

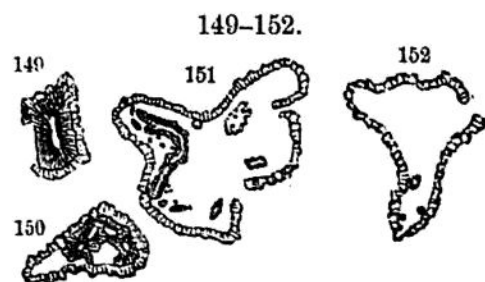
reef, *t*, *t'*, alone at the surface, around a lagoon, *lll*, with an islet, *u*, over the peak *T*, which was the last point to disappear.

These steps are well illustrated at the Fijis. The island Goro (Fig. 149) has a fringing reef; Angau (Fig. 150), a barrier; Exploring Isles (Fig. 151), a very distant barrier, with a few islets; Numuku (Fig. 152), a lake with a single rock. The disappearance of this last rock would make the island a true atoll.

Whenever the subsidence ceases, the waves build up the land above the reach of the tides; seeds take root; and the reef becomes covered with foliage.

The lands inside of coral barriers, as illustrated in these figures, very often show, by their narrow broken features and the deep indentations that were once valleys, that they are sunken lands, and thus sustain Darwin's theory.

The atoll Menchikoff (Fig. 145) was evidently formed, as explained by Darwin, about a high island, consisting of two distinct ridges or clusters of summits, like



Islands of the Fiji group: Fig. 149, Goro; 150, Angau; 151, Exploring Isles; 152, Numuku.

Maui and Oahu in the Hawaiian group.

If the subsidence be still continued, after the formation of the atoll, the coral island will gradually diminish its diameter, until finally it may be reduced to a mere sand-bank, or become submerged in the depths of the ocean. The occurrence of sunken atolls, like the Maldives, is one of the strong arguments for the theory of subsidence.

Thickness of reefs. — The thickness of a coral formation, supposing Darwin's theory to be the true one, is often very great. From soundings within a short distance of coral islands, it is certain that this thickness is in some cases thousands of feet. The barrier reefs remote from an island stand in deep water, approximately proportional in depth to the distance from the coast-line. Supposing the slope of the bottom at the Gambier Islands to be only five degrees, we find, by a simple calculation, that the reef has a thickness of 1200 feet. In a similar manner, it is found that the thickness must be at least 250 feet at Tahiti, and 2000 or 3000 at the Fijis.

The rate of subsidence required to produce the results described cannot exceed the rate of upward increase of the reef-ground. On page 385 some facts are given illustrating the exceeding slowness of such movements.¹

As coral debris is distributed, by the waves and currents, according to the same laws that govern the deposition of silt on sea coasts, it does not necessarily follow that the

¹ For further information on the subject of Coral reefs and limestones, the reader may refer to the author's work on *Coral Islands*, 400 pp. 8vo., 1891, based on his *Exploring Expedition Report on Zoöphytes* (740 pp. 4to, and 61 plates in folio, 1846), and to the chapter on *Coral Reefs and Islands* in his *Expedition Report on Geology* (750 pp. 4to, with 21 plates in folio, 1849); also to Darwin on the *Structure and Distribution of Coral Reefs*, 8vo, with maps and illustrations, London, 1842, the last edition, by Professor T. G. Bonney, in 1889.