PHOTOMETRIC ARRANGEMENT OF THE FIXED STARS.

I close this section with a table taken from Sir John Herschel's *Outines of Astronomy*, p. 645 and 646. I am indebted for the mode of its arrangement, and for the following lucid exposition, to my learned friend Dr. Galle, from whose communication, addressed to me in March, 1850, I extract the subjoined observations:

"The numbers of the photometric scale in the *Outlines of Astronomy* have been obtained by adding throughout 0·41 to the results calculated from the vulgar scale. Sir John Herschel arrived at these more exact determinations by observing their "sequences" of brightness, and by combining these observations with the average ordinary data of magnitudes, especially on those given in the catalogue of the Astronomical Society for the year 1827. See *Observ. at the Cape*, p. 304–352. The actual photometric measurements of several stars as obtained by the Astrometer (*op. cit.*, p. 353), have not been directly employed in this catalogue, but have only served generally to show the relation existing between the ordinary scale (of 1st, 2d, 3d, &c., magnitudes) to the actual photometric quantities of individual stars. This comparison has given the singular result that our ordinary stellar magnitudes (1, 2, 3 . . .) decrease in about the same ratio as a star of the first magnitude when removed to the distances of 1, 2, 3 . . . by which its brightness, according to photometric law, would attain the values 1, $\frac{1}{4}$th, $\frac{1}{9}$th, $\frac{1}{16}$th . . . (*Observ. at the Cape*, p. 371, 372; *Outlines*, p. 521, 522); in order, however, to make this accordance still greater, it is only necessary to raise our previously adopted stellar magnitudes about half a magnitude (or, more accurately considered, 0·41), so that a star of the 2·00 magnitude would in future be called 2·41, and star of 2·50 would become 2·91, and so forth. Sir John Herschel therefore proposes that this "photometric" (raised) scale shall in future be adopted (*Observ. at the Cape*, p. 372, and *Outlines*, p. 522)—a proposition in which we can not fail to concur; for while, on the one hand, the difference from the vulgar scale would hardly be felt (*Observ. at the Cape*, p. 372), the table in the *Outlines* (p. 645) may, on the other hand, serve as a basis for stars down to the fourth magnitude. The determinations of the magnitudes of the stars according to the rule, that the brightness of the stars of the first, second, third, fourth magnitude is exactly as 1, $\frac{1}{4}$th, $\frac{1}{9}$th, $\frac{1}{16}$th . . . as is now shown approximatively, is therefore already practicable. Sir John Herschel employs *α* Centauri as the standard star of the first magnitude for his *photometric scale*, and as the unit for the quantity of light (*Outlines*, p. 523; *Observ. at the Cape*, p. 372). If, therefore, we take the square of a star's photometric magnitude, we obtain the inverse ratio of the quantity of its light to that of *α* Centauri. Thus, for instance, if *κ* Orionis have a photometric magnitude of 3, it consequently has $\frac{1}{9}$th of the light of *α* Centauri. The number 3 would at the same time indicate that *κ* Orionis is 3 times more distant from us than *α* Centauri, provided both stars be bodies of equal magnitude and brightness. If another star, as, for instance, Sirius, which is four times as bright, were chosen as the unit of the photometric magnitudes indicating distances, the above conformity to law would not be so simple and easy of recognition. It is also worthy of notice, that the distance of *α* Centauri has been ascertained with some probability, and that this distance is the smallest of any yet determined. Sir John Herschel demonstrates (*Outlines*, p. 521) the inferiority of other scales to the photometric, which