

# Types of Telescopic Objects



## Open Clusters:

Open clusters are groups of stars held together by mutual gravitational attraction. All Open Clusters are part of our Milky Way galaxy that supposedly originate from large cosmic gas/dust clouds. They are considered to be relatively young in cosmological terms, in the hundreds of millions of years.



## Globular Clusters:

Globular clusters are concentrated, gravitationally bound ranging anywhere from ten thousand to one million stars. They populate the halo or bulge of the Milky Way and other galaxies with a significant concentration toward the Galactic Center. Spectroscopic study of globular clusters shows that they are much lower in heavy element abundance than stars such as the Sun that form in the disks of galaxies; elements that are essential for life to form. Thus, globular clusters are believed to be very old and formed from an earlier generation of stars (*Population II*). Recent estimates for age range from 12 to 20 billion years, not too much younger than the universe itself.

M13 by Mark Christensen



Spiral Galaxy



Lenticular Galaxy



Irregular Galaxy



Elliptical Galaxy

## Galaxies:

Galaxies come in a variety of types and shapes. The most well known is the spiral type. Our own Milky way is a spiral galaxy. The famous Andromeda galaxy is our closest galactic neighbor and is a spiral as well. A lenticular galaxy is shaped like a spiral but does not have the defined spiral arms. Lenticular galaxies are very old, containing mostly Population II stars. Irregular galaxies are believed to have taken their observed shapes due to gravitational distortion. Elliptical galaxies are simply elliptical in shape and do not rotate.



Planetary Nebula



Diffuse Nebula



Supernova Remnants



Dark Nebula

## Nebula:

Diffuse nebulae are clouds of interstellar gas and dust. If they are large and massive enough they are frequently places of star formation, thus generating big associations or clusters of stars. The Great Orion Nebula (M42) is an example of a star hatchery. Planetary Nebulae are born when a star like our own sun uses up its nuclear fuel. The star then throws off a large portion of its mass in the form of gas. A low magnitude white dwarf is left behind to excite the gas enabling us to see the nebula. Planetary nebulae have very short life spans in comparison with other viewable objects. Supernova Remnants result when a star considerably more massive than our Sun, explodes in a most violent detonation which flashes up at a luminosity of up to 10 billion times that of the sun, called type II Supernova. Nearly the entire mass of the star is ejected stellar matter as a rapidly expanding shell. The only supernova remnant in Charles Messier's catalog is M1, the Crab Nebula. Dark Nebulae are difficult to find without dark skies. There are none in Messier's catalog, but some of these objects are nonetheless famous. These dust clouds are only visible by the absorption of light from objects behind them. They are distinguished from diffuse nebulae mainly because they happen to be not illuminated by embedded or nearby stars. The famous Horse Head Nebula is a dark nebula.



M42 & M43 by Mark Christensen