roots, which wound above the ground for 30 ft. or more. This same tree at 27 in. from the ground gave off a horizontal stem, which continued in a straight line, not touching the ground, erect leafy shoots being given off at intervals; its extremity then bent to the ground, rooted, and gave rise to another tree of fair size, 7 in. in diameter, and finally entered the ground and there gave rise to another tree with buttresses and far-spreading roots.

This extending of roots above the surface of the ground is a very common feature of New Zealand forest-trees, and, though perhaps not so strongly in evidence in the Waipoua Reserve as is frequently the case, is still sufficiently striking. Thus *Podocarpus totara* spreads out its roots laterally for many feet, their upper half quite unburied and near the tree raised to a height of 16 in. or more. Though by no means everywhere, certain examples of *Laurelia* put forth from their overground roots most curious arching branches (Photo 19), forming knees 2 ft. in height after the manner of the North American *Taxodium distichum*, and which certainly, whatever their function, outwardly resemble pneumatophores.

The palm *Rhopalostylis sapida* frequently gives off adventitious roots (stilt-roots), red in colour, and so numerous as to touch one another at a distance of a foot or more from the base of the trunk. *Aristotelia racemosa* also, when growing on a moist river-flat, was observed in one instance raised on stout stilt-roots.

Details regarding branching of the trees cannot be given here, sufficient space having been devoted when speaking of physiognomic plants; but, generally speaking, the taller trees have but short branches and small heads of foliage—often, indeed, quite out of proportion to the size of the tree, as in the case of the kahikatea (*Podocarpus dacrydioides*), whose short, slender heads, made up of but few branches, look quite insufficient for the wants of a lofty tree.

The branching of juvenile trees and saplings is an altogether different matter from that of the adult. A frequent form is that slender one noted above, due in part to overhead illumination and in part to a specific character of the plant. Thus the kohekohe (*Dysoxyllum spectabile*) may be 10 ft. tall, quite without branches, and bearing the fine, glossy, bright-green, pinnate leaves only on the final 2½ ft., the stout petioles passing off at a right angle and the leaflets being held horizontally. The rewarewa (*Knightia excelsa*) again has exactly the same habit, which is indeed that of the well-known juvenile form of the lancewood (*Pseudopanax crassifolium*) when this holds its leaves horizontally, as it sometimes does in the forest. A plant of *Knightia* 42 in. tall was bare for 26 in. and then leafy, the leaves ½ in. distant, held horizontally, and borne on short petioles given off at an acute angle. The tarairi (*Beilschmiedia tarairi*) has usually a quite straight, slender, and naked stem, marked with old leaf-scars, and branching only near its apex. Its seedling shows the same habit, an example 6¼ in. tall having leaves only on the apical 1¼ in. Other trees are also slender and upright, but they branch freely from near the base in a pyramidal fashion—as, *e.g.*, the tawa (*Beilschmiedia tawa*) and the celery-leaved pine (*Phyllocladus trichomanoides*). To a third category belong those trees which have a prolonged juvenile form with interlacing branches and probably a quite different form of leaf from that of the adult. This is a phenomenon varying in degree, being only slightly marked in some plants, such as *Carpodetus serratus* and *Nothofagus fusca* or *N. Solandri* (these two latter not plants of the Waipoua Reserve, though *N. fusca* occurs in some semi-kauri forests), while in others, as in *Podocarpus spicatus* and *P. dacrydioides*, the early form bears no resemblance whatever to the adult. But this opens up the question of dimorphism and heterophylly, which is briefly discussed further on, so far as the Waipoua Forest is concerned.

The leaves of the forest-trees are for the most part of no great size: an arbitrary division into large, medium, and small gives for the *tall trees* 1 large, 2 medium, 9 small: the *medium trees*, 4 large, 5 medium, 1 small; the *small trees*, 10 large, 17 medium, 7 small. With regard to texture of leaf, using the terms "thin" and "coriaceous" respectively, we have—*tall trees*, 1, 11; *medium trees*, 3, 7; *small trees*, 12, 22. Thus the texture bears some relation to the degree of exposure of the plants, the least exposed—the small trees—showing 35 per cent. of thin-leaved species, the medium trees 30 per cent., and the tall trees only 8 per cent.

There are far more simple leaves than compound, the figures being respectively, for the whole arborescent vegetation, 47 simple, 9 compound; and with regard to their margins, 37 are entire and 19 are more or less toothed or cut.

With regard to the prevalence of coriaceous leaves, it is evident that those which have to endure the seasonal changes might require a stouter texture than the ones of the summer-green forests of the Old World, and that the thick texture need not be looked upon necessarily as a xerophytic adaptation. In fact, such is not needed at all, the ordinary tropophytic trees of the Old World thriving admirably in New Zealand almost everywhere and under conditions which would at once kill most of the native forest-trees.

The shrubs are nineteen in number. Several are comparatively rare, and others are confined to special stations, consequently only about five—viz., *Phebalium nudum*, *Geniostoma ligustrifolium*, *Coprosma grandifolia*, *Alseuosmia macrophylla*, and *Senecio Kirkii*—can be called common, while the first named might be also omitted, as it is essentially a plant of the kauri sub-association. From this it is plain that young trees, tree-ferns, certain lianes, and *Gahnia-Astelia* tussock play more part in the general physiognomy of the undergrowth—*i.e.*, are better adapted to the conditions of this particular forest—than are the majority of its shrubs. Taking the shrubs as a whole, seven are of the divaricating form, which seems quite out of place and much more suited for xerophytic than hygrophytic conditions. *Carmichaelia australis*, with its leaves reduced to the vanishing point, and with flat, assimilating stems, is also certainly not a normal forest-plant. *Veronica diosmæfolia* belongs rather to the open river-banks than the forest, and is really a heath-plant; it has the close-growing, ball-like form of its subalpine relatives.

Geniostoma, *Coprosma grandifolia*, and *C. robusta* are much-branched shrubs, but of more open habit than those of divaricating form.