

Look up at the sky on a dark night. You probably see the moon and some of the planets in our solar system. The majority of what you see are stars. If it is dark enough, and you are far enough from city lights, you may see a thick band of stars stretching across the whole sky. The Greeks called this band "Galaxies Kuklos," the Milky Circle, and the Romans called it "Via Lactea," the Milky Road. Today, we call this band of the stars the Milky Way.

The Ancient Greeks and Romans did not know that this milky band across the night sky was our own galaxy. In the 1700s, scientists figured out that the Milky Way was a galaxy made of many stars. Long after, scientists still believed that the Milky Way was the *only* galaxy. Astronomers have since found evidence of billions of other galaxies in our universe. In turn, each galaxy contains many billions of stars.

The Discovery of Other Galaxies

Since the 1700s, astronomers have used telescopes to observe fuzzy patches of light called "nebulae." As telescopes advanced to produce better images, astronomers discovered that some of the nebulae had a spiral appearance. Even in the early 1900s, scientists could not agree on whether these nebulae were inside or outside of our own galaxy. In 1920, scientists Heber D. Curtis and Harlow Shapley publicly debated the topic.

In the 1920s, researcher Edwin Hubble found that some of these discussed nebulae were in fact distant, separate galaxies. In 1929, Hubble identified the Andromeda Nebula as an enormous galaxy similar to the Milky



The Milky Way looks like a bright band of stars across the sky.



The Andromeda Galaxy was the object of Hubble's famous 1929 paper.

Way. Hubble began classifying galaxies based on their shapes. This practice continues today.

The Big Bang Theory

With advanced technologies, we can see the stars and galaxies that make up our universe. How did these galaxies form? According to the Big Bang theory, about 15 billion years ago the universe formed from a single point, or singularity, which rapidly inflated. As the new, hot universe cooled, some of the energy was converted into matter. Since the Big Bang, the universe has continued to expand and the galaxies that formed are still moving.

Galaxies Have Different Shapes

Based on his extensive research, Hubble classified galaxies into three main groups: elliptical, spiral, and irregular. He later added another group, S0 galaxies.

Elliptical galaxies appear to be circular or oval-shaped disks. Their actual shape is more like a ball or an egg. Elliptical galaxies can be further classified by their relative elongation. E0 galaxies are nearly circular, whereas E7 galaxies are more elongated.

Spiral-shaped galaxies are another type. The Milky Way is a spiral-shaped galaxy. In general, spiral galaxies have a ball-shaped bulge near the center. A disk of spiraling arms swirls around the central bulge. A halo of older stars is loosely grouped around the bulge and disk.

Furthermore, spiral galaxies have many variations. Ordinary spiral galaxies have arms that come from the center of the galaxy. Barred spiral galaxies have arms that appear to come from the ends of a long barlike area going through the center bulge.



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An elliptical galaxy has a ball or egg shape.



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NGC 2997 is an ordinary spiral galaxy with arms swirling from its central bulge.

Some galaxies have a shape between elliptical and spiral galaxies. These galaxies are known as S0 galaxies. S0 galaxies have a bulge and a disk similar to a spiral galaxy, but without the characteristic arms of a true spiral.

An irregular galaxy, as the name implies, does not have a specific structure or shape. Irregular galaxies are often asymmetrical. Many scientists believe that some irregular galaxies result from contact between materials in two galaxies. This contact distorts the original shapes of each galaxy to form the irregular galaxy. Other irregular galaxies develop their irregular shapes due to the gravitational influence from neighboring galaxies.



NGC 1433 is a barred spiral galaxy with arms swirling from the barlike area going through its center.