

Science Notes

E. E. FREE

The Strangest Star

Imagine a substance four thousand times heavier than lead. A paper weight made of this substance would be too heavy for a dozen men to lift. It would probably go right through the table and on down to the basement, as a heavy safe would crash through a flimsy house. A rifle bullet made of this substance would weigh over two hundred pounds. Only the strongest men could lift it.

Fortunately there is no such substance on earth. A few years ago scientists would have said that no such substance was probable anywhere in the universe. This is changed now. Not only does such a marvelously heavy substance exist, it is probable that there is a whole world made of it.

This world is a star, a star long known as the faint companion star of Sirius. Sirius is the dog star, the brightest fixed star in the sky. It rises about one o'clock these October mornings, well down in the eastern sky, below the familiar belt and sword of Orion. The Sirius that we see is really the brighter of two companion stars. Sirius is a double star. Long ago astronomers discovered this fact and computed as accurately as they could the orbits in which the companion stars revolve, and the weights, sizes, and other characteristics of the two. The weight of the heavy star came out very high, so tremendously high in proportion to the star's size that the astronomers refused to believe their own figures. It was ridiculous, they said, to imagine the existence of matter thousands of times denser than lead. The calculations must be wrong.

There the matter rested until last year. Professor Eddington, the distinguished astronomer of Cambridge University, then suggested that perhaps these ridiculous calculations were right after all. Atomic theory indicated, he urged, a bare possibility that extremely dense matter like this might be real; not on earth, of course, but under some conditions of temperature and pressure which were at

least conceivable in the stars. Now our own Mount Wilson Observatory, in California, has tested this suggestion. Eddington was right. The matter of this strange star, the companion of the brilliant dog star, really is many hundreds of times denser than any kind of matter yet found or produced on earth.

In reporting these Mount Wilson tests, Dr. Walter S. Adams, Director of that Observatory, points out that they provide, also, a new test of the Einstein theory. It is one of the conclusions of this theory that light is affected by gravity. One of the three tests proposed for the theory was the shift of the position of certain red lines in the spectrum of sunlight, due to the fact that the light rays forming these lines had started from the surface of the sun where gravity is much stronger than on earth. On the tremendously heavy star of the Sirius system this shift ought to be, theoretically, some thirty times greater. Gravity is so much more intense.

To measure this shift of the spectrum lines in light from the tiny star was difficult, but it was accomplished. The expected greater shift was found. So we now have good evidence not only for the essential correctness of the Einstein theory, but also for the reality of a star so heavy that if the average substance of it were made into silver dollars they would weigh nearly three hundred earthly pounds apiece.

Water-Drop Wonders

The secret of the tremendous density of this star-twin of Sirius is an atomic secret. Something has happened, Dr. Eddington and Dr. Adams believe, to the atoms of matter in the star. These atoms crowd closer together. Matter becomes more condensed. Whether we shall ever be able to duplicate this condensation here on earth and thus manufacture for earthly wars a supply of two-hundred-pound rifle bullets is very doubtful. Only very limited ranges of pressure and temperature are attainable on earth.

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