

between the continental sea and the existing deep oceans may perhaps account for the diversity of results.

VIII. CONSOLIDATION OF CORAL ROCKS.

All true coral-reef rocks are examples of the consolidation of material mainly of coral origin—either mud, sands, fragments, or standing corals, the last with mud or sands intermixed—by (1), an under-water process; (2), at the ordinary temperature; and they exemplify the mode in which all other submarine limestones of organic origin have been consolidated. The process appears to depend on the presence (proved by chemical analysis) of carbonic acid in the sea-waters that bathe and penetrate the sands. This carbonic acid is derived from three sources: from (1), the rains which wash it down from the atmosphere; (2) the respiration of all the animal life in the waters, even down to the simplest and minutest; and (3) the decomposition of all vegetable or animal débris in the waters or diffused through the sand or mud. This gas is set free, therefore, just where it is needed for the work, and is always ready to perform its part in the process of consolidation. It enables the water to take up carbonate of lime from the grains of the mass to be solidified, or from outside sources; and then the deposition of the same among the grains through their attractions produces the cementation.

The beach and drift sand-rocks or oölites are different from the reef-rock in being superficial deposits. The carbonic acid of the waters performs the same part as in the latter; but with these, there is alternate wetting and drying during the ebb and flow of the tides and the succession of gales and quiet winds. By this means the grains become incrustated, and every new wetting and drying adds a new layer to the surface of each; and thus the oölitic structure is produced. Facts are mentioned on page 122 of pebbles of volcanic or basaltic rocks, lying loose on a seashore, becoming incrustated in this way with a milky layer; and of basaltic conglomerates being made by the same means, the carbonate of lime being added until all