

various classes of fossils of the animal and vegetable kingdoms, and remarks on the different states in which they are found petrified, he considers the geological phenomena connected with them; observing, that some, like those of Ceningen, resembled the testacea, fish, and plants indigenous in the neighbouring region*; while some, such as ammonites, gryphites, belemnites, and other shells, are either of unknown species, or found only in the Indian and other distant seas. In order to elucidate the structure of the earth, he gives sections, from Verenius, Buffon, and others, obtained in digging wells; distinguishes between horizontal and inclined strata; and, in speculating on the causes of these appearances, mentions Donati's examination of the bed of the Adriatic; the filling up of lakes and seas by sediment; the imbedding of shells, now in progress; and many known effects of earthquakes, such as the sinking down of districts, or the heaving up of the bed of the sea, so as to form new islands and lay dry strata containing petrifications. The ocean, he says, deserts its shores in many countries, as on the borders of the Baltic; but the rate of recession has been so slow in the last 2000 years, that to allow the Apennines, whose summits are filled with marine shells, to emerge to their present height, would have required about 80,000 years, — a lapse of time ten times greater, or more, than the age of the universe. We must therefore refer the phenomenon to the command of the Deity, related by Moses, that "the waters should be gathered together in one place, and the dry land appear." Gesner adopted the views of Leibnitz, to account for the retreat of the primeval ocean: his essay displays much erudition; and the opinions of preceding writers of Italy, Germany, and England are commented upon with fairness and discrimination.

Arduino, 1759. — In the year following, Arduino †, in his memoirs on the mountains of Padua, Vicenza, and Verona, deduced, from original observations, the distinction of rocks into primary, secondary, and tertiary, and showed that in those districts there had been a succession of submarine volcanic eruptions.

Michell, 1760. — In the following year (1760) the Rev. John Michell, Woodwardian Professor of Mineralogy at Cambridge, published in the Philosophical Transactions, an Essay on the Cause and Phenomena of Earthquakes. ‡ His attention had been drawn to

* Part ii. chap. 9.

† *Giornale del Crisellini*, 1759.

‡ See a Sketch of the History of English Geology, by Dr. Fitton, in *Edinb. Rev.* Feb. 1818, re-edited Lond. and *Edinb. Phil. Mag.* vol. i. and ii. 1832–33. Some of Michell's observations anticipate in so remarkable a manner the theories established forty years afterwards, that his writings would probably have formed an era in the science, if his researches had been uninterrupted. He held, however, his professorship only eight years, when his career was suddenly cut short by preferment to a benefice. From that time

he appears to have been engaged in his clerical duties, and to have entirely discontinued his scientific pursuits, exemplifying the working of a system still in force at Oxford and Cambridge, where the chairs of mathematics, natural philosophy, chemistry, botany, astronomy, geology, mineralogy, and others, being frequently filled by clergymen, the reward of success disqualifies them, if they conscientiously discharge their new duties, from farther advancing the cause of science, and that, too, at the moment when their labours would naturally bear the richest fruits.