

Chilian coast, *not* that the land had risen, but that the ocean had permanently retreated.

Dr. Meyen, a Prussian traveller, who visited Valparaiso in 1831, says that on examining the rocks both north and south of the town, nine years after the event, he found, in corroboration of Mrs. Graham's account, that remains of animals, and sea-weed, the *Lessonia* of Bory de St. Vincent, which has a firm ligneous stem, still adhered to those rocks which in 1822 had been elevated above high-water mark.* According to the same author, the whole coast of Central Chili was raised about four feet, and banks of marine shells were laid dry on many parts of the coast. He observed similar banks, elevated at unknown periods, in several places, especially at Copiapo, where the species all agree with those now living in the ocean. Mr. Freyer also, who resided some years in South America, has confirmed these statements †; and Mr. Darwin obtained evidence that the remains of an ancient wall, formerly washed by the sea, and now 11½ feet above high-water mark, acquired several feet of this additional elevation during the earthquake of 1822. ‡

The shocks continued up to the end of September, 1823; even then, forty-eight hours seldom passed without one, and sometimes two or three were felt during twenty-four hours. Mrs. Graham observed, after the earthquake of 1822, that besides a beach newly raised above high-water mark, there were several older elevated lines of beach, one above the other, consisting of shingle mixed with shells, extending in a parallel direction to the shore, to the height of fifty feet above the sea. §

Extent of country elevated. — By some observers it has been supposed that the whole country from the foot of the Andes to a great distance under the sea was upraised in 1822, the greatest rise being at the distance of about two miles from the shore. “The rise upon the coast was from two to four feet: — at the distance of a mile inland it must have been from five to six, or seven feet.” || It has also been conjectured by the same eye-witnesses to the convulsion, that the area over which this permanent alteration of level extended may have been equal to 100,000 square miles. Although the increased fall of certain water-courses may have afforded some ground for this conjecture, it must be considered as very hypothetical, and the estimate may have exceeded or greatly fallen short of the truth. It may nevertheless be useful to reflect on the enormous amount of change which this single convulsion occasioned, if the extent of country moved upward really amounted to 100,000 square miles, — an extent just equal to half the area of France, or about five sixths of the area of Great Britain and Ireland. If we suppose the elevation to have been only three feet on an average, it will be seen that the

* Reise um die Erde; and see Dr. Meyen's letter cited Foreign Quart. Rev. No. 33. p. 13. 1836.

† Geol. Soc. Proceedings. No. 40. p. 179., Feb. 1835.

‡ Proceedings Geol. Soc. vol. ii. p. 447.

§ Geol. Trans., vol. i., second series, p. 415.

|| Journal of Sci. vol. xvii. pp. 40. 45.