

from opposite sides of the earth's orbit, 186,000,000 miles apart. But there are various ways of determining the actual brightness, or candle-power, of a star, such as a measurement of the intensity of certain of the dark lines in its spectrum. Such measures have been used as the basis for distance determinations of very distant stars. Direct photographs have shown how bright they appear, the spectrum shows how bright they really are and the difference has been interpreted as being due to the distance. But if there is absorbing matter in space, then the star would appear fainter than it ought, while the absolute brightness would be the same, and the distance so determined would be too large.

Evidence of Absorption in Space

In recent work at the Lick Observatory of the University of California, Dr. R. J. Trumpler has found good evidence that there actually is some absorption in inter-stellar space. He has studied some of the open star clusters and, by assuming that clusters of the same constitution have approximately the same linear dimensions, he concludes that within our Milky Way system light is absorbed at the rate of .67 of a magnitude in 1000 parsecs. The parsec is the astronomer's measuring stick, and is equal to 206,265 times the distance from the earth to the sun, or 19,200,-

000,000,000 miles. Another way of expressing the absorption calculated by Dr. Trumpler would be to say that 39 per cent. of the light is absorbed every time it travels a thousand parsecs.

This rate of absorption refers to the light that affects a photographic plate, the shorter waves of the blue and ultraviolet. The longer waves of yellow light that we mostly see by are only absorbed about half as much. But measures of star magnitudes, used in determining distances, are mainly by photography, so the higher figure is the one to be considered. He also found that the absorption takes place mainly in the region of the Milky Way. Our system of stars is approximately the shape of a grindstone and we are somewhere near the center. When we look towards the edge of the grindstone we look through a much greater depth of stars than when we look to the sides. This concentration of stars to the edge causes the appearance of the Milky Way. The fact that the absorption takes place mainly in this region suggests that the absorbing stuff is distributed in the form of a thin sheet through the middle of the grindstone.

Blue Light Rapidly Lost

Dr. van de Kamp, who has been working on the same problem independently, confirms Dr. Trumpler's results. He has studied a number of

stars of spectral types B and A, which are bluish in color. But he finds that the farther away they are, the less bluish they appear. As there is no reason to suppose that the color of their light actually varies, depending on how far they are away from us, he concludes that their light is absorbed in its passage, and that the blue light is absorbed more rapidly than the red, or longer waves. He believes also that the absorbing stuff is concentrated in a thin sheet in the plane of the Milky Way, and agrees with Dr. Trumpler that it is probably about 175 parsecs in thickness.

Dr. Harlow Shapley, director of the Harvard College Observatory, in a study made a few years ago of nebulae which are completely outside our galactic system, came to the conclusion that their light was not absorbed appreciably. Evidently space outside our system is quite transparent. As none of these nebulae are observed in the direction of the Milky Way, the absorption of their light after it reaches our system would be negligible. Hence the vast distances determined for those objects, tens of millions of parsecs, are still apparently valid. But the distance of stars in our own system, and in the direction of the Milky Way may have to be modified considerably. Dr. van de Kamp estimates that stars really only 5,000 or 10,000 parsecs away, for example, would seem to be at 23,000 and 220,000 parsecs respectively, when no allowance is made for absorption.

Dust, Meteors, Electrons . . . ?

In his report to the Astronomical Society, Dr. van de Kamp did not make any suggestions as to the nature of the absorbing stuff. Dr. Trumpler, however, recently suggested that in addition to fine cosmic dust and large meteors, it might consist of free electrons, or pieces of atoms that have become ionized and had some of their electrons removed, and free atoms, of calcium, sodium and other elements. There is other evidence for highly rarefied clouds of calcium floating around between the stars.

Science News-Letter, September 6, 1930

All the states except two now have laws permitting municipalities to control the use, height, and area of buildings by district or zones.

The busy honeybee sometimes flies eight miles to gather honey, and then flies eight miles back to the hive.

Fighting Leprosy With Vitamins

Medicine

HOPE that one of the world's oldest and most loathsome scourges may be conquered is contained in reports from Japan that Dr. K. Shiga, bacteriologist and dean of the Imperial Medical Faculty at Seoul, Korea, has discovered that vitamins in sufficient amounts will prevent infection of animals, and presumably men, with leprosy.

Although the leprosy bacillus was discovered in leprosy sores of persons afflicted with the disease more than 50 years ago, it has hitherto not been possible to transmit leprosy to lower animals by inoculation. A solitary case of experimental transfer of the disease from man to man, from a leper to a condemned criminal in the Sandwich Islands, was not regarded as convincing evidence, because the convict had other opportunities of contracting the disease. After many futile attempts to reproduce leprosy experimentally, scientists were forced to

assume that a special individual susceptibility to the disease is requisite for its production.

This old assumption of the necessity of individual susceptibility to leprosy is now verified by Doctor Shiga. When he injected leprosy bacilli taken from human leprosy sores into normal, healthy rats, the animals remained normal and showed no signs of the disease. They were not "susceptible" to leprosy. Later, however, after the food of the animals had been deprived of vitamins, they soon developed leprosy sores and became victims of the disease. They had become "susceptible."

If such a simple dietary deficiency accounts for animal or human susceptibility to leprosy, then it will be possible to protect people from leprosy by merely watching their bill of fare and perhaps even to cure lepers by adding vitamins to their food.

Science News-Letter, September 6, 1930