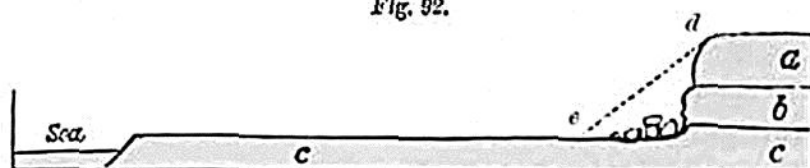


faced, wherever, in consequence of the altered state of the tides and currents, the sea has receded for a few centuries. We see the cliffs crumble down in a few years if composed of sand or clay, and soon reduced to a gentle slope. If there were shells on the beach they decompose, and their materials are washed away, after which the sand and shingle may resemble any other alluviums scattered over the interior.

The features of an ancient shore may sometimes be concealed by the growth of trees and shrubs, or by a covering of blown sand, a good example of which occurs a few miles west from Dax, near Bourdeaux, in the south of France. About twelve miles inland, a steep bank may be traced running in a direction nearly northeast and southwest, or parallel to the contiguous coast. This sudden fall of about 50 feet conducts us from the higher platform of the Landes to a lower plain which extends

Fig. 92.



Section of inland cliff at Abesse, near Dax.
a. Sand of the Landes. b. Limestone. c. Clay.

to the sea. The outline of the ground suggested to me, as it would do to every geologist, the opinion that the bank in question was once a sea-cliff, when the whole country stood at a lower level. But this is no longer matter of conjecture, for, in making excavations in 1830 for the foundation of a building at Abesse, a quantity of loose sand, which formed the slope *d e*, was removed; and a perpendicular cliff, about 50 feet in height, which had hitherto been protected from the agency of the elements, was exposed. At the bottom appeared the limestone *b*, containing tertiary shells and corals, immediately below it the clay *c*, and above it the usual tertiary sand *a*, of the department of the Landes. At the base of the precipice were seen large partially rounded masses of rock, evidently detached from the stratum *b*. The face of the limestone was hollowed out and weathered into such forms as are seen in the calcareous cliffs of the adjoining coast, especially at Biarritz, near Bayonne. It is evident that, when this country stood at a somewhat lower level, the sea advanced along the surface of the argillaceous stratum *c*, which, from its yielding nature, favored the waste by allowing the more solid superincumbent stone *b* to be readily undermined. Afterwards, when the country had been elevated, part of the sand, *a*, fell down, or was drifted by the winds, so as to form the talus, *d e*, which masked the inland cliff until it was artificially laid open to view.

When we are considering the various causes which, in the course of ages, may efface the characters of an ancient sea-coast, earthquakes must not be forgotten. During violent shocks, steep and overhanging cliffs are often thrown down and become a heap of ruins. Sometimes unequal movements of upheaval or depression entirely destroy that horizon-