

the consideration of terrestrial magnetism and atmospheric temperature, as far as these sciences are included in the century which we have attempted to describe. The able and important work on magnetic and electric forces, the *Physiologia nova de Magnete*, by William Gilbert, to which I have frequently had occasion to allude,* appeared in the year 1600. This writer, whose sagacity of mind was so highly admired by Galileo, conjectured many things of which we have now acquired certain knowledge.† Gilbert regarded terrestrial magnetism and electricity as two emanations of a single fundamental force pervading all matter, and he therefore treated of both at once. Such obscure conjectures, based on analogies of the effect of the Heracleean magnetic stone on iron, and the attractive force exercised on dry straws by amber, when animated, as Pliny expresses it, with a soul by the agency of heat and friction, appertain to all ages and all races, to the Ionic natural philosophy no less than to the science of the Chinese physicists.‡ According to Gilbert's idea, the earth itself is a magnet, while he considered that the inflections of the lines of equal declination and inclination depend upon the distribution of mass, the configuration of continents, or the form and extent of the deep, intervening oceanic basins. It is difficult to connect the periodic variations which characterize the three principal forms of magnetic phenomena (the isoclinal, isogonic, and isodynamic lines) with this rigid system of the distribution of force and mass, unless we represent to ourselves the attractive force of the material particles modified by similar periodic changes of temperature in the interior of the terrestrial planet.

In Gilbert's theory, as in gravitation, the quantity of the material particles is merely estimated, without regard to the specific heterogeneity of substances. This circumstance gave his work, at the time of Galileo and Kepler, a character of cosmical greatness. The unexpected discovery of rotation-magnetism by Arago in 1825, has shown practically that every kind of matter is susceptible of magnetism; and the most recent investigations of Faraday on dia-magnetic substances

* *Cosmos*, vol. i., p. 177, 179, and vol. ii., p. 278.

† Lord Bacon, whose comprehensive, and, generally speaking, free and methodical views, were unfortunately accompanied by very limited mathematical and physical knowledge, even for the age in which he lived, was very unjust to Gilbert. "Bacon showed his inferior aptitude for physical research in rejecting the Copernican doctrine which William Gilbert adopted" (Whewell, *Philosophy of the Inductive Sciences*, vol. ii., p. 378).

‡ *Cosmos*, vol. i., p. 188.