

guardians of the established theory of the universe, to compare it in the greatest possible detail with the facts. Mr. Lubbock was the first mathematician who undertook the extensive labors which such a conviction suggested. Finding that regular tide-observations had been made at the London Docks from 1795, he took nineteen years of these (purposely selecting the length of a cycle of the motions of the lunar orbit), and caused them (in 1831) to be analyzed by Mr. Dessiou, an expert calculator. He thus obtained⁴³ Tables for the effect of the Moon's Declination, Parallax, and hour of Transit, on the tides; and was enabled to produce Tide-tables founded upon the data thus obtained. Some mistakes in these as first published (mistakes unimportant as to the theoretical value of the work), served to show the jealousy of the practical tide-table calculators, by the acrimony with which the oversights were dwelt upon; but in a very few years, the tables thus produced by an open and scientific process were more exact than those which resulted from any of the secrets; and thus practice was brought into its proper subordination to theory.

The theory with which Mr. Lubbock was led to compare his results, was the Equilibrium-theory of Daniel Bernoulli; and it was found that this theory, with certain modifications of its elements, represented the facts to a remarkable degree of precision. Mr. Lubbock pointed out this agreement especially in the semi-mensual inequality of the times of high water. The like agreement was afterwards (in 1833) shown by Mr. Whewell⁴⁴ to obtain still more accurately at Liverpool, both for the Times and Heights; for by this time, nineteen years of Hutchinson's Liverpool Observations had also been discussed by Mr. Lubbock. The other inequalities of the Times and Heights (depending upon the Declination and Parallax of the Moon and Sun,) were variously compared with the Equilibrium-theory by Mr. Lubbock and Mr. Whewell; and the general result was, that the facts agreed with the condition of equilibrium at a certain anterior time, but that this anterior time was different for different phenomena. In like manner it appeared to follow from these researches, that in order to explain the facts, the mass of the moon must be supposed different in the calculation at different places. A result in effect the same was obtained by M. Daussy,⁴⁵ an active French Hydrographer; for he found that observations at various stations could not be reconciled with the formulæ of Laplace's *Mécanique*

⁴³ *Phil. Trans.* 1831. *British Almanac*, 1832.

⁴⁵ *Connaissance des Temps*, 1838.

⁴⁴ *Phil. Trans.* 1834.