

who found the flattening to be between  $\frac{1}{87}$  and  $\frac{1}{88}$ . Hansen and Sir John Herschel give the preference to  $\frac{1}{87}$ . The earliest observation of the flattening, by Dominique Cassini, is older than the year 1666, as I have already pointed out elsewhere. This circumstance has an especial historical importance, on account of the influence which, according to Sir David Brewster's acute remark, the discovery of this flattening by Cassini exercised upon Newton's ideas as to the figure of the Earth. The *Principia Philosophiæ Naturalis* bears witness to this, but the epochs at which the *Principia* and Cassini's observation of equatorial and polar diameters of Jupiter appeared, might excite chronological doubts.\*

As the mass of Jupiter after that of the Sun is the most important element of the whole planetary system, its accurate determination, which has recently been effected through the disturbances of Juno and Vesta, as well as by the elongation of his satellites, especially the fourth, † must be considered as one of the most productive improvements of calculating astronomy. The value of the mass of Jupiter is greater now than formerly; that of Mercury, on the contrary, smaller. The former, together with that of the four satellites, is  $\frac{1}{1047878}$ , while Laplace gave it as  $\frac{1}{108809}$  ‡

Jupiter's *period of rotation* is, according to Airy, 9h. 55' 21".3 mean solar time. Dominique Cassini first found it (1665) to be between 9h. 55m. and 9h. 56m., by means of a spot which was visible § for many years, even indeed to 1691, and was always of the same color and outline. The greater part of these spots are of greater blackness than the streaks upon Jupiter. They do not, however, appear to belong to

Laplace (*Syst. du Monde*, p. 266) found it theoretically between  $\frac{1}{24}$  and  $\frac{5}{8}$ , with increasing density of the strata.

\* Newton's immortal work, *Philosophiæ Naturalis Principia Mathematica*, appeared as early as May, 1687, and the papers of the Paris Academy did not contain the notice of Cassini's determination of the flattening ( $\frac{1}{87}$ ) until the year 1691; so that Newton, who might certainly have known of Richer's pendulum-experiment at Cayenne, from the account of the journey printed in 1679, must have become acquainted with the configuration of Jupiter by verbal intercourse and the active correspondence of that time. With regard to this subject, and the only apparent early acquaintance of Huygens with the pendulum-experiment of Richer, compare *Cosmos*, vol. i., p. 165, note, and vol. ii., p. 146, note.

† Airy, in the *Mem. of the Royal Astron. Soc.*, vol. ix., p. 7; vol. x., p. 43.

‡ As early as the year 1824. (Laplace, *op. cit.*, p. 207.)

§ Delambre, *Hist. de l'Astron. Mod.*, tom. ii., p. 754.