

coves of land to give force to the waters of currents, and to direct their course, and the absence also of fresh-water streams, are the only modifying causes not present. It is readily understood, therefore, why lagoon entrances are more likely to become filled up by growing coral, than the passages through barrier reefs.

III. RATE OF GROWTH OF REEFS.

The formation of a reef has been shown to be a very different process from the growth of a zoöphyte. Its rate of progress is a question to be settled by a consideration of many distinct causes, none of which have yet been properly measured.

a. The rapidity of the growth of zoöphytes is an element in this question of great importance, and one that should be determined by direct observation with respect to each of the species which contribute largely to reefs, both in the warmer and colder parts of coral-reef seas.

b. The character of the coral plantation under consideration should be carefully studied; for it is of the greatest consequence to know whether the clusters of zoöphytes are scattered tufts over a barren plain, or whether in crowded profusion. Compare the débris of vegetation on the semi-deserts of California with that of regions buried in foliage; equally various may be the rate of growth of coral rock in different places. An allowance should also be made for the shells and other reef relics. The amount of reef-rock formed in a given time cannot exceed, in cubic feet, the aggregate of corals and shells added by growth—that is, if there are no additions from other distant or neighbouring plantations.

c. It is also necessary to examine all conditions that are connected with, or can influence, the marine or tidal currents of the region—their strength, velocity, direction, where they eddy, and where not, whether they flow over reefs that may afford débris or not. All the débris of one plantation may sometimes be swept away by currents to contribute to other