

of stars which naturally compensate for the light destroyed by interference, and again combine the colored rays into white light. For this reason, we most rarely meet with traces of scintillation in Jupiter and Saturn, but more frequently in Mercury and Venus, for the apparent diameters of the disks of these last-named planets diminish to $4''\cdot4$ and $9''\cdot5$. The diameter of Mars may also decrease to $3''\cdot3$ at its conjunction. In the serene cold winter nights of the temperate zone, the scintillation increases the magnificent impression produced by the starry heavens, and the more so from the circumstance that, seeing stars of the sixth and seventh magnitude flickering in various directions, we are led to imagine that we perceive more luminous points than the unaided eye is actually capable of distinguishing. Hence the popular surprise at the few thousand stars which accurate catalogues indicate as visible to the naked eye! It was known in ancient times by the Greek astronomers that the flickering of their light distinguished the fixed stars from the planets; but Aristotle, in accordance with the emanation and tangential theory of vision, to which he adhered, singularly enough ascribes the scintillation of the fixed stars merely to a straining of the eye. "The riveted stars (the fixed stars)," says he,* "sparkle, but not the planets; for the latter are so near that the eye is able to reach them; but in looking at the fixed stars (*πρὸς δὲ τοὺς μένοντας*), the eye acquires a tremulous motion, owing to the distance and the effort."

In the time of Galileo, between 1572 and 1604—an epoch remarkable for great celestial events, when three stars† of greater brightness than stars of the first magnitude suddenly appeared, one of which, in Cygnus, remained luminous for twenty-one years—Kepler's attention was specially directed to scintillation as the probable criterion of the non-planetary nature of a celestial body. Although well versed in the science of optics, in its then imperfect state, he was unable to rise above the received notion of moving vapors.‡ In the Chinese Records of the newly appeared stars, according to the great collection of Ma-tuan-lin, their strong scintillation is occasionally mentioned.

The more equal mixture of the atmospheric strata, in and near the tropics, and the faintness or total absence of scintil-

* Aristot., *De Cælo*, ii., 8, p. 290, Bekker.

† *Cosmos*, vol. ii., p. 326.

‡ *Causæ scintillationis*, in Kepler, *De Stella nova in pede Serpentarii*, 1606, cap. xviii., p. 92-97.