

configuration. All that we know regarding this subject resolves itself into this one point, that the active cause is subterranean; that continents did not arise at once in the form they now present, but were, as we have already observed, increased by degrees by means of numerous oscillatory elevations and depressions of the soil, or were formed by the fusion of separate smaller continental masses. Their present form is, therefore, the result of two causes, which have exercised a consecutive action the one on the other: the first is the expression of subterranean force, whose direction we term accidental, owing to our inability to define it, from its removal from within the sphere of our comprehension, while the second is derived from forces acting on the surface, among which volcanic eruptions, the elevation of mountains, and currents of sea water play the principal parts. How totally different would be the condition of the temperature of the earth, and, consequently, of the state of vegetation, husbandry, and human society, if the major axis of the New Continent had the same direction as that of the Old Continent; if, for instance, the Cordilleras, instead of having a southern direction, inclined from east to west; if there had been no radiating tropical continent, like Africa, to the south of Europe; and if the Mediterranean, which was once connected with the Caspian and Red Seas, and which has become so powerful a means of furthering the intercommunication of nations, had never existed, or if it had been elevated like the plains of Lombardy and Cyrene?

The changes of the reciprocal relations of height between the fluid and solid portions of the earth's surface (changes which, at the same time, determine the outlines of continents, and the greater or lesser submersion of low lands) are to be ascribed to numerous unequally working causes. The most powerful have incontestably been the force of elastic vapors inclosed in the interior of the earth, the sudden change of temperature of certain dense strata,* the unequal secular loss of

* De la Beche, *Sections and Views illustrative of Geological Phenomena*, 1830, tab. 40; Charles Babbage, *Observations on the Temple of Serapis at Pozzuoli, near Naples, and on certain Causes which may produce Geological Cycles of great Extent*, 1834. "If a stratum of sandstone five miles in thickness should have its temperature raised about 100°, its surface would rise twenty-five feet. Heated beds of clay would, on the contrary, occasion a sinking of the ground by their contraction." See Bischof, *Wärmelehre des Innern unseres Erdkörpers*, s. 303, concerning the calculations for the secular elevation of Sweden, on the supposition of a rise by so small a quantity as 7° in a stratum of about 155,000 feet in thickness, and heated to a state of fusion.