.

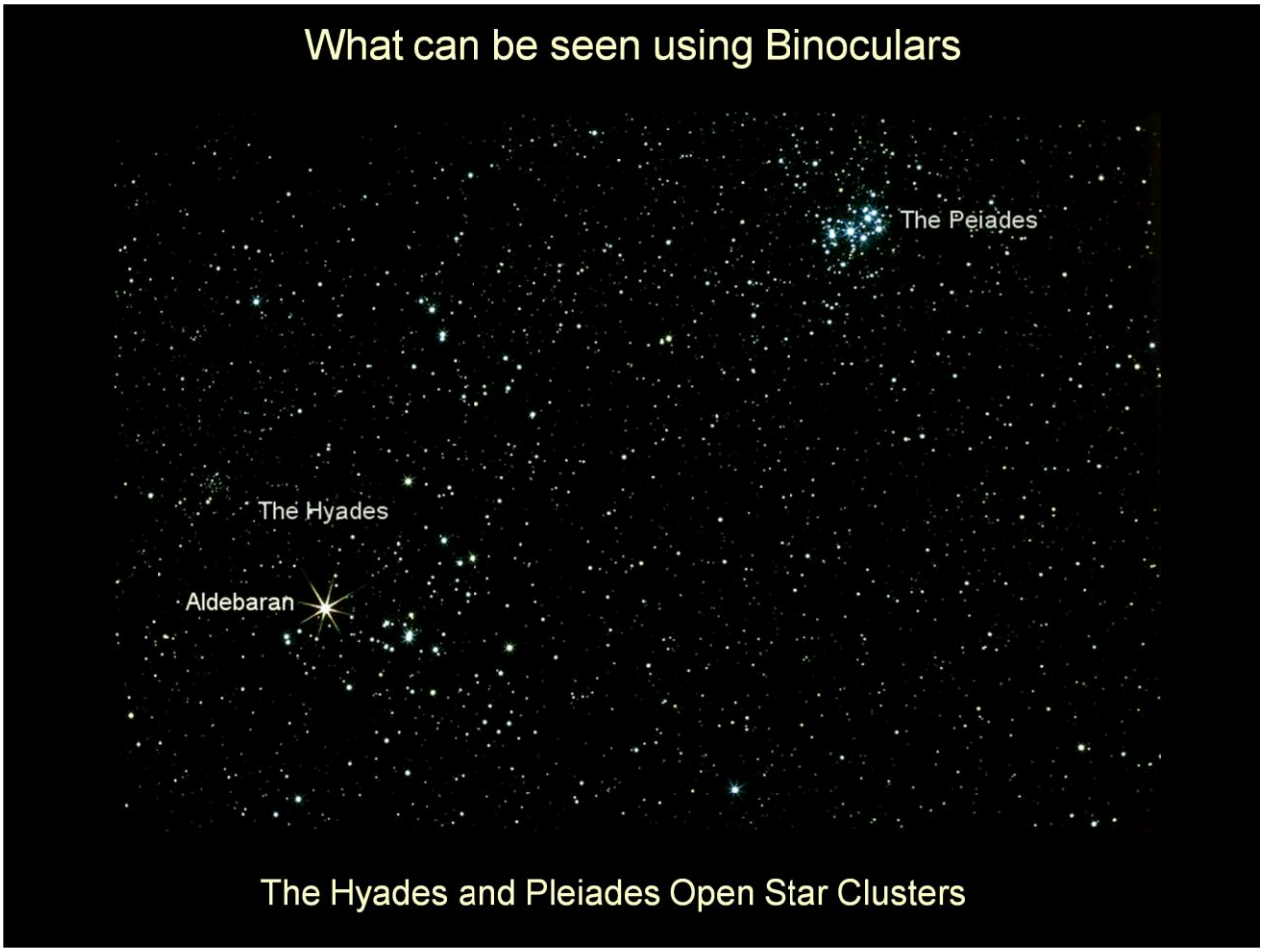


There are many depictions of Taurus on star charts.

The bright red star Aldebaran is normally used to show the bull's eye.

With a little imagination Taurus appears to be charging Orion in the illustration. It sits on the Ecliptic and is one of the star signs of the Zodiac.

The asterism (stick figure shape) used to identify Taurus resembles a stretched 'X'.



Taurus is host to two beautiful ‘naked eye’ Open Star Clusters called ‘the Hyades’ and ‘the Pleiades’.

Surrounding the bright red star Aldebaran is an Open Cluster Hyades.

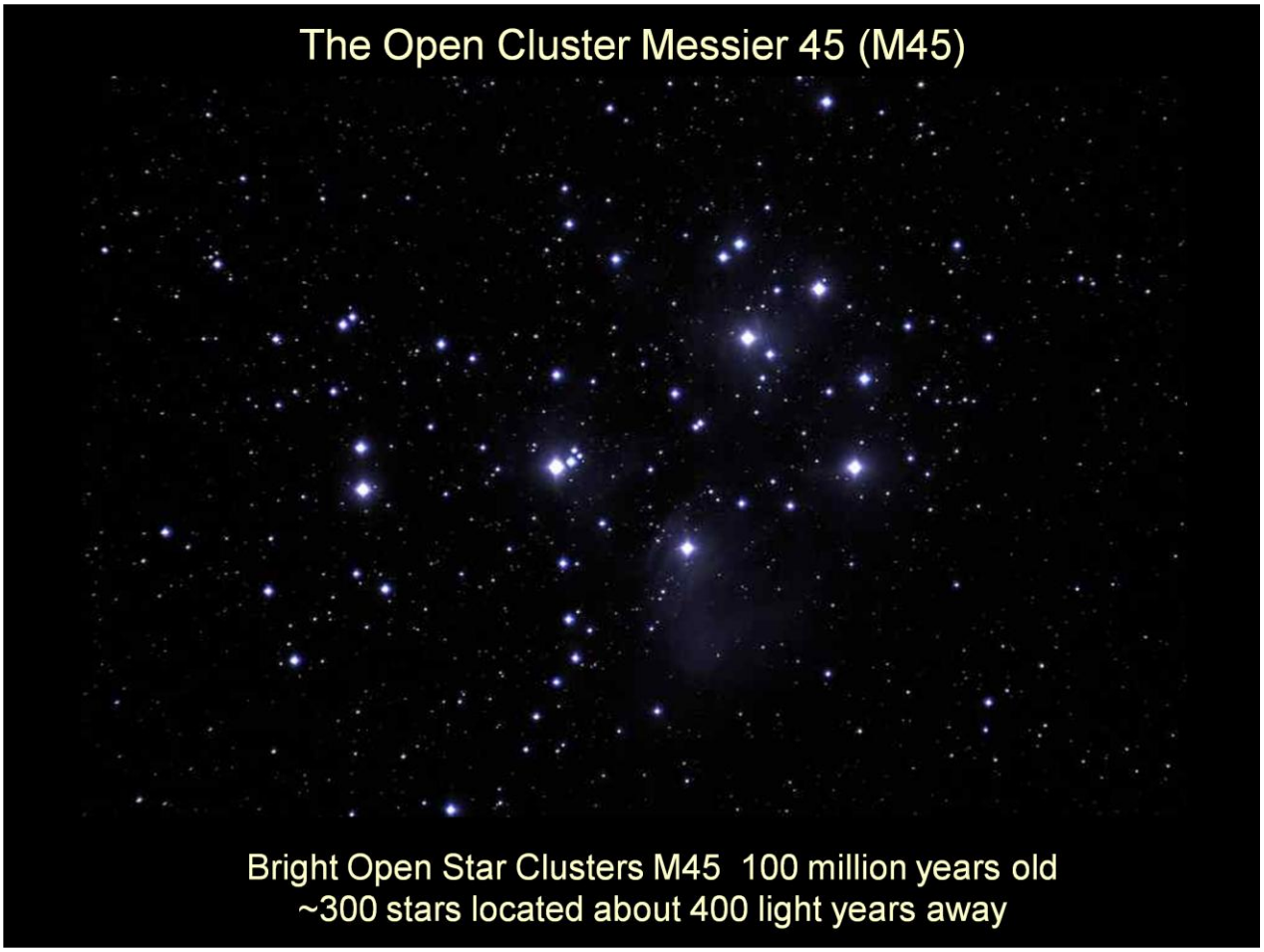
It is an older cluster than the Pleiades so its stars have begun to disperse.

It is also quite far away from us so the stars appear a little faint. In a dark Moonless sky the cluster can be seen with the naked eye but is best seen using binoculars.

The cluster is large, at 3.5° in diameter (about 7 Moon diameters) and well dispersed.

The Hyades Open Star Cluster is estimated to be located about 153 light-years away from us and the stars are thought to be about 625 million years old.

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 real jewel of Taurus really is 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'.

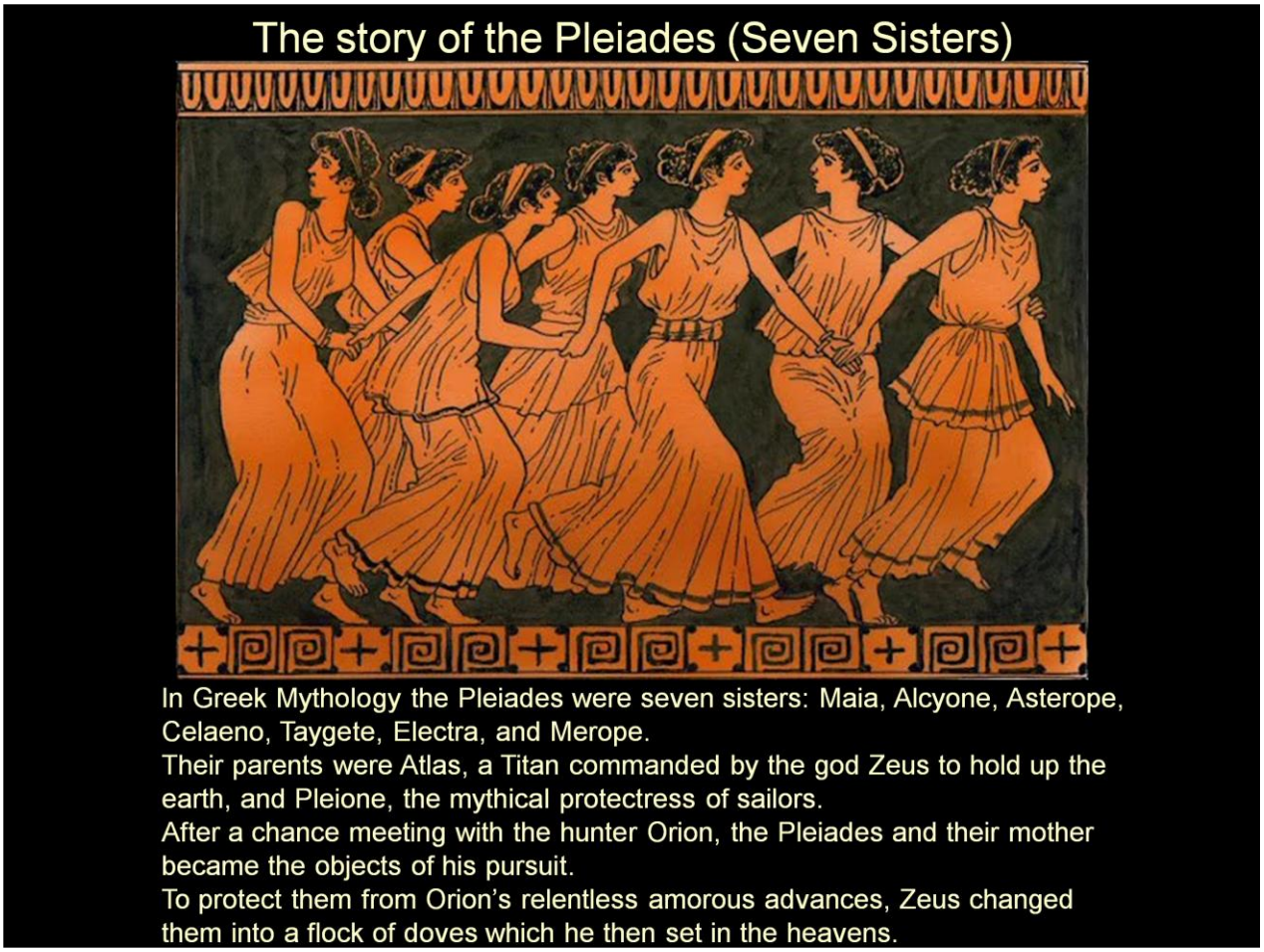
M45 is visible to the naked eye initially looking like a small patch of light.

Closer observation, with good eyesight, will reveal a cluster of up to seven stars.

Using a good pair of binoculars about 30 stars will be seen.

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

M45 is one of the closest open clusters to us at 400 light years.



GREEK MYTHOLOGY

The Pleiades were seven daughters of Atlas, a Titan commanded by the god Zeus to hold up the earth and Pleione, the mythical protector of sailors. The Seven Sisters are also known as the 'Water Girls' or the 'Ice Maidens', due to their association with water, be it seas, rivers, rain, hail, snow, ice or frost. The Greek legends often refer to the sisters as 'Oceanids'. Some sources claim that the name 'Pleiades' originates from the ancient Greek word 'plein', meaning 'to sail'.

Maia – is the eldest sister and known for her outstanding beauty as well as her solitary life. The story goes that despite her beauty, she was a shy, waiflike woman who preferred her own company and lived alone in the caves.

Alcyone (Ally) – Alcyone, the second sister, was known as the leader. During the Halcyon days – when the world was filled with joy, prosperity and tranquillity – she watched over the Mediterranean Sea, making it calm and safe for sailors.

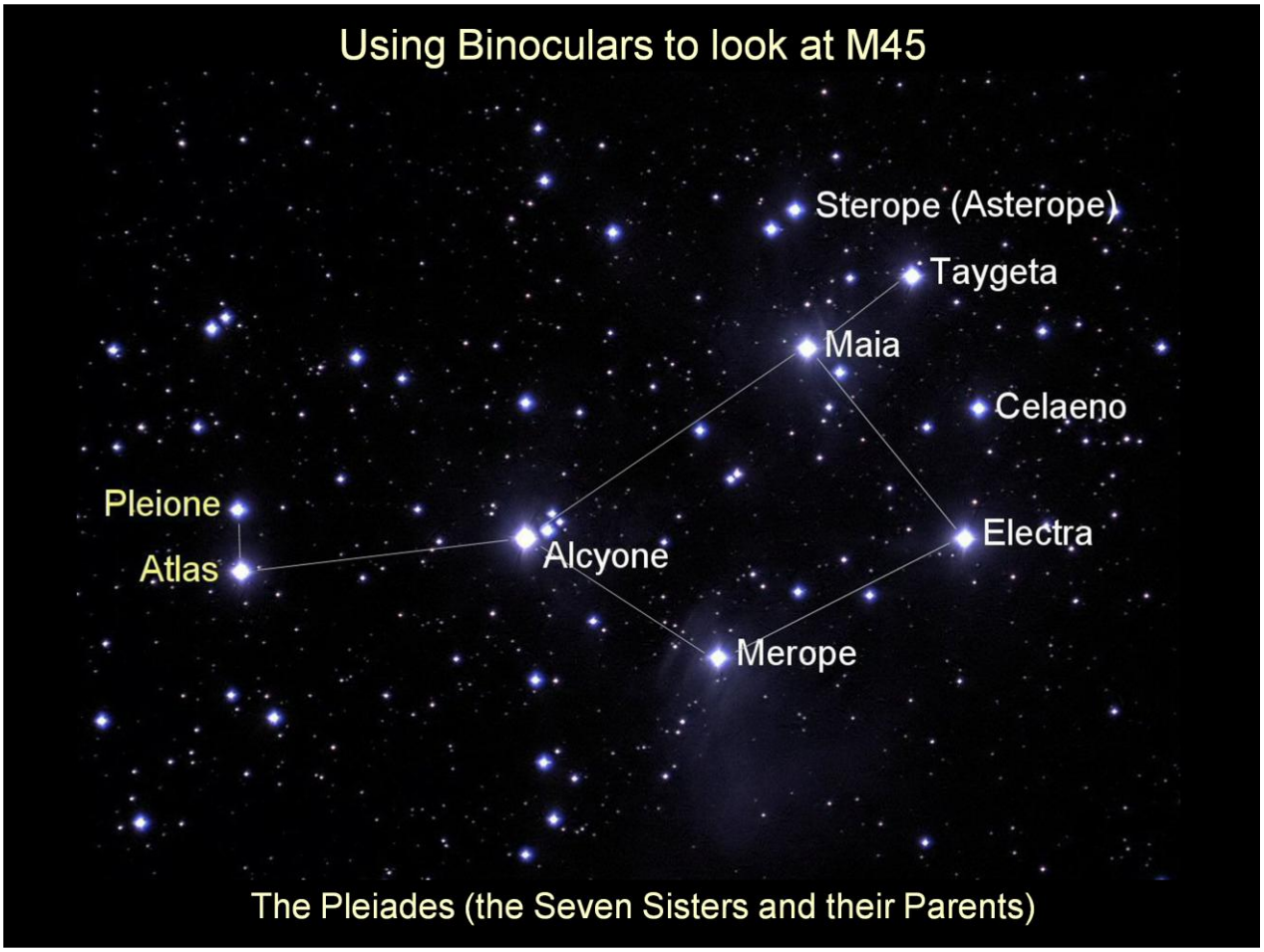
Merope (The Lost Sister) – Merope is more commonly accepted as the 'lost Pleiad' because hers was the last star to be mapped by astronomers and is the faintest star in the cluster, not visible to the naked eye.

Asterope (Star) – the Greek name of Asterope translates to 'Star' and she is traditionally portrayed as one of the weaker sisters, perhaps because this star is one of the two that shines less brightly than the others.

Celaeno (Ce-Ce) – Celaeno is commonly translated as meaning 'melon' or 'swarthy'. Celaeno, like Asterope, shines less brightly than the others, supposedly because she was once struck by lightning by Theon the Younger.

Taygete (Tiggy) – in the myths, Taygete, like Maia, valued her independence and lived alone in the mountains.

Electra – known as the third brightest star Electra bore four children, one of which was Dardanus, who later became the founder of the ancient city of Troy.



The biggest and brightest stars of M45 (the Seven Sisters) have been named after seven sisters from Greek Mythology.

They were the seven daughters of the Titan god called Atlas and his wife the sea-nymph Pleione.

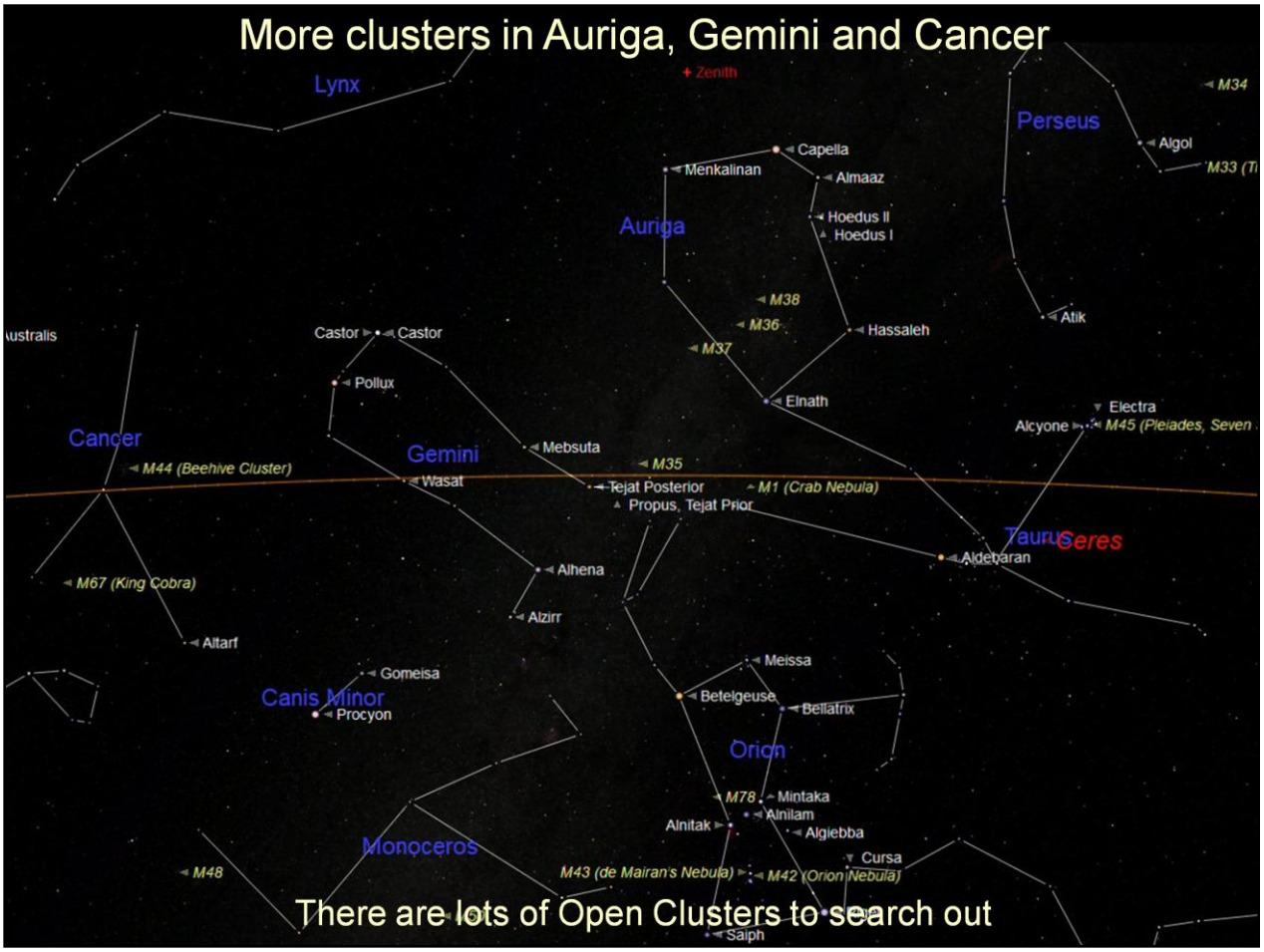
Atlas and Pleione are included as the naked eye stars but the 6th & 7th sisters are actually Sterope (Asterope) and Celaeno.

The stars of the Pleiades cluster would have formed from the gas and dust of a Nebula. Gravity draws the atoms of the Nebula together to form denser clumps of gas that become ever denser.

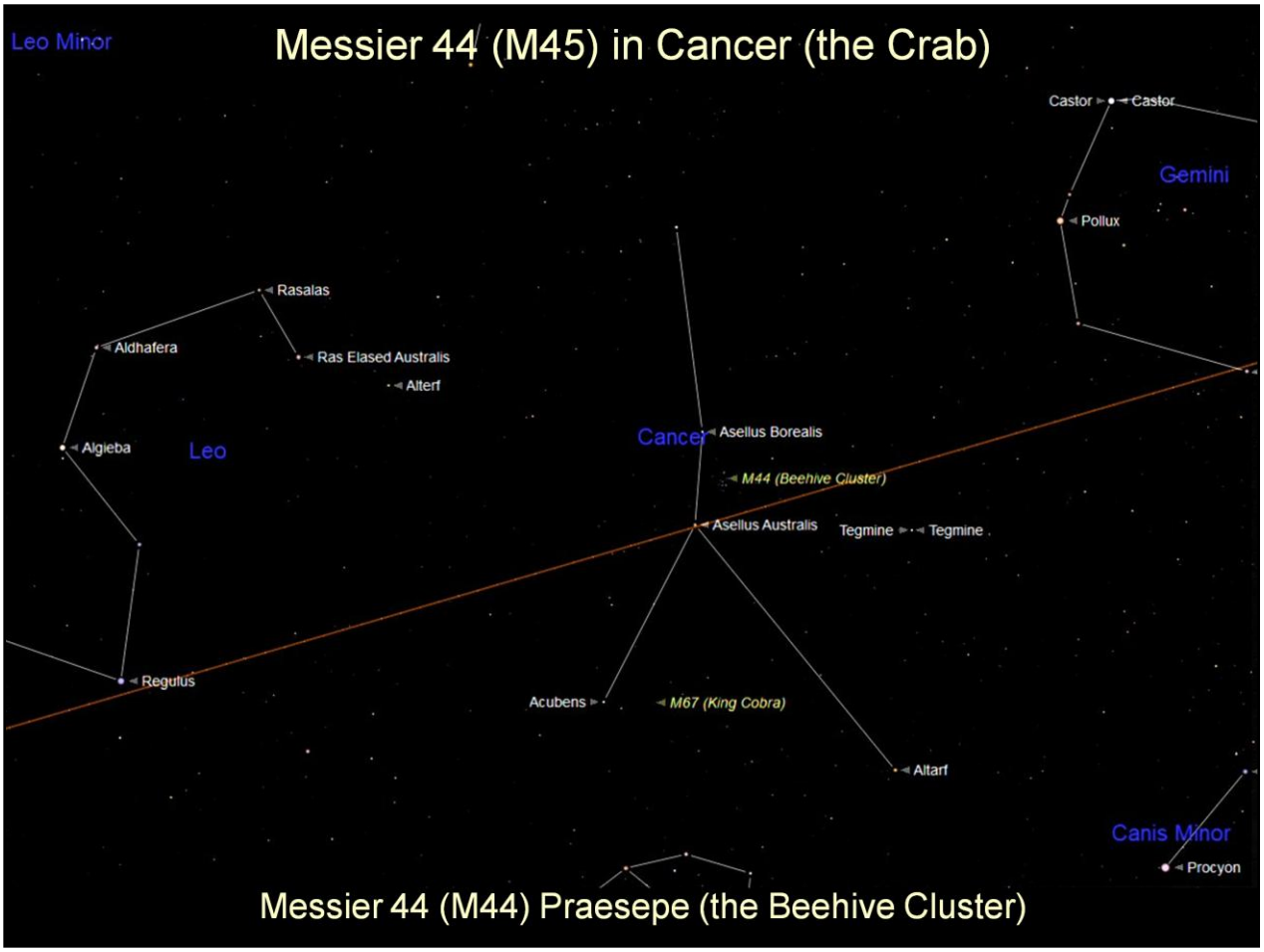
Eventually the gas is squeezed into dense spheres where the pressure and high temperature at the core causes Hydrogen atoms to combine through Nuclear Fusion.

As Hydrogen atoms are fused into Helium tremendous amount heat is produced and the sphere becomes a shining new star.

Any left-over gas and dust is blown away by intense radiation from the young stars and a cluster of new Open Cluster of young stars is revealed.

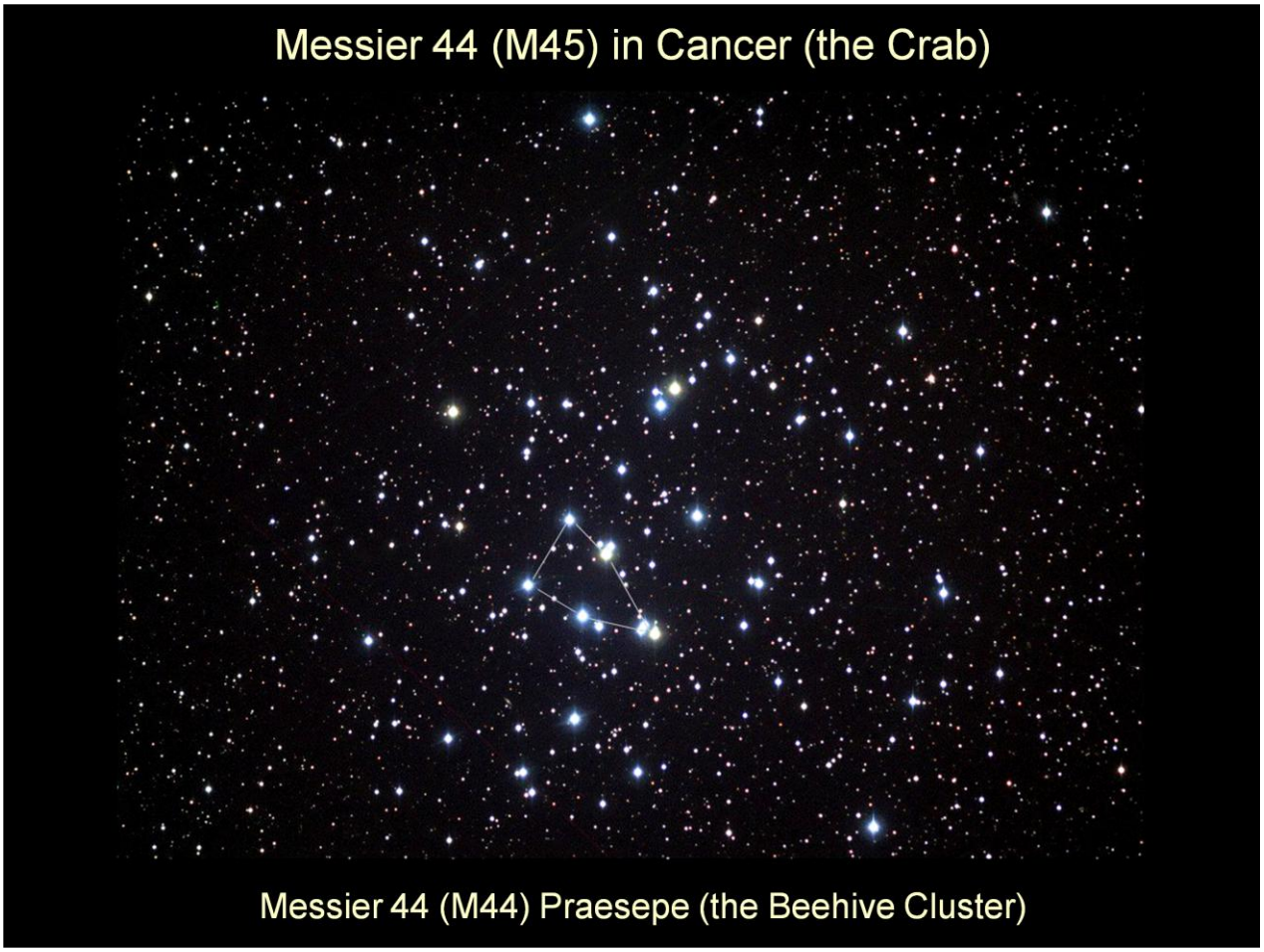


There are a number of other Open Clusters in the constellations surrounding Taurus. These constellations are: Cancer, Perseus, Auriga and Gemini.



Between the two prominent constellations of Gemini and Leo is the rather indistinct constellation of Cancer (the Crab). The stars of Cancer are quite faint and so the recognisable shape of the constellation can be difficult to identify especially in a light polluted sky. The recognised 'stick figure' shape of Cancer is an upside down 'Y' (ʎ).

However it is well worth searching fort Cancer using binoculars or a small telescope to see the Open Cluster Messier 44 (M44) known as Praesepe (or the Beehive Cluster).

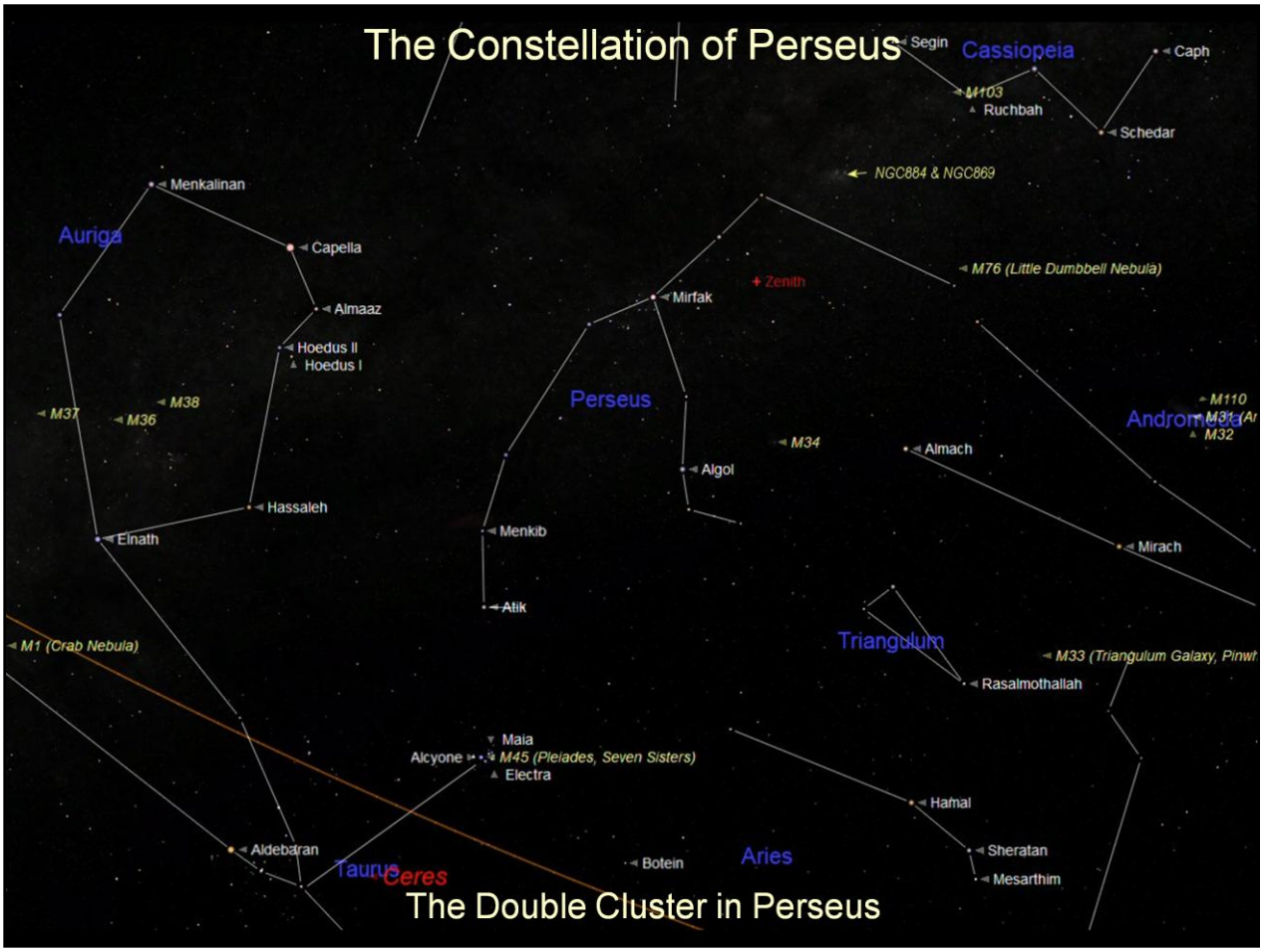


Messier 44 (M44) is one of the few deep sky objects that look best using binoculars or a small telescope at low power.

It can be difficult to see M44 in a light polluted sky but it will be visible using binoculars.

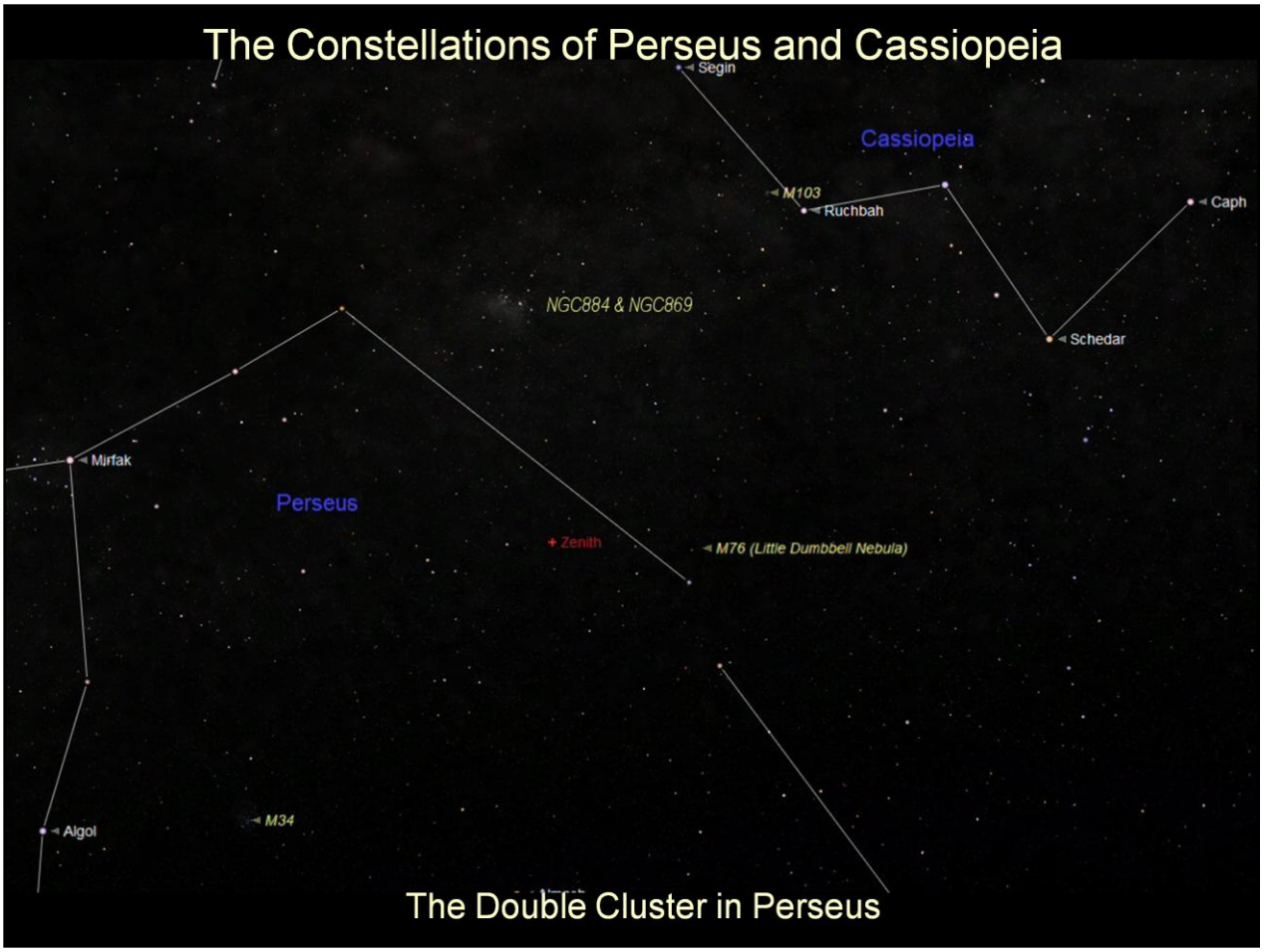
M44 is also known as ‘Praesepe’ or the ‘Beehive Cluster’ (because of its resemblance to and old fashioned pyramid shaped straw beehive with a swarm of bees around it).

The distance to M44 is thought to be between 520 and 610 light years and it has an estimated age of around 600 million years. The diameter of the bright inner cluster core is about 23 light years across.



To the north of Taurus and its beautiful Open Cluster Messier 45 (the Seven Sisters) is the constellation of Perseus.

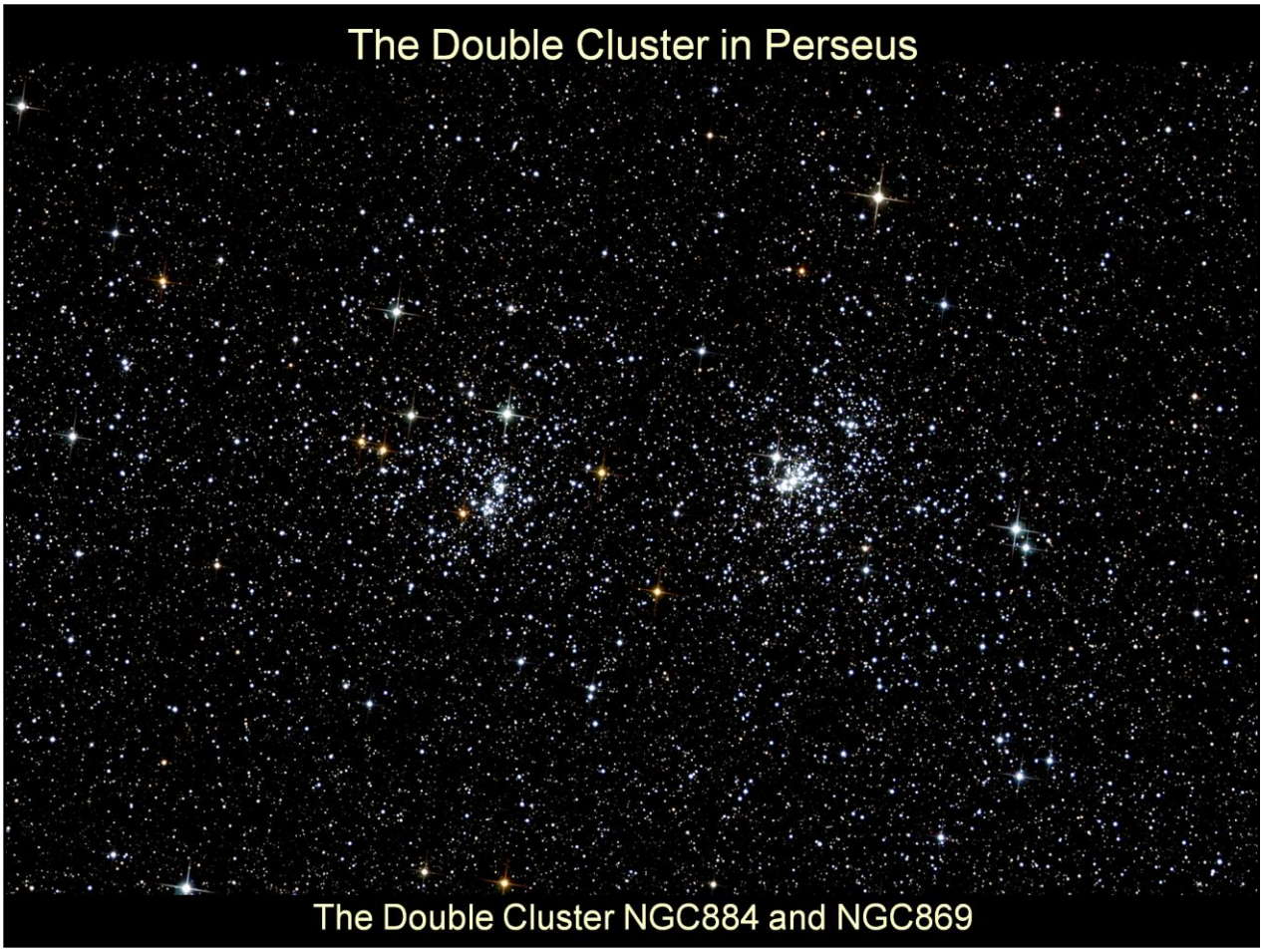
The stick figure of Perseus looks a little like a horse riding spur or an up-side-down ‘Y’ shape with a fairly distinct line of stars pointing to the bid ‘W’ shape of Cassiopeia.



Between the top end of the Perseus line of stars and the ‘W’ of Cassiopeia a small smudge of light may be seen with the naked eye on a clear dark night.

This small smudge of light can be seen as a lovely pair of Open Clusters using binoculars.

These clusters are NGC884 and NGC869. NGC is the New General Catalogue [catalogue of deep sky objects].

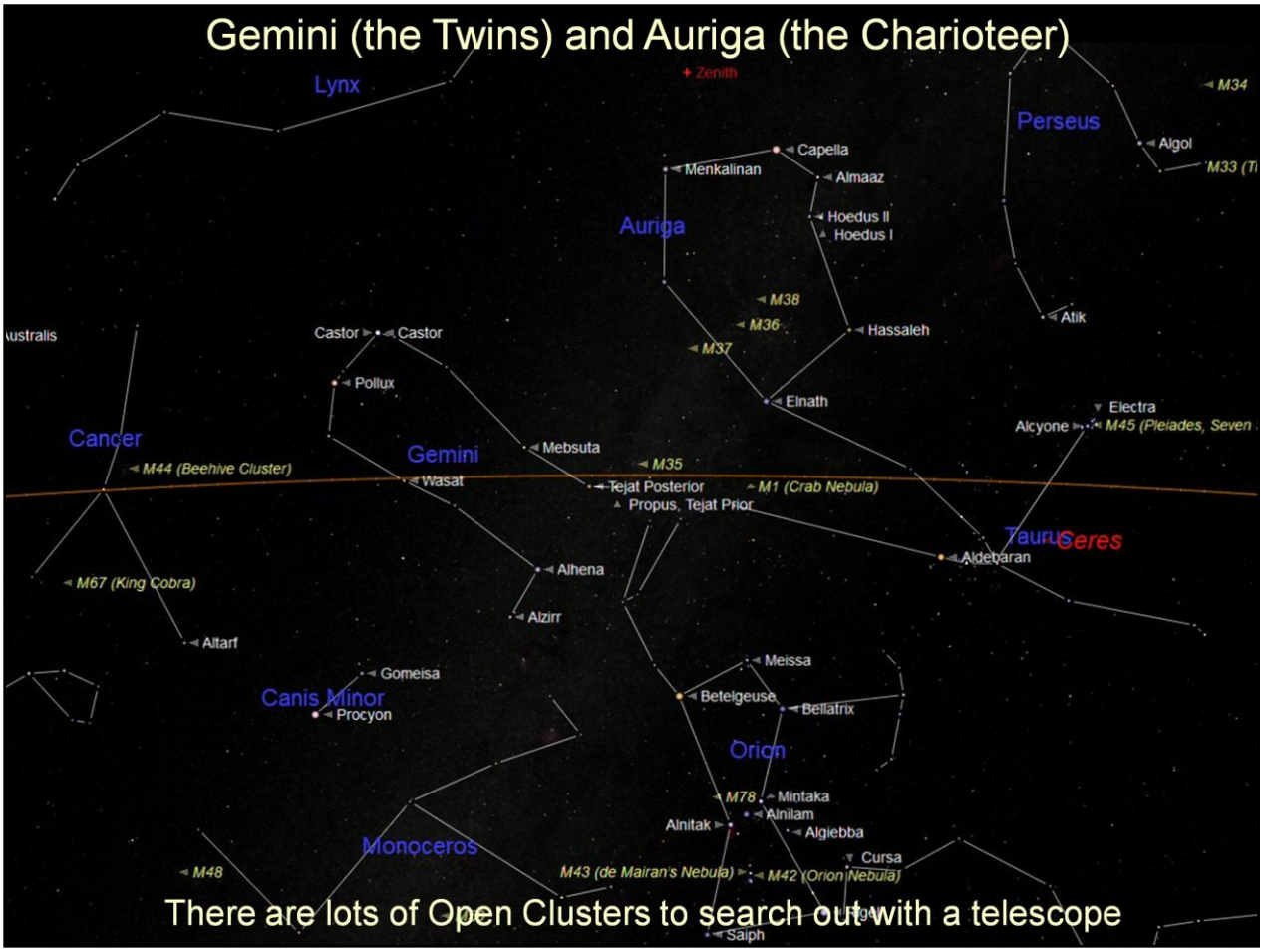


The Double Cluster is best seen using binoculars and is beautiful.

The clusters are individually known as NGC884 and NGC869.

It is not known if the clusters are associated with each other or just in the same line of sight for us. It is difficult to establish if there is a difference in the distance that the two clusters are from us.

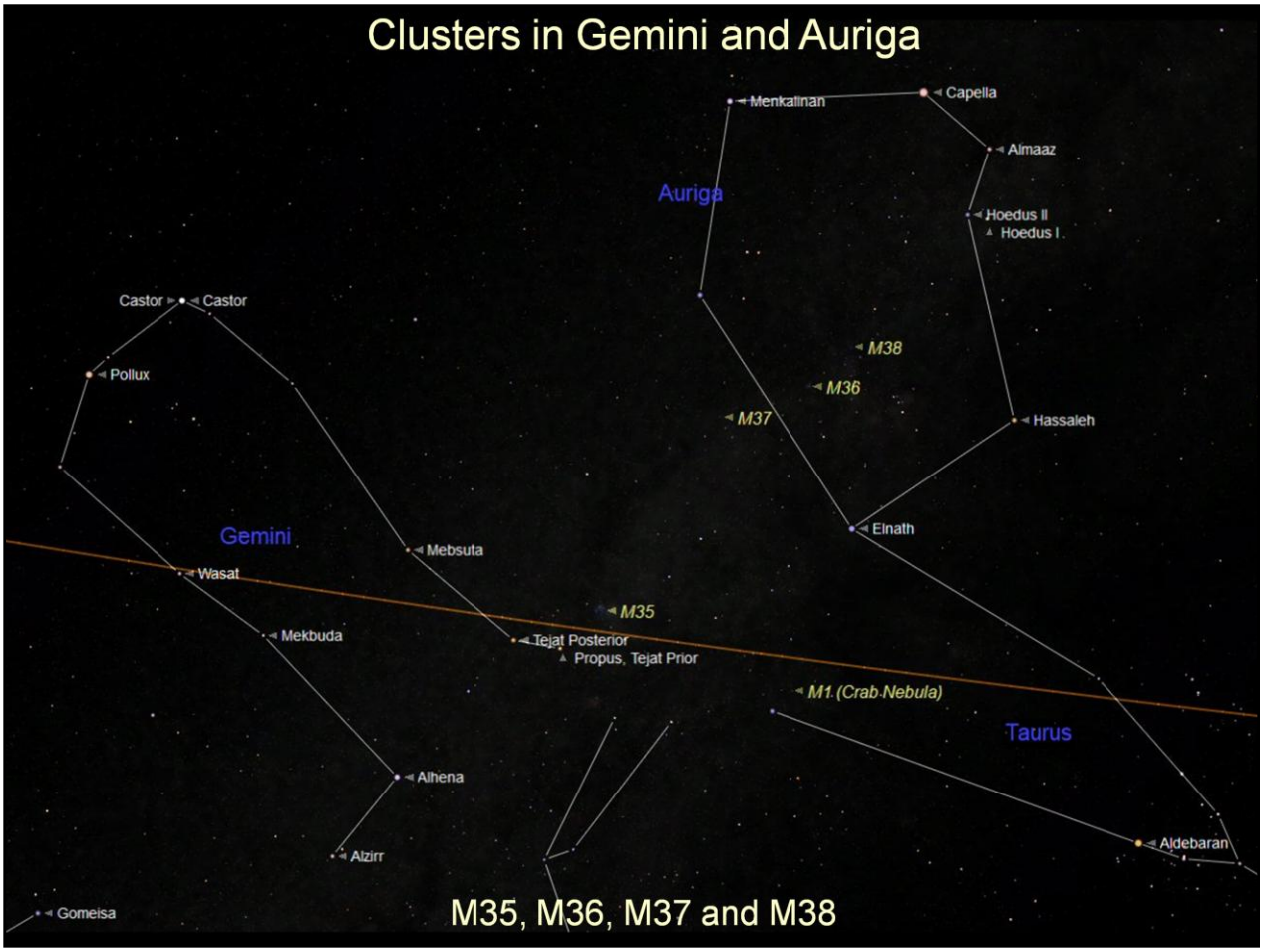
So it is most likely the clusters formed separately but close together.



Some Open Clusters are not visible to the ‘naked eye’ but it may be just possible to see using binoculars.

There are four such Open Clusters in a line through the constellations of Gemini and Auriga.

Messier 35 (M35) can be found in Gemini and M36, M37 and M38 are in Auriga.

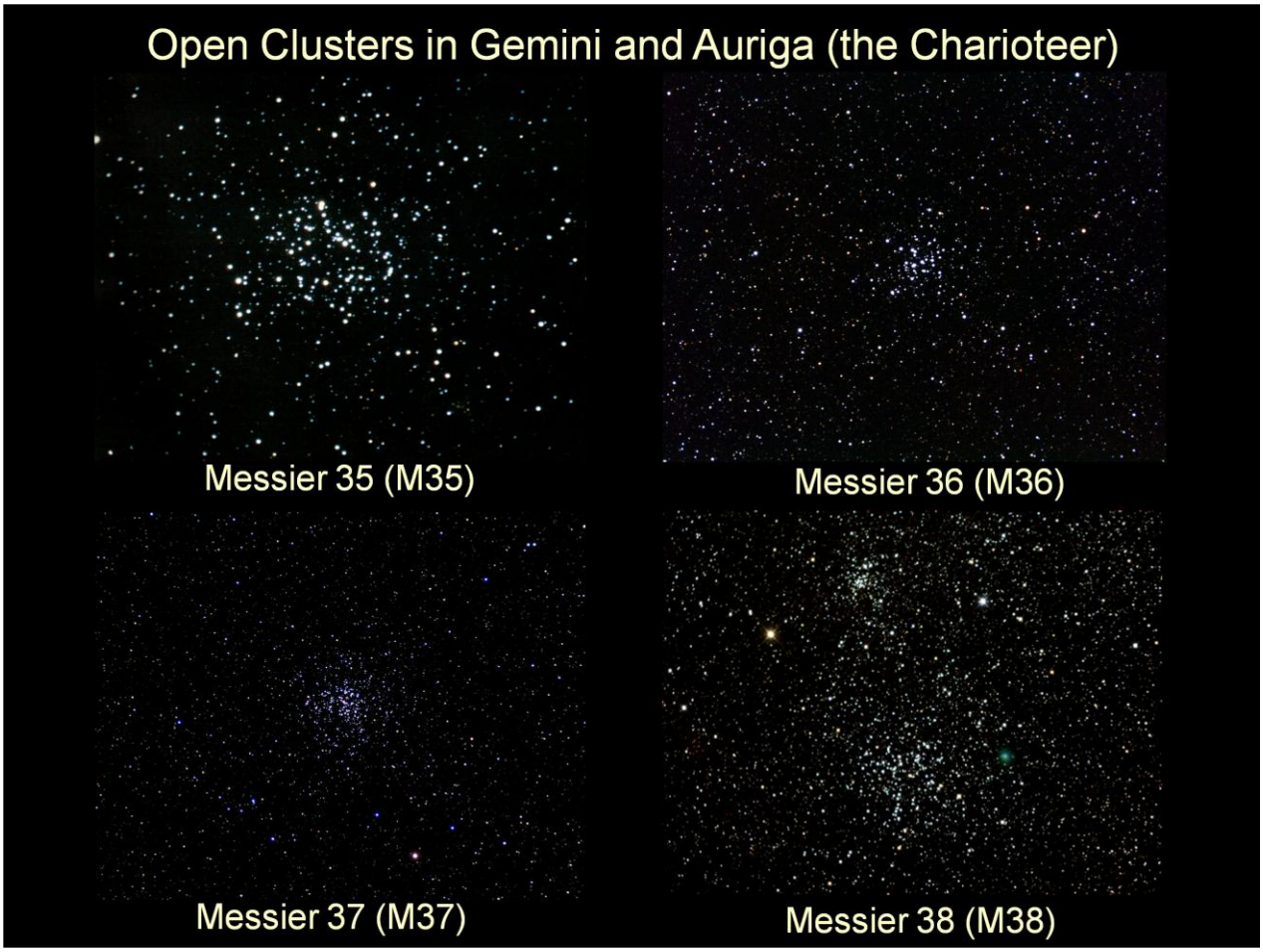


The Milky Way (our Galaxy) passes through Auriga and Gemini so there are lots of star to see.

If we use binoculars to sweep through Auriga and Gemini we may just be able to see the Open Clusters Messier 35 (M35) M36, M37 and M38.

They will however appear small and quite difficult to see as faint ‘smudges’ of light.

A telescope will show them as clusters of stars.



Messier 35 in Gemini is the best open cluster of the four because it has most stars.

M35 is lovely to see in a telescope and has a noticeable string of stars running through it.

M36 is not very impressive and difficult to make out against the stars of the Milky Way.

M37 looks quite spars using a telescope.

M38 looks very nice using a telescope especially a larger one.

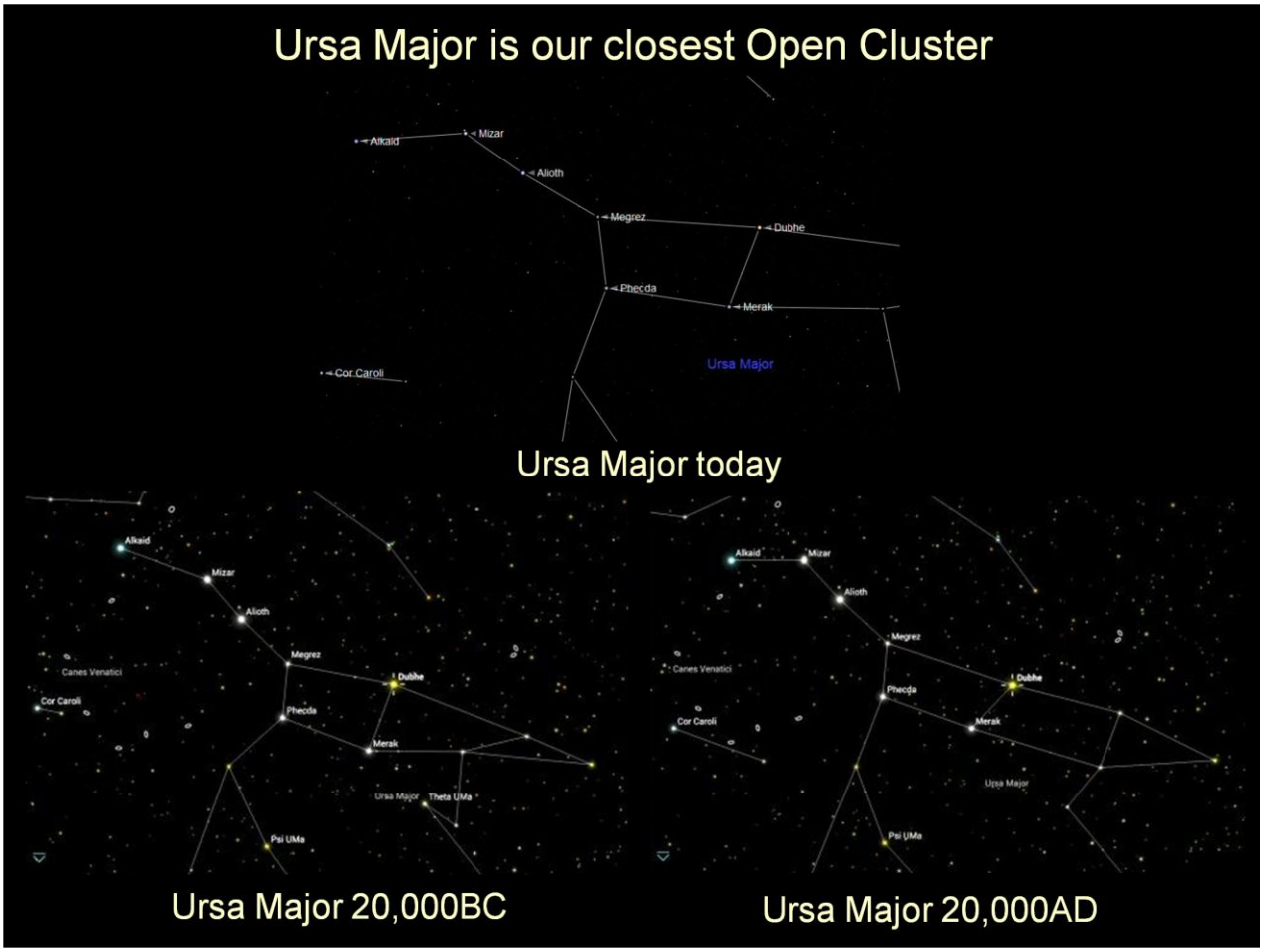
Ursa Major is our closest Open Cluster

Ursa Major (the Great Bear) is one of the best known constellation.

It is also known as the Plough or the Big Dipper to the Americans.

The seven brightest stars form the shape of a Saucepan.

The seven bright stars along with a further 23 fainter stars are associated and members of the closest Open Cluster to us.



The Ursa Major cluster of stars is the closest Open Cluster to us.

The average distance to the stars is about 80 light years.

As the stars are so close they appear to move faster than most other stars.

The movement is still unperceivable to us but over thousands of years they will be seen to move.

The images above show how much the asterism has and will changed in 40,000 years.

A copy of this presentation, with notes, is available on the Beginners website.
This can be viewed at: www.naasbeginners.co.uk.