

The compression which may be inferred from lunar inequalities affords an advantage not yielded by individual measurements of degrees or experiments with the pendulum, since it gives a mean amount which is referable to the whole planet. The comparison of the Earth's compression with the velocity of rotation shows, further, the increase of density from the strata from the surface toward the center—an increase which a comparison of the ratios of the axes of Jupiter and Saturn with their times of rotation likewise shows to exist in these two large planets. Thus the knowledge of the external form of planetary bodies leads us to draw conclusions regarding their internal character.

The northern and southern hemispheres appear to present nearly the same curvature under equal degrees of latitude, but, as has already been observed, pendulum experiments and measurements of degrees yield such different results for individual portions of the Earth's surface that no regular figure can be given which would reconcile all the results hitherto obtained by this method. The true figure of the Earth is to a regular figure as the uneven surfaces of water in motion are to the even surface of water at rest.

When the Earth had been measured, it still had to be weighed. The oscillations of the pendulum\* and the plummet have here likewise served to determine the mean density of the Earth, either in connection with astronomical and geodetic operations, with the view of finding the deflection of the plummet from a vertical line in the vicinity of a mountain, or by a comparison of the length of the pendulum in a plain and on the summit of an elevation, or, finally, by the employment of a torsion balance, which may be considered as a horizontally vibrating pendulum for the measurement of the relative density of neighboring strata. Of these three methods† the

\* La Caille's pendulum measurements at the Cape of Good Hope, which have been calculated with much care by Mathieu (Delambre. *Hist. de l'Astron. au 18me Siècle*, p. 479), give a compression of  $\frac{1}{284.1}$ th; but, from several comparisons of observations made in equal latitudes in the two hemispheres (New Holland and the Malouines (Falkland Islands), compared with Barcelona, New York, and Dunkirk), there is as yet no reason for supposing that the mean compression of the southern hemisphere is greater than that of the northern. (Biot, in the *Mém. de l'Acad. des Sciences*, t. viii., 1829, p. 39-41.)

† The three methods of observation give the following results: (1.) by the deflection of the plumb-line in the proximity of the Shehallien Mountain (Gaelic, Thichallin) in Perthshire, 4.713, as determined by Maskelyne, Hutton, and Playfair (1774-1776 and 1810), according to a method that had been proposed by Newton; (2.) by pendulum vibra