"Here one has climbed a sapling tarairi, left it at its summit, arched downwards and branched, putting a limb into another sapling.

"Quite a number of stems may wind round a sapling as a main axis and round one another.

"The main stem of a *Rhipogonum* creeps on the ground in circuitous fashion for 9 or 10 yards, bends on itself also on the ground, comes back nearly to where it started from, and then climbs a sapling 10 ft. tall of *Dysoxylum*—putting out all the way straight, non-climbing shoots, which have broad, coriaceous leaves on their flanks—and then continues from top of tree to forest-floor, leafy all the way, but its growing-point finally destroyed."

The number of juvenile trees destroyed by *Rhipogonum*, *Freycinetia*, and other lianes must be enormous, not merely their strangling action but also their extreme weight coming into play, and it is this removal of the original props which leads in part to the abundance of supplejack-stems forming close entanglements. In like manner liane cables hang from the forest-roof, especially of *Rubus australis*, and, in other forests but not in the Waipoua, strange to say, of *Muehlenbeckia australis*, these having in some cases lost their original support, and in other cases having broken away, through their strain and the action of wind, from that part of the forest-roof to which they really belong.

Freycinetia Banksii (the kiekie) is equally at home either on the ground or as a liane, completely hiding the trunk of a lofty tree with its green, coriaceous, sword-like leaves. Here the climbing habit is no special advantage, so far as its leaves are concerned, these receiving all the light they require when it is a ground-plant, and, indeed, getting more than when passing from the climbing stem. Whether the climbing is better for fruit-production I cannot say. The stems are terete, hard, woody, and rigid, 1 in. or more in diameter, marked with leaf-scars, and are fastened to the bark of the tree up which they climb by stout roots given off at about a right angle, which pass right round the supporting tree if it is slender, and even back to the liane-stem itself, finally branching into many slender branches, which are close together and parallel with the main root, or nearly so. These holding-roots cling most closely to the substratum, and can only be removed by a considerable degree of force.

The climbing species of rata are especially interesting, as no climbing Myrtaceæ exist out of New Zealand, the climbing habit having here arisen in this family owing to the presence of those special conditions—a moist atmosphere and equable climate—which have made the woody liane-form so common in tropical forests. They have all both climbing and non-climbing shoots, and coriaceous, thick, glossy, entire leaves. In *Metrosideros scandens* the slender main axis gives off numerous short, straight, lateral branches at an acute angle, and these may branch again several times, so that with the small, round, glossy, dark-green leaves a leaf-mosaic is formed on the tree-trunk. Short lateral roots are given off, binding the stems fast to the bark. The leaves are here situated on the flanks of the stems, and opposite, but on the non-climbing shoots they are arranged decussately, though almost invariably more or less bent to one side through heliotropism. After a time the roots cease to function, wither, and the climbing stem, no longer attached to the tree, may be at some distance away from it. This applies to all the climbing ratas, but their early climbing form is not so tightly pressed to the substratum as just described, and the lateral twigs may be held away from the tree. (See thick *M. florida* stem, Photo 1.)

The terminal portions of the climbing stems have frequently very few leaves for a considerable distance. The non-climbing stems may be produced very freely, and often come off from near the base of the plant. They differ in their density of branching in different species, and are frequently of considerable size.

The climbing hard fern (*Blechnum filiforme*) is chiefly remarkable for its surprising dimorphism, a brief account of which is given in my Kapiti report, together with a plate (4). The climbing stems are hard, brittle, brown in colour, and woody; they branch freely, and a perfect mantle of such branches may quite surround a trunk. This lateral branching assists in holding the plant to its support. The leaves of this climbing fern are a foot or more long, and are held out from the tree by the strong leaf-stalks, sometimes at right angles, sometimes drooping somewhat. No particular liane, unless it be *Freycinetia*, holds undisputed sway over a tree. Thus on a tarairi was noted the climbing form of *Metrosideros scandens*, the liane form of *Blechnum filiforme*, the bare stems of adult *M. scandens* 5 in. distant from the trunk but touching the tree at the base and again higher up, masses of *Hymenophyllum dilatatum* with semi-drooping fronds and close to the *Blechnum*, while on the same trunk were lichens, mosses, liverworts, and on the bough above at 30 ft. from the ground, immense plants of *Astelia Solandri*.

The only other liane* needing mention is the mangemange (*Lygodium articulatum*). This has a moderately slender, creeping rhizome about ⅛ in. in diameter, covered with a mat of chestnut-coloured linear scales. The stems are very slender, wiry, extremely tough and smooth, brown or purplish-brown in colour, often twisted on their axis, and bearing pinnæ in distant opposite pairs. The stems wind round themselves or a sapling, shrub, or small tree-fern from right to left, and finally form close, elastic masses some feet in depth. The leaves are bright-green, moderately thin, but rather stiff and waxy on the under-surface. The fertile pinnæ are pale greenish-yellow, and hang downwards, resembling little bunches of grapes. They show their relationship to the sterile by one of the lateral secondary pinnæ being frequently leafy and without sporangia. The young plant is erect and does not climb; it is only after several pinnæ are developed that the climbing stem is produced, at first quite pale green and with rudimentary pinnæ for a time. The climbing stem is slender, green, and soft in its apical portion, and its pinnæ in gradual course of development and of a pale, tender green.

* The remaining lianes are of no great importance in the Waipoua Forest; they are to be found in the list of species, where their life-forms are briefly noted.