

Cyathodes fraseri Margins broadly hyaline, flat, stoutly ciliate, apex a pungent apicule, veins strongly raised below.

Cyathodes juniperina Blade linear, minutely serrate distally, apex a pungent apicule, veins not evident above, intervenium below whitened by wax deposited in minutely reticulate fashion.

Cyathodes parviflora Margins usually recurved only in proximal half of blade, entire, apex with a very short rounded mucro, lower surface with prominent branched and reticulate venation.

Cyathodes pumila Margins flat, entire, apex shortly apiculate, lower surface between midrib and margins entirely covered with a thick (usually non-reticulate) deposit of white wax.

Cyathodes robusta Blade lanceolate, margins strongly recurved, apex with short rounded mucro, intervenium below usually whitened with wax deposited in minutely reticulate fashion.

Dracophyllum muscoides Blade about as long as the sheathing petiole, linear, obscurely serrate distally.

Epacris alpina and *E. pauciflora* (both vars) Blade ovate, margins minutely serrate distally, veins not at all prominent below, intervenium pale but not wax-covered.

Pentachondra pumila Petiole relatively long (c. 1/3 length of blade); blade lanceolate, margins minutely serrate, apex subobtuse, the veins relatively obvious below (as compared to those of *Epacris pauciflora*) being narrower and paler than the intervenium, but not raised.

Sprengelia incarnata Leaf recurved so that upper half (blade) is at right angles to the stem-enclosed lower half (sheathing base/petiole), apicule long and subpungent, lower surface of blade with conspicuous pale dots (stomata) and obscure veins.

References

Allan, H. H. 1961: Flora of New Zealand. Vol. 1. Government Printer, Wellington.

Poole, A. L. & Adams, N. M. A. 1964. Trees and Shrubs of New Zealand. Government Printer, Wellington.

The lignotuber of tutu (*Coriaria arborea*)

Alan Esler & Wilson Esler

Early farmers on the Auckland isthmus had it fairly easy with no forest to clear or logs to drag out of swamps. Bracken fern prevailed in the early 1940s. This could be burnt off and land cultivated for the first grain crops. But the farmers complained about having to dig out the roots of tupaki that we know as tutu. To throw some light on the subject we began to take an interest in the underground parts of tutu, not in the fernland because there is none locally. The quest began in Taranaki where the Mangorei Stream swept away most of the soil from beneath the plants on its margins. The first feature to notice was the size of these "roots" — great woody masses like overgrown distorted beetroots more than half a metre across. They were fairly regular in outline sitting slightly askew and held by a few very stout roots.

Seedlings growing on mossy rocks at a higher level told some more of the story. They had globular tubers with many shoots, some forming top growth, others latent or aborted. The specimen illustrated in *Wild plants in Auckland* on p188 had a tuber the size of a walnut and 37 shoots of various kinds.

The tutu we examined at Te Kaha in the Bay of Plenty was playing a supreme pioneering role stabilising steep roadside batters composed of shattered, moving greywacke fragments. The hard substrate prevented downward growth which was then directed across the slope as a stout arm sprouting new growth along the way. In the deep detritus on the lower side of the road

the plants took on the proportions on the lower half of a person's body.

Around Auckland tutu is a pioneer on the eroding sandstone slopes along the coast. The substrate is very unstable and many plants slide or roll as chunks of rock become dislodged. In the new position the uppermost part of the tuber resprouts even if it has been inverted. Further distortion occurs when parts of the tuber distant from the new shoots die off.

Woody plants that grew along streams are often well represented on coastal driftwood. These tell a story about what goes on underground without having to do any spade work. Tutu is less often seen than expected. The wood is fairly soft and also subject to decay in parts long before it becomes driftwood.

Enough information was gained from this range of examples to allow speculation on the form the tubers may have taken when growing with bracken on level permeable soil. They were likely to have been fairly regular in profile, inverted conical, possibly more than half a metre wide, and with a few stout roots arising high on the body of the tuber. Quite large bushes could develop on these wide persistent crowns after each destructive fire.

Such a life form is anomalous in the New Zealand flora. In Australia plants of this nature had a regenerative advantage in fire ravaged vegetation and evolved in that direction. Do other species of *Coriaria*

in New Zealand have swollen underground parts, and those growing in Australia, Asia, S. America and S. Europe?

We may ask how the lignotuber forms. Tracing the growth of a seedling would provide some answers. In the eucalypts the swelling begins in the stem in the axils of the cotyledons. There may be other possibilities in other Myrtaceae, Casuarinaceae, Proteaceae, Fabaceae, Sterculiaceae, Tremandraceae and Dilleniaceae, all families exhibiting this phenomenon. If the tubers have stem origins the regenerative stump is a stem. This would not be the only New Zealand plant with a descending stem acting as a root. Where does the stem end and the roots begin? At least the distal parts have nodules of a nitrogen fixer that seems to qualify them as roots.

Did the nitrogen fixing ability have any bearing on the high fertility of the volcanic soils of the Auckland

isthmus which grew high yielding cereal crops year after year? We might expect such fire ravaged soils to be depleted of nutrients. However, on these free draining soils the ash would not be carried away by surface wash and streams. Overseas it is now realised the slash and burn cultural practices are not as depletive as assumed because nutrients in quantity are retained in the charcoal. Maybe on fernland nutrients retained in carbonised frond bases acted as a nutrient sink.

Vegetation with a combination of tutu (sometimes with koromiko also) was common elsewhere in the early farming days but was recorded only in passing in some district histories. That kind of vegetation has gone but maybe somewhere there is a lone tutu bush on level friable soil that we, or you, could excavate to give a subterranean glimpse that we have not yet found. We think our reconstruction is fairly good but would like it confirmed.

Acknowledgement

We are grateful to Sylvia Guo for typing this for us.

Sandspit, Kawau Bay – a hot spot for *Olearia albida*

Maureen Young

Olearia albida Hook.f. var. *albida*, a member of the Asteraceae, grows as a shrub or small tree to 5 metres tall, and is one of the plants that make our northern coastal forest special. It naturally ranges from North Cape to south of East Cape, but is very local in occurrence. *Olearia albida* is common along this part of the coast (e.g. at Tapapakanga Regional Park), although uncommon elsewhere in Auckland region. It is not considered threatened, but in the Auckland Region the small population size places it at potential risk, and for that reason, on the Auckland threatened and uncommon vascular plant list it is classified as "Regionally at Risk – Sparse" (Stanley et al 2005).

It is a distinctive shrub with paper-like bark that peels in narrow strips. The leaves are leathery with wavy margins, with scattered white hairs on the upper surface and white tomentum on the under surface. These white hairs give the whole shrub a pale coloration that causes it to stand out from the surrounding vegetation. It flowers in late autumn.

My records of *O. albida* on the East Coast of the Rodney District, from the Puhoi River to Goat Island Beach, show that it is widely scattered along the coastline. During a Bot Soc trip to Mahurangi West Regional Park on 19 February 2005, two gnarled old trees were seen on the cliff-top on the southern-most

headland. Three widely spaced trees grow in the coastal vegetation between Buckletons Bay and Christian Bay, one can be found growing in the bush at Ti Point, and another in a gully on the Goat Island Bay walkway.

The exception to this scattered distribution occurs at Sandspit. While travelling by ferry from Sandspit to Kawau Island in the winter of 2005, I surmised that several pale coloured trees seen growing along the north side of the channel of the Matakana River were specimens of *O. albida*. On checking this out I found that, at a rough count, there were at least 28 trees growing there. On the cliff between Brick Bay and Sandspit grow another 20 or more - without being able to abseil it is impossible to come to a more accurate count. Finally, about a hundred metres east of the last Sandspit bach, a large tree swoops down over the beach and gives a fine opportunity to check out the flowers in season.

In the northern Rodney District I have also seen this plant at Atuanui (Mt Auckland), growing quite commonly along the Hoteo River and also near a pa site in the northeast section of the reserve. There is an historical record of it growing on Kawau Island (Buchanan 1976) but there have been no recent sightings there.

References

- Stanley, R., de Lange, P.J. and Cameron, E.K. 2005. Auckland Regional Threatened & Uncommon Vascular Plant List. *Auckland Botanical Society Journal* 60(2): 152 – 157.
- Buchanan, J. 1876. On the Botany of Kawau Island. *Transactions of the New Zealand Institute*: 9: 503–527.