

tions lying between the Alps and the mountains of northern Africa, and spreading eastward so as to inclose the basins of the Mediterranean, Black Sea, Caspian, and Sea of Aral, and to rise into the great mountain-ridges of Central Asia. In this zone lie numerous volcanic vents, both active and extinct or dormant, from the Azores on the west to the basaltic plateaus of India on the east. The Pacific Ocean, surrounded with a vast ring of volcanic vents, has its borders likewise subject to frequent earthquake shocks. Some of the most terrible earthquakes within human experience have been those which have affected the western seaboard of South America.¹⁸⁴ It is worthy of notice that the coasts of the Pacific Ocean more specially liable to convulsions of this nature plunge steeply down into deep water with slopes of one in twenty to one in thirty, while shore-lines such as those of Australia, Scandinavia, and the east of South America, where the slope is no more than from one in fifty to one in two hundred and fifty, are hardly ever affected by earthquakes. It should also be remarked that while earthquakes are apt to occur along the flanks of mountain-chains and to travel along these lines of elevation, they seldom cross a large mountain-chain. In some regions the site of disturbance is not on land but under the sea. This has been clearly established for Japan.¹⁸⁵

Origin of Earthquakes.—Though the phenomena of an earthquake become intelligible as the results of the transmission of waves of shock arising from a centre where some

¹⁸⁴ The Charleston Earthquake of 31st August, 1886, has been fully discussed by Captain Dutton, Ninth Ann. Report U. S. Geol. Survey, 1887-88, p. 209. The earthquakes of Central America are discussed by F. de Montessus de Ballore in a Memoir rewarded by the Acad. Sci. Nat. Saone et Loire, and published at Dijon, 1888.

¹⁸⁵ Milne, "Earthquakes," p. 227.