

vived great revolutions on the earth's surface, is hypothetical; and all which depends on this assumption belongs to theoretical geology.

Confining ourselves, then, to volcanic effects, which have been produced, certainly or probably, since the earth's surface assumed its present form, we have still an ample exhibition of powerful causes of change, in the streams of lava and other materials emitted in eruptions; and still more in the earthquakes which, as men easily satisfied themselves, are produced by the same causes as the eruptions of volcanic fire.

Mr. Lyell's work was important in this as in other portions of this subject. He extended the conceptions previously entertained of the effects which such causes may produce, not only by showing how great these operations are historically known to have been, and how constantly they are going on, if we take into our survey the whole surface of the earth; but still more, by urging the consequences which would follow in a long course of time from the constant repetition of operations in themselves of no extraordinary amount. A lava-stream many miles long and wide, and several yards deep, a subsidence or elevation of a portion of the earth's surface of a few feet, are by no means extraordinary facts. Let these operations, said Mr. Lyell, be repeated thousands of times; and we have results of the same order with the changes which geology discloses.

The most mitigated earthquakes have, however, a character of violence. But it has been thought by many philosophers that there is evidence of a change of level of the land in cases where none of these violent operations are going on. The most celebrated of these cases is Sweden; the whole of the land from Gottenburg to the north of the Gulf of Bothnia has been supposed in the act of rising, slowly and insensibly, from the surrounding waters. The opinion of such a change of level has long been the belief of the inhabitants; and was maintained by Celsius in the beginning of the eighteenth century. It has since been conceived to be confirmed by various observations of marks cut on the face of the rock; beds of shells, such as now live in the neighboring seas, raised to a considerable height; and other indications. Some of these proofs appear doubtful; but Mr. Lyell, after examining the facts upon the spot in 1834, says, "In regard to the proposition that the land, in certain parts of Sweden, is gradually rising, I have no hesitation in assenting to it, after my visit to the districts above alluded to."<sup>4</sup> If this conclusion be generally accepted by

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<sup>4</sup> *Phil. Trans.* 1835, p. 32.