

one of the Kermadec group, was sighted, and the ship passed between it and Raoul or Sunday Island.

At 6 A.M. on the 14th star observations showed a strong northerly current. At 7 A.M. a sounding and trawling were obtained in 520 fathoms at Station 170 (see Sheet 27). Raoul and Macauley Islands both being in sight, and the former having been surveyed and fixed by Captain Denham, it was possible to determine the height of Macauley Island, which proved to be 800 feet. From the northward Macauley Island appeared to be wedge-shaped, but from the eastward it looked round-backed. At noon another sounding and trawling and serial temperatures were taken in 630 fathoms (Station 170A, see Sheet 27), and at 4.30 P.M. the ship proceeded to the northward under steam, passing west of Raoul Island.

Kermadec Islands.—The Kermadec group of islands, which are all very small, forms with New Zealand, Macquarie Island, and the Tonga group, a direct line of volcanic action, stretching in a northeasterly direction, and thus nearly at right angles to the northwest lines, which are followed by many of the remaining Pacific groups, such for example as the Fijis.

The flora of Raoul Island was described by Sir J. D. Hooker¹ from collections made by Mr. Macgillivray of H.M.S. "Herald." Forty-two vascular plants are known from the islands, of which five are endemic species. Half the number are New Zealand ferns; the large proportion of ferns in the flora is most remarkable, and also their New Zealand character. The group lies just at the northern limit of the zone of westerly winds, and within that of calms and changeable winds, but so close to the limit that the winds may well have transported many of the plants, and the preponderance of ferns may possibly be due to the fact, that the winds have been the main agents in transporting vegetation to the islands, and have sufficed to carry the minute fern spores, whilst heavier seeds have seldom reached the island, by other means of transit. If fern spores be diffused mainly by wind, it should be especially difficult for them to cross the zones of constant rains, and there ought to be a marked separation of fern forms in distribution about those lines. There is no connection between the flora of the Kermadecs and that of Norfolk Island, although on all considerations such would have been expected to occur, as is also pointed out by Sir J. D. Hooker. The soundings of the "Gazelle" and "Tuscarora" have proved that a channel of more than 1000 fathoms in depth passes up between New Zealand and the Kermadec Islands, hence an ancient land connection cannot be looked to as an explanation of the New Zealand affinities of the Kermadec flora.

On the 15th July, at 6.30 A.M., a sounding and trawling were obtained in 600 fathoms, in lat. 28° 33' S., long. 177° 50' W. From this position Raoul Island was just visible,

¹ Sir J. D. Hooker, Botany of Raoul Island, *Journ. Linn. Soc., Lond. (Bot.)*, vol. i. p. 125, 1857.