

opinion, than to the doctrine of catastrophes.¹ But Steno, in 1669, approached nearer to this doctrine; for he asserted that Tuscany must have changed its face at intervals, so as to acquire six different configurations, by the successive breaking down of the older strata into inclined positions, and the horizontal deposit of new ones upon them. Strabo, indeed, at an earlier period had recourse to earthquakes, to explain the occurrence of shells in mountains; and Hooke published the same opinion later. But the Italian geologists prosecuted their researches under the advantage of having, close at hand, large collections of conspicuous and consistent phenomena. Lazzaro Moro, in 1740, attempted to apply the theory of earthquakes to the Italian strata; but both he and his expositor, Cirillo Generelli, inclined rather to reduce the violence of these operations within the ordinary course of nature,² and thus leant to the doctrine of uniformity, of which we have afterwards to speak. Moro was encouraged in this line of speculation by the extraordinary occurrence, as it was deemed by most persons, of the rise of a new volcanic island from a deep part of the Mediterranean, near Santorino, in 1707.³ But in other countries, as the geological facts were studied, the doctrine of catastrophes appeared to gain ground. Thus in England, where, through a large part of the country, the coal-measures are extremely inclined and contorted, and covered over by more horizontal fragmentary beds, the opinion that some violent catastrophe had occurred to dislocate them, before the superincumbent strata were deposited, was strongly held. It was conceived that a period of violent and destructive action must have succeeded to one of repose; and that, for a time, some unusual and paroxysmal forces must have been employed in elevating and breaking the pre-existing strata, and wearing their fragments into smooth pebbles, before nature subsided into a new age of tranquillity and vitality. In like manner Cuvier, from the alternations of fresh-water and salt-water species in the strata of Paris, collected the opinion of a series of great revolutions, in which "the thread of induction was broken." Deluc and others, to whom we owe the first steps in geological dynamics, attempted carefully to distinguish between causes now in action, and those which have ceased to act; in which latter class they reckoned the causes which have

¹ "Here is a part of the earth which has become more light, and which rises, while the opposite part approaches nearer to the centre, and what was the bottom of the sea is become the top of the mountain."—Venturi's *Léonardo da Vinci*.

² Lyell, i. 3. p. 64. (4th ed.)

³ *Ib.* p. 60.