

That the periods of the variable stars are very irregular has been long known; but that this variability, with all its apparent irregularity, is subject to certain definite laws, was first established by Argelander. This he hopes to be able to demonstrate in a longer and independent treatise of his own. In the case of χ Cygni, he considers that two perturbations in the period—the one of 100, the other of $8\frac{1}{2}$ —are more probable than a single period of 108. Whether such disturbances arise from changes in the process of light which is going on in the atmosphere of the star itself, or from the periodic times of some planet which revolves round the fixed star or sun χ Cygni, and by attraction influences the form of its photosphere, is still a doubtful question. The greatest irregularity in change of intensity has unquestionably been exhibited by the variabilis Scuti (Sobieski's shield); for this star diminishes from the 5.4th down to the ninth magnitude; and, moreover, according to Pigott, it once totally disappeared at the end of the last century. At other times the fluctuations in its brightness have been only from the 6.5th to the sixth magnitude. The maximum of the variations of χ Cygni have been between the 6.7th and fourth magnitude; of Mira, from the fourth to the 2.1st magnitude. On the other hand, in the duration of its periods δ Cephei shows an *extraordinary*, and, indeed, of all variable stars, the *greatest* regularity, as is proved by the 87 minima observed between the 10th of October, 1840, and 8th of January, 1848, and even later. In the case of ϵ Aurigæ, the variation of its brilliancy, discovered by that indefatigable observer, Heis, of Aix-la-Chapelle,* extends only from the 3.4th to the 4.5th magnitude.

A great difference in the maximum of brightness is exhibited by Mira Ceti. In the year 1779, for instance (on the 6th of November), Mira was only a little dimmer than Aldebaran, and, indeed, not unfrequently brighter than stars of the second magnitude; whereas at other times this variable star scarcely attained to the intensity of the light of δ Ceti, which is of the fourth magnitude. Its mean brightness is equal to that of γ Ceti (third magnitude). If we designate by 0 the brightness of the faintest star visible to the naked eye, and that of Aldebaran by 50, then Mira has varied in its maximum from 20 to 47. Its probable brightness may be expressed by 30: it is oftener below than above this limit. The measure of its excess, however, when it does occur, is

* Argelander, in Schumacher's *Astron. Nachr.*, bd. xxvi. (1848), No. 624, s. 369.