

west, apparently enter on the eastern edge of Jupiter, they hide from us, in their passage, successive portions of the disk of their primary, and can be perceived with telescopes of moderate power, since they stand out in *luminous relief* from the disk. The visibility of the satellite is attended with more difficulty the nearer it approaches the center of the primary. From this phenomenon, which was early observed, Pound, Newton's and Bradley's friend, inferred that the disk was less luminous near the edge than at the center. Arago considers that this assumption, renewed by Messier, involves difficulties which can only be solved by new and more delicate observations. Jupiter was seen without any satellites by Molyneux in November, 1681; by Sir William Herschel on the 23d of May, 1802; and, lastly, by Griesbach, on the 27th of September, 1843. Such a non-visibility of the satellites has reference, however, to the space *without* the disk of Jupiter, and is not inconsistent with the theorem that all the four satellites can not be *eclipsed* at one time.

SATURN.

The *period* of sidereal or true *revolution* of Saturn is 29y. 166d. 23h. 16m. 32s. His mean diameter is 62,028 geographical miles, equal to 9022 terrestrial diameters. The period of *rotation*, deduced from the observation of some dark spots (knot-like condensations of the bands) upon the surface,* is 10h. 29m. 17s. Such a great velocity of rotation corresponds to the considerable *flattening*. William Herschel estimated it, in 1776, at $\frac{1}{10} \cdot \frac{1}{4}$; Bessel, after corresponding observations during a period of more than three years, found that at

* The earliest and careful observations of William Herschel, in November, 1793, gave for Saturn's period of rotation 10h. 16m. 44s. It has been incorrectly attributed to the great philosopher, Immanuel Kant, that he conjectured the period of Saturn's rotation from theoretical considerations in his *Allgemeinen Naturgeschichte des Himmels*, forty years before Herschel. The number that he gives is 6h. 23m. 53s. He calls his determination "the mathematical calculation of an unknown motion of a heavenly body, which is, perhaps, the *only prediction* of that kind in pure Natural Philosophy, and awaits confirmation at a future period." This confirmation of his conjecture did not take place at all; observations have shown an error of $\frac{3}{5}$ of the whole, *i. e.*, of four hours. In the same work it is said respecting the ring of Saturn, "that in the aggregation of particles which constitute it, those of the inner edge complete their revolution in 10 hours, those of the external edge in 15 hours. The first of these ring-numbers is the only one which accidentally comes near the planet's observed period of rotation (10d. 29m. 17s.). Compare Kant, *Sämmtliche Werke*, th. vi., 1389 p. 135 and 140.