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MEASURING THE STARS

Physics

Walking out on any clear and moonless night, one is thrilled at the sight of the seeming myriad of twinkling stars. To the artistically inclined, there is beauty and majesty, to the philosophically minded, food for speculation. Where are these stars, what are they, whence come they, and whither do they go? Are they unchangeable through the aeons or do they progress through youth, maturity, old age, and finally into stellar death and oblivion? We can follow briefly only one or two of these speculations in these few short paragraphs.

First, we notice that some of the stars are very bright, some so dim as to be barely visible, with all degrees of brilliancy between. Two or three of the brightest objects may not be stars at all, but planets. With these we are not here concerned. A little less obvious than the difference in brightness is the difference in color of different stars. Some appear almost a dull red, while others have brighter colors—red, yellow, and blue. Unlike the planets, the stars shine by their own light. Each is a sun and its color is determined by its temperature. The blue stars are the hottest and the dull red ones are coolest.

The few thousand stars that are visible to the unaided eye are only a small fraction of the number revealed by large telescopes. Why such a difference in brilliancy? A star, like a lamp, may seem bright either because it is actually powerful or because it is relatively close. Likewise it may seem faint because it is inherently so or because it is far away. Many stars which are in reality very brilliant are not even visible to the unaided eye, because of their great distance, while the one that seems brightest of all to us, the sun, is of only average absolute magnitude.

Astronomers have long sought a method of measuring the dimensions of stars but the enormous distance of even the nearest, excepting our sun, has made the search most difficult. In the last ten or fifteen years, they have discovered relations which can be applied to such measurements. These make use of the differences in the spectra of different stars and the measurement of the total amount of radiant energy received from them. Some of the results were amazing — almost incredible—to the layman in science. The English astronomer, Eddington, for example, found that Betelgeuse has a diameter of 215, 000,000 miles, Aldebaran, about 300, 000,000 miles and Antares surpasses both with a diameter of about 385, 000,000 miles. If these figures are correct, the last named star is of such stupendous size that if our sun with its planets were placed at its center, the sun would appear a mere pigmy and Mercury, Venus, Earth and Mars would all be thousands or even millions of miles below the surface of this giant. Otherwise stated, this star has a volume so stupendous that it could swallow up a hundred million suns such as ours.

Such results were not a little surprising. It was thought highly important, scientifically, to check them by another method. In this the astronomer was aided by the physicist, Professor Michelson, of Chicago University, conceived a method by which a direct measurement of the angular diameter of a star might be made. From this the diameter in miles could be computed if the distance of the star was known. The