of the association under consideration, and wanting in the north-east of the island. It has also many features in common with the Longwood forest near Orepuki, but this is at once distinguished by the presence in its upper portions of *Nothofagus* and the abundance of *Coprosma Banksii*.

The forest of the west of Otago being a taxad-beech forest right to sea-level belongs to a different category, although the bulk of the species are identical. The subalpine forests of the central mountain-chain of the North Island and of the volcanic plateau, although they are *Nothofagus* formations, have much in common with the forest of Stewart Island, especially in their undergrowth (see Cockayne, 26).

(*d.*) *The Yellow-pine* (Dacrydium intermedium) *Association.*

This association, so far as my observations go, does not extend northwards beyond the valley of the Freshwater River; from thence it is abundant in low-lying country to the south coast. How far it extends eastward I cannot say. The tree itself (*D. intermedium*) is to be met with in the ordinary rimu-kamahi association of the Port Pegasus district*; but the special association is confined to wet ground, or to situations exposed to wind.

Besides the presence of the small pine (*D. intermedium*), with its curious dimorphic yellowish-green foliage and weeping habit of growth when young, the floor of the low forest or scrub is covered with huge moss and liverwort cushions, sometimes quite globular in form, which are one of the most remarkable sights of Stewart Island (Photo No. 24). It is hard at first sight to believe that these cushions are not moss-covered boulders, and one naturally expects on kicking one to strike a hard substance. Frequently they are so close that progress can only be made by stepping from cushion to cushion.

A typical example, such as is shown in the photograph (No. 24), consists entirely of the moss *Dicranoloma Billardieri*. Its height will be from 1 ft. 6 in. to 2 ft., and its diameter about the same. Within the cushion the moss is dead, and changing into peat. The ultimate leafy shoots are pale yellow-green in colour, and $1\frac{1}{2}$–$1\frac{3}{4}$ in. long. Such a cushion is nearly always sopping wet with rain-water, and permeated by a network of small roots coming from the neighbouring trees. The liverwort cushions have identically the same habit (see Photo No. 25); they are formed by perhaps *Plagiochila gigantea* and *P. ramosissima*, but I am not quite certain as to the species. The shoots continue to grow outwardly and die inwardly, thus increasing the size of the cushion up to a certain limit. Moss-cushions of smaller size quite encircle slender stems of trees or shrubs, or occupy the basal portion of larger trunks. Epiphytic on the cushions are other mosses and liverworts, seedlings, filmy ferns, and lycopods.

On the flat ground of river-valleys, or where most sheltered, the association consists of nearly all the ordinary forest trees and shrubs, but they are of slender habit, and for the most part of irregular growth. The hupiro (*Coprosma foetidissima*) is no longer dominant, as in the undergrowth of the rimu-kamahi forest; but the broadleaf (*Griselinia littoralis*), the simple-leaved and Edgerley's panaxes (*Nothopanax simplex, N. Edgerleyi*), the native fuchsia (*F. excorticata*), the small-leaved myrtle (*Myrtus pedunculata*), small thin-barked totara (*Podocarpus Hallii*), manuka (*Leptospermum scoparium*), the sharp-leaved heath (*Styphelia acerosa*), and the weeping-matipo (*Suttonia divaricata*) play a conspicuous part. Erect green tussocks of *Gahnia procera* are as plentiful as in the subalpine scrub. Filmy ferns are not nearly so numerous as in the rimu-kamahi forest, but, on the other hand, there are great breadths of the umbrella-fern (*Gleichenia Cunninghamii*) (see Photo No. 20), and, as usual, a great deal of the common hard fern (*Blechnum discolor*). The forest-snowberry (*Luzuriaga marginata*) is abundant on the floor and on the moss cushions. Near the outskirts of the association, where it abuts on a manuka heath, &c., is generally much very tall *Gleichenia dicarpa* (scrambling umbrella-fern), climbing by means of its long flexible stem and horizontal pinnae.

In many parts of a forest such as the above, the ground between the moss cushions,† or places where these are not numerous, is covered everywhere with species of mosses and liverworts; indeed, the rich growth of these is astonishing. Where the bryophyte carpet is densest, ferns are almost absent. Finally, an occasional tall rimu (*D. cupressinum*) rises above the forest-roof.

Where the wind strikes the association strongly, it decreases in height, more manuka appears, the low trees press more closely together, the bryophyte cushions and *Gahnia* tussocks get closer, and a scrub results.

In ascending the Remarkables from Port Pegasus, on each flat piece of ground where boggy conditions prevail the taller forest gives place to a piece of yellow-pine association such as described above, but in which there are many rimus no taller than the other low trees, and a strong undergrowth of *Dacrydium Bidwillii*.

(*e.*) *Regeneration of Forest.*

There is a deep-rooted popular belief that when the New Zealand forest is once interfered with, and the light let in through trees being removed, and so on, it is doomed. This opinion is one of those half-truths that arise from an imperfect acquaintance with the facts. It is true that forests do cease to be; but it is not merely the cutting-out of a certain proportion of the trees which has led to their destruction, but fire and cattle-grazing must be added to the destructive influences. All over New Zealand remnants of the former forest-covering may be seen holding their own, even where no particular care is given to keep them intact, and in no few places old forest growths have reasserted themselves.

Climate more than any other factor governs the growth of rain-forests. The primeval dense forest of New Zealand was the result of excessive rain, and that same rain which caused the trees originally to mass themselves into forests will favour their regeneration should no detrimental factors be working for the contrary.

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* The word "district" is not used here in a plant-geographical sense.

† The term "moss cushion" is intended to include both mosses and liverworts.