

of peculiar conditions in the star or of the superposition of a second spectrum on the main one. Further measurements and observations have been planned with a view to elucidating the point.

On the Nebula h 2302 N.G.C. 7822 Cassiopeiae; the Region surrounding H II. 457 N.G.C. 1665 Eridani, with ten new nebulae; and H III. 558 N.G.C. 7492 Aquarii. By Isaac Roberts, D.Sc., F.R.S.

The nebula *h 2302* is described by Sir John Herschel in the *Phil. Trans.* 1833 November, p. 481, as exceedingly faint, of a round figure, diam. $10' \pm$.

Three photographs of the nebula and of the region surrounding it were taken with the 20-inch reflector and exposures of the plates during 90 minutes each, 1901 October 9, 1902 October 25, and 1902 December 2. They show the nebula to be a cloud of very faint nebulosity, irregular in light intensity and structure; the stars DM. 1679, zone 66° , mag. 6.0, DM. 1676, zone 66° , mag. 7.8, and DM. 1675, zone 66° , mag. 9.0, which is the brightest in a cluster of bright and faint stars, are, apparently, involved in the nebulosity. The cloud measures about $42'$ of arc from *preceding* to *following* and $38'$ from *north* to *south*; there are also faint indications, on the negative, of further extensions of the nebulosity which a longer exposure of the plate would reveal with greater density.

The region around the nebula H II. 457 *Eridani* N.G.C. 1665 includes many nebulae, amongst which are the following prominent ones:—H II. 457 is shown on the photograph taken with the reflector 1903 February 17, to be a right-hand spiral viewed obliquely, nucleus stellar; these features are not recorded by Herschel.

H III. 589 N.G.C. 1659. The photograph shows this nebula to be a spiral with bright stellar nucleus; very faint star involved in the *north following* end; these features are not recorded by Herschel.

H III. 588 N.G.C. 1643 is described by Herschel as extremely faint; very small; irregularly round; brighter in the middle. The photograph shows it to be bright and pretty large.

h 330 N.G.C. 1656. Sir J. Herschel describes this nebula as extremely faint; irregular figure? The photograph shows it like a large stellar nucleus with extensions of faint nebulosity in *south following* to *north preceding* direction; a faint star near it on the *n.f.* side.

N.G.C. 1645. D'Arrest describes it as very faint; pretty small; round. The photograph shows it like a pretty bright star surrounded by nebulosity.

N.G.C. 1666 and 1677 Swift V. are on the plate.

N.G.C. 1667 Stephan XIII. is probably a spiral nebula with small irregular nucleus, and large rather dense nebulosity, and not as described in the Catalogue. N.G.C. 1681 Stephan IX. is shown with a bright (not a faint) stellar nucleus surrounded by nebulosity.

Bigourdan 380 is shown on the photograph as a pretty bright stellar nucleus surrounded by nebulosity elongated in *s.f.* to *n.p.* direction.

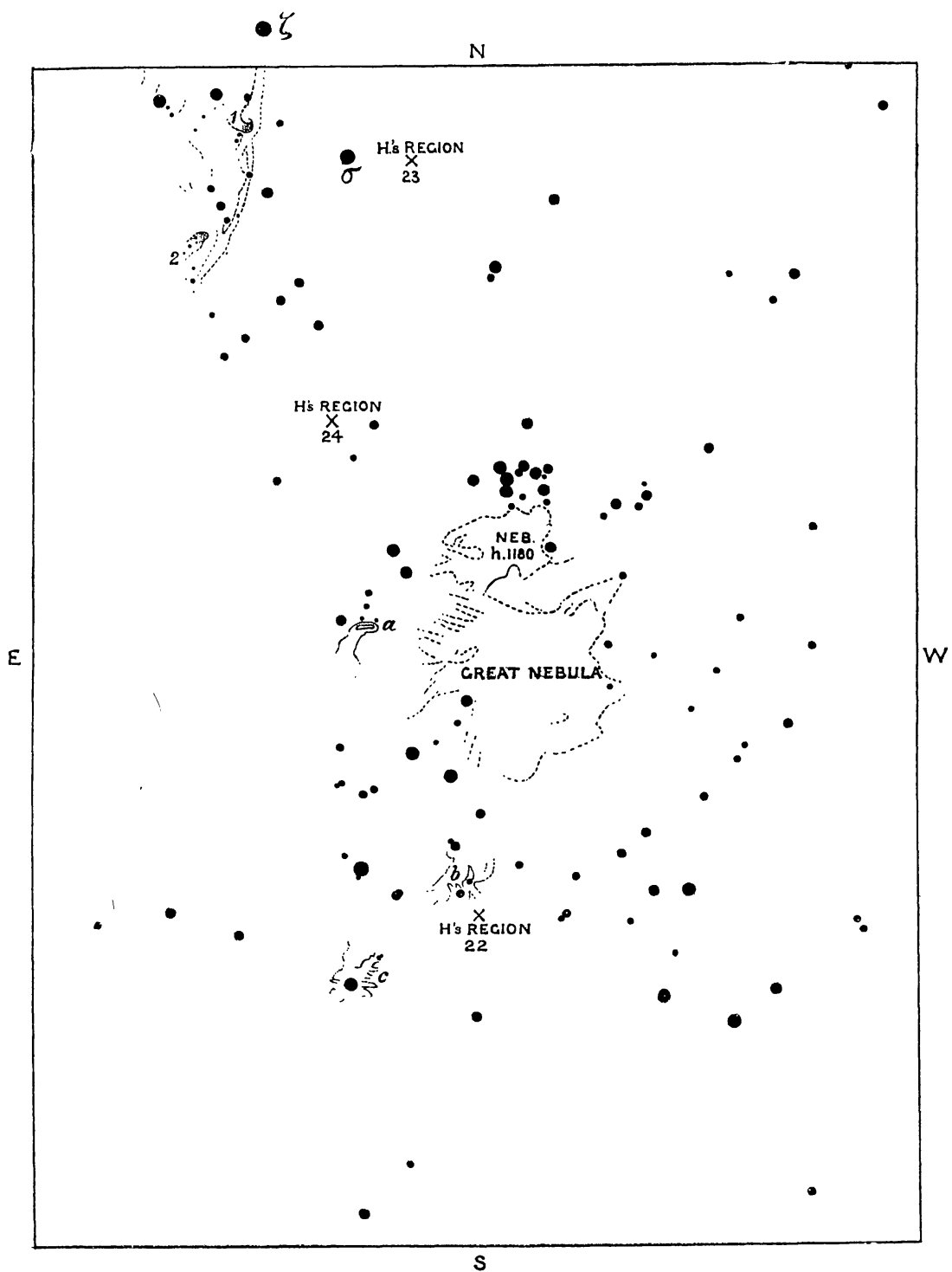
The following ten nebulae are shown on the photographic plate, but are not recorded in Dr. Dreyer's catalogues; they are therefore assumed to be new. The approximate coordinates here given are for the epoch 1860, which is that of the Catalogue.

R.A.			N.P.D.	
h	m	s	°	
4	39	43	94 56'4	Stellar nucleus surrounded by faint nebulosity.
4	39	53	95 12'7	Small spiral nebula with bright stellar nucleus; indication of star on south end.
4	41	31	95 36'6	Right-hand spiral nebula; faint stellar nucleus.
4	41	51	95 22'9	Probably a spiral nebula; faint and small; elongated in <i>n.f.</i> to <i>s.p.</i> direction.
4	42	43	95 14'1	Small right-hand spiral nebula; with stellar nucleus; elongated; indications of condensations.
4	43	27	95 19'9	Faint spiral nebula with faint nucleus; elongated in <i>s.f.</i> to <i>n.p.</i> direction.
4	43	50	95 40'2	Faint spiral nebula, viewed obliquely, with faint stellar nucleus and condensations.
4	43	55	95 8'6	Nebula like small bright stellar nucleus surrounded by nebulosity.
4	44	51	96 28'2	Faint nebula, probably a spiral; brighter in the middle; elongated in <i>s.f.</i> to <i>n.p.</i> direction.
4	44	58	95 12'7	Very faint nebula with faint nucleus; probably a spiral.

III III. 558 N.G.C. 7492 *Aquarii*, which was photographed with the 20-inch reflector and with an exposure of the plate during 90 minutes, 1902 December 18, is a cluster of very faint stars, described by W. Herschel, in the *Phil. Trans.* 1833, as a nebula eF; vL; 2 or 3'; the faintest thing imaginable.

Besides the nebulae which have been described above, there are, on this as well as on nearly all of my negatives, such vast numbers of faint stars which are claimed by some astronomers to be nebulae, that practically the name "Faint Star" might be altogether omitted from astronomical nomenclature. But at present I cannot admit any justification for such a stupendous departure from established usage. The irregular and nebulous appearance of the margins of the stellar images on the photographic plates are, doubtless, caused by atmospheric tremors during the exposures and by instrumental effects.

KEY MAP.



NEBULOSITIES IN ORION.



NEBULOSITIES IN ORION.

PHOTOGRAPH BY DR. MAX WOLF, HEIDELBERG.

On Three of Sir William Herschel's observed Nebulous Regions in Orion. By Dr. Max Wolf.

Dr. Roberts has recently published in the *Monthly Notices* (vol. lxiii. p. 26) an interesting paper upon Herschel's suspected nebulous regions. Photographing these regions systematically with his 20-inch reflector and 5-inch portrait lens, he has found that nearly all these places show absolutely no nebulosity. This seems to me strange, as both Professor Barnard and myself found the case to be the contrary. I had made contact prints from a photograph of the nebulosities connecting the great θ Orion nebula and the ζ Orion nebula. My photograph (Plate 11) covers three of Herschel's regions, which Roberts finds free from nebulosity, viz. :

Herschel's No.	R.A. 1900. h m s	Decl. 1900.	Herschel's Description.	Roberts' Description.
22	5 28 53	-6 56	Affected with milky nebulosity.	No nebulosity.
23	5 30 10	-2 43	Affected.	No nebulosity.
24	5 31 56	-4 18	Visible and unequally bright nebulosity. I am pretty sure that this joins to the great nebula in <i>Orion</i> .	No nebulosity.

The original plate was taken 1901 January 16 with the a -lens of the Bruce telescope of 16-inch aperture, exposure 6 hours 15 minutes.

Herschel's No. 22 : From the great *Orion* nebula in a southwestern direction all is filled with whitish nebulosity, connecting the great *Orion* nebula with the neck and head of the great snake which lies round *Orion*, with ζ *Orionis* as centre. This snakelike nebulous wing was first photographed by Barnard and Pickering and afterwards independently by myself, using small portrait lenses. Herschel's No. 22 is in this connecting nebulosity. It is shown on half a dozen or more plates taken since 1891, and it can be seen very well on the plate given here.

Herschel's No. 23 lies east of σ *Orionis*. We see at once that there is bright nebulosity on the plate. We find between ζ and ϵ *Orionis* and the θ *Orion* nebula a beautiful weaving of nebulous masses, with rifts and channels and islands, the two great *Orion* nebulae appearing only as concentrated clouds in this enormous nebulosity.

Herschel's No. 24 belongs to the same mass and consists of fine nebulous structures.

We find therefore relatively bright nebulae in these three regions. They are not at all faint or diffuse, but are easily detected by photography, and show a fine network of the same kind as the great *Orion* nebula itself.