time computed for it from the mean of the whole number of wires, the measured value of the intervals and the declination of the star.

Error of Observation of each Wire on the Mean of the Five.

Name of Star.	1st Wire.	2d Wire.	3d Wire.	4th Wire.	5th Wire.
	s.	s.	s.	s.	s.
α Aurigæ	+0·102	+0·058	−0·003	−0·109	−0·049
β Orionis	+0·032	+0·053	−0·036	+0·013	−0·062
α Orionis	+0·058	+0·046	+0·024	+0·041	−0·168

There may be some difference of opinion as to what the probable error of the mean for each star may be, but there can be little doubt of its being under the now declared quantity of "solar refraction;" and there can be no doubt at all as to the merit of the observer, Mr. Alexander Wallace, the assistant astronomer of the Observatory, the characteristic excellence of whose transits for many years past has enabled the three observations now under discussion to assume an importance which has seldom fallen to the lot of any other three transits.

Royal Observatory, Edinburgh, Jan. 9, 1856.

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

By Captain W. S. Jacob.

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

"I have to communicate a matter of great interest regarding *α Centauri.* Finding from my observations communicated by last mail that the pair must have come to about their minimum of distance, I thought something like a good approximation to the orbit might be procured, especially as the observations of Richaud in 1690, and Feuillée in 1709, seem to bring both the period and perihelion passage within very narrow limits:* viz. the former between 77^{yrs} and $79^{yrs}\cdot5$, and the latter between 1862·4 and 1844·2. But on laying down an ellipse which would pass through the positions of 1834, 1848, and 1856, and computing intermediate points, to my dismay I found *enormous* errors, and the largest of all at those epochs which had been best observed, and where the observations were most accordant *inter se*, viz. about 1852–3. I then set to work to project the observed distances as well as angles into a curve, with the time for a co-ordinate, and on attempting to bring these into agreement, found them altogether incompatible, not only with each other, but with any kind of elliptic motion. Lastly, I took out the places independently from the two curves without

* These points will be more fully discussed in a paper about to be presented to the Society by E. B. Powell, Esq.

any sort of adjustment, merely reading off the angles and distances for each complete year, and laid them down in contiguity with the ellipse; the result is shown in fig. 1, where these places are marked +, and exhibit a very regular epicyclic curve, in which the revolution of the star round the proper elliptic place can be traced throughout, the places corresponding to Kepler's law of equal areas being marked by the short oblique lines cutting the curve.

"In order to show how very little the actual observations are altered by projecting them into curves, I have laid down in fig. 2 on a larger scale the places* as taken from the observation books, *without any preparation* beyond taking the means for the different epochs; and although, as might be expected, the curve is not quite so regular as before, yet its course is marked with sufficient distinctness. (The places are marked o.) The jump from *a* to *b* is partly accounted for by a change from daylight to night observations—the day measures of distance being usually shorter than those by night. I think, then, there can be no hesitation in pronouncing on the existence of a disturbing body. The disturbance is much more strongly marked than in the case of 70 *Ophiuchi*,† where it was the result of calculation and of a balance of errors; whereas here it is visible to the eye by inspection of the *unprepared observations*. Of course I am wrong in making the observed and mean places coincide at 1856·0, but there is no help for this, as the period of the disturbance is unknown, and will continue so for some years, as we have at present only six years of really accurate observations. The errors introduced by this assumption will not be very important, as they will be spread gradually over all the preceding places.

"Supposing my view of the matter to be correct, the distance must now be on the increase, and the place of 1857·0 cannot differ much from

$317^{\circ}\cdot5$ $\quad$ $3''\cdot90+$

"The following are the results of five nights' measures of *Saturn* and his rings reduced to his mean distance; epoch, 1856·04442, Greenwich mean time:—

Major Axis of Outer Ring, outside	... ...	39·997
— — fine line	... ...	37·966
— — inside	... ...	35·820
— Inner Ring, outside	... ...	34·859
— — inside	... ...	26·271
— Obscure Ring	... ...	22·214
— Planet	...	17·940
Minor Axis of Outer Ring	... ...	18·754

* From 1850 to 1856 being the only period in which the distance measures can be depended on.

† *Vide Monthly Notices*, vol. xv. p. 228.

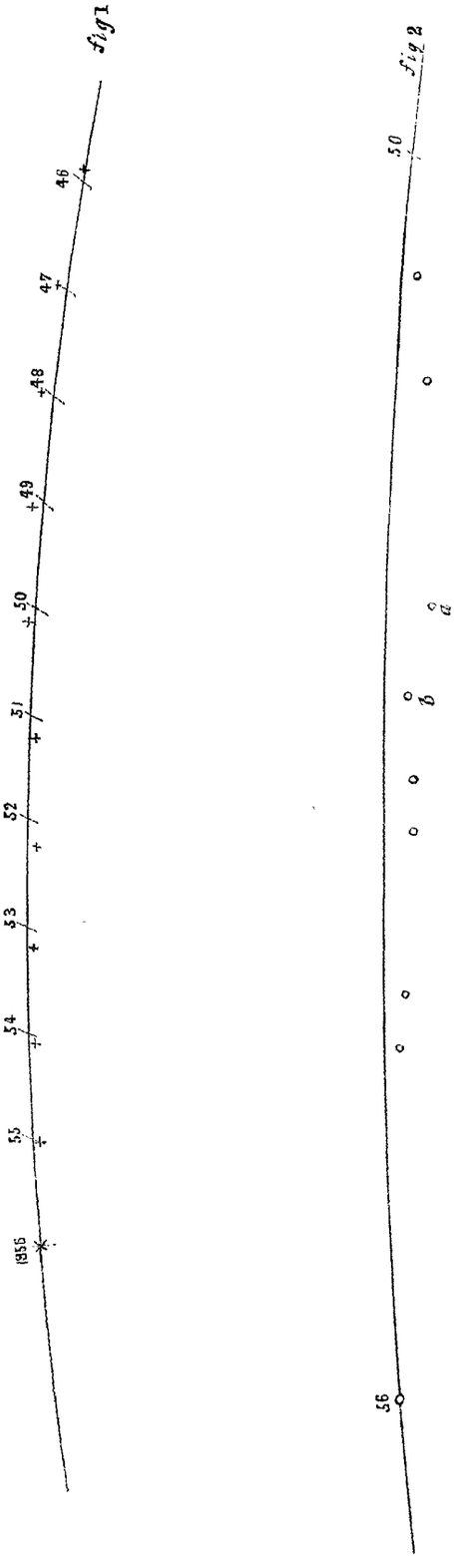
fig 1
46
47
48
49
50
51
52
53
54
55
1856
fig 2
50
a
b
56

"These agree very closely with the measures of 1853, the chief difference being in the outer ring *inside*, which, as you may see in my engraving, has not, to my eye, a definite boundary.

"With reference to my drawing of *Saturn*, sent by last mail, I have since, on the 22d inst., seen under good definition, with power 365, the shadow on the ring *convex* throughout, but with a kind of projecting *ear* just where it crosses the dark space between the rings, which, when seen less distinctly, or with a lower power, is doubtless what has given rise to the impression of concavity; as it was, the phenomenon was visible only by glimpses when the atmosphere was at its best, and the focus very exactly adjusted. The same thing was seen afterwards with a Huyghenian eye-piece of about 300. It was somewhat as represented in the accompanying sketch;* the exact form of the projection could not be made out, but it had rather a triangular appearance, and was seen distinctly crossing the dark division, which was much paler than the shadow; the one indeed was *black* and the other brown; the division, therefore, is not mere empty space, but filled with matter of some kind, since a shadow can be seen upon it, and from the form of the shadow it would seem to be depressed below the level of the other rings, though I confess myself unable to suggest the kind of section it must have to account for so peculiar a form of shadow.

"P.S. The shadow could also be distinctly seen upon the obscure ring.

"*Madras, January* 19."

Apparent Right Ascensions and North Polar Distances of recently discovered Small Planets, observed at the Royal Observatory, Greenwich, 1856, January and February.

The observations of N.P.D. are corrected for Refraction and Parallax.

Urania.

Mean Solar Time of Observation.	Apparent R.A.	Apparent N.P.D.
	h m s	° ′ ″
1856, Jan. 2	14 14 26·1	9 2 3·20	72 36 8·56
30	11 56 56·1	8 34 34·28	71 15 26·36
31	11 51 55·7	8 33 29·56	71 12 31·76
Feb. 14	10 43 14·1	8 19 48·47	70 38 39·46

* This was exhibited at the meeting of the Society.— Ed.