

well-known security of many of these harbours depends entirely on this fortunate peculiarity in their structure.

"In what manner is this singular conformation to be accounted for? The action of the waves is seen to be the cause of the superior elevation of some reefs on their windward sides, where sand and large masses of coral rock are thrown up by the breakers; but there is a variety of cases where this cause alone is inadequate to solve the problem; for reefs submerged at considerable depths, where the movements of the sea cannot exert much power, have, nevertheless, the same conformation, the leeward being much lower than the windward side.*

"I am informed by Captain King, that, on examining the reefs called Rowley Shoals, which lie off the north-west coast of Australia, where the east and west monsoons prevail alternately, he found the open side of one crescent-shaped reef, the *Impérieuse*, turned to the east, and of another, the *Mermaid*, turned to the west; while a third oval reef, of the same group, was entirely submerged. This want of conformity is exactly what we should expect, where the winds vary periodically.

"It seems impossible to refer the phenomenon now under consideration to any original uniformity in the configuration of submarine volcanos, on the summits of which we may suppose the coral reefs to grow; for although it is very common for craters to be broken down on one side only, we cannot imagine any cause that should breach them all in the same direction. But the difficulty will, perhaps, be removed, if we call in another part of the volcanic agency—subsidence by earthquakes. Suppose the windward barrier to have been raised by the mechanical action of the waves to the height of two or three yards above the wall on the leeward side, and then the whole island to sink down a few fathoms, the appearances described would then be presented by the submerged reef. A repetition of such operations, by the alternate elevation and depression of the same mass (an hypothesis strictly conformable to analogy), might produce still greater inequality in the two sides, especially as the violent efflux of the tide has probably a strong tendency to check the accumulation of the more tender corals on the leeward reef; while the action of the breakers contributes to raise the windward barrier."†

Previously to my adverting to the signs above enumerated of a downward movement in the bed of the ocean, Dr. MacCulloch, Captain Beechey, and many other writers had shown that masses of recent coral had been laid dry at various heights above the sea-level, both in the Red Sea, the islands of the Pacific, and in the East and West Indies. After describing thirty-two coral islands in the Pacific, Captain Beechey mentioned that they were all formed of living coral except one, which, although of coral formation, was raised about seventy or eighty feet above the level of the sea, and was encompassed by a reef of living coral. It is called Elizabeth or Henderson's Island,

* Voyage to the Pacific, &c., p. 189.

† See Principles of Geol., 1st ed., 1832, vol. ii. p. 293.