

Offered Title: Globular Clusters

The hallmarks of science are challenge, question, and change. What appears to be true today is fodder for controversy tomorrow. It's all about evidence. Globular clusters formation, and recently their age, has been a source of speculation so let's check out the science behind these islands of stars.

Globular clusters are kind of weird. They are spherically shaped and densely packed, with hundreds of thousands, even millions of mostly very old stars.

The first record of a globular cluster observation was in 1665 by German amateur astronomer Abraham Ihle. He was observing Saturn in Sagittarius (hey, it's in Sagittarius now) and noticed the faint fuzzy cluster that Charles Messier would later name M22. William Herschel coined the name "globular cluster" in a catalog he published in 1789. Messier and others would go on to find and catalog numerous globulars and we currently know of 158.

The first attempt at defining them was done by Harlow Shapley in the early 20th century. His first measurements resulted in an incorrect estimate of their distances. He used what he thought were *Cepheid variable* stars within the clusters to determine their distances. It was later found that the stars Shapley used were *RR Lyrae variable* stars, fainter than *Cepheid variables*. The bottom line here is due to the brightness differences his distance estimates were too great and so was later corrected. During his study he discovered that globulars are satellites of our Milky Way galaxy, orbiting the core in a spherical arrangement. Spherical clusters orbiting in a spherical pattern, interesting.

In the late 1920's Henrietta Swope and Helen Battles Sawyer worked with Shapley to classify globular clusters based on the concentration of stars toward their cores. This resulted in 12 classes (I to XII), from high to low (Class I being the highest).

In a globular cluster's core, the distance between stars is about the distance between Neptune and our Sun, and in its outskirts about a light year apart. Gravity is so intense it appears very improbable a solar system could form in globular clusters.

If, in the unlikely event a planetary system was to form inside a globular and someone could look out into a planet's sky it would be ridiculous. The sky would be full of very, very bright stars, with no hope for dark skies.

How did globulars form? Well, that's one of those "we're not sure" answers, but possibly in exceptionally large and dense molecular hydrogen clouds as the early universe was developing.

Globulars have been considered some of the oldest objects in our universe, containing mostly red giant stars at the end of their life cycle. This idea has been challenged recently by computer modeling research that places them closer to 9 billion years old, not the previously accepted 13 billion years. We'll see.

What's in the Sky?

October 4; pre-dawn; east-northeast: A thin crescent Moon rises with M44 (the Beehive Cluster) in Cancer, a pretty binocular site.