Definition: galaxy from Collins English Dictionary

*n pl -axies

1 any of a vast number of star systems held together by gravitational attraction in an asymmetric shape (an irregular galaxy) or, more usually, in a symmetrical shape (a regular galaxy), which is either a spiral or an ellipse Former names: island universe, extragalactic nebula Related adjective: galactic

2 a splendid gathering, esp one of famous or distinguished people

[C14 (in the sense: the Milky Way), from Medieval Latin galaxia, from Latin galaxias, from Greek, from gala milk; related to Latin lac milk]

Summary Article: galaxy

from The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide

Grouping of millions or billions of stars, held together by gravity. There are billions of galaxies in the universe. There are different types, including spiral, barred spiral, and elliptical galaxies. Our own Galaxy, the Milky Way, is about 100,000 light years across (a light year is the distance light travels in a year, about 9.5 trillion km/6 trillion mi; 1 trillion = 10¹²), and contains at least 100 billion stars.

The galaxies are moving away from our own in all directions. The universe is thus expanding in all directions. The evidence for this comes from examining light from the galaxies by splitting the light into a spectrum. A feature known as the red shift appears, in which the light is shifted towards the red end of the spectrum due to an increase in wavelength caused by the galaxies' recession.

Spiral galaxies, such as the Milky Way, are flattened in shape, with a central bulge of old stars surrounded by a disc of younger stars, arranged in spiral arms like a Catherine wheel.

Barred spirals are spiral galaxies that have a straight bar of stars across their centre, from the ends of which the spiral arms emerge. The arms of spiral galaxies contain gas and dust from which new stars are still forming.

Elliptical galaxies contain old stars and very little gas. They include the most massive galaxies known, containing a trillion stars. At least some elliptical galaxies are thought to be formed by mergers between spiral galaxies. There are also irregular galaxies. Most galaxies occur in clusters, containing anything from a few to thousands of members.

The Milky Way is a member of a small cluster, the Local Group. The Sun lies in one of its spiral arms, about 27,000 light years from the centre.

Galaxies vary in size, structure, and luminosity, and, like stars, are found alone, in pairs, or in clusters. As these systems are very remote, they appear in telescopes as hazy, nebulous objects and were first described as nebulae (see nebula). Later, when their remoteness was understood, they were known as
Only two, the Magellanic Clouds, are easily visible to the naked eye. The next brightest, the Andromeda galaxy, is just visible. About 35 of the brightest galaxies appear in the list compiled by the French astronomer Charles Messier and several thousand in the New General Catalogue. Billions can be photographed with modern telescopes.

**Distances** About 20 galaxies are known to be within 2.5 million light years of the Sun, and several thousand within 50 million light years. The distances of those closer than 10 million light years can be estimated from the brightness of individual Cepheid variables if such stars can be identified. Up to about 100 million light years away the magnitudes of supergiants, and of novae or supernovae at maximum, can be used to determine distance. Still greater distances have been estimated by comparing the apparent magnitude of a galaxy with its estimated absolute magnitude. The greatest distances of all are found by measuring the red shift (that is the lengthening of the wavelengths of light from an object as it moves away), and assuming the truth of the red shift–distance relation, one of the essential dogmas of modern cosmology. Once the distance is known, it becomes possible to estimate the masses of some of the nearer galaxies. It is also possible to estimate the masses of clusters of galaxies, but the masses so found have been larger than would be expected from the sum of the masses of the visible individual galaxies. This discrepancy, sometimes known as the problem of the missing mass or ‘dark matter’, has not been explained.

**Types of galaxy** Normal galaxies were classified by the US astronomer Edwin Hubble into three basic types: spiral, elliptical, and irregular. Spiral galaxies, of which our own Galaxy is a typical example, consist of a nucleus, a disc containing the spiral arms, and a halo. Spiral galaxies are classified according to the appearance of their arms. Sa spirals have a large nuclear bulge and tightly coiled spiral arms, while Sc spirals have a small nucleus and arms less tightly wound. Sb spirals are intermediate between Sa and Sc. Barred spirals are classified SBa to SBc. Elliptical galaxies are something like huge globular clusters, with no spiral arms. They are divided into eight subgroups, E0–E7, the E0s appearing spherical and the E7s the most elongated. Irregular galaxies have a chaotic appearance and show no symmetry. Irregulars are very much less frequent than spirals and ellipticals; they also tend to be smaller but brighter in proportion to their mass.

**Clusters** Clusters of galaxies can be roughly classified as regular or irregular. Regular clusters have spherical symmetry, central concentration, and usually at least 1,000 members brighter than absolute magnitude $-16$. One of the nearest examples is in Corona Borealis. Irregular clusters are made up of loose groups of small clusters. Unlike the regulars, which consist almost entirely of ellipticals, the irregular clusters contain all types of galaxies. They vary greatly in content and may contain more than a thousand galaxies, as in the cluster in Virgo, or only 20 or so, as in the Local Group to which our Galaxy belongs. The Local Group contains over 30 members within a region about 10 million light years across, including 2 large Sb spirals (our own and the Andromeda galaxy), 1 smaller Sc spiral, and numerous elliptical or irregular galaxies. The irregular galaxies include the Magellanic Clouds. The Local Group is a subgroup of the ‘Local Supercluster’. This is centred in or near the Virgo cluster and is about 100 million light years in diameter and 25 million light years thick.

**Recent discoveries** In 2003 astronomers identified the nearest galaxy to the Milky Way. The Canis Major Dwarf Galaxy is situated about 25,000 light years from us, less than a third of the distance of the previously known closest galaxy, the Sagittarius Dwarf Elliptical Galaxy. It was discovered using infrared

https://search.credoreference.com/content/topic/galaxy
data and had been unnoticed previously as its position was masked by dense dust clouds.

Also in 2003 astronomers discovered an object claimed to be a ‘dark galaxy’, using the Arecibo radio telescope in Puerto Rico. The ‘high-velocity’ cloud of hydrogen, called HVC 127-41-330, is situated 2 million light years from Earth and is apparently rotating too fast to be able to hold itself together unless there is a gravitational attraction from unseen matter preventing it from breaking up. As the cloud contains no obvious gravitational sources such as stars, it is thought to consist of more than 80% dark matter. In 2005 astronomers using the Lovell telescope at the Jodrell Bank Observatory, Manchester, UK, discovered a better dark galaxy candidate, VirgoHI 21.

In 2006 astronomers discovered a massive galaxy, HUDF-JD2, at a distance, and hence an epoch, at which standard theories had indicated galaxies of this size should not yet have formed.

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