XVII. "Observations with the Great Melbourne Telescope, in a Letter to Prof. Stokes." By A. Le Sueur. Communicated by Prof. Stokes, Sec. R.S. Received April 18, 1870.

Observatory, Feb. 27.

Dear Sir,—I have little more definite to tell you with reference to the star η Argûs; thinking that a larger dispersion would be of advantage, I have had a supplementary arrangement added to the spectroscope, by means of which a direct prism may be interposed between the collimator and the usual prism.

With this increased dispersion, the red line keeps its place; the yellow one turns out to be slightly more refrangible than D.

The green lines, which, with the smaller dispersion, were very difficult, now become almost unmanageable; this would seem to throw some doubt on their reality, as mere extra dispersion should have little effect on real lines.

The direct prism being a small one, does not take in the whole of the pencil when condensed to the limits bearable by the collimator; but as the arrangements at my disposal do not in any case admit of utilizing the full condensation, the smallness of the prism has not had any material effect.

On the whole, I am now inclined to think that, with respect to the green lines, the appearance of the spectra is due to a character of light somewhat similar to that of α Orionis, &c.; a spectrum of groups of dark lines, with spaces more or less free between them, producing the effect (when the light is not sufficient to bear a slit fine enough for dark lines) of a spectrum crossed by bright lines.

The behaviour of the red line, however (of the blue one, being less conspicuous, I cannot speak with so much confidence), would lead to the already drawn inference that it is a real hydrogen line.

I have examined other stars of about the same magnitude as η Argûs; in the majority of these there is not even a suspicion of condensation in any part of the spectrum; red stars, R Leporis for instance, give a spectrum not dissimilar to that of η Argûs; but the red line on none of the stars examined is so conspicuous as in η.

The weather since the beginning of this year has been more favourable, so that I am able, by degrees, to increase the amount of work done. The routine work is the review of figured nebulæ; as might be expected, the 4 feet gives views considerably different from the C. G. H. drawings; but at present I have nothing worthy of special mention.

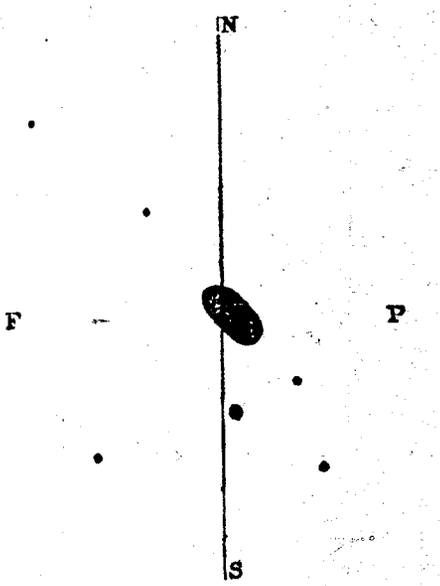
The light of the nebulæ, as they are taken up for general examination, is analyzed with the prism; of those which have been examined I have yet found none for which it may be certainly said that the light is not of definite refrangibilities.

In irregular nebulæ, the bright knots even, which are so distinctly

mottled as to point to a cluster condition, give out, as far as I have yet seen, light which is monochromatic, or nearly so.

Acknowledged clusters, where discrete stars are plainly discernible, are of course excluded; of the nebulosity mixed up with such clusters as 47 Toucan, I cannot speak with certainty; but if the light were monochromatic, I think that (in the case particularized at least) the brilliancy would be sufficient to afford a definite impression.

Would you call Lord Rosse's attention to 1477–78 (general catalogue), of which I enclose a diagram from measured positions? The configuration differs so widely from that given in the Philosophical Transactions, that, with reference to the rotation of the two nebulous stars, it would be interesting to have the evidence of any additional observations made at Parsonstown.



From Mr. Huggins's observations of the nebulæ in Orion, I gather that he has seen only the three usual lines; with a wide slit, I had lately a very strong suspicion of a fourth line, probably G. I have not specially examined the nebulæ since; but probably Mr. Huggins will be able to give confirmatory evidence.

On the night of February 1st we had a pretty brilliant auroral display; being at work at the time, I missed part of it; but as soon as I became aware of its existence I applied the spectroscope. At moments four lines already known were easily visible, the chief line being remarkably brilliant. A much narrower slit than that used could have been borne at the time of maximum display, which, however, lasted only a few moments. I was intent on measuring the lines, as at the time I had no published definite information with reference to other than Ångström's special line; but at moments light was seen at the red end of the spectrum sufficiently bright to leave a distinct impression of colour; when, however, special attention was devoted to that part of the spectrum the aurora had greatly diminished in brilliancy, so that I was unable to make out whether a red line existed, or whether there was a general spectrum at the red end. I incline to the latter opinion, and put it down to the rose-coloured arc; this arc, however, which seemed pretty brilliant after the streamers had disappeared, did not *then* give a visible spectrum. Probably this phenomenon has been observed before to better purpose; but I cannot find mention thereof in published accounts.

Yours truly,

A. Le Sueur.