

instances observed, the layers dip at an angle of six to eight degrees down the beach. This dip is nothing but the slope of the beach itself, and arises from the circumstance that the sands are deposited by the incoming waves, or tides, on such a sloping surface. Tutuila and Upolu, in the Navigator group, and Oahu in the Hawaiian, afford many examples of these beach formations. At certain localities the beach sand-rock has been washed away after it was formed; and occasionally large masses or slabs have been uplifted by the sea and thrown high up on the beach.

Deposits of the same kind sometimes include detritus from the hills. Black basaltic pebbles are thus cemented by the white calcareous material, producing a rock of very singular appearance. Near Diamond Hill, on Oahu, is a good locality for observing the steps in its formation. Many of the pebbles of the beach are covered with a thin incrustation of carbonate of lime, appearing as if they had been dipped in milk, and others are actually cemented, yet so weakly that the fingers easily break them apart.

The lime in solution in waters washing over these coral shores is also at times deposited in the cavities or seams of the volcanic rocks; thus the cavities of a lava or basalt become filled with white calcareous kernels, and the cellular lava is changed into an amygdaloid. In large cavities, or caverns, it often forms stalactites or stalagmitic incrustations. Similar facts are stated by Mr. Darwin as observed on the shores of Ascension; and many interesting particulars are given respecting calcareous incrustations on coasts in his work on Volcanic Islands, some of which are cited further on. They were observed by the writer upon Madeira, in St. Jago, one of the Cape Verds, as well as among the volcanic islands of the Pacific.

Jukes speaks of the oolitic character of the beach sand-rock about islets connected with the Australian barrier, and states "that the fact that the rock was not consolidated under water was proved by nests of turtles' eggs being found imbedded in it, these evidently having been deposited by the animal when the sand was above water and still loose and incoherent."