Mystery of the B Stars Explained

Astronomy

Astronomers Discuss Eclipses and Sunspots

Rotation of the galaxy—the system of stars of which the sun, the milky way and all the visible stars are part—around a distant and massive center, helps explain the peculiar motions of the bluish-white stars classified as type B. This announcement was made to the astronomers at the meeting of the American Association for the Advancement of Science by Dr. J. S. Plaskett, director of the Dominion Astrophysical Observatory, at Victoria, B. C.

Dr. Plaskett explained that the stars of type B, which are classified by the lines that appear in their spectra when their light is analyzed, all are moving from or towards the sun with much smaller speed than any other spectral type. But the curious fact has been found that most are moving from the sun, as if the whole system of these stars was expanding around the sun as a center. The average speed away from us is about five kilometers (3.1 miles) per second.

Though various suggestions have been made to account for this anomaly, such as errors of measurement, Dr. Plaskett has found that most of them agree with what would be caused by a rotation of the whole stellar system.

However, this only explains the motion of the fainter B type stars. Those brighter than the 5.5 magnitude, that is, those closest to the sun, still showed such a motion, even taking into account the galactic rotation. None of the other causes suggested would explain this, he declared.

"It is inconceivable that these causes should not operate in exactly the same way and to the same degree for faint as for bright stars. To imagine any physical property of this uniform class of B stars which depends only upon the apparent brightness, or, in other words, the distance from the sun, an insignificant star in the system, and only about one thousandth as luminous as the B stars, is to carry anthropomorphic prejudices to an absurd degree," said Dr. Plaskett.

Actually, he has found, the closer ones happen to be members of a special group of B stars in the constellation Scorpio and Centaurus, which actually show an unusually high speed for stars of this type. As a result of this work, he has found that the average speed of the B type stars ranges from about 9 kilometers (5.6 miles) per second for the brighter ones to 12 kilometers (7.4 miles) per second for those fainter and more distant. Great as this speed seems, it is less than the motions of stars of any other type.

Origin of the Corona

A startling suggestion that the sun's corona, seen as bright wings around it at the time of an eclipse, may originate partly in the atmosphere of the earth was made by Dr. Harlan T. Stetson, director of the Perkins Observatory at Ohio Wesleyan University. The balance of the light, in fact, most of the corona that we see, he suggested, may be actually around the sun, but not the limited clouds of material that they have been supposed to be. The cloud that causes it, according to his hypothesis, extends throughout the whole solar system and perhaps to the other stars.

The tiny particles in this cloud shine partly by an actual reflection of sunlight, and partly by an excitation by some of the other rays from the sun. This nebulous cloud, he said, may be similar to the cloud of nebulosity that astronomical photographs reveal around the Pleiades, the cluster of faint stars seen high overhead in winter evenings. Such a cloud would also explain the zodiacal light, a faint glow seen extending above the western horizon after sunset or the eastern horizon before sunrise.

Though this cloud accounts for most of the coronal light, Dr. Stetson suggested that some of it may originate high in the earth's atmosphere, due to excitation by the sun's rays in the same way as the northern lights. This glow would be present on the side of the earth towards the sun at all times, but, of course, could only be observed at the time of an eclipse. As the rays would travel in parallel paths the lines of the glow would seem to radiate from the sun, and cause the coronal streamers actually observed.

Good Radio Coming

If you think that distant radio broadcast stations have failed to come in as well in the last two or three years as they did in the early days of radio in 1923 and 1924, despite the more powerful stations nowadays, you may be justified. Activity of the sun, as shown by large numbers of sun spots, was to blame. With a decline in the number of sun spots scheduled for the next few years, you can look forward to a time of good reception of distant stations.

Dr. Stetson made the following prediction for the future:

"Forecasting on the basis of the 15-month cycle, (*Turn to page* 14)

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SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

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Advertising rates furnished on application.

Artificial Atmosphere Is Better

Physiology

Helium, the gas that makes the American non-inflammable airships possible, may prove of value in helping submarine crews to work more efficiently, if a suggestion made by Dr. J. Willard Hershey, of McPherson College, is adopted. Speaking before the chemists attending the meeting of the American Association for the Advancement of Science, he told of his study of artificial atmospheres. Some mixtures of gases, quite different from the mixture that forms the air we breathe, supported life of mice and guinea pigs even better than ordinary air, he discovered.

Natural air contains 21 per cent. oxygen, 78 per cent. nitrogen and 1 per cent. of a mixture of gases, including carbon dioxide, helium, argon, krypton, neon and xenon. One series of experiments on white mice showed that a mixture of nitrogen and oxygen, in the same proportion as in air but without the other gases, only supported life for a few days. This demonstrated that the rare gases are necessary for life, said Dr. Hershey.

In pure oxygen, the animals lived only two to five days, while a similar group of animals, also kept in a large bottle with normal food supply, but supplied with ordinary air, suffered no ill effects whatever. With a mixture of 60 per cent. oxygen and 40 per cent. nitrogen, however, the animalse lived as well as normally, if not better.

A mixture of 79 per cent. helium and 21 per cent. oxygen, practically ordinary air with the nitrogen replaced by helium, supported the life of mice in a normal manner. Using argon instead of helium and in the same proportion, the mice did not survive. Dr. Hershey pointed out that the argon mixture does not diffuse through the living cells as rapidly as natural air, while helium diffuses more rapidly. As the helium-oxygen atmosphere is considerably lighter than air, it would doubtless be possible for a person to live inside the gas bag of an airship containing it.

However, Dr. Hershey found that a mixture of 25 per cent. oxygen and 75 per cent. argon supported the life of mice, and that at the end of ten days in it they appeared better than at the start.

"In the field of practical application of prepared atmospheres there is a wide range of commercial uses and values," said Dr. Hershey. "Medical men have a fair knowledge of the action of oxygen in the air, but nothing is understood by them concerning the other gases. It is quite possible that a knowledge of atmospheres may aid in the control of diseases.

"In deep-sea diving, mines, and in submarines, foul air is encountered and is not sufficient in amount to sustain life. A prepared atmosphere for such activities would broaden their respective range of usefulness. An artificial atmosphere in a submarine that sustained life even more effectually than the normal air would bring about a safer and more efficient submarine. A prepared atmosphere would be of great advantage to the high-altitude flyer."

Dr. Hershey believes that the widest field of prepared atmospheres will be in the treatment of disease.

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Good Radio—*Continued*

the year 1930 should show a general decrease in sun spot numbers as the year waxes, with a corresponding increase in radio signal strength in the broadcast zone. By the very end of 1930 and the beginning of 1931, the general rise of a secondary sun spot maximum should be evident. By 1931, however, it is believed that we shall be so far from the maximum of the 11-year period that the secondary maximum will have no effect upon radio reception and allied electro-magnetic phenomena as have the sun spot maxima of 1928-29. The general lifting of the ionization level in the earth's atmosphere should continue, with the fluctuations noted, through the next six years, but in 1934 solar activity should be as quiescent as at the last minimum of 1923."

Dr. Stetson believes that these radio changes are produced by variations in the height of this ionized layer of the atmosphere, known as the Kennelly-Heaviside layer. Long waves of 18 kilocycles show an opposite effect. Their reception is best when sun spots are most numerous.

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Entomology—*Continued*

Aldous of Kansas State Agricultural College talked on the effect of different frequencies and heights of cutting on the yield and vigor of prairie grass vegetation. In general, his experiments showed that too frequent cropping off at the tops of the plants discouraged them from coming back with new herbage.

Dr. J. E. Weaver of the University of Nebraska discussed the effects of grazing on roots and other underground parts of plants. To obtain his data it was necessary for Dr. Weaver and his associates to become scholarly ditch-diggers, for the roots of prairie plants are frequently several times as long as their tops, and deep trenches have to be driven for considerable distances to get an idea of the form and distribution of roots.

Weather of course has as much effect on prairie vegetation as it has on plant life everywhere. Dr. W. G. McGinnies of the University of Arizona discussed the value of measuring the physical factors of weather and soil condition, such as evaporation rates, available soil moisture, intensity of sunshine and so on.

Science News-Letter, January 4, 1930