

or that the continents emerged, by an expansive force acting beneath them,—the effect on the water would be nearly the same. This effect, in scooping out valleys, has been compared to what may be observed in miniature “by the drainage of the retiring tides on muddy shores, especially in confined estuaries, where the fall is considerable and rapid,” the water cutting out channels for its passage, as it drains off. The retiring of the ocean suddenly from the present continents, would be a cause sufficient for the excavation of valleys; but I have stated, in the preceding Chapter, the reasons for believing, that continents emerged from the ocean, by the long continued action of an upheaving or expanding force.

The fifth theory, which ascribes the formation of valleys, and the extensive denudations of the strata, to deluges that have suddenly swept over different parts of the globe, has been maintained by Professor Pallas and Sir James Hall. The former conjectured, that the inundations that have covered parts of the Asiatic continent with blocks of stone, beds of gravel, and marine remains, were occasioned by the formation of volcanic islands in the Indian ocean. Within the period of authentic history, extensive inundations have been occasioned by volcanoes and earthquakes, which afford probability to the opinion of Pallas. In the year 1650, a new volcanic island rose from the sea in the Grecian Archipelago; and according to the account of Kircher, a contemporary writer, it occasioned the sea to rise forty-five feet in height, at the distance of eighty miles, and destroyed the galleys of the Grand Signior in the port of Candia. The principal damage done by earthquakes to cities adjoining the sea, is often effected by an enormous wave, the sea, retiring from its bed in the first instance, suddenly returns with a prodigious swell, and in a few moments rushes over the adjacent country.

Sir James Hall has given greater extension and consistency to this speculation. He supposes that the upheaving of a large island, like Sumatra, might take place so suddenly as to drive the ocean with great impetuosity over the summits of the highest mountains, and strip off the glaciers, and transport them into distant countries. Ice being specifically lighter than water, the glaciers would carry away with them, the blocks of stone that had fallen from the impending rocks, and had become encased in ice. This theory of Sir James Hall's would, I conceive, offer a better explanation than any other, for the occurrence of groups of fragments of particular rocks, unmixed with fragments of other rocks. Each glacier, loaded with stones from the rocks above it, may be regarded as a ship freighted with specimens of its native mountains, which it deposits, by thawing, in the place where it ultimately rests. Nor would a wave or swell of the sea, that had covered the highest mountains, suddenly subside; it would sweep repeatedly over the whole surface of the globe, at a lower and lower level each time; breaking down opposing obstacles, opening new passages for the water, and scooping out