Imaging the Seven Sisters

NAS Meeting 5th March 2021

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One of the most beautiful objects to be seen in the winter and spring night sky is the ‘naked eye’ Open cluster of stars known as Messier 45 (M45). It is also known as the Pleiades or the Seven Sisters. At first glance M45 looks like a small cloud or a smudge of light but a closer look will reveal the six brightest stars in this cluster and even the seventh star for those with good eyesight. It does come into its element when using binoculars it can then be seen as a beautiful cluster of about thirty stunningly bright white stars. It is at its best when seen through binoculars.

Richard’s beautiful picture above shows the Seven Sisters at the top centre in the constellation of Taurus (the Bull). Slightly to the lower left of M45 is the older, fainter and more dispersed cluster of the Hyades gathered around the bright orange star Aldebaran at the centre of Taurus.

Further to the lower left is the familiar constellation of Orion the Hunter with the three stars forming his belt and a line of stars representing his sword hanging from his belt.

My DSLR mounted on the Skywatcher 80mm

After a failed attempt to image M45 using a Sony DSLR camera on a tripod Steve Harris decided to have another try with the DSLR mounted to the focuser of his Skywatcher 80mm aperture Refracting Telescope with a focal length of 400mm.

This small telescope is mounted ‘piggy back’ on his Meade LX200 300mm Schmidt-Cassegrain telescope. This set up will enable the camera to track M45 as it appears to move across the sky.

The telescope setup is shown in the image above.

My DSLR adapted for use with Skywatcher 80mm

To use the DSLR camera with the Skywatcher telescope the zoom lens assembly was removed and fitted with an eyepiece focuser adaptor. To do this the Focus Extension (that has the same diameter as a standard eyepiece) shown above was screwed into the Adaptor Ring. The Adaptor was then clipped into the camera in place of the Lens Assembly. See the next slide.

My DSLR adapted for use with Skywatcher 80mm

The DSLR camera is shown with the telescope focuser adaptor fitted. It has also been fitted with a remote shutter operation button to prevent shake of the camera when taking a picture. Also notice the mode selection dial on the camera has been set to the 'M' position for manual focus mode. This means the camera will be focused using the telescope focuser.

The video adaptor cable for connecting to the TV

One other thing was used was the video connector cable shown above. This was used to relay the target image, normally shown on the camera 'live view' screen, on to a television screen.

The television that was used with an image of the Seven Sisters displayed on the screen. The stars could not be seen on the screen when taking the picture so the focus and shutter speed had to be adjusted from the previous exposure by increments until the resulting image was as good as possible.

The image above was the final result from about 30 iterations of focus and shutter speed adjustments. The blue halo around the brighter stars is a real effect. The star cluster is moving though a tenuous cloud of Hydrogen gas in space and the stars are illuminating the gas around them. See the next slide.

The image above is a long exposure used to reveal the illuminated gas around the stars (not taken by the author).

The DSLR camera used has the facility to increase the magnification of the set up electronically by pressing a button on the camera. The first press increases the magnification by 1.4x and a second press increases the magnification to 2x. This image was achieved after a few more focus and shutter speed adjustments. The seven brightest stars that are traditionally recognised as the Seven Sisters can easily identified in this image.

The stars that are traditionally recognised as the Seven Sisters are numbered above but not in any particular order.

Messier 45 (M45) the Seven Sisters

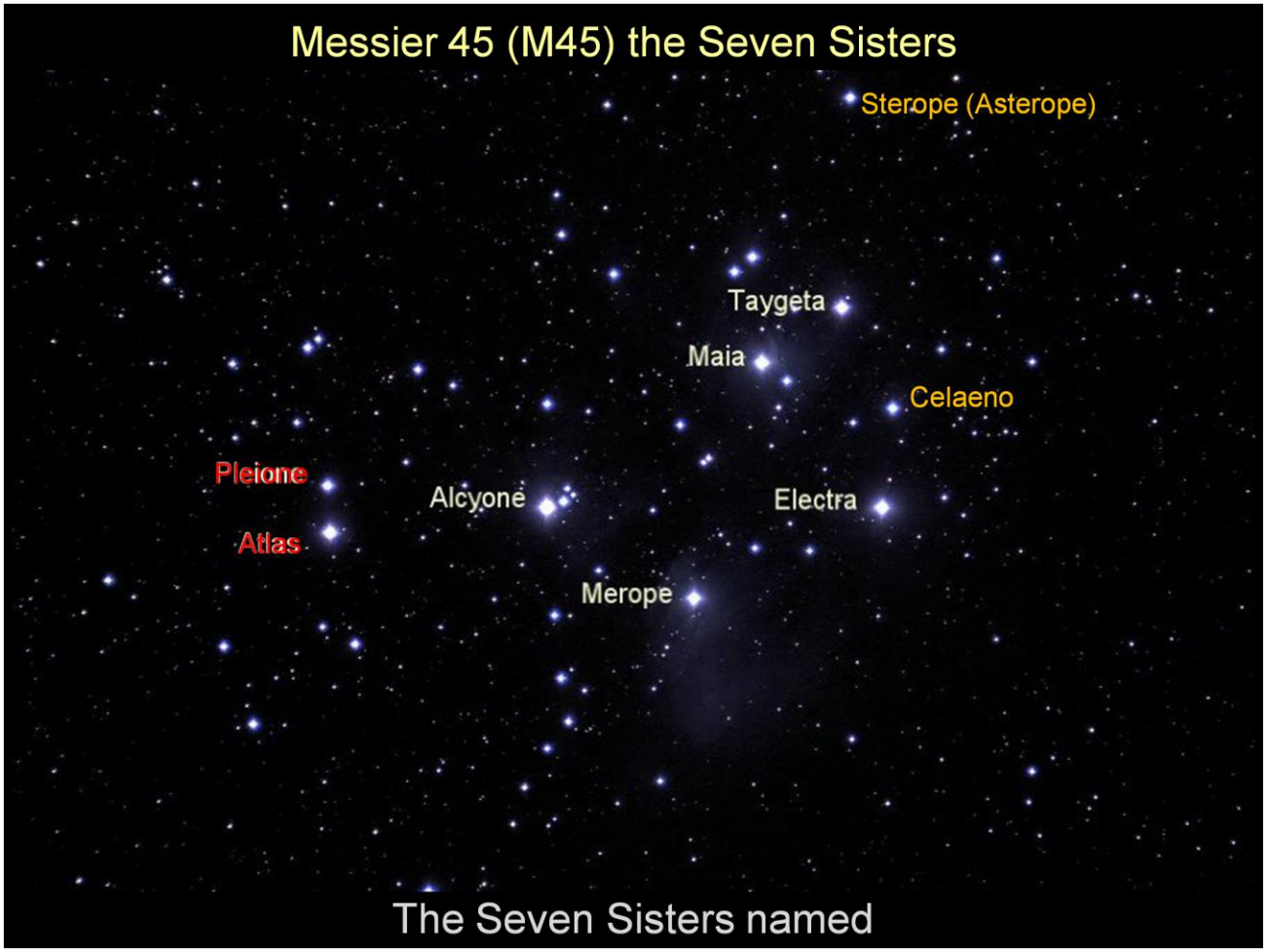
Alcyone	Eta Tauri (25 Tauri)	B7IIIe	2.86
Atlas (Father)	27 Tauri	B8III	3.62
Electra	17 Tauri	B6IIIe	3.70
Maia	20 Tauri	B7III	3.86
Merope	23 Tauri	B6IVev	4.17
Taygeta	19 Tauri	B6V	4.29
Pleione (Mother)	BU Tauri (28 Tauri)	B8IVpe	5.09
Celaeno	16 Tauri	B7IV	5.44
Sterope (Asterope)	21 Tauri, 22 Tauri	B8Ve, B9V	5.64, 6.41

The chart above shows the nine brightest stars in the M45 cluster in order of their brightness from the top (the magnitude is shown in the right column lowest magnitude number denotes the brightest). So Alcyone is the brightest.

The Seven Sisters names are: Alcyone, Electra, Maia, Merope, Taygeta, Celaeno and Asterope (also called Sterope).

It can be seen that Atlas and Pleione (shown in red) are actually the sister's Father Atlas (the Titan who holds the World in his shoulders) and their Mother Pleione.

The two fainter stars Celaeno and Asterope (also called Sterope) (shown orange) are the real 6th and 7th sisters. Asterope is actually a binary (double) star.



The true sisters and their Mother and Father are labelled on the image above.

The Seven Sisters names are: Alcyone, Electra, Maia, Merope, Taygeta, Celaeno and Asterope (also called Sterope).

Atlas and Pleione are their Father and Mother.

Messier 45 (M45) the Seven Sisters

The Pleiades Sisters by Elihu Vedder 1885

In Greek mythology, the cluster represents the Seven Sisters who were the daughters of the sea-nymph Pleione and the Titan Atlas.

Their father Atlas was forced to carry the heavens on his shoulders. Then Orion the hunter started to pursue the sisters. The King of the Gods Zeus first transformed them into doves and then into stars and put them in the sky. It is still said that Orion can still be seen pursuing them across the sky.

The painting above is one of many paintings depicting the Seven Sisters.

With one of the many mythical stories of how the Seven Sisters became to be in the night sky.

Messier 45 (M45) the Seven Sisters

M45 is an Open Cluster in Taurus

It is located 444 light years from us

About 30 bright stars are seen using binoculars

It has about 1000 large stars with a total mass of 800 Suns

But may have up to 3000 including the smallest dwarfs

It is 110 arc minutes (~4x the diameter of our Moon)

The cluster is about 100 million years old

Star production finished about 80 million years ago

Here are a few facts and figures about the stars of the M45 Open Cluster.

Messier 45 (M45) the Seven Sisters

Alcyone is an eclipsing binary system. The primary component is a blue-white giant 8.2 times larger than the Sun, six times more massive and 2,400 times more luminous.

The star has a very high rotational velocity, 215 km/s, 100x faster than our Sun and consequently has disc of gas around its equator.

The second component is separated from the primary by 0.031 arc seconds, which is roughly equal to the distance between the Sun and Jupiter.

The binary system is also orbited by three companions: two 8th magnitude A-type white dwarfs and a yellow F-type dwarf.

The stars of the Seven Sisters are quite different to our Sun and very interesting. Alcyone is the largest and brightest of all the stars in the cluster.

Messier 45 (M45) the Seven Sisters

Pleione is another hot B-type star in the cluster. It is 190 times more luminous than the Sun and spins close to its breakup velocity, at 329 km/s.

The star is located less than 5 arc minutes away from the considerably brighter Atlas and is not easily visible to the naked eye. It is variable and varies from magnitude 4.8 to 5.5.

Because the star rotates so rapidly, it has a circumstellar disc of ejected material orbiting its equator.

Pleione is the smallest and faintest of the stars that usually define the sisters in 'naked eye' view of the Seven Sisters cluster. However we have seen that Pleione is actually the Mother of the Sisters. It would be fun to use a pair of binoculars to identify the true sisters and the Mother and Father.

Over another few hundred million years the stars will gradually move further apart and the pattern that we currently see will change. Eventually the stars will disperse and become separated as lone stars moving around the vastness of our galaxies. The Open Cluster called the Hyades that surround the bright orange star at the centre of the constellation of Taurus is a much more dispersed Open Cluster.

Our Sun was once a member of a cluster like M45 but after 4.3 billion years all of Sun's siblings have long gone.

This presentation is available on the

Beginner's Website: naasbeginners.co.uk