Sect. 2.—Application of the Newtonian Theory to the Moon.

The Motions of the Moon may be first spoken of, as the most obvious and the most important of the applications of the Newtonian Theory. The verification of such a theory consists, as we have seen in previous cases, in the construction of Tables derived from the theory, and the comparison of these with observation. The advancement of astronomy would alone have been a sufficient motive for this labor; but there were other reasons which urged it on with a stronger impulse. A perfect Lunar Theory, if the theory could be perfected, promised to supply a method of finding the Longitude of any place on the earth's surface; and thus the verification of a theory which professed to be complete in its foundations, was identified with an object of immediate practical use to navigators and geographers, and of vast acknowledged value. A good method for the near discovery of the longitude had been estimated by nations and princes at large sums of money. The Dutch were willing to tempt Galileo to this task by the offer of a chain of gold: Philip the Third of Spain had promised a reward for this object still earlier;[1] the parliament of England, in 1714, proposed a recompense of 20,000*l.* sterling; the Regent Duke of Orléans, two years afterwards, offered 100,000 francs for the same purpose. These prizes, added to the love of truth and of fame, kept this object constantly before the eyes of mathematicians, during the first half of the last century.

If the Tables could be so constructed as to represent the moon's real place in the heavens with extreme precision, as it would be seen from a *standard* observatory, the observation of her apparent place, as seen from any other point of the earth's surface, would enable the observer to find his longitude from the standard point. The motions of the moon had hitherto so ill agreed with the best Tables, that this method failed altogether. Newton had discovered the ground of this want of agreement. He had shown that the same force which produces the Evection, Variation, and Annual Equation, must produce also a long series of other Inequalities, of various magnitudes and cycles, which perpetually drag the moon before or behind the place where she would be sought by an astronomer who knew only of those principal and notorious inequalities. But to calculate and apply the new inequalities, was no slight undertaking.

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[1] Del. *A. M.* i. 89, 66.