

stratum, is about equal to that distance which, on a general average, corresponds to the light of a star of the ninth or tenth magnitude, and certainly does not exceed that corresponding to the eleventh."* Where, from the peculiar nature of individual problems, measurements and the direct evidence of the senses fail, we see but dimly those results which intellectual contemplation, urged forward by an intuitive impulse, is ever striving to attain.

IV.

NEW STARS AND STARS THAT HAVE VANISHED.—VARIABLE STARS, WHOSE RECURRING PERIODS HAVE BEEN DETERMINED.—VARIATIONS IN THE INTENSITY OF THE LIGHT OF STARS WHOSE PERIODICITY IS AS YET UNINVESTIGATED.

NEW STARS.—The appearance of hitherto unseen stars in the vault of heaven, especially the sudden appearance of strongly-scintillating stars of the first magnitude, is an occurrence in the realms of space which has ever excited astonishment. This astonishment is the greater, in proportion as such an event as the sudden manifestation of what was before invisible, but which nevertheless is supposed to have previously existed, is one of the very rarest phenomena in nature. While, in the three centuries from 1500 to 1800, as many as forty-two comets, visible to the naked eye, have appeared to the inhabitants of the northern hemisphere—on an average, fourteen in every hundred years—only eight new stars have been observed throughout the same period. The rarity of the latter becomes still more striking when we extend our consideration to yet longer periods. From the completion of the Alphonsine Tables, an important epoch in the history of astronomy, down to the time of William Herschel—that is, from 1252 to 1800—the number of *visible* comets is estimated at about sixty-three, while that of new stars does not amount to more than nine. Consequently, for the period during which, in the civilized countries of Europe, we may depend on possessing a tolerably correct enumeration of both, the proportion of new stars to comets visible to the naked eye is as one to seven. We shall presently show that if from the tailless comets we separate the new stars which, according to the records of Ma-tuan-lin,

* *Observations at the Cape*, § 315.