it was carried into effect in the course of the last century. Thus Lalande applied Clairaut's theory to Mars, as did Mayer; and the inequalities in this case, says Bailly[20] in 1785, may amount to two minutes, and therefore must not be neglected. Lalande determined the inequalities of Venus, as did Father Walmesley, an English mathematician; these were found to reach only to thirty seconds.

The Planetary Tables[21] which were in highest repute, up to the end of the last century, were those of Lalande. In these, the perturbations of Jupiter and Saturn were introduced, their magnitude being such that they cannot be dispensed with; but the Tables of Mercury, Venus, and Mars, had no perturbations. Hence these latter Tables might be considered as accurate enough to enable the observer to find the object, but not to test the theory of perturbations. But when the calculation of the mutual disturbances of the planets was applied, it was always found that it enabled mathematicians to bring the theoretical places to coincide more exactly with those observed. In improving, as much as possible, this coincidence, it is necessary to determine the mass of each planet; for upon that, according to the law of universal gravitation, its disturbing power depends. Thus, in 1813, Lindenau published Tables of Mercury, and concluded, from them, that a considerable increase of the supposed mass of Venus was necessary to reconcile theory with observation.[22] He had published Tables of Venus in 1810, and of Mars in 1811. And, in proving Bouvard's Tables of Jupiter and Saturn, values were obtained of the masses of those planets. The form in which the question of the truth of the doctrine of universal gravitation now offers itself to the minds of astronomers, is this:—that it is taken for granted that it will account for the motions of the heavenly bodies, and the question is, with what supposed masses it will give the *best* account.[23] The continually increasing accuracy of the table shows the truth of the fundamental assumption.

The question of perturbation is exemplified in the satellites also.

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[20] *Ast. Mod.* iii. 170. [21] Airy, *Report on Ast. to Brit. Ass.* 1832.

[22] Airy, *Report on Ast. to Brit. Ast.* 1832.

[23] Among the most important corrections of the supposed masses of the planets, we may notice that of Jupiter, by Professor Airy. This determination of Jupiter's mass was founded, not on the effect as seen in perturbations, but on a much more direct datum, the time of revolution of his fourth satellite. It appeared, from this calculation, that Jupiter's mass required to be increased by about 1-80th. This result agrees with that which has been derived by German astronomers from the perturbations which the attractions of Jupiter produce in the four new planets, and has been generally adopted as an improvement of the elements of our system.