

could be traced.¹ What to some contemporaries of Newton, and even to Newton himself, seemed an absurdity—that action could take place at a distance²—became through

¹ Voltaire, who did not dive very deep into the teachings of Newton, gives a graphic description of the different opinions then current in English and French learned circles. In his 'Lettres sur les Anglais,' written about the time of the death of Newton, after having discoursed on Quakerism, the Church and Government, on vaccination, Bacon and Locke, he devotes four chapters to the philosophy of Newton, which he contrasts with that of Descartes. "Un Français qui arrive à Londres trouve les choses bien changées en philosophie, comme dans tout le reste. Il a laissé le monde plein, il le trouve vide. Paris on voit l'univers composé de tourbillons de matière subtile, à Londres on ne voit rien de cela. Chez nous c'est la pression de la lune qui cause le flux de la mer; chez les Anglais c'est la mer qui gravite vers la lune. . . . Chez vos Cartésiens tout se fait par une impulsion qu'on ne comprend guère; chez M. Newton c'est par une attraction dont on ne connaît pas mieux la cause. . . . Descartes assure encore que l'étendue seule fait la matière, Newton y ajoute la solidité" (lettre xiv.)

² "You sometimes speak of gravity as essential and inherent to matter. Pray, do not ascribe that notion to me; for the cause of gravity is what I do not pretend to know" (Newton's 2nd letter to Bentley, 17th January 1692-93). "It is inconceivable that inanimate brute matter should, without the mediation of something else, which is not material, operate upon and affect other matter without mutual contact, as it must be, if gravitation, in the sense of Epicurus, be essential and inherent in it. And this is one

reason why I desired you would not ascribe innate gravity to me. That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance through a *vacuum*, without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity that I believe no man, who has in philosophical matters a competent faculty of thinking, can ever fall into it. Gravity must be caused by an agent acting constantly according to certain laws; but whether this agent be material or immaterial, I have left to the consideration of my readers" (3rd letter to Bentley, 5th February 1692-93). And in the fifth answer to Leibniz (published after Leibniz's death) Clarke says: "That the sun attracts the earth . . . —that is, that the earth and sun *gravitate* towards each other, or tend towards each other, with a force which is in a direct proportion of their masses, . . . and in an inverse duplicate proportion of their distances, and that the space betwixt them is void—that is, has nothing in it which sensibly resists the motion of bodies passing transversely through: all this is nothing but a phenomenon or actual matter of fact, found by experience. That this phenomenon is not produced *sans moyen*—that is, without some cause capable of producing such an effect—is undoubtedly true. Philosophers therefore may search after and discover that cause, if they can; be it mechanical or not mechanical. . . . The phenomenon itself, the attraction, gravitation, or tendency of bodies towards each other, and the laws or proportions