

Chapter 29. Clusters and Superclusters: The Distribution of Galaxies

Note. Galaxies are not uniformly distributed, but are clumped into *clusters* and *superclusters*.

Note. The *Local Group* is the cluster that contains the Milky Way. There are three large spirals, the Milky Way, Andromeda, and Triangulum galaxies. Most members are dwarf ellipticals. It is a 1,000 kpc disk.

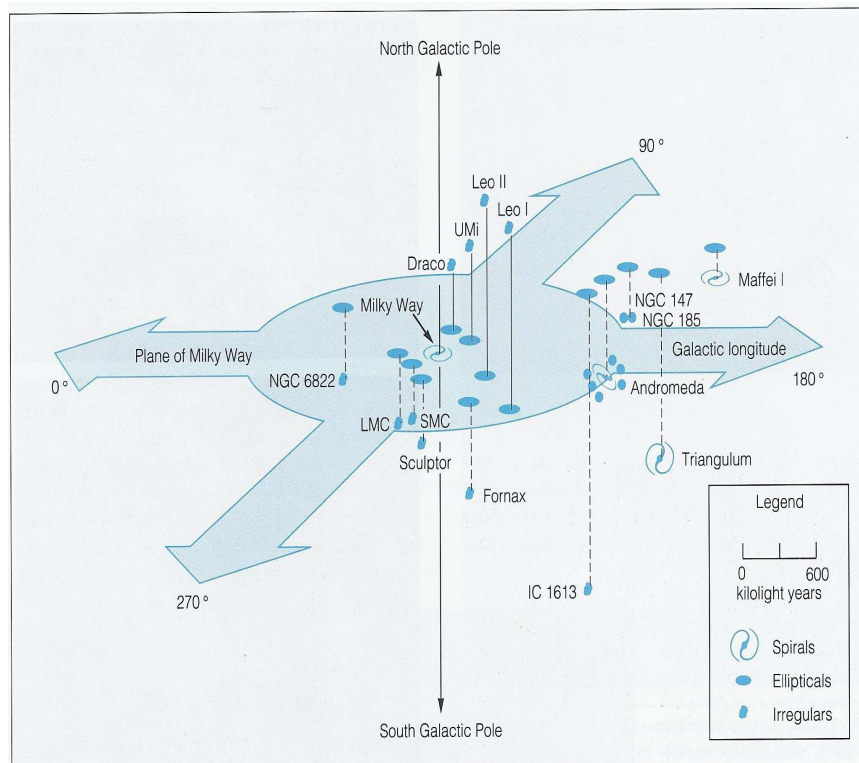


Figure 29.2 Page 565.



Figure 29.6 Page 567. The Andromeda Galaxy.

Note. The Magellanic Clouds orbit the Milky Way every several hundred million years. They are Type I irregulars which seem to be young ones on their way to becoming “disk” galaxies.

Note. The galaxies of the Local Group are used in calibrating the distance estimators mentioned in the previous section.

Note. Rich clusters may contain 100s or 1,000s of galaxies. Gravitational interactions force the larger galaxies to the center. These interactions can strip a galaxy of its interstellar gas and halo and may convert a spiral into an elliptical. X-ray observations indicate a very hot diffuse gas between the clusters.

Note. The clusters themselves are in *superclusters*, which may be sheet-like or string-like and in huge arcs spanning hundreds of millions of light-years.

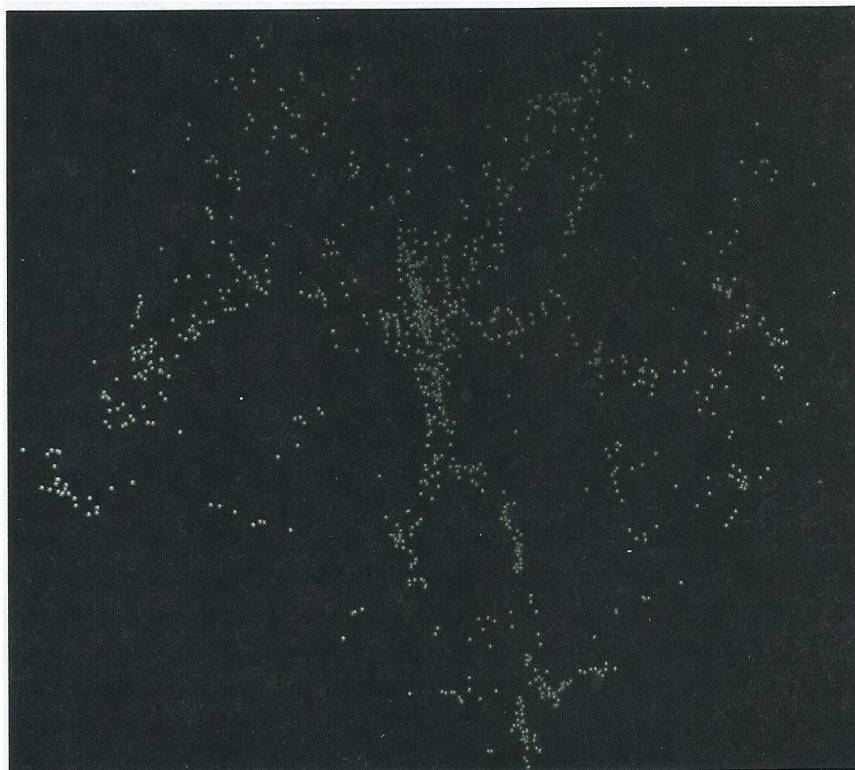


Figure 29.17 Page 575. Distribution of Galaxies.

Note. There are two theories of cluster formation. In the *top-down theory*, clusters formed first and then fragmented to form galaxies. In the *bottom-up theory* galaxies formed first and then aggregated to form clusters.

Note. The arc-like shape of superclusters must be explained. One suggestion is the explosion of “super” supernova, forcing the matter into a filament structure. Another suggestion is that disturbances are created by *cosmic strings*. These are long, thin warps in the fabric of spacetime. This is a popular idea.

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