

Phyllocladus alpinus, its leaf-like shoots of a somewhat glaucous colour. This latter may assume a pyramidal form, 8 ft. or so tall, or be merely of a straggling habit and sparingly branched. There are also fairly dense bushes of *Suttonia divaricata*, *Coprosma cuneata*, *Aristotelia fruticosa*, *C. parviflora*, and *C. microcarpa*. These shrubs may grow so closely and be themselves so dense as to exclude the floor-vegetation.

The second layer or tier of plants is made up of those more lowly ones which carpet the ground, and of the seedlings, ferns, and herbaceous plants—these frequently of considerable size—which grow through this covering or are dotted here and there. The most conspicuous of the mat-forming plants is the bright-green or occasionally dark-green filmy fern *Hymenophyllum multifidum*, whose fronds are sometimes so much curled up that the plant looks dead. Both stoloniferous and mat-forming is *Lagenophora petiolata*, the small roundish leaves close to the ground, and the little, white, daisy-like flower-heads raised on straight slender stalks. A moss builds up low cushion-like masses of yellowish green, through which grow in abundance the beech seedlings; also the green, grass-like, narrow leaves and slender culms of *Uncinia cæspitosa* covering considerable areas, thanks to its creeping stems, which also benefit by the mossy covering. The broader-leaved and taller *Uncinia australis* is less common, and likes the more shady gullies and recesses. The small fern *Blechnum penna marina* is often quite common, and the club-moss *Lycopodium fastigiatum*, here erect and green, and not depressed and orange-coloured as on the steppe, may form spreading colonies. Seedlings of all the forest-plants are present, but the most common, next to those of the beech, are the cut-leaved form of *Nothopanax simplex* and *Aristotelia fruticosa*. Where the forest is more open the piripiri (*Acena Sanguisorbæ*) is abundant. Near the outer rim of the formation is quite frequently a prostrate form of *Styphelia acerosa*, very different from the typical erect, dense-growing shrub, its wiry stems creeping through the loose layer of humus, and finally rising up for a few inches or even a foot. Other constituents of the forest, though not common, are *Erechtites glabrescens*, *Nertera dichondræfolia*, *Pittosporum rigidum*, *Gastrodia Cunninghamii*, and *Myosotis Forsteri*.

The gullies have a richer undergrowth than the slopes, and in such the dark-green, rather tall fern *Polystichum vestitum* and the delicate bright-green fronds of *Hypolepis millefolium* are abundant, while *Hymenophyllum multifidum* is everywhere. Here, too, is a good deal of *Astelia montana*, with its arching, coriaceous, hairy, sword-like leaves, while in many places are fine colonies of the enormous moss, a foot or more tall, *Polytrichum dendroides*.

The forest-floor is fairly level. There are no roots spreading over the ground, nor the unevennesses these occasion in the hygrophytic forests. The ground, mossy or covered with a thick layer of brown leaves, is springy to the tread. The higher epiphytes and lianes are quite wanting. *Hymenophyllum multifidum* is common on the tree-trunks, and so are mosses and lichens, as before mentioned.

Dead trees still standing (Photo. No. 15) or lying prone, are a frequent feature, while, as stated previously, seedlings and saplings are in abundance. So, if there are no fires, or interference from those animals which feed on the trees and especially destroy the bark and the undergrowth, these subalpine forests will long remain in their pristine vigour. Seedlings of most of the trees and shrubs are plentiful, even in forests where but few of the adults are present in the locality. The most abundant of all are the cut-leaved *Nothopanax simplex*, *Aristotelia fruticosa*, the beech itself, *Nothopanax Colensoi*, and finally the various species of *Coprosma*.

(3.) Affinities of the Formation.

Pure *Nothofagus cliffortioides* forest is very common in certain parts of the South Island, especially the central Southern Alps on their east side, but rarer in the North, where *N. Menziesii* is a more abundant subalpine tree. The presence of the formation usually bespeaks a dry and poor soil and a small rainfall—i.e., for a mountain region and a high altitude. Probably powerful or frequent winds are a factor, too, which helps in determining its presence. Generally speaking, the forest we are considering has a richer undergrowth than the same formation in the eastern Southern Alps, but it is poorer in species as a whole, though this is a matter dependent on the history of the vegetation, and not on any special ecological factors.

(e.) SUBALPINE BEECH FOREST OF *NOTHOFAGUS MENZIESII* (SILVER-BEECH).

This formation occurs at approximately an altitude of between 3,200 ft. and 3,700 ft. on the south and west of Ruapehu. It is also found in the higher parts of some of the river-gorges to the east of Tongariro. *N. Menziesii* is altogether a larger tree than *N. cliffortioides*, and is frequently more than 70 ft. in height, with a trunk 3 ft. in diameter. The tree itself is by no means confined to the subalpine zone, but occurs in abundance mixed with *N. fusca* at as low as 2,000 ft. altitude, even descending still lower into the mixed taxad forest.

The forest zones, as already noted, are only well defined in their central parts; elsewhere there is a combination of the two most adjacent. At about 3,400 ft. the trees are 40 ft. or 50 ft. tall, and consist almost entirely of *N. Menziesii*, though at a higher altitude than this a good deal of *N. fusca* is still present in places. The *N. Menziesii* forest of this district owes its physiognomy in part to the short leafy boughs or twigs which are given off from the trunks almost to their bases, while the abundance of *Coprosma fetidissima*, which here replaces *C. tenuifolia* of the *N. fusca* forest, gives the stamp to the straggling and rather open undergrowth. Some of the trees are 2 ft. in diameter, but many are much less, and the thick ones are distant, being merely dotted here and there. The smaller trees and the thicker-stemmed shrubs are covered much more abundantly with mosses than are those in the mountain-beech forest. All the plants of this latter forest are also present here, but in addition are the following: *Luzuriaga parviflora*, *Liberia pulchella*, *Alseuosmia macrophylla*, *Coprosma tenuifolia*, *Uncinia leptostachya*, *Gahnia pauci-*