

traction of matter, we cannot help noticing Francis Bacon ; for his notions were so far from being chargeable with the looseness and indistinctness to which we have alluded, that he proposed an experiment²⁰ which was to decide whether the facts were so or not ;—whether the gravity of bodies to the earth arose from an attraction of the parts of matter towards each other, or was a tendency towards the centre of the earth. And this experiment is, even to this day, one of the best which can be devised, in order to exhibit the universal gravitation of matter : it consists in the comparison of the rate of going of a clock in a deep mine, and on a high place. Huyghens, in his book *De Causâ Gravitatis*, published in 1690, showed that the earth would have an oblate form, in consequence of the action of the centrifugal force ; but his reasoning does not suppose gravity to arise from the mutual attraction of the parts of the earth. The apparent influence of the moon upon the tides had long been remarked ; but no one had made any progress in truly explaining the mechanism of this influence ; and all the analogies to which reference had been made, on this and similar subjects, as magnetic and other attractions, were rather delusive than illustrative, since they represented the attraction as something peculiar in particular bodies, depending upon the nature of each body.

That all such forces, cosmical and terrestrial, were the same single force, and that this was nothing more than the insensible attraction which subsists between one stone and another, was a conception equally bold and grand ; and would have been an incomprehensible thought, if the views which we have already explained had not prepared the mind for it. But the preceding steps having disclosed, between all the bodies of the universe, forces of the same kind as those which produce the weight of bodies at the earth, and, therefore, such as exist in every particle of terrestrial matter ; it became an obvious question, whether such forces did not also belong to all particles of planetary matter, and whether this was not, in fact, the whole account of the forces of the solar system. But, supposing this conjecture to be thus suggested, how formidable, on first appearance at least, was the undertaking of verifying it ! For if this be so, every finite mass of matter exerts forces which are the result of the infinitely numerous forces of its particles, these forces acting in different directions. It does not appear, at first sight, that the law by which the force is related to the distance, will be the same for the particles as it is for the masses ; and, in reality, it

²⁰ *Nov. Org. Lib. ii. Aph. 86.*