

ASTRONOMY

# "Haze of Stars" Found Surrounding Milky Way

## Sun With Its Attending Planets Is Located About 32,000 Light Years From Our Galaxy's Center

**A**GLOBULAR "haze of stars" surrounds our grindstone-shaped Galaxy, or Milky Way system, in which the sun, with its attending planets, is located about 32,000 light years from the center.

These are two of the facts about the stellar systems called galaxies, announced by Dr. Harlow Shapley, director of the Harvard College Observatory, in a new book, *Galactic and Extragalactic Studies*, just issued by the Observatory. It is made up of 21 papers by Dr. Shapley, some with the collaboration of members of his staff, from 1933 to 1940.

Many of the researches were made with the aid of Cepheid variable stars, which vary in a characteristic manner, mostly in a period less than 40 days. The longer the period, the brighter, on the average, is the star. Thus by measuring its period, its actual brightness, or "candle-power," may be determined. Knowing how bright it is, and how bright it looks, the distance may be calculated.

In one of the studies, Dr. Shapley makes a new determination of the relationship between the period and luminosity of Cepheids, based on more complete observations than those of the past, and shows that it differs very little from that previously used. However, the curve he shows for this relation reveals a considerable scattering of some of the star brightnesses.

"This," he declares, "demands much further close investigation; at present it appears that occasionally large real differences in luminosity occur for stars with periods of equal length."

Probably of most interest to the layman is Study III, by Dr. Shapley and Dr. John S. Paraskevopoulos, superintendent of the Observatory's Boyden Station, at Bloemfontein, South Africa. This reproduces photographs taken there with the 60-inch reflecting telescope, of thirty interesting galaxies, nebulae and clusters, in the southern skies. Two of them are shown on this page.

Another paper deals with the linear dimensions of 125 galaxies, which are like our Milky Way system, but outside

its limits. None of them seem to be as large as ours, but the one in Andromeda, which is faintly visible to the naked eye, and among the nearest, seems to be the biggest.

The average galaxy, he says, "is a little less than two kiloparsecs in diameter." The kiloparsec is an astronomical unit of distance, equal to 3,260 light years—that is, the distance that a beam of light, travelling 11,000,000 miles a minute, can go in 3,260 years. The Andromeda galaxy, it is stated, seems to be about 12 kiloparsecs in diameter, while our own is more like 30. The sun is about 10 kiloparsecs from the center of ours.

This study also indicates the density of the galaxies in space. This corresponds, he says, "to about 500 galaxies in the

unit cube, which is one million light years on a side."

Dr. Shapley explains in the introduction to the book that the studies were possible as a result of the establishment, at the Harvard Observatory, of a special bureau for galactic and extragalactic research, the expenses of which are "borne in part by the Associates of Physical Sciences in Harvard University."

"The Galactic Bureau," he states, "has grown gradually until it now requires more than half the time of four telescopes at the Boyden Station in South Africa and part of the time of three instruments at the Oak Ridge (Mass.) Station. It involves nearly the full-time activity of nine individuals in Cambridge, and the part-time work of a few others. So many workers are necessary because the discovery and studies of large numbers of variable stars are extremely laborious processes, and the metagalactic surveys include the determination of the positions and magnitudes of several hundred external galaxies on nearly every long-exposure plate."

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Russian fur farmers report success in breeding *sables* in captivity.



**"RING-TAILED SNORTER"**

*Like a celestial pollywog is this curious object (left) in the constellation of Corvus, the crow, known familiarly among Harvard astronomers as the "ring-tailed snorter." It is a distant galaxy of stars, like our Milky Way system, though differing greatly in shape. Strange is the fact that it has a twin, a short distance away, of similar shape and brightness. Undoubtedly the two are related. To the right is the "eight burst" planetary nebula in the faint constellation of Antlia, the air pump. It is so called from the number of distinct arcs that can be detected in its boundary, not all of which are revealed in this reproduction. They suggest that the nebula may have originated in a series of bursts from the star in the center.*