astronomers, as likely, if corroborated, to throw much light on the physical condition of the planet. For the last five or six years that I have been assiduously observing, measuring, and making drawings of *Saturn*, I have noticed irregularities in the widths of especially the two bright rings, and in the dark division between them, only to be accounted for, as it appears to me, by supposing, 1st. That the centre of the rings is not coincident with the centre of the planet; 2d. That the rings are not of the same breadth throughout; 3d. That they are, as proved by the form of the shadows, situated in different planes, and, moreover, that the nodes of the rings have a somewhat rapid motion. For I have frequently observed the rings wider at one extremity of their minor axes than accords with their breadths at the extremities of the major axes. Also, I have observed the same phenomena with respect to the principal dark division; and, moreover, that sometimes the eastern ansa of one of the bright rings is wider than the western, and *vice versâ*, by quantities quite appreciable to a practised eye, although difficult to determine exactly by measurement. From the concave form of the shadow, as at present seen on the middle ring, it is evident that this ring is elliptical in its section, and, I believe, of considerably greater thickness than that assigned usually to it. It would be very desirable to have the depth of this curvature of the shadow well determined by accurate micrometrical measurements, as it would afford data for determining the form and thickness of at least the middle ring.

"7 *St. Mary's Road, Canonbury, February* 2, 1856."

Note on the Rings of Saturn and on the Orbit of α Centauri.

By Captain W. S. Jacob.

(*Extract of a Letter to the Editor.*)

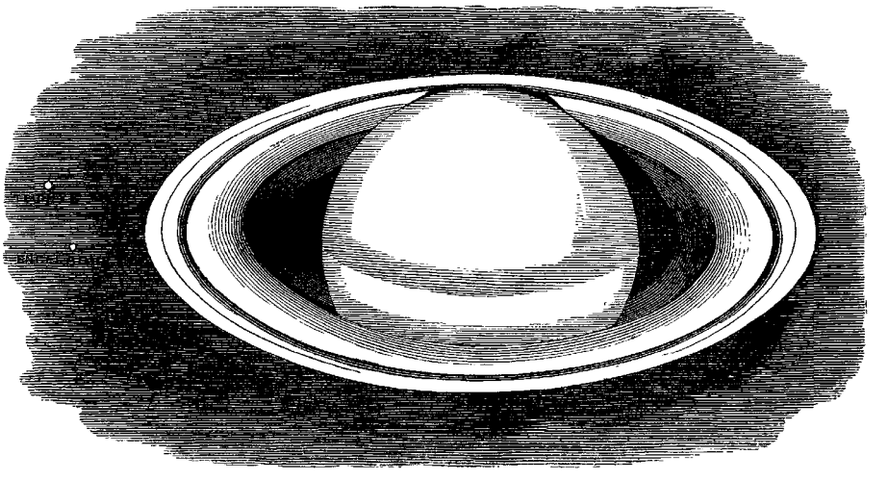
"We arrived here on the 29th December, and the accompanying drawing will show you that I have not been long in recommencing work. It represents *Saturn* as I saw him on the 8th instant at $6\frac{1}{2}^h$. The concave outline of the shadow I see plainly enough, yet cannot but think it an illusion; the more so as in a subsequent careful scrutiny, on the 10th, I could not be *quite sure* that the outline was not a straight line. The edge of the shadow in the faint ring I am unable to see, only I cannot trace the ring up to the planet in that part. I am quite unable to imagine any section for the bright ring (compatible with its ascertained thinness) that would give such an outline to the shadow. I am making a series of micrometric measures of the rings, and will communicate the result when complete.

"*α Centauri* has advanced considerably, and come to very

nearly its minimum distance for the present; five days' observations give:—

Epoch, 1856·015 302°·24 3″·806

The periastral time will not, I think, differ much from 1862·5.



"*Madras, January* 12, 1856."

Note on Solar Refraction. By Professor C. Piazzi Smyth, Royal Observatory, Edinburgh.

This term of "solar refraction" was given by Professor W. Thomson to characterise an effect which he had deduced theoretically from the dynamical theory of heat, and, if proved to exist, is pregnant with important consequences to every part of astronomy.

For it at once infers the necessity of the existence of a medium pervading space,—a medium, though rare, of similar constitution to our own atmosphere, and undergoing by necessity a condensation in the neighbourhood of the sun. Hence, he showed, that there cannot but arise a refraction of objects beyond the sun, when this body crosses their line of direction.

The theory could do but little beyond pointing to the fact of some amount of such solar refraction, while the exact amount could only be ascertained by astronomical measures. But with a comparatively small number of such observations, there seemed thus a promise of obtaining speedily a quantitative result,—a result, too, bearing immediately on the much-vexed question of a resisting medium, to approach which, at present, astronomers have scarcely any other method than that of cometary perturbations, wherein are mixed up so many other unknown quantities, and wherein the opportunities for observation are so rare, that generations may pass away before anything decisive is arrived at.