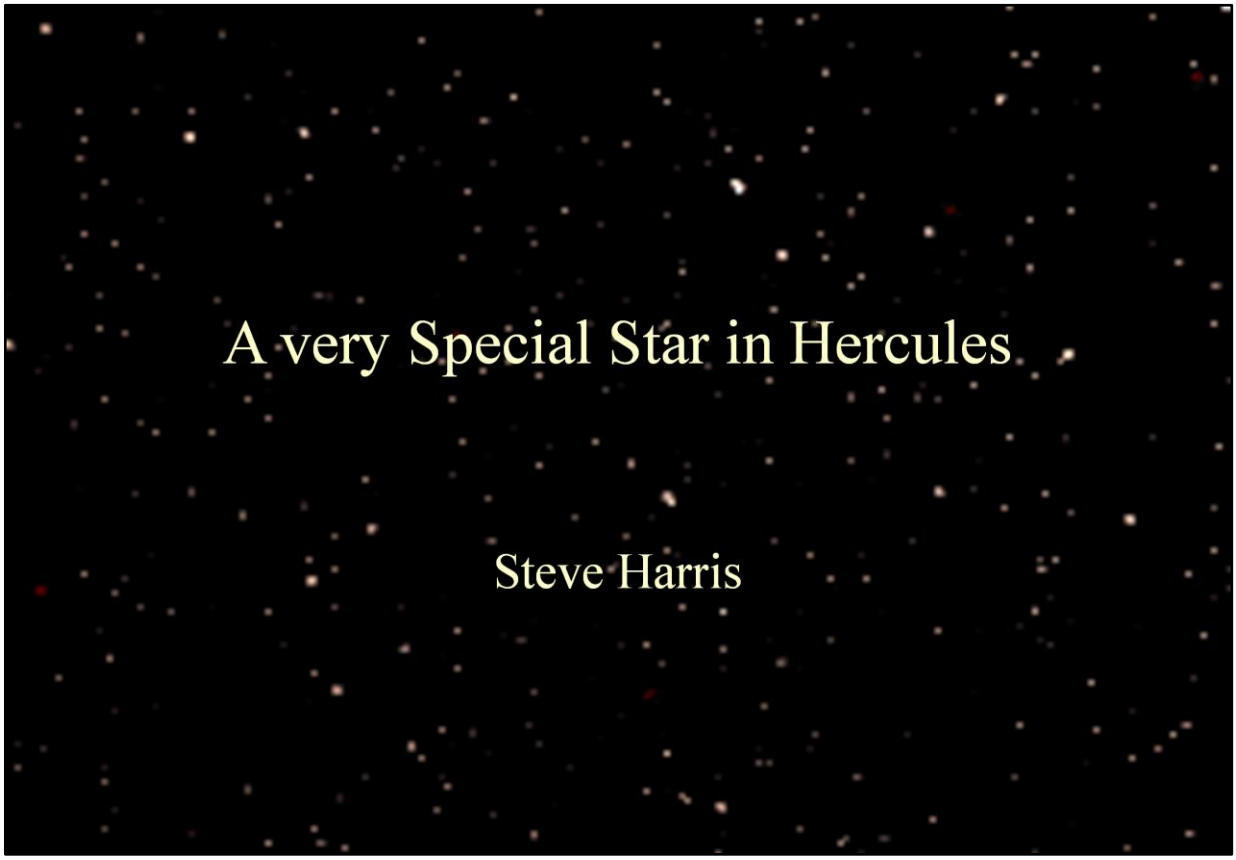
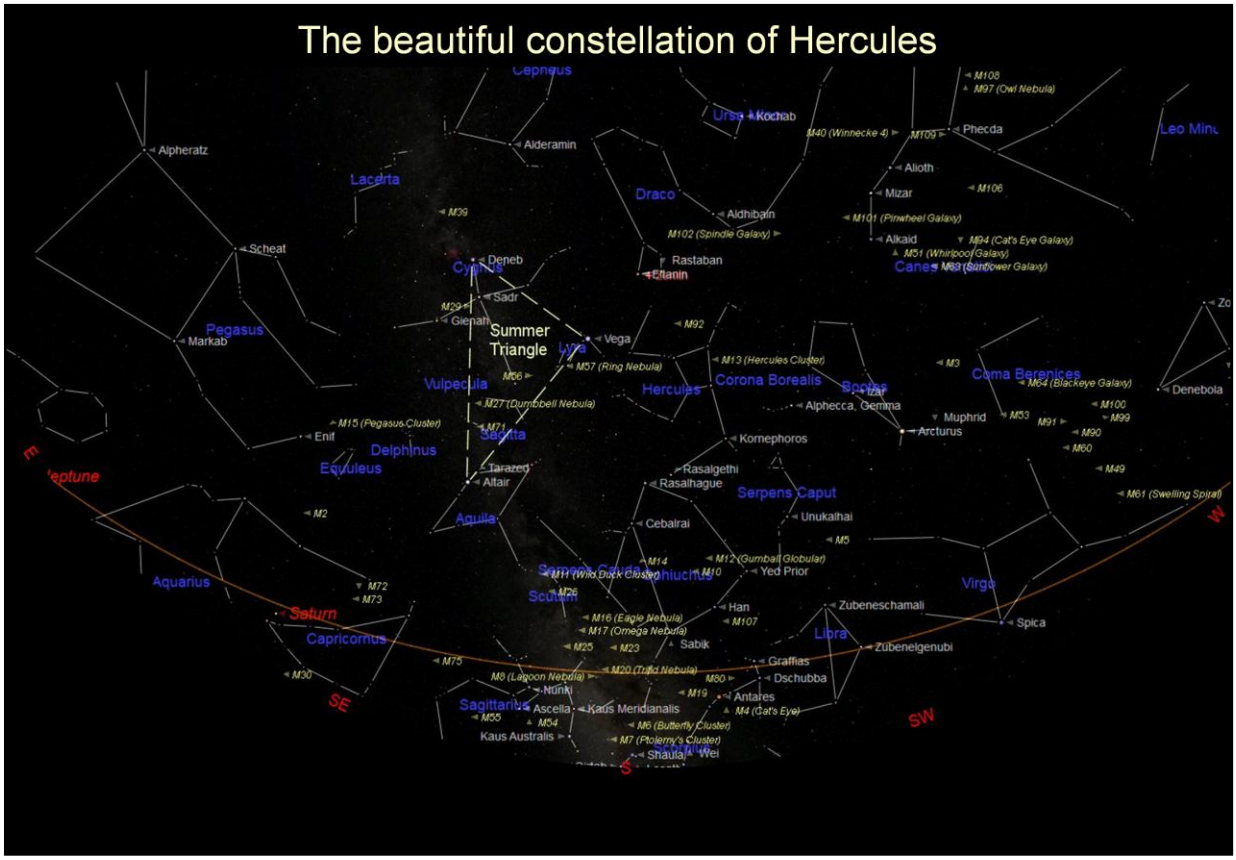
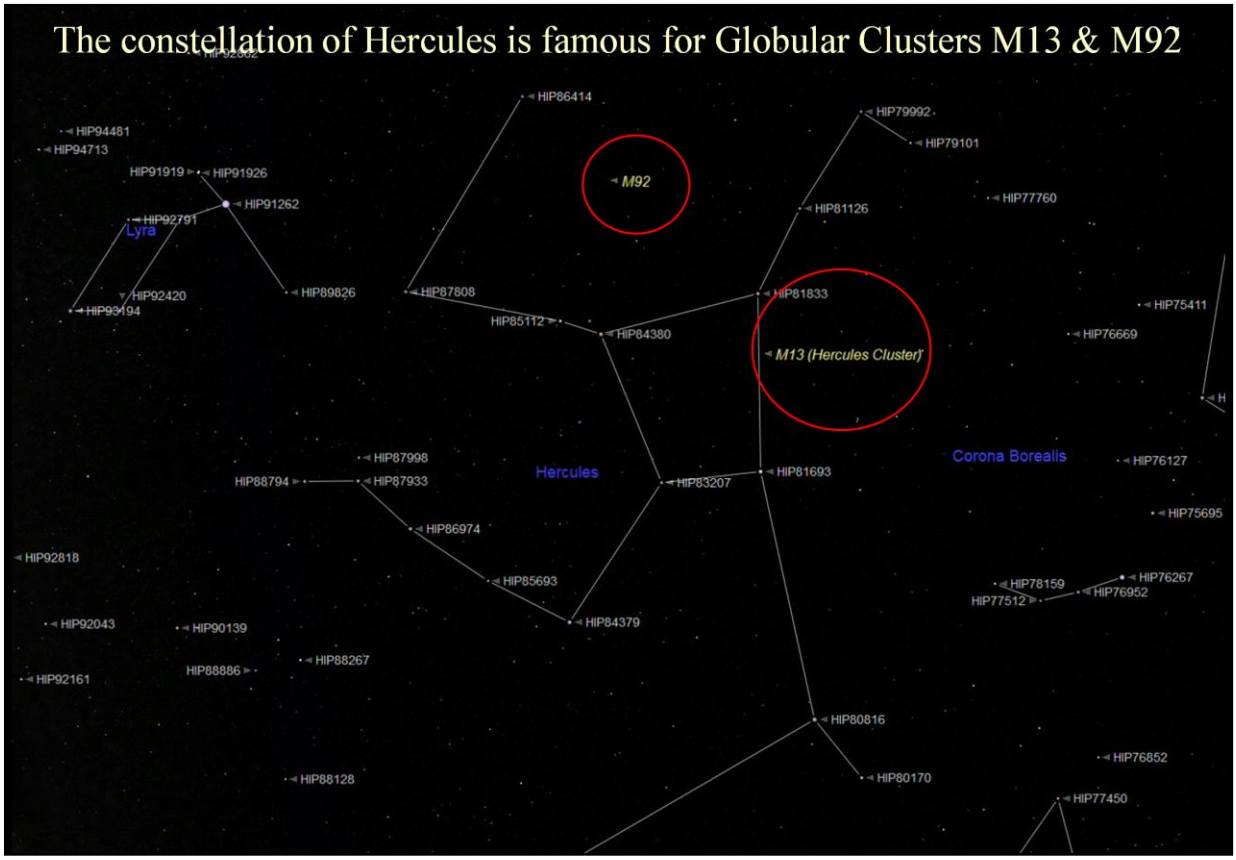

A very Special Star in Hercules
Steve Harris



Hercules is a summer constellation located between the bright stars Vega and Arcturus.

Its most recognisable feature is the mishaped square formed by four stars.

This square is called the ‘keystone’ due to the stone at the centre of an arch.



The constellation is searched out for the two sought after Globular Clusters that it hosts.

Globular Clusters are spherical clusters of between 100,00 and 1 million stars.

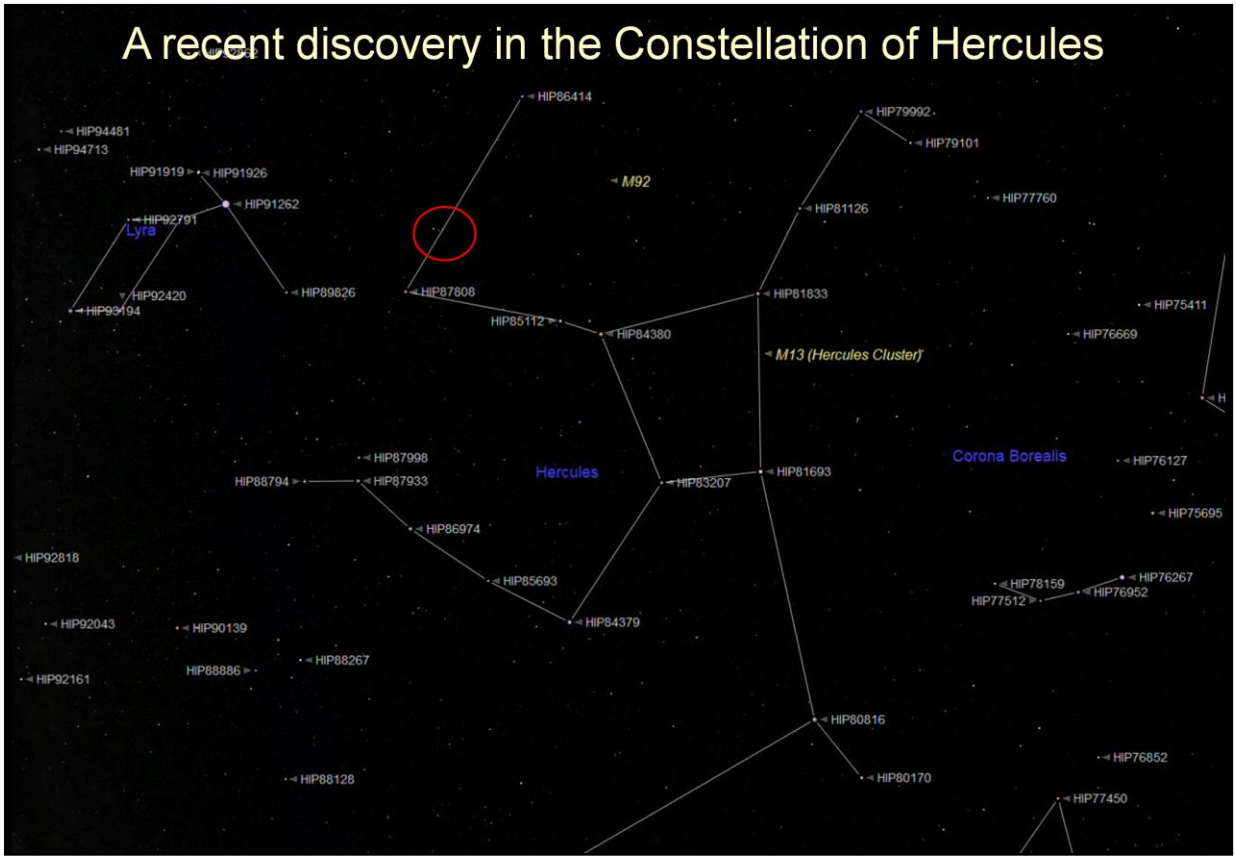
They are thought to be the dense cores of small galaxies the have ventured too close to our galaxy.

They have had their outer stars stripped off by the gravity of the Milky Way.

Messier 13 (M13) is the biggest, brightest and closest Globular Cluster to us.

Messier 13 (M13) the Great Globular Cluster

Messier 92 (M92) a smaller and more distant Globular Cluster



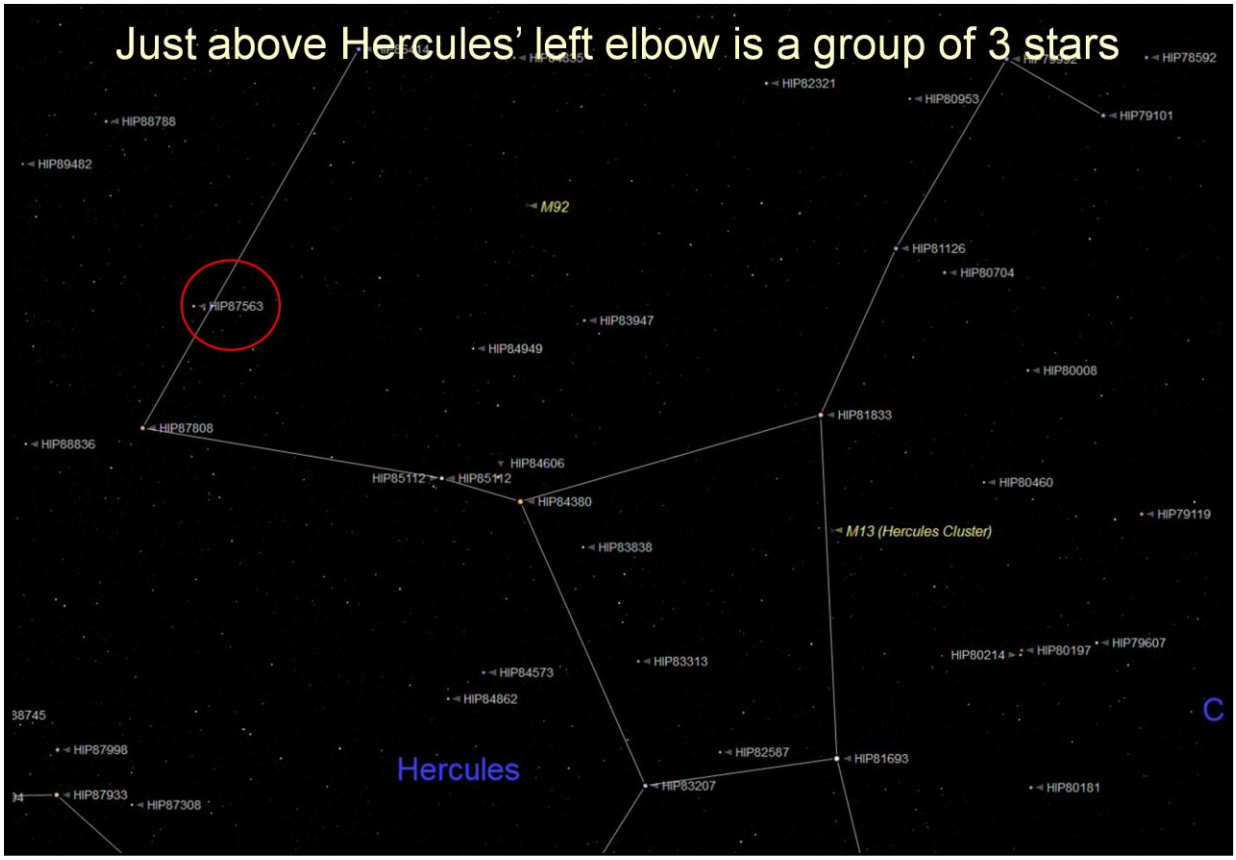
Hercules is named after the famous strong man fro mythology.

His stick figure is usually show with the Keystone representing his body.

His arms are attached to the upper two stars and his legs to the lower two stars.

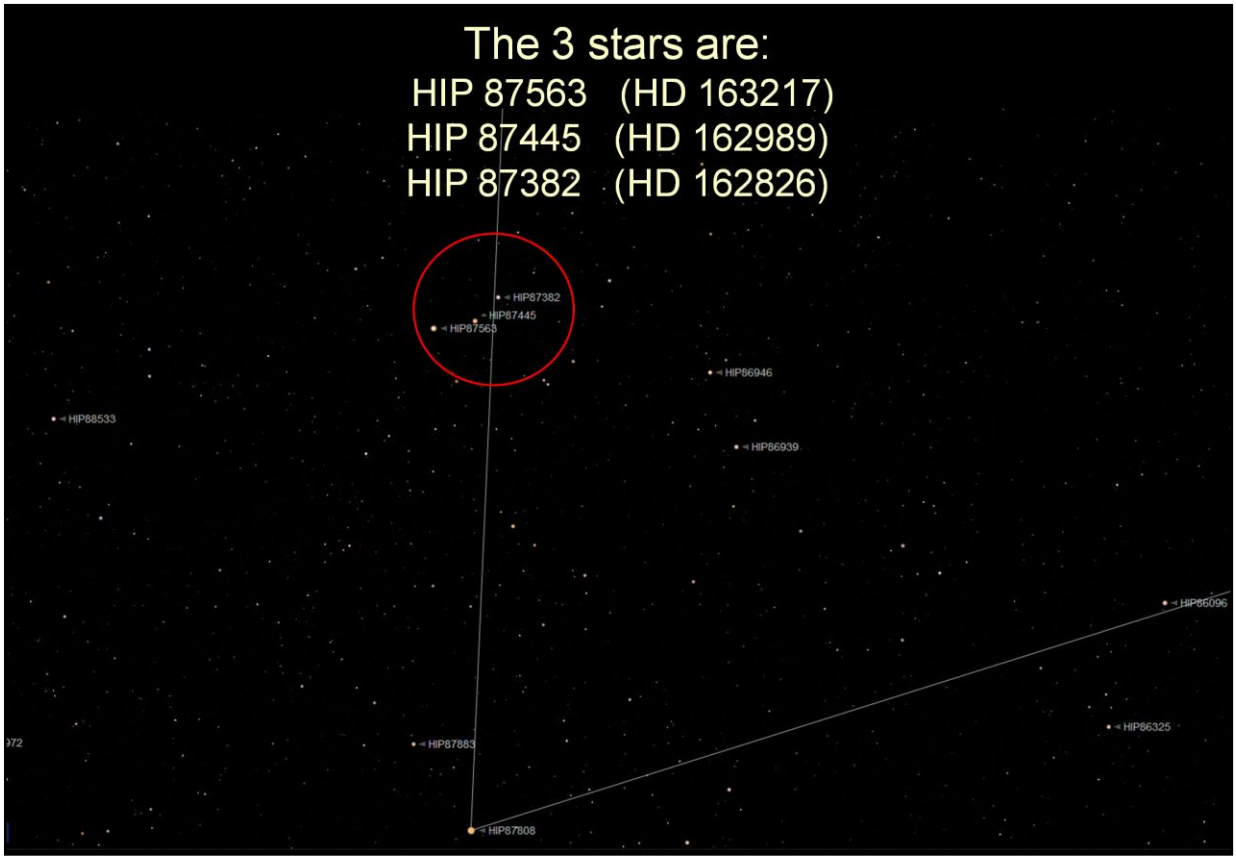
Just above his left elbow there is a small group of three stars (circled above).

These three stars can be found using binoculars.



This star can be found using binoculars or a small telescope.

It looks like a small group of three stars.



The three stars circled are:

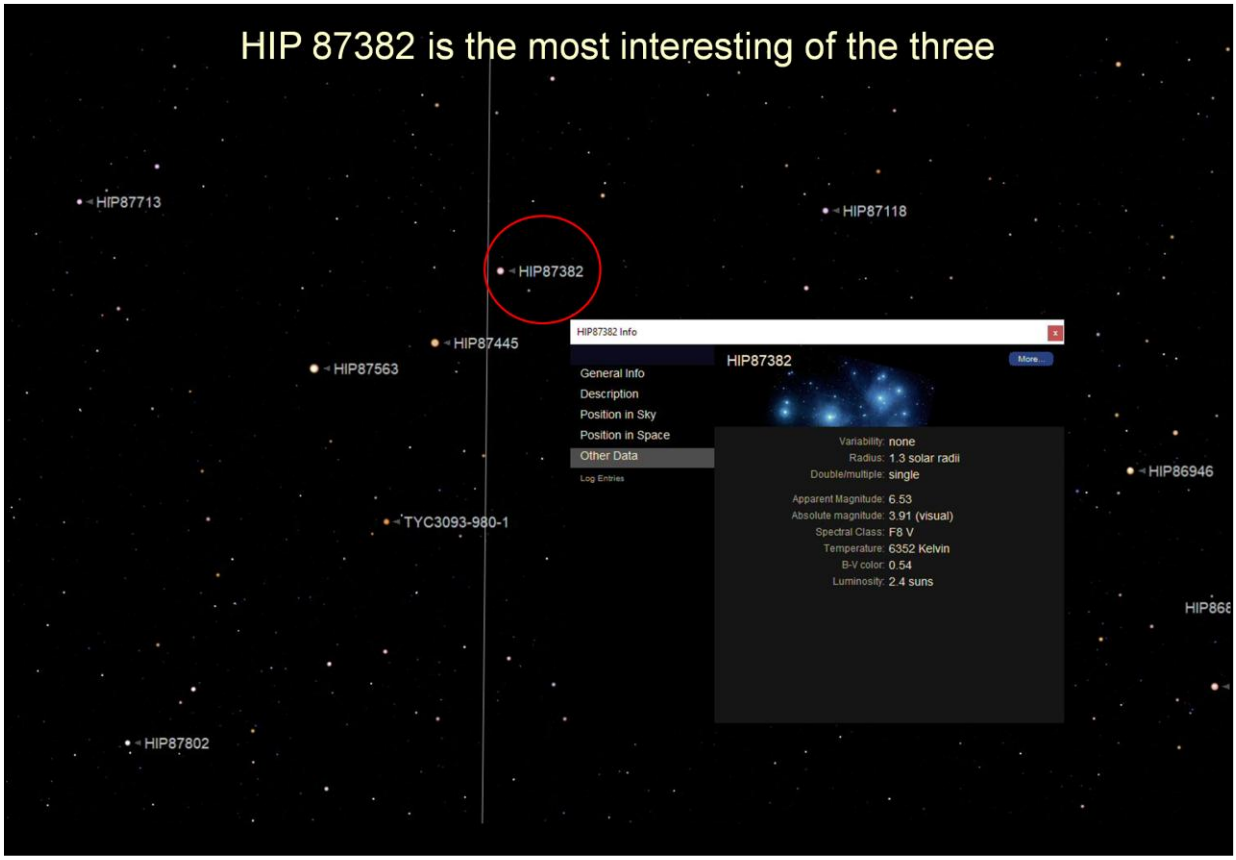
HIP 87563 also listed as HD 163217

HIP 87445 also listed as HD 162989

HIP 87382 also listed as HD 162826

HIP is from the Hipparcos Star Catalogue.

HD is from the Henry Draper Star Catalogue.



The ratio of abundances of chemical elements are key parts of a star's chemical fingerprint like Barium and Yttrium, for example.

After the scientists analyzed the chemistry of these stars, they were left with two potential candidates.

They next modelled the orbits of these stars around the centre of our Milky Way Galaxy.

They found one of these candidates, HD 162826, may have shared the stellar nursery the Sun was born in about 4.6 billion years ago.

HD162826 (HIP 87382)

HD 162826 (**HIP 87382**) is a star in the constellation Hercules.

It is about 110 light-years (34 parsecs) away from Earth.

It has an apparent magnitude of 6.46.

Can be found with binoculars or a low-power telescope

It is quite close to Vega in the constellation Lyra.

Our Sun is a G2V star with a temperature of 5772 K, 4.6 billion years old.

HD 162826 is a F8V star with a temperature of 6210 K, 4.5 billion years old.

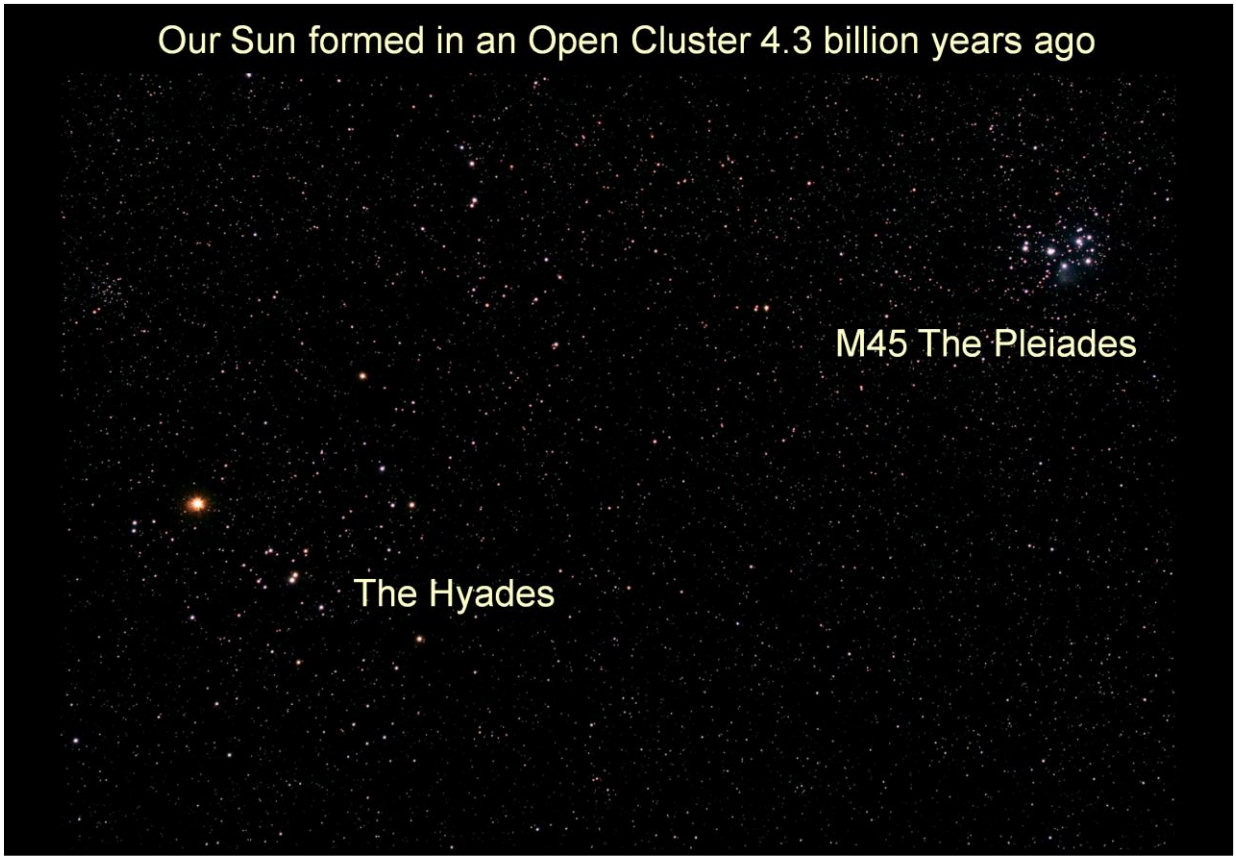
HD 162826 is just 15% more massive than the Sun and 3% more abundant in metals.

It has similar amounts of the unusual elements Barium and Yttrium

In May 2014, astronomers at the University of Texas at Austin announced that HD 162826 is "almost certainly" one of what may be thousands of siblings of the Sun, emerging from the same stellar nursery some 4.5 billion years ago. This conclusion was reached by determining it has the same chemical composition as the Sun, including rare elements such as barium and yttrium, and by determining its orbit and projecting backward its revolutions about the galactic centre.

The cluster in which HD 162826 and the Sun formed is believed to have been an open cluster, permitting the stars to scatter widely over time. The stars in this cluster were not too closely packed during their formation to disrupt planetary disk development, but were not so far apart as to prevent the seeding of Earth with radioactive elements produced by a nearby supernova.

The discovery of a first solar sibling by searching for specific rare elements may make it easier to identify other siblings in the future. However, HD 162826 is probably the nearest solar sibling, because others would have been identified first if they had been closer to the Sun. It had not been expected that even one sibling would be found at this relatively short distance; the study that identified this star worked on a dataset of only 100,000 stars, to prepare to receive data about billions of stars expected from the Gaia Space Telescope in five to ten years.



Stars form in vast clouds of Hydrogen Gas called a Nebula (Pl Nebulae).

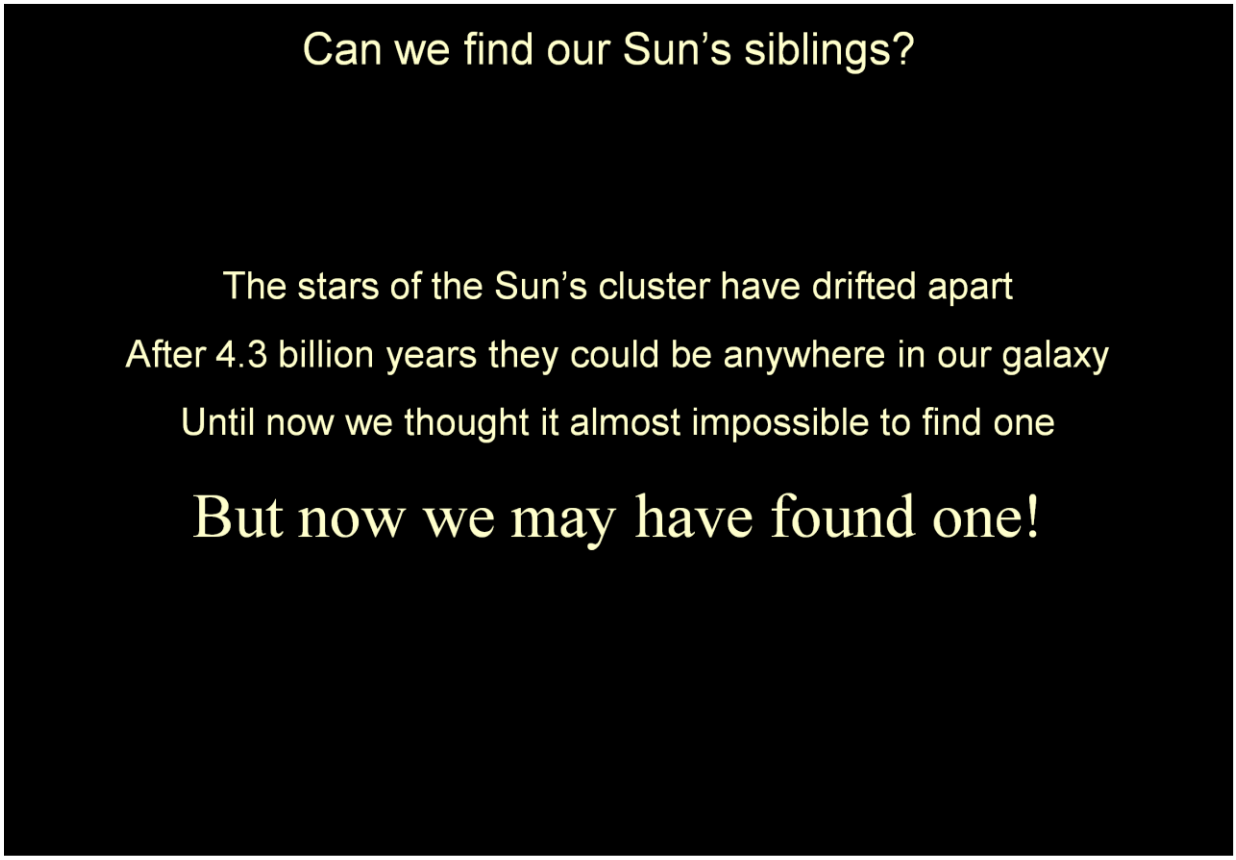
As the stars light up their intense radiation blows away any left over gas.

As the Nebula is cleared away a cluster of new stars is revealed.

This is known as an Open Cluster.

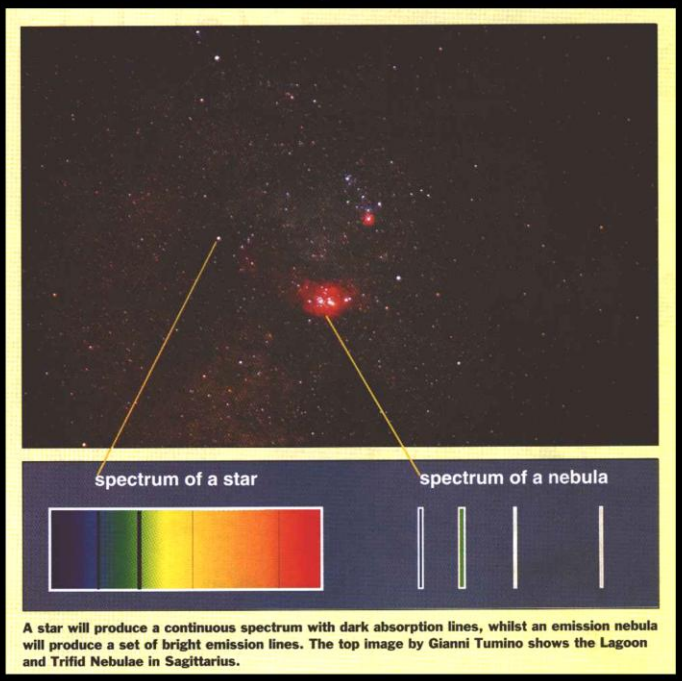
The members of the cluster will be moving in slightly different directions and speeds.

Gradually the stars will move further apart and eventually the cluster will disperse.



Over billions of years the stars of the cluster will have moved around our galaxy.
The stars will mostly be distributed all around the galaxy.

How can we identify our Sun's siblings?



A star will produce a continuous spectrum with dark absorption lines, whilst an emission nebula will produce a set of bright emission lines. The top image by Gianni Tumino shows the Lagoon and Trifid Nebulae in Sagittarius.

Each element has a unique 'fingerprint'
It emits or absorbs the same wavelengths

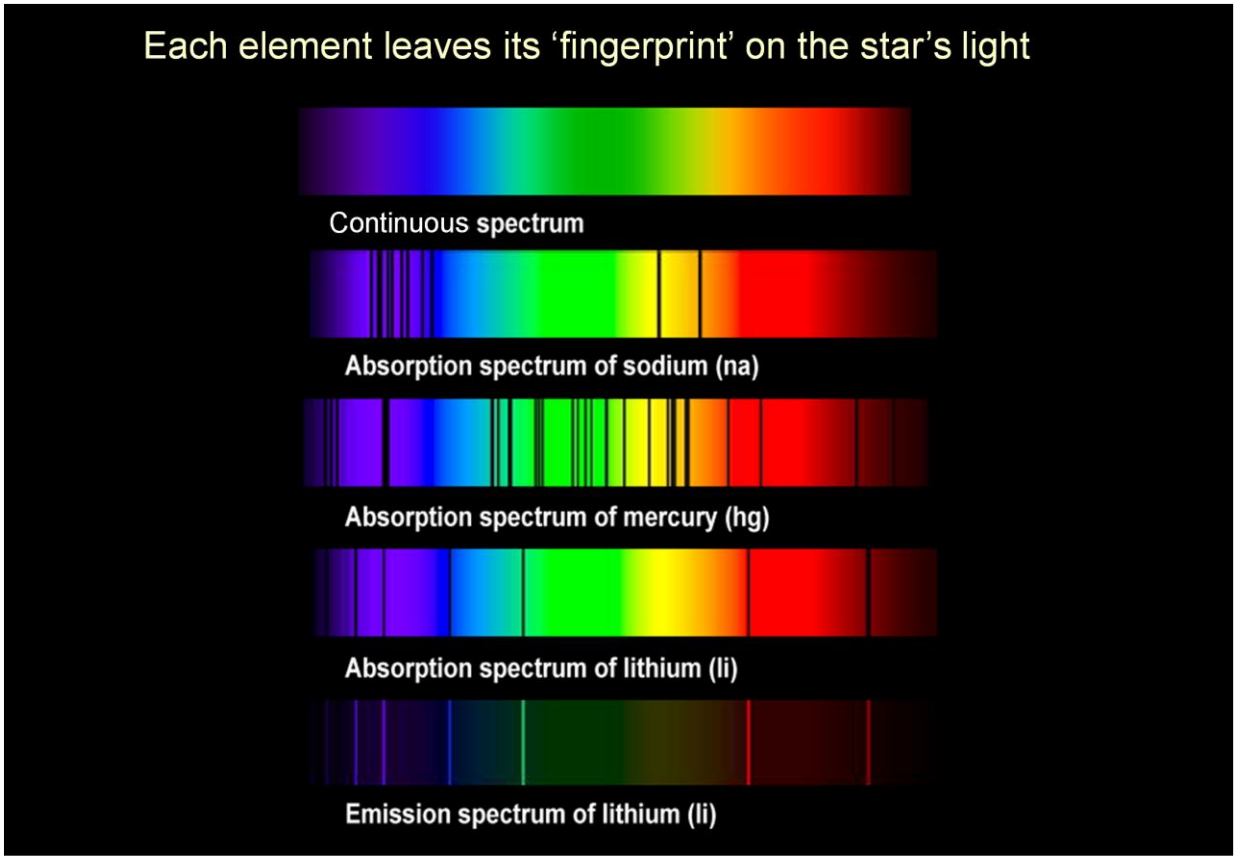
When an atom of a certain element is excited it will emit light of a certain wavelength (colour).

Each element will always emit the same wavelength or pattern of wavelengths.

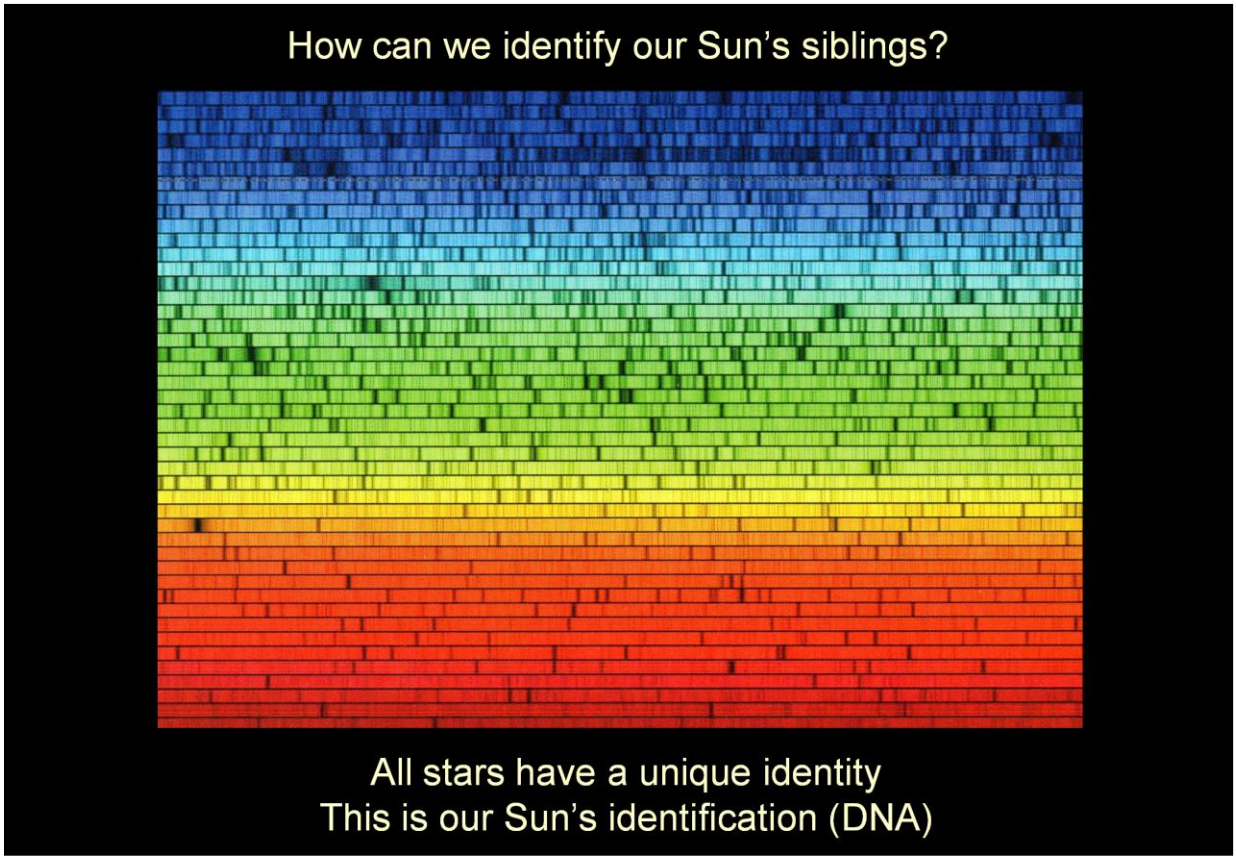
So the presence of this atom can be identified by this pattern of wavelengths of coloured light.

Similarly light passing through a nebula will absorb those same wavelengths of it light from those elements.

These absorbed wavelengths (colours) will appear as dark lines on the spectrum from a star.



The spectra shown above show the patterns of different elements imprinted on them.



The spectrum above is the light emitted from our Sun.

The lines are the combined patterns of elements that have absorbed those wavelengths of sunlight.

By identifying these absorption lines we can identify the elements that absorbed them.

The spectrum from the star HD162826 has a spectrum that is almost identical to our Sun.

The Big Questions

If HD 162826 formed with our Sun
and has the same composition as our Sun

Does it have any Earth like Planets?

and

Do any of these Planets have LIFE?