result of some higher and still unknown power, or of "the centrifugal force of the æther, which fills the realms of space, and is rarer within bodies, but increases in density outward. The latter view is set forth in detail in a letter to Robert Boyle* (dated February 28, 1678), which ends with the words, "I seek the cause of gravity in the æther." Eight years afterward, as we learn from a letter he wrote to Halley, Newton entirely relinquished this hypothesis of the rarer and denser æther.† It is especially worthy of notice, that in 1717, nine years before his death, he should have deemed it necessary expressly to state, in the short preface to the second edition of his Optics, that he did not by any means consider gravity as an "essential property of bodies;"‡ while

two or three general principles of motion from phenomena, and afterward to tell us how the properties and actions of all corporeal things follow from those manifest principles, would be a very great step in philosophy, though the causes of those principles were not yet discovered; and therefore I scruple not to propose the principles of motion, and leave their causes to be found out."—Newton's *Optics*, p. 377. In a previous portion of the same work, at query 31, p. 351, he writes as follows: "Bodies act one upon another by the attraction of gravity, magnetism, and electricity; and it is not improbable that there may be more attractive powers than these. How these attractions may be performed I do not here consider. What I call attraction may be performed by *impulse*, or by some other means unknown to me. I use that word here to signify only in general any force by which bodies tend toward one another, whatsoever be the cause."

* "I suppose the rarer æther within bodies, and the denser without them."—*Operum Newtoni*, tomus iv. (ed. 1782, Sam. Horsley), p. 386. The above observation was made in reference to the explanation of the discovery made by Grimaldi of the *diffraction* or inflection of light. At the close of Newton's letter to Robert Boyle, February, 1678, p. 94, he says: "I shall set down one conjecture more which came into my mind: it is about the cause of gravity. . . ." His correspondence with Oldenburg (December, 1675) shows that the great philosopher was not at that time averse to the "æther hypotheses." According to these views, the impulse of *material* light causes the æther to vibrate; but the vibrations of the æther alone, which has some affinity to a nervous fluid, does not generate light. In reference to the contest with Hooke, consult Horsley, t. iv., p. 378–380.

† See Brewster's *Life of Sir Isaac Newton*, p. 303–305.

‡ Newton's words "not to take gravity for an essential property of bodies" in the "Second Advertisement" contrast with his remarks on the forces of attraction and repulsion, which he ascribes to *all* molecular particles, in order, according to the theory of emission, to explain the phenomena of the refraction and repulsion of the rays of light from reflecting surfaces "without their actual contact." (Newton, *Optics*, book ii., *prop.* 8, p. 241, and Brewster, *Op. cit.*, p. 301.) According to Kant (see *Die Metaphysischen Anfangsgründe der Naturwissenschaft*, 1800, s. 28), we can not conceive the existence of matter without these forces of attraction and repulsion. All physical phenomena are there-