periodic times were as the cubes of the mean distances of the satellites from the primary planets. It was this which led Kepler, in the *Harmonices Mundi*, to state, with the firm confidence and security of a German spirit of philosophical independence, to those whose opinions bore sway beyond the Alps; "eighty years have elapsed,* during which the doctrines of Copernicus, regarding the movement of the earth, and the immobility of the sun, have been promulgated without hinderance, because it is deemed allowable to dispute concerning natural things, and to elucidate the works of God; and now that *new testimony is discovered in proof of the truth of those doctrines*—testimony which was not known to the spiritual judges—ye would prohibit the promulgation of the true system of the structure of the universe!" Such a prohibition—a consequence of the old contest between natural science and the Church—Kepler had early encountered in Protestant Germany.†

The discovery of Jupiter's satellites marks an ever-memorable epoch in the history and the vicissitudes of astronomy.‡ The occultations of the satellites, or their entrance into Jupiter's shadow, led to a knowledge of the *velocity of light* (1675), and, through this knowledge, to the explanation of the *aberration-ellipse* of the fixed stars (1727), in which the great orbit of the earth, in its annual course round the sun, is, as it were, reflected on the vault of heaven. These discoveries of Römer and Bradley have been justly termed "the keystone of the Copernican system," the perceptible evidence of the translatory motion of the earth.

Galileo had also early perceived (September, 1612) the importance of the occultations of Jupiter's satellites for geographical determinations of longitude on land. He proposed this method, first to the Spanish court in 1616, and afterward to the States-General of Holland, with a view of its being applied to nautical purposes,§ little aware, as it would appear,

* It should be seventy-three years; for the prohibition of the Copernican system by the Congregation of the *Index* was promulgated on the 5th of March, 1616.

† Freiherr von Breitschwert, *Keppler's Leben*, s. 36.

‡ Sir John Herschel, *Astron.*, s. 465.

§ Galilei, *Opere*, t. ii. (*Longitudine per via de' Pianeti Medicei*), p. 435–506; Nelli, *Vita*, vol. ii., p. 656–688; Venturi, *Memorie e Lettere di G. Galilei*, Part i., p. 177. As early as 1612, or scarcely two years after the discovery of Jupiter's satellites, Galileo boasted, somewhat prematurely indeed, of having completed tables of those secondary satellites "to within 1′ of time." A long diplomatic correspondence was carried on with the Spanish embassador in 1616, and with the Dutch