fixed stars, since they convey a greater quantity of intense light to the eye without perceptibly enlarging the image;

age when seen by the naked eye by dividing the *square of the diameter of the object-glass by the square of the diameter of the emerging pencil*, or rather the *surface of the object-glass by the surface of the circular base of the emerging pencil*.

"By dividing the surface of the object-glass by the surface of the pupil, we have already obtained the ratio of the total quantities of light produced by the two images of a planet. This number is lower than the quotient which we obtain by dividing the surface of the object-glass by the surface of the emerging pencil. It follows, therefore, with respect to planets, that a telescope causes us to gain less in intensity of light than is lost by magnifying the surface of the images on the retina; the intensity of these images must therefore become continually fainter, in proportion as the magnifying power of the telescope increases.

"The atmosphere may be considered as a planet of indefinite dimensions. The portion of it that we see in a telescope will therefore also be subject to the same law of diminution that we have indicated. The relation between the intensity of the light of a planet and the field of atmospheric light through which it is seen, will be the same to the naked eye and in telescopes, whatever may be their dimensions and magnifying powers. Telescopes, therefore, do not favor the visibility of planets in respect to the intensity of their light.

"The same is not the case with respect to the stars. The intensity of the image of a star is greater when seen with the telescope than with the naked eye; the field of vision, on the contrary, uniformly illumined in both cases by the atmospheric light, is clearer in natural than in telescopic vision. There are two reasons, then, which, in connection with the consideration of the intensity of light, explain why the image of a star preponderates in a telescope rather than in the naked eye over that of the atmosphere.

"This predominance must gradually increase with the increased magnifying power. In fact, deducting the constant augmentation of the star's diameter, consequent upon the different effects of diffraction or interference, and deducting also the stronger reflection experienced by the light on the more oblique surfaces of ocular glasses of short focal lengths, *the intensity of the light of the star is constant* as long as the aperture of the object-glass does not vary. As we have already seen, the brightness of the field of view, on the contrary, diminishes incessantly in the same ratio in which the magnifying power increases. All other circumstances, therefore, being equal, a star will be more or less visible, and its prominence on the field of the telescope will be more or less marked, in proportion to the magnifying powers we employ." —Arago, *Manuscript of* 1847.

I will further add the following passage from the *Annuaire du Bureau des Long. pour* 1846 (*Notices Scient. par M. Arago*), p. 381:

"L'expérience a montré que pour le commun des hommes, deux espaces éclairés et contigus ne se distinguent pas l'un de l'autre, à moins que leurs intensités comparatives ne présentent, au minimum, une différence de $\frac{1}{60}$. Quand une lunette est tournée vers le firmament, son champ semble uniformement éclairé: c'est qu' alors il existe, dans un plan passant par le foyer et perpendiculaire à l'axe de l'objectif une *image indéfinie* de la région atmosphérique vers laquelle la lunette est dirigée. Supposons qu'un astre, c'est-à-dire un objet situé bien au-