For certain purposes it is necessary to know how much of each colour of the spectrum is transmitted through a wedge, and fig. 2 shows how this is accomplished.

The electric light and the collimator are placed as before, but the parallel emergent rays fall upon a pair of prisms, and the spectrum is brought to a focus by L_{11} on to a screen in which there is a slit against which the wedge in its setting is placed. The slit can be placed in any spectrum ray, and the wedge surface is always kept perpendicular to that ray. A lens L_{111} brings the rays to a focus, so that a monochromatic image of the surface of the last prism is formed on the screen. From the surface of the first prism parallel rays are reflected: these are caught by a mirror and fall on a pair of precisely similar prisms, and the remainder of the apparatus is exactly the same as that described above, a second patch of coloured light being formed over the first patch. The slit S_{111} is so adjusted in the spectrum that the two patches are of the same colour. The sectors are placed as shown in the figure, the rod R forming two shadows, as before. The method of procedure is to place the slit S_{11} in some colour in the spectrum, and S_{111} in the same. The wedge is then graduated for this beam throughout its length, another position is taken up and the same process gone through. By this means we get the logarithmic factor of transparency for each part of the wedge for the whole of the spectrum colours. As I have mentioned in another paper, the factor most essential to know for extinction purposes is that for the part of the spectrum near the Fraunhofer line E.

Photograph of the Cluster M. 46, *and of the Nebula* H IV. 39 *Argûs.*

By Isaac Roberts, D.Sc., F.R.S.

The photograph of the cluster M. 46 and of the nebula H IV. 39 *Argûs*, R.A. $7^h\ 37^m$, Decl. 14° 30′ south, was taken with the 20-inch reflector on 1894 February 24, with exposure of the plate during 90 minutes, and the copy now presented is enlarged to the scale of 1 millimetre to 24 seconds of arc.

The cluster is No. 2437 in the *New General Catalogue*, and 1564 in the *General Catalogue*. The nebula is No. 2438 in the *New General Catalogue*, and 1565 in the *General Catalogue*.

Sir J. Herschel describes the cluster as a remarkable object, very bright, very rich, very large, with a planetary nebula involved, which he describes as pretty bright, pretty small, extremely little extended, barely resolvable.

Lord Rosse (*Phil. Trans.*, 1850, p. 513, Pl. XXXVIII., fig. 12, and *Observations of Nebulæ and Clusters of Stars*, p. 61) records twenty-one observations of the nebula made between the years 1848 and 1876. He saw it first as a planetary nebula 60″ in diameter, and subsequently as an annular nebula with two stars, and a suspected third star, in it. Much uncertainty as to the character of the object is shown by the records, and in

the last observation (1876) he says, "It can hardly be called a planetary nebula."

The star *n.p.*, the centre, is estimated as of 13th–14th magnitude, and the other star near the *following* edge 16th magnitude.

Lassell (*Mem. R.A.S.*, vol. xxiii. p. 60, Pl. II. fig. 5) describes it as a planetary nebula, and saw two stars in it.

The photograph leaves us in no doubt as to the character of the nebula. It is an annular nebula, as perfect in outline as M. 57 *Lyræ*, and is seen projected on a plane facing the eye and circular in form. The ring is most condensed on the *n.f.* side, but no distinct central nebulosity is shown, and there are three stars in the interior: the brightest of them (13th–14th magnitude) is near the centre; another, of about 16th magnitude, is on the *s.p.* side; and the third, which is below 16th magnitude, is almost involved in the ring on the *s.f.* side. There is also evidence of very faint condensations of nebulosity in the ring itself.

The nebula, as the photograph clearly shows, is either involved or else in alignment with the northern part of the cluster, which is a magnificent aggregation of stars between 9th and 16th magnitude, and the photo-fields around it are crowded with stars having the usual remarkable groupings, and numerous apparent double, triple, and multiple stars. Some years hence these rich photo-fields of stars and their groupings will afford delightful studies for our successors by the aid of photography.

Photograph of a "New" Spiral Nebula in Perseus. By Isaac Roberts, D.Sc., F.R.S.

The Spiral Nebula is in R.A. $2^h\ 29^m\ 58^s$, Dec. 38° 31′·4 *north*, Epoch 1895. It is $3^m\ 51^s$ *preceding* and 5′·4 *south* of ☿ I. 156 *Persei*; both nebulæ are visible on the same photograph.

I assume this nebula to be new to science for the reasons that it is very faint, and is not recorded in the *New General Catalogue* or in the supplement to it, a manuscript copy of which Dr. Dreyer kindly sent me.

The convolutions of the spirals are very faint, but clearly visible on the negative, and involved in them are four 14–15 mag. stars and 6 or 7 stars, or star-like condensations, less bright than 16th mag. The convolutions are symmetrical, and proceed from a very faint star-like nucleus.

Photograph of the Nebula ☿ I. 156 *Persei.* By Isaac Roberts, D.Sc., F.R.S.

The photograph of the nebula ☿ I. 156 *Persei*, R.A. $2^h\ 33^m\ 49^s$, Dec. 38° 36′·8 *north*, was taken with the 20-inch reflector on 1893 December 29, with exposure of the plate during three hours, an enlargement of which to the scale of 1 millimetre to 24 seconds of arc is now presented.