

- I. pottsii* (Cook.) Aorangi Mts. and hills behind Wellington, wet ground and stream-banks, near S.L. to 2800 feet, A.P.D.
- Juncus antarcticus* Hook. f. Mt. Barton, Aorangi Mts., 2700 feet, D. R. McQueen!
- Luzula banksiana* Mey. Wellington Coast, from Ohau Bay to C. Palliser, rock crevices, A.P.D.
- Microlaena polynoda* (Hook. f.) Hook. f. Pahaoa Taipos, forest, A.P.D.
- **Myosotis pygmaea* var. *minutiflora* Simp. et Thom. Ohau and Te Ikaamaru Bays, Wellington, raised beaches, R. Mason, S. Natusch, A.P.D.
- Pimelea gnidia* (Forst.) Willd. Mangatoetoe, Aorangi Mts., rocky ground, 2400 feet, A.P.D.
- Poa colensoi* Hook. f. Pahaoa Taipos, 1500 feet, and Mangatoetoe, Aorangi Mts., 2500-2800 feet, cliffs and rocky ground, A.P.D.
- Raoulia glabra* Hook. f. Pahaoa Taipos, rocky ground, 1500 feet, A.P.D.
- Schizeilema trifoliolatum* (Hook. f.) Domin. Pahaoa Taipos, forest, 1000 feet, A.P.D.
- Senecio greyii* Hook. f. Pahaoa Taipos, 500-1500 feet, R. Mason, N. T. Moar, D. R. McQueen, A.P.D.; Mangatoetoe, Aorangi Mts., near S.L. to 2800 feet, D. R. McQueen, A.P.D.
- Uncinia strictissima* Petrie. Pahaoa Taipos, and Aorangi Mts. near C. Palliser, scrub, near S. L. to 1500 feet, A.P.D.
- Wahlenbergia ramosa* Simp. Pahaoa Taipos, 1000-1500 feet, Mangatoetoe, near S.L. to 2800 feet, and Wellington Coast, from Ohau Bay to C. Palliser, rocks, A.P.D.

Plants and Vegetation of New Caledonia

K. H. Marshall

THIS article is adapted from a letter written from New Caledonia in November 1943, while the writer was in the New Zealand armed forces.

Botanically, New Caledonia is a link between New Zealand and Australia, many families from both countries being represented here. I shall try to give you a general picture of the vegetation, as seen through the eyes of a New Zealander. There are about five main belts, determined partly by altitude and partly by other ecological factors. The first is that of the salt marshes and mangrove swamps along the coast, but I know very little about them, having never troubled to go into either; there are too many mosquitoes for one thing. I believe there is a species of kowhai there, which I would like to see.

Most of the farming country is in the second belt, the Niaouli lowlands of savannah type. The Niaouli tree (*Melaleuca leucadendron*) is similar to the eucalyptus, and is usually about thirty feet high with a not-very-straight trunk six to twelve inches in diameter, though many grow much bigger. They cover the whole lowland with a light canopy of shade, and beneath and between them grow the native and introduced grasses and weeds. The Niaouli lowlands lie between the mountains and the sea on the west side of the island only.

On the lower slopes and foothills of the mountains is the third belt, which usually consists of tall and thick scrub on the ridges and bush in the gullies, with the Niaouli dovetailing into it in an interesting manner. Above this is a belt of short scrub, seldom more than a few feet high, and in this belt grow many pretty and interesting ground orchids. It reminds me of our pakihi hills in Golden Bay. Then above this, usually at about 3500 feet, enters what is here termed the "Clouds Forest", so named on account of the clouds which nearly always lie along the summits in New Caledonia. The clouds forests are in many ways similar to our own West Coast rain forests; they are nearly always damp, almost dripping, and are rich in ferns and other moisture-loving plants.

Our camp is near the border of the Niaouli belt and the scrub-bush belt of the lower mountain-sides, so I can keep the latter under fairly close observation. The leptospermum is in full bloom just now, and looks very much like ours in New Zealand. I have seen two species. Epiphytic on leptospermum and other shrubs is a dendrobium that has pretty yellow blooms with a purple-spotted labellum. A species of *elaecarpus* (*E. neocaledonica*) grows in gullies and on small flats; it has showy racemes like our pokaka (*E. hookerianum*) and deep bright blue, perfectly round drupes about three-quarters of an inch in diameter. The leaves, in aging, turn a bright red, so that altogether it is a colourful and graceful tree. Other representatives of New Zealand families in this interesting scrub-bush belt include several cordylines, one of which is a little herbaceous one also found in North Auckland. Another one, with a long slender trunk about one and a half inches in diameter and deflexed leaves in two rows, all remaining alive, scrambles untidily over other shrubs and thickets until it finally reaches the tree-tops. I never even suspected it of being a lily until I spotted it in flower one day. A dianella is very similar to ours, and may be the same. There are some coprosmas, a pterostylis and other orchids, and several podocarpus species, one very like our miro, another like our kahikatea, a third an interesting little plant that grows as a compact, glaucous-green shrub in dry river-beds. Also, some very pretty members of the verbena family and some sweet-scented jasmynes occur here. A melicytus can quite plainly be recognised as a brother to our mahoe, and there are members of the families Piperaceae, Meliaceae, Proteaceae (including one

knightia), myrtles of various sorts, a muehlenbeckia, a freycinetia, a dodonaea similar to or perhaps the same as our ake-ake, several genera and many species of Cunoniaceae and many Australian families, and many acacias. One of the latter, *A. spirobolis* (gaiac), has very pretty grained wood and is in great demand among the boys for carving souvenirs. There are many others of interest, too numerous to mention here.

We pass from this belt, usually from 1000 feet altitude or more, into the short open scrub country on poor red-clay soil. Although uninteresting from a distance, when seen closely there is a wealth of interest. It is a great place for ground orchids, including earinas, thelymitras, microtis, caledenias, a gastrodia and others. The outstanding feature of this belt is the presence of dracophyllums, which are abundant and showy. In parts of this belt there are large numbers of kauri (*Agathis ovata*) scattered about in the scrub. They do not develop a tall straight trunk like other species, but appear more like great spreading oaks. Also in this region, but extending into the clouds forest above and the bush belt below, are species of araucaria, casuarina, pittosporum, a dacridium (*D. araucarioides*) similar to our rimu but with long erect branchlets instead of drooping ones, an elytranthe with pretty, delicate, red-pink flowers, and many eugenia species, some with showy red fruits. The pitcher-plant I must mention. If you have ever tried to get through a tangled mass of supple-jacks in a gully, you will know what it is like trying to climb a mountain-side covered with pitcher-plant vines. The pitcher is an elaborate adaptation of the leaf-tip, complete with lid, and always has a drop of water in it containing drowned ants and other insects. The ground beneath the vines is bare, and the soil always very poor. A small drosera is plentiful in similar situations, and both plants use insects to supplement the supply of nitrogen.

Passing into the clouds forest there is a further wealth of interest. On the edge is a metrosideros with masses of brilliant red bloom equalling any rata. *Agathis lanceolata* has a tall straight trunk very much like our kauri. Dracophyllums, pandanus, ferns, and other moisture-loving plants are the general order here, with vine-ratas showing on the tree tops. An interesting pterostylis I saw only once at a little over 3000 feet; it had a purplish-brown hood striped with white, ovate radicle leaves, and nothing much in the way of cauline leaves. I collected an alseuosmia in a particularly damp and shaded spot, but it lacked the lovely scent of ours. Near the same spot I came across a lily of the same genus as the garden onion. On an open summit, just over 4000 feet, grow large clumps of a particularly fine dianella with broad, drooping grass-like, light green leaves and large, showy panicles of sky-blue flowers. But perhaps my most thrilling discovery of all was a small natural clearing of about one square chain, at 5000 feet, just crammed full of xeronema in full bloom. What a sight to thrill the eyes of a New Zealander! I'll never forget it.