

ASTRONOMICAL NOTES.

DECEMBER.

THE beauty of the midnight sky is now very much enhanced by the proximity of Jupiter to the brightest region of the heavens, and the observer has very direct evidence of the superior brilliancy of the planet as compared even with the brightest of the fixed stars, Sirius, yet the great lustre of the latter is most remarkable when we come to consider the immense distance which separates it from our system.

A comparison among the stars as to relative magnitude has led to some general theorems regarding their distances, on the assumption, however, that they are uniformly distributed in space, and that they vary but slightly in volume and intrinsic brilliancy. The law that light varies inversely as the square of the distance is of course the basis of calculations of this kind.

The formula reached to determine the distance of a star of n magnitude in terms of the distance of a 1st mag. star is

$$D = \left[\frac{1}{\sqrt{\delta}} \right]^{n-1}$$

δ being .422, the logarithm of the ratio by which the brightness increases from magnitude to magnitude. This is accepted by Prof. Newcomb as giving a near approach to accuracy, and notwithstanding many exceptions it probably enables us to form some idea of the stellar universe.

We have in our winter sky one remarkable exception. The brilliant Sirius is $4\frac{1}{2}$ magnitudes brighter than Alcyone, the principal star of the beautiful cluster, the Pleiades, and the above formula would place Alcyone at 4.51 times the distance of Sirius, or at the distance of 75.3 years of light journey. But the beautiful Pleiad,

though it has resisted all attempts at a determination of its parallax by ordinary methods is estimated to be at a distance of 267 years of light travel (J. Ellard Gore, F. R. A. S.), from the consideration of the proper motion of stars in its neighbourhood, and must consequently be incomparably brighter than Sirius, and presumably vastly larger.

The observer will have several evenings in December when Jupiter may be studied to advantage; all the phenomena of the satellites are visible at Toronto from the 12th to 15th and from 27th to 31st. The planet having now passed opposition we see the east surface of the shadow cone which it casts into space, and the occultations of the satellites occur at the west side of Jupiter's disc, while before opposition the satellites disappeared in the shadow before reaching a line tangent to the disc.

It may be of interest to note that the question of inherent light in Jupiter is an open one; it has been claimed that the light of the giant planet is all reflected, notwithstanding that he is considered young in planet life. There is a profitable field for the observer in the study of such questions.

Venus, now at her greatest elongation east and in crescent phase, outrivals Jupiter in brilliance; she forms a beautiful picture with the young moon on Dec. 12th.

The observer armed with moderate optical aid may pick up Neptune on the evening of Dec. 21st: the moon transits the meridian at 11 p. m., the planet preceding it by 15 mins and 5 degs. south; preceding the planet 6 mins., and 2 degs. north the 4th mag. star Tau Tauri culminates. Neptune