

Nebulae Hold Sky's "Speed Record"^{Astronomy}

Apparent Rate of 7,200 Miles a Second Observed

APPARENTLY speeding away from the earth at the rate of 7200 miles a second, a faint group of nebulae just studied by Mt. Wilson Observatory astronomers sets a new astronomical record. Speaking before the Pacific Section of the American Association for the Advancement of Science, meeting at Eugene, Ore., this week, Dr. Edwin P. Hubble and Milton L. Humason told of their studies which make most previously measured astronomical speeds and distances fade into relative insignificance.

The nebulae studied form what is known as the Ursa Major cluster, and are in the bowl of the Great Dipper, near the star under the point where the handle joins the bowl. Though too far away to be studied in detail, each member of the cluster is undoubtedly a swarm of stars, like the milky way system of which the sun is part.

The observatory's 100-inch telescope, largest in the world, was the instrument that revealed this high apparent speed. By making a time exposure of fifty hours, on nine separate nights, a photograph was obtained by Mr. Humason of the spectrum of the brightest nebula in the group. This proved to be similar to the spectrum

of the sun. The dark lines crossing it, each indicating the presence of a certain element, were not in the position they would occupy if the light came from a terrestrial source. Instead they were displaced to the red end of the spectrum. Ordinarily such a shift is taken to indicate a motion of the light source away from the earth. Such a motion spreads the light waves out, making them longer, or redder. If the object is approaching, they are squeezed together and made shorter or more violet in color.

On such a basis, the shift observed by Mr. Humason was indicative of a speed of the nebulae away from the earth of 11,500 kilometers (about 7,200 miles) per second. Previously he had discovered some other record high speeds, such as 7,000 kilometers per second for a group in the constellation of Coma Berenices, 5,100 for a group in Perseus, 3,400 for one in Pegasus and 900 for one in Virgo.

For some years Mr. Humason's colleague, Dr. Hubble, has been studying these nebulae in various ways. It was in 1924 that he announced his first results, which solved an astronomical problem of long standing by proving that these spiral nebulae are actual galaxies of stars, beyond our

own system. Though this was done with a couple of the very closest of the nebulae, by methods which could not be applied to the fainter, smaller and more distant ones, he found that he could get a determination of their distance from a measurement of their size or brightness. The nebulae all seem to be of roughly the same size. The small clusters consist of small and faint nebulae, so apparently they appear small only because of their great distance. From comparisons of their size, he has determined the distance of those whose "speed" was measured by Mr. Humason.

Even before the study of the Ursa Major cluster was completed, a direct relationship was found between the apparent velocity and the distance; the farther away the faster the recession from the earth. Using this relationship, Dr. Hubble predicted that Mr. Humason would obtain an apparent speed for the group of about 12,000 kilometers per second, corresponding to its distance of 75 million light years. The most distant stars in our own system are of the order of a hundred thousand light years, a light year being equal to about six trillion miles. When the velocity of the Great Bear cluster came out at 11,500 kilometers, the prediction was abundantly justified. As the relationship holds very closely for all the cases which have been studied, it is believed that the method can now be reversed. By measuring the apparent velocity of a nebula, its distance can be determined.

Just what these high speeds mean is not certain. It is not likely that all the spiral nebulae are seeking to depart from the vicinity of our system, nor is it likely that the farthest ones should be invariably the fastest. More probable is the hypothesis that something happens to the light waves as they travel through space, which spreads them out in just the same way as a motion of the source. The curvature of space, proposed by the Einstein theory, by which space itself is curved in higher dimensions, just as a ball is curved in three dimensions, has been given as one cause of such an effect. At the same meeting, Dr. R. C. Tolman, physicist at the California Institute of Technology, discussed the possible causes of the effect.

Further Research on Cold Necessary

WHETHER the conquest of the common cold has been begun by the researches of Dr. J. A. F. Pfeiffer of the University of Maryland Medical School must be answered by further scientific work. As soon as Dr. Pfeiffer's results are published and as soon as he provides other scientists with cultures of the organism to which he attributes colds, independent investigations can be begun to test his conclusions.

Only when other scientists are convinced of the validity of Dr. Pfeiffer's conclusions will the public be in a position to benefit.

This is the method of scientific research. The annals of medicine are filled with hopeful reports from scientists who believed in good faith that they had solved the problems of troublesome diseases. At least two other germs have been previously credited with causing the common cold. Thousands of dollars are being

spent and dozens of investigators are at work on this one problem alone. While much information is accumulating, the cause is not yet known.

Scientists and practising physicians are not at all agreed on the exact nature of a common cold. It has been suggested that just as formerly "fever" was the name given to what we now know as many different diseases, among them typhoid, typhus and tularemia, so the word "cold" may include a number of different diseases of the respiratory organs with similar symptoms. If that is the case, different germs may cause the different diseases now lumped together under the common name of cold.

Dr. Pfeiffer's work has no connection with the studies being made at the Johns Hopkins University under the John J. Abel fund for research on the common cold.

Medicine

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