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STAR CLUSTERS

Ken Tapping, 6th December, 2016

If it happens to be clear, these evenings you can see the Pleiades in the eastern sky. It is a little group of stars, looking like a necklace dropped by a goddess. These stars are often referred to as the “Seven Sisters”, although average eyes may see only six, and good eyes under good conditions will see around ten. Binoculars will show the group to have hundreds of members. The Pleiades is an example of an “open star cluster” – open because its members are spread out and easy to see.

The stars in the Pleiades are “siblings”, born from the same cloud of gas and dust, which collapsed about 100 million years ago. As it collapsed it broke into hundreds of little “cloudlets” each of which eventually formed stars. The birth place is now long gone, but we think it looked very much like the Orion Nebula, a huge cloud of glowing gas where we can see almost all stages in star formation going on right now. The constellation of Orion rises in the late evening. Three stars form Orion’s belt, and that silvery blob where his sword would be is the Orion Nebula. That is a good target for binoculars or telescopes.

A lot of cloud material escapes being formed into stars. Its gravity, together with the mutual attraction of the stars for each other, holds the siblings together as an open cluster. However, when the stars start to shine, they produce their versions of our “solar wind”. This, together with their light and heat, starts to blow away the remaining material in their birth clouds. As the cloud’s gravitational “glue” vanishes, the forces holding the cluster together grow weaker, until the cluster breaks up. Sometimes two or more stars form close enough together to orbit each other, staying together as double or multiple stars. There are many of these in the sky. The other stars go wandering off on their own. Open clusters are therefore made up of young, often blue stars.

Many stars shared common birth clouds, but have long since gone their own way. Open clusters are therefore young stars. Estimates suggest that in

about 250 million years the Seven Sisters will be all off leading their own lives. We have discovered long-gone clusters by measuring the movement of stars and tracking them back in time to see if they come together at one place, betraying their common origin in a cloud long-gone.

In summer the constellation of Hercules is high in the sky. The main part of the constellation is a grouping of four stars forming the shape of a keystone or tombstone. Partway up one of the sides of the keystone is a fuzzy blob. Binoculars or a telescope will show the ball-shaped blob to be a concentration of stars – crowded into one continuous blur of stars in the centre and thinning out as one scans outwards. These clusters are very different from open clusters. They are called “globular clusters” because they look like balls of stars, containing from a few thousand to several million members, all concentrated into a lump ten to thirty light years across. Many galaxies have tens or hundreds of these, moving in highly elliptical orbits, taking them through their host galaxies, out of the other side, and then back through. Our galaxy, the Milky Way, has about 150 of them. Unlike the stars in open clusters, the stars in globular clusters are old and red. Many are only a few hundred million years younger than the universe itself, which is almost 14 billion years old.

One other big difference between open clusters and globular clusters is that we understand fairly well how open clusters form. However, globular clusters are another matter. They could be the result of the collapse of huge clouds when their host galaxies were forming..... Maybe.

Venus is low in the southwest after sunset. Look for a bright, starlike object, shining steadily. Mars is low in the Southwest in the evening. Jupiter rises in the early hours. The Moon will reach First Quarter on the 7th.

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