

Mastroia, Renee

Mastroia 1

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### Cars with Stars

Globular clusters are found innumerable throughout our galaxy, the Milky Way. The question that most ask is, how do globular clusters relate to everyday life? The globular cluster, M45, is found in countries all over the world. Believe it or not, the M45 relates to America's most desired passion – cars. Known as the Pleiades cluster, the M45 is the logo used by the Subaru car manufacturing company. This amazing globular cluster is now seen on the road, on the backs of cars, on television, billboards, the Internet, but most importantly in the sky. In order to get a true view of this beautiful cluster, it is best to look towards the sky.

The Pleiades, coinciding with the Greek myth, are the seven daughters of Atlas and Oceanid. Atlas is the titan who holds up the sky. Each star in this cluster has a name, one for each of the seven sisters. The sisters are Alcyone, Maia, Electra, Taygeta, Celaeno, Merope, and Asterope. In this cluster, only six of the “seven sisters” can be seen. Celaeno is said to be the “Lost Pleiad”. According to the legend, she was struck by lightning. However, the star that is known as Celaeno is “just at the limit of human vision in terms of brightness”

(<http://www.astro.wisc.edu/~dolan/constellations/messier/m45.html>).

Alcyone means the “queen who wards off evil”

<sup>1</sup>([http://www.ras.ucalgary.ca/~gibson/pleiades/pleiades\\_myth.html](http://www.ras.ucalgary.ca/~gibson/pleiades/pleiades_myth.html)). The magnitude of Alcyone is 2.86, which means that it is considerably bright on the magnitude scale.

Alcyone is in the spectral class B7e III

<sup>2</sup>([http://www.seds.org/messier/more/m045\\_tab.html](http://www.seds.org/messier/more/m045_tab.html)). This means that it is a blue-white, <sup>3</sup>normal giant. Alcyone is the brightest star in the M45 globular cluster.

Asterope means “lightening”, “twinkling”, “sun-face”, or “stubborn-face”.

Asterope is a binary star, which means that there are two stars within the one star.

Asterope has two different magnitudes and spectral classes because of this. The magnitude of Asterope 1 is 5.64 and its spectral class is B8e V. The magnitude of Asterope 2 is 6.41 and is in the spectral class B9/A0 Vn. The two Asterope stars are blue-white and white main sequence stars.

Celaeno has the Greek meaning of “swarthy”. It is good to remember that this is also known as the “Lost Pleiad” and is not visible to the naked eye. The magnitude of Celaeno is 5.44 and is in the spectral class B7 IV. Celaeno is a blue-white subgiant.

Electra means “amber”, “shining”, and “bright” in the Greek language. Electra’s magnitude is 3.70, which means it is slightly dimmer than Alcyone. Electra is in the spectral class B6e III, meaning that it is a blue-white normal giant.

In Greek, Maia means “grandmother”, “mother”, “nurse”, and “the great one”.

Maia is said to be the oldest of the seven sisters. The magnitude of Maia is 3.86 giving

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<sup>1</sup> All references to the meanings of mythological names are found at this Internet web site.

<sup>2</sup> All references to the magnitude and spectral classes of the stars are found at the given web site.

<sup>3</sup> The type of star (i.e. normal giant) is figured out based on the temperature in Kelvin’s of the individual star.

this star a minute difference and being slightly dimmer than Electra. Maia is in the spectral class B7 III. This star also has blue-white coloring and is a normal giant.

Merope in Greek means “eloquent”, “bee-eater”, and “mortal”. Merope’s magnitude is 4.17 and is in the spectral class B6 IV. It is much dimmer than Maia and is also blue-white in color. Maia is a subgiant, like her sister Celaeno.

Taygeta means “long-necked” in the Greek language. The magnitude of Taygeta is 4.29, meaning that it is even dimmer than Merope. It is in the spectral class B6 V. Also like its sisters, is blue-white in color and is a normal giant.

Although, the main part of the cluster focuses on the seven sisters, it also includes their parents and at least 500 more bluish stars

(<http://www.subaru-global.com/about/origin/index.html>). The M45 Pleiades is an open cluster<sup>4</sup>. The properties of an open cluster are the stars in a cluster are all about at the same distance, the stars have approximately the same age, the stars have about the same chemical composition, and the stars have different masses, ranging from about 80-100 solar masses for the most massive stars in very young clusters to less than about 0.08 solar masses (<http://www.seds.org/messier/open.html>). Most of the stars in this cluster are binaries<sup>5</sup>. The Pleiades cluster contains reflective nebulae<sup>6</sup> (Science Desk References, pp.342).

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<sup>4</sup> Open clusters are physically related groups of stars held together by mutual gravitational attraction.

<sup>5</sup> A binary star is a system of two stars that revolve around each other under their mutual gravitation -- called also *binary system*

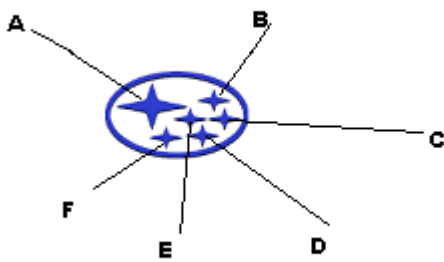
<sup>6</sup> A reflective nebula is dust and gas reflecting light off of nearby stars.

The M45 can be found in the constellation Taurus. It is also more than 400 light-years distant from earth (Grolier Incorporated). The pattern of this open cluster resembles the Little Dipper. The linear diameter of this Messier object is about 15 light years across. The Pleiades has been seen for many centuries. The recorded age of this open cluster is  $8 \times 10^7$  years<sup>7</sup> (McGraw-Hill Encyclopedia of Science and Technology, pp. 66).

Subaru is a Japanese word meaning “unite.” In 1953, six Japanese companies merged to form Fuji Heavy Industries Ltd. The new corporation adopted the “Subaru” cluster of stars as its official logo for its line of automobiles (<http://www.subaru-global.com/about/origin/index.html>). Not only is Subaru a powerful globular cluster, but it is also an extraordinary name for a line of cars. The next time that you are driving on the road and you happen to notice the new Subaru model of car, think of all the possibilities. Think of how the company originated and where they stand in the big scheme of things. Remember, this is not just a shiny picture of stars that is seen only in the daylight on cars, but it is also found in the brilliant night sky surrounded by millions of other possibilities for future industries.

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<sup>7</sup> This is also known as 80,000,000 years.



The Subaru logo is very comparable to the M45 Pleiades. The biggest star in the logo, A, is equivalent to the brightest star in the Pleiades, Alcyone. The star labeled B in the logo is the star Asterope in the M45. Although, Asterope is a double star, the logo

does not display this given information. Star C is the star Taygeta in the actual open cluster. Most would think that star D in the logo is equivalent to Celaeno. However, because Celaeno is not visible to the naked eye, Star D represents the star Electra. As seen in the logo, star E is known as Maia in the M45 Pleiades. Finally, Star F that is shown in the logo is the star known as Merope in the cluster. The Subaru Company has done an excellent job of displaying the M45 Pleiades open cluster. Although, there are some slight differences in the two, these are both extremely similar and relate to one another in great numbers.