

PART II.—THE PLANT FORMATIONS.

A. INTRODUCTION.

In what follows, the forest as a whole is considered as one formation, notwithstanding that it differs much in different parts and that no one tree or collection of trees is everywhere dominant. This treatment shows certainly a much broader conception of a plant-formation than that in any of my other phytogeographical writings, and it virtually means the inclusion of all the types of New Zealand rain-forest under one head. Such an arrangement has its advantages, since in any classification of the forests of the world the rain-forests of New Zealand could be most conveniently considered as one whole. Also they can be subdivided into their minor natural divisions, and these, according to their relative importance, be classified, as is here done with associations and sub-associations. A further delimitation would be *groups* such as the association of *Gahnia xanthocarpa* and *Astelia trinervia*, but it is to be feared a too minute classification would be more artificial than natural.

B. FOREST FORMATIONS.

1. GENERAL REMARKS.

The great mass of trees forming the Waipoua Forest is by no means of uniform composition. The nature of the soil, the steepness or flatness of the ground, and the height above sea-level govern the arrangement of the plants. Thus, steep slopes, flat rich valley-bottoms, or fairly level ridges, vary considerably in their plant covering. As for altitude, certain plants—*e.g.*, *Macropiper excelsum*, *Hoheria populnea*, *Sophora tetraptera*, *Hypolepis distans*—are only to be found in the lowest parts of the forest. Other plants, notably the kauri itself, hardly occur at above 1,200 ft., while at this altitude *Ixerba brexioides* and *Quintinia serrata* become plentiful. At nearly 2,000 ft. the forest changes altogether, the tarairi being comparatively rare and the rimu (*Dacrydium cupressinum*) dominant, while there, too, occurs the broadleaf (*Griselinia littoralis*), a plant quite absent from the lower levels. From the Toetoehatiko ridge right to the eastern boundary of the forest there is no kauri, and the tarairi becomes gradually less in evidence, it giving place to the tawa (*Beilschmiedia tawa*), the towai* (*Weinmannia sylvicola*), or, on the highest ground of all, to the rimu (*Dacrydium cupressinum*). Where the ground is badly drained and water can lie comes in the kahikatea (*Podocarpus dacrydioides*) and the maire-tawake (*Eugenia maire*). With the above exceptions and a few minor ones dealt with elsewhere, the forest consists of the tarairi (*Beilschmiedia tarairi*) and the kauri (*Agathis australis*) as the dominant trees. From the above it might seem easy enough to show that the forest is made up of different associations, and so doubtless it is, but these usually imperceptibly merge the one into another, while, excepting in the wettest ground, a very large percentage of the trees, shrubs, and ferns occur in all parts of the forest, also different portions of what might be considered a definite plant-association differ both in species and physiognomy. Notwithstanding the above, it seems reasonable to consider the forest a collection of associations, some of which, as the kauri-tarairi, are well marked. Also certain other plants grow associated together, especially *Gahnia xanthocarpa* and *Astelia trinervia*, which form those dense thickets that, although so characteristic of kauri forests in general, occur also where that tree is altogether absent.

Bearing in mind the limitations observed in the preceding paragraph, the Waipoua Forest may be considered as made up of the following associations:—

(a.) *The kauri-tarairi*, in which *Agathis australis* and *Beilschmiedia tarairi* are dominant each in a sub-association of its own, though there is an intermediate stage where the kauri is merely dotted here and there, the tarairi forming the main mass of trees.

(b.) *The tawa-towai-rimu association*, which is most ununiform, one or other of the trees giving it the name being dominant and not usually all three in equal proportions.

(c.) *The swamp association*, which also is not uniform everywhere, the kahikatea (*Podocarpus dacrydioides*) giving the character in some instances, while in others the arborescent growth is comparatively scanty.

2. LEADING PHYSIOGNOMIC PLANTS AND THEIR LIFE-FORMS.

In order to save repetition when describing the formations, and so that readers unacquainted with the New Zealand flora may understand what follows, it seems well to give a brief account of those species on which the physiognomy of the forest depends, laying stress rather on their general appearance and ecological peculiarities than on such special marks as are used for purposes of botanical classification. The following comprise the most important:—

Filices: *Cyathea dealbata*, *Dicksonia lanata*, *Blechnum Frazeri*, *B. filiforme*.

Taxaceæ: *Podocarpus dacrydioides*, *Dacrydium cupressinum*.

Pinaceæ: *Agathis australis*.

Pandanaceæ: *Freycinetia Banksii*.

Cyperaceæ: *Gahnia xanthocarpa*.

Palmæ: *Rhopalostylis sapida*.

Liliaceæ: *Astelia trinervia*, *A. Solandri*.

Lauraceæ: *Beilschmiedia tarairi*, *B. tawa*.

Cunoniaceæ: *Weinmannia sylvicola*.

Rutaceæ: *Phebalium nudum*.

Myrtaceæ: *Metrosideros robusta*, *M. florida*, *M. scandens*.

Epacridaceæ: *Dracophyllum latifolium*.

Loganiaceæ: *Geniostoma ligustrifolium*.

Caprifoliaceæ: *Alseuosmia macrophylla*.

Compositæ: *Senecio Kirkii*.

* Towai is used rather than tawhero throughout this report, since it is the sole name for *Weinmannia sylvicola* in the Hokianga district.