

6. AFFINITIES OF THE KAPITI FLORA AND ITS HISTORY.

The flora of Kapiti consists of 218 species of flowering-plants, ferns, and fern-allies, 175 belonging to the first division and 43 to the second.

If we put on one side the outlying islands—Stewart Island and those close to the mainland excepted—of the New Zealand biological region, the remainder may, in my opinion, be naturally divided into three botanical provinces. These are (a) the northern province, extending from the Three Kings Islands to latitude 38° S.; (b) the central province, stretching from the southern boundary of the northern province to latitude 42° S. in the South Island; (c) the southern province, comprising the remainder of the South Island and the whole of Stewart Island. From the above it may be seen that Cook Strait is no line of demarcation between the North and South Island plants. But these limits as just given are to some extent artificial: certain plants overstep the boundary-lines and penetrate for some distance south of the provinces to which they properly belong—as, for instance, some of the central province reach Banks Peninsula on the east and to beyond Hokitika on the west: all the same, such exceptions do not affect the general applicability or naturalness of the divisions.

So far as the plants of Kapiti are concerned, 175 species are found in all three of the above provinces, 40 are confined to the central and northern provinces, 1 to the central and southern, and the distribution of 2 is uncertain. As for the general distribution of the species, 116 are endemic, and the remainder occur in either Australia, South America, Malaya, Polynesia, or elsewhere, details being given in section 8.

If we consider the formations of Kapiti, the forest is very closely related, so far as the species go, to that of southern Wellington, the arborescent plants being almost identical. Ecologically, however, it specially resembles the low forest on the steep slopes near the sea between Paekakariki and Paraparaumu, which, in fact, is only a few miles distant. With regard to the other islands of Cook Strait, I have only examined the flora of Stephen Island, and this has a very similar forest (Plate III, 2), which, however, is much poorer in species, and, as may be seen from the photograph, of a more wind-swept habit. As for the forests of northern Marlborough, including D'Urville Island, they too have in large measure the same species as Kapiti. These facts taken in connection with the geological history of New Zealand are not without significance.

According to Hutton* the North and South Islands of New Zealand were united during the early Pliocene period. This being the case, a continuous forest would stretch from the North to the South Island over what is now Cook Strait, Kapiti and Mana Islands rising up as mountains, with meadows and rocky ground above and forest below. But, according to Hutton, the land sank in the southern part of the North Island during the later Pliocene period,† and later still a considerable subsidence took place in the South Island. During this period of subsidence Kapiti would be gradually reduced in area, a hard struggle for existence would take place amongst its plants, those of the meadow-land would go to the wall, but sufficient space would be left for those of the forest to remain intact, though probably some of its species would be much reduced in number of individuals—as, e.g., the taxads—and others would vanish altogether. On this latter supposition may be explained the absence of a number of extremely common trees whose presence might well be expected, such as *Dodonaea viscosa* (the akeake), *Hoheria sexstylosa* (the lacebark), *Plagianthus betulinus* (the ribbonwood), *Sophora microphylla* (the kowhai), *Myrtus bullata* (the ramarama, a most common shrub of Wellington forests). In this connection the great rarity of *Cordyline australis* (cabbage-tree) on the island must be noted. According to the above view, then, the forest of Kapiti is a remnant of the ancient forest mass which occupied much of central New Zealand ages ago, and the species would be then differentiated just as we know them at present.

On the other hand, it may be urged that the whole island would be submerged, or that there has never been land connection with either of the main islands. Leaving out of the question many points supplied by the general biology of New Zealand, is the fact that the wonderful animal *Peripatus* occurs in the Kapiti forest, while there are also earthworms common to the South Island. Also, had the island—an island of quite limited area—been colonised entirely by bird, current, or wind agency, it is hardly likely that such a very considerable percentage of the neighbouring forest-trees would have arrived, or that a formation almost identical with that on the adjoining coast should exist. Also, it is far more easy to account for the presence of a few individuals of certain species in the forest on the supposition that these are remnants of a larger band than to suppose they are new-comers, since such can only with the greatest difficulty gain a foothold in a closed primeval forest formation where there are no grazing animals to disturb the condition of affairs. Even now in mountain-meadows of New Zealand—spots much more suited for plant immigrants than forests, where sheep are not depastured—there are no introduced plants of any kind, notwithstanding the enormous colonising-power of these latter.

One matter of interest cannot be overlooked—namely, the presence on Kapiti of the South Island robin and not of the North Island species. The idea of a later connection with the South Island than the North must be at once dismissed by the fact that the sea is more shallow between Kapiti and the North Island than it is between it and the neighbouring portion of the South Island, the depths being 30 fathoms on the one hand and 80 and 86 on the other, while even close to the western cliffs of Kapiti the depth of 51 fathoms is reached.

Now, this robin must be looked upon either as having come from the South Island after the separation of Kapiti, or as being there at the time of the connection with the North Island. But in the former case we must admit the feasibility of a bird of short flight, and a denizen of the dense forest, crossing a considerable stretch of water, a by no means likely proceeding. On the other hand, it

* "The Geological History of New Zealand" (Trans. N.Z. Inst., Vol. xxxii, p. 177; 1900).

† *Loc. cit.*, p. 182.