

HEAVENLY NEWS

“The Lives of Stars”

By Teri Smoot, Lead Docent CPRC Community Observatory

The stars that we observe in the night's sky have very specific life cycles that, in some ways, mimic our own. Stars are born; frequently live their young lives in packs with other stars, mature frequently along with one or two other stars, and eventually die. When we look at the heavens, we see stars in all of these conditions.

Stars are born in gigantic clouds of gas and dust that form in interstellar space. These clouds can weigh as much as 6 million suns and are primarily composed of hydrogen gas with traces of other elements. These clouds condense under their gravitational forces and, frequently, coalesce into several large dense regions. As these individual regions collapse further, they get heated. When the temperature builds to a sufficient degree (assuming the region is large enough), nuclear fusion will occur and a star will be born. Right now, the most prominent of these nebulae in our sky is the Orion nebula. Later in the summer, we will be able to see the Lagoon, Triffid, Eagle, and Swan nebulae where lots of stars are currently being born.

After nuclear fusion starts in these gas clouds, the radiation pressure starts to drive away the extra gas in the nebula. As this gas is blown away by the star light, a group of stars remain that were all born around the same time. These groups of stars range from a few million to a few hundred million years old and are called galactic or open clusters. These clusters of stars are the equivalent of “teen age” stars. Again, we will be able to show you several examples of open clusters at the observatory such as the Wild Duck cluster.

As time passes, gravitational interactions between the stars in the star clusters and the stars in the rest of the galaxy cause the clusters to “evaporate”. The clusters become sparser and sparser. However, as stars become middle aged, they frequently still exist in pairs or larger groups. Again, there are several of these double star systems, including the Boy Scout star, that we will be able to show you at the observatory.

Finally, as stars become older, they will have burned up all of their nuclear fuel and they start to die. The first thing that happens as a star starts to die is that they swell up into a red giant phase. This will happen to our sun in approximately another 4.5 billion years (the sun is about halfway through its life cycle). When the sun enters its red giant phase, it will swell so much that the orbit of the earth will probably be just inside its atmosphere. One of two things happens after the red giant phase. If the star has a low mass (less than about 8 solar masses), then it will puff off its outer atmosphere into a giant shell of gas and dust called a planetary nebula. Larger stars will blow up in a catastrophic supernova. Again, at the observatory, we will be able to show you both planetary nebulae such as the Owl or Dumbbell and supernova remnants such as the Veil nebula.

Please join us at the Community Observatory, a gift of the Cameron Park Rotary Club, some weekend night this summer and let us show you all of the different conditions of stars that are currently visible. The docents will be happy to explain what you are seeing and discuss how and why the nebulae and clusters look the way they do. For more information about the observatory and driving directions go to www.communityobservatory.com.

