Distant Milky Ways

Eight hundred and forty million million million miles (840,000,000,000,-000,000,000 miles) is the distance of the farthest object that astronomers can see with the great 100-inch reflecting telescope of the Mt. Wilson Observatory, the largest in the world, Dr. Edwin Hubble said in a recent lecture at the Carnegie Institution of Washington, of which the observatory is part.

The work of Dr. Hubble with this giant instrument has shown that our "Milky Way" or galaxy, is not alone in space, but that scattered around the sky are millions of other galaxies, many similar to our own, and all outside its confines. The spiral nebulae, which until recently were astronomical mysteries, are among these other galaxies, but they represent a late stage in their development, in Dr. Hubble's opinion.

"Their different forms," he said, "fall into a progressive sequence characterized by rotational symmetry around dominating nuclei. From small, compact globular masses, they flatten and expand into lens-shaped forms and then break up into the thin disc-shaped spirals." This series of observed forms of the nebulae, he pointed out, agrees well with a course of development outlined on theoretical grounds by Dr. J. H. Jeans, prominent English astronomer.

In some of the closer spiral nebulae that Dr. Hubble has observed, he has made photographs which actually show the individual stars, and from the study of these he has determined the approximate distances. But the ones that are farther removed have also had their approximate distances determined, because they all are of nearly the same average brightness. The fainter they appear, the farther away they are, on the average, and by counting the number with different apparent brightnesses, it is possible to determine their distribution in space.

"The faintest nebulae," said Dr. Hubble, "that can be detected with the largest telescope, the 100-inch reflector at Mt. Wilson, are at an average distance of 140,000,000 light years, a light year being the distance which light will travel in one year, going at a speed of 186,000 miles per second. One light year is about 6,000,000,000,000 miles. A sphere of 140 million light years radius comprises the observable region of space. Within this sphere are some 2,000,000 nebulae, distributed in a fairly uniform manner. Great clusters of nebulae do exist, but their effect on the distribution is averaged out when large volumes of space are considered.

"The nebulae are so distant that in observing them we are witnessing scenes and events which actually occurred in past geological ages. The nearest of them all, the Magellanic Clouds, present the appearance they had back in the great ice age. The spiral in Andromeda is a Pliocene object. The border of the observable region takes us back to the late Paleozoic. Recent events are on their way, traveling with the speed of light, but only a daring prophet would expect that man will still be on earth to receive them.

"The existing limits to the observable region are of a mechanical nature; with faster plates and larger telescopes, it will be possible to push them back to several times their present distance. In fact, with improvements that are believed to be thoroughly practical today, it might be possible to detect exceptionally brilliant nebulae at a distance of a thousand million light years, to photograph them with light started on its journey when the earth itself was young."

Tombs Yield Treasure

Golden drinking cups, necklaces of gold rosettes, silver signet rings, carved agates, and other ornaments of a workmanship that challenges comparison with the best jewelry of today and yet made at least 3,000 years ago have come to light in an ancient beehive tomb in Greece. The treasure was found by a group of Swedish archæologists, headed by Prof. Axel W. Persson of Upsala University. The art objects, contemporary with the tomb of King Tutankhamen in Egypt, are now locked in a special safe in the Greek museum at Nauplia, where Prof. Persson has just returned for a detailed study of the finds, easily the most important since the German Professor Schliemann made his discoveries at Mycenæ and Troy about thirty years ago.

How Prof. Persson came to make these thrilling finds, he explained in detail a few days before he returned to Greece in a lecture before the Upsala Society for Classical Philology at the University in Upsala, Sweden. Originally he was a member of the Archæological Expedition to Greece that was organized and participated in by the Swedish Crown Prince, but before leaving the country he was asked to investigate the reported find of a beehive tomb northeast of the Argive Plain at Dendra, a considerable distance away from the previous excavations at Asine, at the extreme southeastern tip of the Peloponnesos.

Usually the beehive tombs have been plundered of all contents centuries ago, but this one was intact and the antiquities placed as mementoes with the bodies of a king and queen and princess were most convincing proof of the high culture that prevailed in Greece during the Mycenean Age, or before Homer. Pictures of such animals as lions and bulls decorated the golden vessels and rings while the war scenes artistically carved in the small agate stones on the signet rings aroused the immediate admiration of the excavators. Curiously enough the design of an octopus on the bottom of the king's drinking cup reminded Prof. Persson, he said in his lecture, of Japanese art, while certain prehistoric houses found in Greece recall the cubistic effects that ultra-modern architects achieve with reinforced concrete.

Originally the existence of a beehive tomb had been reported to the Greek authorities at Mycenæ by a guide named Orestes who, while conducting an American woman to the ruined Mycenean fortress of Midea, had noticed peasants removing flat stones from a tobacco field near Dendra, less than a mile from Midea. From his father, Dimitri, who had helped excavate beehive tombs in his youth, Orestes had heard of possible treasure finds under such stones and when the Swedish archæologists were called in by Dr. Bertos, the Greek ephor, they quickly confirmed his suspicions.

Though caved in, the tomb had not been robbed and when cleared of its debris it measured eight meters in width and about the same distance in height, the vault being made of flat, unworked stones. Situated on a slight incline, the tomb was entered by a passage about 48 feet long and seven feet wide.

About sixty centimeters down began to appear the human bones and the bits of gold, Mycenean necklaces about the skeleton of a girl, eighteen large and eighteen small gold rosettes of exquisite workmanship, and about the waist the thinly gilded ornaments of a girdle. In the other shafts were found the remains of a man and a woman stretched on beds of limestone and with golden vessels or ornaments placed about the bones that had not been touched for three thousand years.