

the particles of the earth to have separate motions, which produce collisions, and thus propagate¹⁶ an "agitation of the ether," radiating in all directions; and,¹⁶ "by the rotation of the sun on its axis, concurring with its rectilinear action on the earth, arises the motion of the earth about the sun." The other motions of the solar system are, as we might expect, accounted for in a similar manner; but it appears difficult to invest such an hypothesis with any mechanical consistency.

John Bernoulli maintained to the last the Cartesian hypothesis, though with several modifications of his own, and even pretended to apply mathematical calculation to his principles. This, however, belongs to a later period of our history; to the reception, not to the prelude, of the Newtonian theory.

(*Borelli.*) In Italy, Holland, and England, mathematicians appear to have looked much more steadily at the problem of the celestial motions, by the light which the discovery of the real laws of motion threw upon it. In Borelli's *Theories of the Medicean Planets*, printed at Florence in 1666, we have already a conception of the nature of central action, in which true notions begin to appear. The attraction of a body upon another which revolves about it is spoken of and likened to magnetic action; not converting the attracting force into a transverse force, according to the erroneous views of Kepler, but taking it as a tendency of the bodies to meet. "It is manifest," says he,¹⁷ "that every planet and satellite revolves round some principal globe of the universe as a fountain of virtue, which so draws and holds them that they cannot by any means be separated from it, but are compelled to follow it wherever it goes, in constant and continuous revolutions." And, further on, he describes¹⁸ the nature of the action, as a matter of conjecture indeed, but with remarkable correctness.¹⁹ "We shall account for these motions by supposing, that which can hardly be denied, that the planets have a certain natural appetite for uniting themselves with the globe round which they revolve, and that they really tend, with all their efforts, to approach to such globe; the planets, for instance, to the sun, the Medicean Stars to Jupiter. It is certain, also, that circular motion gives a body a tendency to recede from the centre of such revolution, as we find in a wheel, or a stone whirled in a sling. Let us suppose, then, the planet to endeavor to approach the sun; since, in the mean time, it requires, by the circular motion, a force to recede from the same central body, it comes to pass, that when

¹⁶ Art. 5.¹⁶ Ib. 8.¹⁷ Cap. 2.¹⁸ Ib. 11.¹⁹ P. 47.