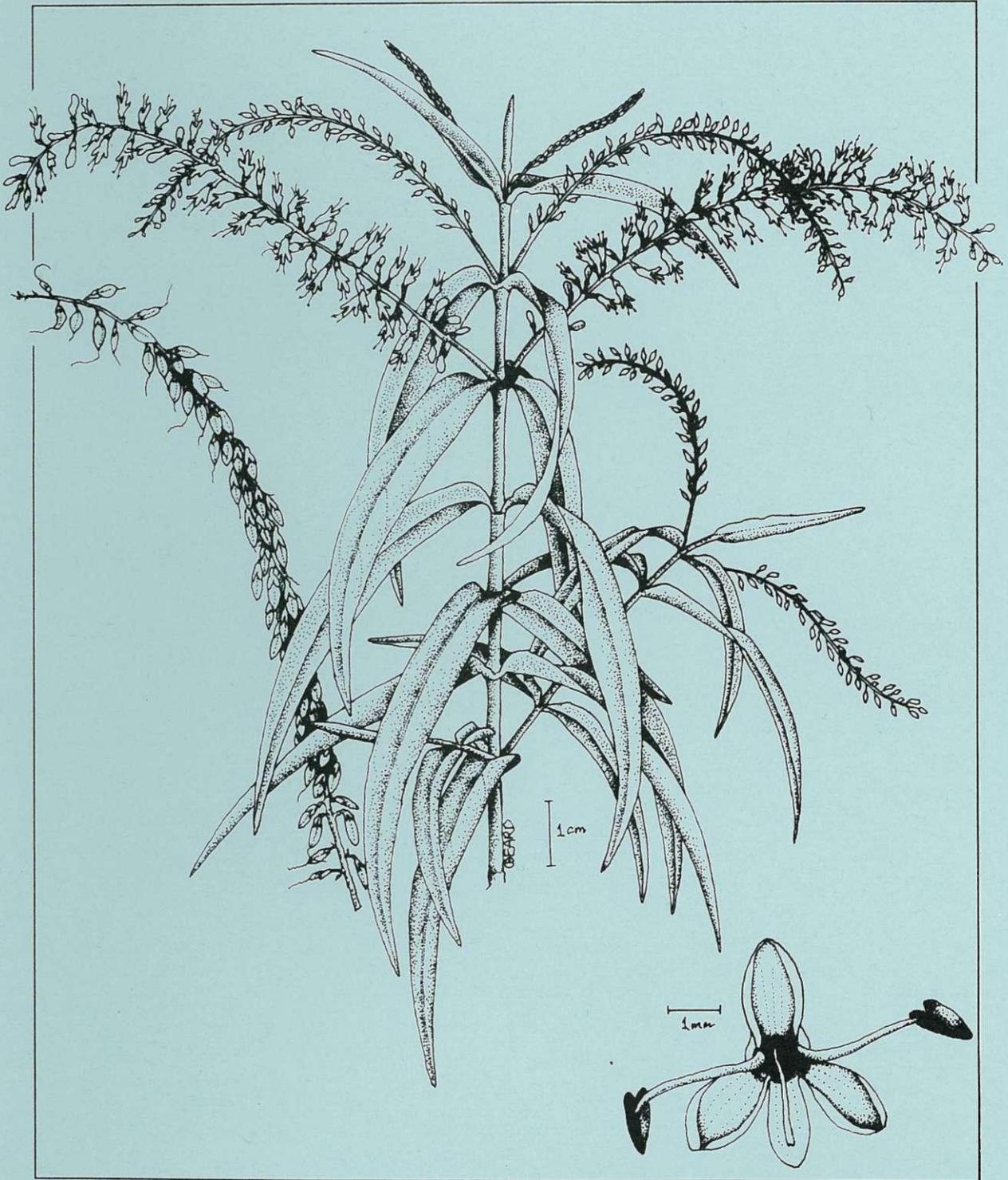


NEW ZEALAND BOTANICAL SOCIETY
NEWSLETTER
NUMBER 44 JUNE 1996



Erratum - New Zealand Botanical Society Newsletter 44

Authors of "A revised checklist of New Zealand mistletoe (Loranthaceae) hosts" are:

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NEW ZEALAND BOTANICAL SOCIETY
N E W S L E T T E R
NUMBER 44 JUNE 1996

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Cover illustration

Flowering branch of *Hebe tairawhiti* in cultivation at Hamilton, 5 March 1996. Plant grown from a cutting collected on Tarndale Road, Waiapu Ecological District. Inset at left: raceme of unripe capsules. Inset at bottom: corolla, showing anthers and style. Illustration by **Catherine Beard**, Herbarium Keeper, Department of Biological Sciences, University of Waikato.

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Subscriptions

The 1996 ordinary and institutional subs are \$14 (reduced to \$10 if paid by the due date on the subscription invoice). The 1996 student sub, available to full-time students, is \$7 (reduced to \$5 if paid by the due date on the subscription invoice).

Back issues of the *Newsletter* are available at \$2.50 each - from Number 1 (August 1985) to Number 43 (March 1996). Since 1986 the *Newsletter* has appeared quarterly in March, June, September and December.

New subscriptions are always welcome and these, together with back issue orders, should be sent to the Secretary/Treasurer (address above).

Subscriptions are due by 28 February of each year for that calendar year. Existing subscribers are sent an invoice with the December *Newsletter* for the next year's subscription which offers a reduction if this is paid by the due date. If you are in arrears with your subscription a reminder notice comes attached to each issue of the *Newsletter*.

Deadline for next issue

The deadline for the September 1996 issue (Number 45) is 31 August 1996.

Please forward contributions to: Bruce & Beverley Clarkson, Editors
NZ Botanical Society Newsletter
7 Lynwood Place
HAMILTON

Contributions may be provided on an IBM compatible floppy disc (in Word Perfect 5.1) or by e-mail (ClarksonB@Landcare.CRI.NZ).

NEWS

Regional Botanical Society News

■ Auckland Botanical Society

Forthcoming activities

Saturday, 20 July	Cascade-Kauri Park. A walk based around the Lower Kauri Track/Long Road Track
Thursday, 25 July	"Threatened plant management: case studies from the South Island"; Dr David Norton
Sunday, 18 August	Browns Island. Botany and geology of a little volcanic remnant in the inner Hauraki Gulf
Wednesday, 4 September	"A new beginning - The Auckland Regional Plan Pest Management Strategy"; Lance Vervoort
Saturday, 21 September	Umupuia/Duders Regional Park, South Auckland
Saturday, 2 October	Lucy Cranwell Lecture - Easter Island: Its Botanical History, Professor John Flenley
Saturday 19 October	Hamiltons Road, Awhitu Peninsula

Further information available from Sandra Jones, Hon. Sec. on (09) 817-6102 (evenings)

Helen Cogle, 30 Daffodil St., Titirangi, Waitakere City

■ Canterbury Botanical Society

Our programme to commemorate the work of Etienne Louis Raoul at Akaroa in 1840 (refer to Newsletter No.43, p.15-16) opened with a field trip to Hinewai where Hugh Wilson led us on to Stony Bay Peak. This mountain forms a back-drop to Akaroa and it can be expected that Raoul would have collected there. Among the plants seen were several which were named by Raoul in 1844 or 1846. At our April meeting Margaret Bulfin and Warwick Harris introduced Raoul - the man and his botany. We are privileged to have enjoyed a lively and forthright talk by Margaret so close to her untimely death on 3rd May. This month the southern Port Hills were the scene of a lichen workshop led by David Galloway who came up from Millers Flat for the occasion. The workshop concluded in a University laboratory examining our specimens from a rich flora of crustose, fruticose, and foliose species. One of our more experienced members agreed to compile a list of lichens found. We are glad to welcome to Canterbury Anthony Wright, who shared his knowledge of this plant group.

Beech forest ecology was discussed by Udo Benecke in February and by Glenn Stewart in May. Udo presented a case for sustainable use of west coast beech forests by selective logging of coupes 0.1ha in area, and leaving 20% of the forest untouched. Glenn stressed that it is premature to set up selective logging practices until more facts are known of the whole forest system, eg. different responses of red and silver beech; one third of the forest biomass (carbon content) is stored in dead wood, standing and fallen; and 40% of the nitrogen is fixed by lichens.

Students' grants were made to Anna Campbell, to attend the Australian wheat conference and visit the Queensland Wheat Research Institute; and to Sandra Hammond to assist in thesis preparation on population structure of nikau palm in Palm Gully, Akaroa Harbour, where it is at its southern limit on the east coast of the mainland.

Forthcoming is the AGM on 8 June when the Bledisloe Trophy will be presented to Ross and Yvonne Elder in recognition of their long and active participation in the Society. Also Annie Acton-Adams will take an illustrated mountain flower trek in the European Alps.

Bryony Macmillan, Canterbury Botanical Society, P O Box 8212, Christchurch

Footnote: It is with sadness we note that Margaret Bulfin, well known and respected botanist, formerly on the staff of Botany Division, D.S.I.R., died on the 3rd May 1996, after a brief illness. Editors

■ Nelson Botanical Society

March field trip- Pearse Resurgence

At first, native vegetation was limited but masses of *Blechnum vulcanicum* adorned rock faces along the track and *Corybas macranthus* was found on some of the moister faces. Further along limestone occurred, with *Asplenium trichomanes*, *Adiantum cunninghamii*, *Sophora microphylla* var. *longicarinata* and *Brachyglottis hectori*. Later on in forest we observed, both pepperwood (*Pseudowintera colorata*) and horopito (*P. axillaris*) with a wide range of filmy ferns, also *Leptopteris hymenophylloides*, *L. superba* and the hybrid *L. x intermedia*. The giant moss *Dawsonia superba* was also noted. During lunch stop a pair of blue ducks kept everybody fascinated, particularly by their lack of concern at having a group of botanical-minded admirers. By the end of the day 167 plant species had been recorded.

Easter Camp

Friday we headed up the Ngakawau Gorge on the Charming Creek walkway. The early part of the walkway was flanked by problem plants, the most conspicuous was the sweet scented ginger. Native species included southern rata, *Coprosma grandifolia*, tutu and tree ferns such as *Cyathea medullaris* and *Dicksonia squarrosa*. The main debate was on the differences between broadleaf and puka that had to be resolved in the evening. The shrubland and the gorge soon closed and steep wet rocky banks flanked the track with *Olearia cheesemanii*, *Hebe gracillima*, *Celmisia monroi* var. *morganii* quite common. After we crossed the main river the vegetation changed, along with the geology to beech forest with silver, pink and bog pines. Ferns here included *Hymenophyllum ferrugineum*, *Schizaea australis* and *Dicksonia lanata*. One distant voice debated: it can't be cissy it doesn't have a petticoat; a reference to the pale underside of *Rubus schmidelioides* compared to *R. cissoides*.

Saturday morning was easy walk along Nile River terraces. Vegetation was dominated by kamahi, silver beech, southern rata and abundant *Cyathea smithii* or *Dicksonia squarrosa*. The trees contained an abundance of epiphytes including huge plants of *Dendrobium cunninghamii* and a profusion of *Earina autumnalis*. Other plants of note were *Hymenophyllum ferrugineum*, *Jovellana repens* and *Pseudopanax macintyreii* and the odd *Ascarina lucida* and huge *Pseudopanax edgerleyi*.

Later in the afternoon we visited Tauranga Point to see a coastal turf dominated by plants such as *Leptinella dioica*, *Nertera depressa* and *Centella uniflora*. On the cliffs *Blechnum banksii*, *Asplenium banksii*, *Peperomia urvilleana*, red fruited *Einadia triandra* and the tiny orchid, *Bulbophyllum pygmaeum* were noted and at one point *Fatsia japonica* was seen.

Sunday we drove to within half a kilometre of the top of Mt Augusta on the Sockton coalfield and took most of the rest of the day to get there. The vegetation was a mosaic of wetlands dominated by *Chionochloa juncea*, scrappy *Coprosma grandifolia*, stunted kanuka, *Epacris alpina*, yellow silver pine hybrids and pockets of silver beech, alpine toatoa, bog pine and rata shrublands. Time was spent sorting out some of the small wetland plants such as the moss-like *Gaimardia setacea*, *Centrolepis ciliata* and mats of the tiny *Abrotanella caespitosa*. Among the rocks *Coprosma* "decepiens", pink-throated *Forstera mackayi* and purple leaved *Gentiana townsonii* were common. Along the windswept ridges tightly compacted *Dracophyllum polita* was confused with *Oreobolus pectinatus* and the blue green *Dracophyllum pubescens* clung to the rocks. Other interesting plants here were *Oreobolus impar*, *Herpolirion novae-zelandiae* and stunted *Luzuriaga parviflora* (under the low silver beech-rata forest).

On Monday Laurie Metcalf led us to the Denniston coal plateau, an area predominantly of low manuka shrubland scarcely 30 cm tall with large areas of bare rock and sedgeland dominated by *Chionochloa juncea*, *Empodisma minus*, *Juncus squarrosus* and *Carpha alpina*. In submerged areas *Liparophyllum gunnii* was abundant and under rocks *Abrotanella caespitosa* was quite common. A few flowers of *Euphrasia disperma* with corolla tubes up to 5 cm long, also remained and attracted much attention. After lunch near the Burnett Face (parking on *Nardus stricta*) we followed the road towards New Creek where in more sheltered gullies low mountain beech forest was present with silver pine, yellow-silver pine, cedar, toatoa and *Pseudopanax linearis*.

April field trip - Wairoa ultramafics

At the end of the road we were in the midst of the ultramafic vegetation with the late flowering unnamed gentian (*Gentiana* aff. *tenuifolia*) still with many plants in the last stages of flowering. Some plants were over 50 cm tall. Other species of interest here were *Carex devia*, *Colobanthus* "Red Hill", cedar, silver pine, *Corokia cotoneaster*, *Pittosporum divaricatum*, and a large patch of *Exocarpos bidwillii*. After lunch we headed into Bull Creek. Magnificent large patches of filmy ferns were common and included *Hymenophyllum dilatatum*, kidney fern, and *H. demissum*. At the creek a brief sidle took us out into a

patch of *Olearia coriacea* with many plants in full flower. The journey down the creek took us through groves of tree ferns and over more carpets of filmy ferns. Near one resting place we saw a small stand of maire (*Nestegis cunninghamii*). Further onwards we passed through groves of *Pseudopanax anomalus*. Amazingly we arrived on time but 100 m from the vehicles just as the predicted rain began.

May field trip - Adele Island

Adele Island has been heavily modified, like much of the Abel Tasman Coast but still contains a few former forest remnants. We landed near high tide on a tiny beach and after exploring the shore noting a fine-leaved form of *Poa anceps*, *Microlaena polynoda* and *Echinopogon ovatus*, headed up a steep slope under black beech forest with many patches of *Hymenophyllum cupressiforme* on the floor and a large leaved form of *Coprosma rhamnoides* and *Helichrysum aggregatum* impeding the way. This soon gave way to sparse manuka-kanuka shrublands. Along the ridge line *Korthalsella salicornioides* was quite common on kanuka. On the descent into Steam Cove we fought with large areas of *Blechnum* "blackspot". Highlights of this section included the winter flowering orchids *Pterostylis alobula*, *Acianthus sinclairii* and *Cyrtostylis reniformis*. At the cove we at last saw some real forest and soon found several large *Streblus banksii*, *Arthropteris tenella* and a fine patch of *Trichomanes endlicherianum*. A fitting end to a rewarding day.

Forthcoming trips

16 June	John Slow/Snowdens
21 July	Stephens bay/Kaiteriteri
18 August	Mangatapu Saddle
15 September	Dovedale
20 October	Pelorus Bridge

Graeme Jane, 136 Cleveland Terrace, Nelson

NOTES AND REPORTS

Field Report

■ Mt. Holdsworth - An interesting botanical jaunt

A trip from Hamilton to the Wairarapa for a family wedding at the beginning of December 1995 was an excellent excuse for extending the visit to include a trip into the Tararua Range for some more southern botanising. It didn't take much to convince Catherine Beard to join me for an excursion into the Holdsworth area.

For those not familiar with the area, access into this part of the Tararua's is via Norfolk Rd, a few kilometres north of Carterton. At the head of the valley, the Mt. Holdsworth camping area is the starting point of a number of tracks into the Tararua Ranges. Walks can vary from a casual stroll through lowland beech forest, to trips across the range to eastern peaks. The Holdsworth camping area is administered by DoC and is located beside the Atiwhakatu Stream at the end of the road. There are substantial grassed areas for tents, caravans, etc. with flush toilet facilities provided. Camp fees are a mere \$4 per person per night. Water is available from conveniently located taps, and although there were no notices warning of the presence of giardia, we took the precaution of chemically treating our water just in case. There are a number of deep pools along the river for those bold enough to brave the cold mountain water.

Our goal was to botanise our way up to Mt. Holdsworth itself, with particular emphasis on the alpine zone. The notice boards at the start of the track inform that the trip to Powell Hut, which is just beyond the treeline but below Mt. Holdsworth peak, is a mere 5 hours. As botanisers to new areas know, suggested times for trips are grossly underestimated!

As we had arrived in the middle of the afternoon, we decided to head for Mountain House which is a hut situated at about 600 m a.s.l. on route to Powell Hut. A notice at the camp ground had informed us that this hut was unavailable to the public as it was currently being used by track maintenance people. We decided we would camp out in the vicinity of Mountain House because it is the only source of water.

The trip to Mountain House passes through beech forest, with *Nothofagus fusca*, *N. solandri* and *N. menziesii* dominating the canopy. It was pleasant to enter the beech forest which provided us with some respite from the scorching temperatures being experienced in the Wairarapa. Species in flower in this part

of the trip were; *Weinmannia racemosa*, *Alseuosmia pusilla*, *Libertia ixioides*, *Coprosma rigida*, *Pseudowintera colorata* and *Nertera depressa*.

The track to Mountain House was in good condition and was of reasonable gradient, emerging a couple of times out of the beech dominated canopy to lower growing vegetation, thus offering views of the distant peaks. Along the trackside banks of these more open, drier areas, we saw *Adenochilus gracilis* and a *Caladenia* species in flower, and a *Thelymitra* species in bud. *Myrsine salicina* was abundant throughout, initially fooling us into thinking it was *Toronia toru*! Closer toward Mountain House we came across *Pterostylis patens* in flower, *Thelymitra pauciflora* in bud, and an occasional *Helichrysum aggregatum*. A flowering plant of this latter species was spotted a few days later amongst riverside vegetation close to our campsite at the Holdsworth camping ground.

It was interesting to see *Clematis paniculata* was still flowering in this more southerly region. *Gaultheria antipoda* was in flower and also *G. rupestris* was looking particularly stunning with its mass display of flowers. Along a small stretch of the track, a few flowering plants of *Pimelea longifolia* were looking especially beautiful. A small group of the magnificent *Cordyline indivisa* adjacent to Mountain House were the only ones we saw on our trip.

We camped out not far from Mountain House on a bed of moss, amongst *Dracophyllum longifolium* and a *Coprosma* hybrid swarm. The climb from Mountain House to Powell Hut was reasonably steep, with Powell Hut situated just out of the bushline at 1200 m. Shortly after emerging from the bushline, we became enthusiastic (understatement) about the range of higher altitude plants that greeted us. These plants included *Aciphylla squarrosa* var. *flaccida*, *A. dissecta*, *Anisotome aromatica*, *Hebe tetragona*, *Chionochoa pallens*, *Brachyglottis bidwilli*, *B. eleagnifolia*, *Olearia lacunosa* and *Pittosporum rigidum* with its stunning dark red flowers.

We eventually reached Powell Hut and decided to rest until lunch time, planning to botanise around and beyond the hut afterwards. Unfortunately the weather took an unpleasant and somewhat sudden change, with thick cloud rolling in and strong winds developing. The wind progressed to gale-force velocity within the hour. Powell Hut is of Lockwood construction capable of sleeping 40 people and was erected in 1983 after the previous hut was blown down. Gas cookers are installed in the hut, and the two toilets (a short distance from the hut) are of the self-composting type. The track to Powell is very popular and during the few days we spent in the area, we came across at least eight separate school groups, as well as other trampers. According to the hut log book, a school party of 28 had stayed the previous night! Obviously not the ideal place for anyone seeking seclusion.

Although the Lockwood construction is supposed to be able to withstand extreme adverse weather better than conventional building methods, I was certainly hoping this was so because every few minutes a particularly strong gust would shake the hut on its foundations; a rather scary sensation.

The frustration of sheltering in the hut while plants were waiting to be botanised became too much, so we donned clothing suitable for the Antarctic and headed out into the elements to study the alpine species. A short distance from the hut, a single plant of *Ranunculus insignis* was in full bloom in a sheltered spot. Further on *R. verticillatus* was also seen flowering. We were too early for the flowering of *Celmisia spectabilis*, but were fortunate in seeing one early flower of *C. hieracifolia* with its attractive leaves.

Visibility was reduced to a few metres, and once we moved away from the relatively sheltered position of the hut and onto the ridge top, we frequently had to clutch the trackside vegetation to stop ourselves being blown away. The marvellous alpine plants compensated for the unpleasant conditions. We spent about 3 hours within an area no more than 20 minutes walk from the hut, not venturing far from the track, but saw an abundance of species, many of which were in flower. We were both highly impressed with the edelweiss *Leucogenes leontopodium* with its amazingly woolly flower head (Fig. 1). Also particularly eye-catching was the lovely *Kelleria dieffenbachii*, a mass of small white flowers. *Hebe*

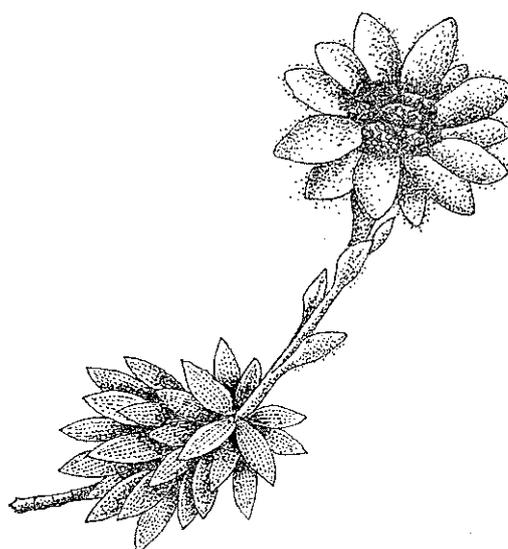


Fig. 1 *Leucogenes leontopodium*

evenosa with its white flowers, the yellow flowered *Bulbinella gibbsii* var. *balanifera*, *Aciphylla colensoi*, and *Psychrophila novae-zealandiae* with its interesting folded leaves, were all present.

Fortunately, the wind died down during the night (and the hut remained attached to terra firma), and the morning dawned beautifully clear, giving breathtaking views of the ranges, and looking down upon rivers of cloud in the valleys.

Anxious to continue botanising, we set off early for Mt. Holdsworth summit itself (1470 m), admiring the abundance of flowering *Euphrasia* species. Plants of particular interest were *Phyllachne colensoi*, *Raoulia grandiflora*, *Oreomyrrhis colensoi*, *Prasophyllum colensoi*, *Astelia linearis*, *Drosera stenopetala*, *Dracophyllum uniflorum*, *Helichrysum bellidioides* and *Brachyglottis lagopus*, a herbaceous species with dark, fleshy, textured leaves. The green mats of *Raoulia eximia* var. (*R. rubra*, Druce 1988) had us fooled for a while because the only plant we found in flower had only the white tips of the capitula showing. Also, quite rare was *Raoulia eximia* x *Leucogenes leontopodium*, which later required input by Bruce Clarkson, and perusal of the Mt. Holdsworth list of Druce (1988) to determine its identity.

From Mt. Holdsworth peak and trig, there were great views of the ranges. The ruggedness of this area is awe-inspiring. Catherine was convinced she could see an aeroplane on the side of a distant ridge. She was pleased to have this confirmed later in the day by a passing schoolboy, who informed her that it was the remains of a plane that had crashed about 40 years ago.

On the return journey, in the beech forest below Mountain House, we interrupted the intentions of a morepork (*Ninox novaeseelandiae*) which came to rest on a branch just above us, carrying a lizard in its beak. After eye-balling us for a few minutes, to see what we were up to, it flew into a hollow branch just above our heads in response to some chirping sounds from within. It was wonderful to have such a close-up, daytime view of this bird. The tiny rifleman (*Acanthisitta chloris*) could also be enticed into view with the aid of a *Dianella nigra* leaf-whistle.

We concluded our trip by walking the short round trip which incorporates Donnelley's Flat, and then pitching our tent for a night at the camping ground, experiencing gusty winds which threatened to take the tent skywards. A very enjoyable and botanically stimulating trip.

Acknowledgement

Catherine Beard for contributing to the compilation of the species list and the *Leucogenes leontopodium* drawing.

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Meryl F. Merrett, 9 Howden Road, Hamilton

Comment

■ **Warning - Plants and skin don't often mix**

Many gardeners are aware that some plants cause skin reactions, from relatively mild urticaria (rash or red streaks), to more severe dermatitis, such as swelling and blistering. Some of the known plants that cause more severe skin reactions are *Rhus succedania*, wax tree; *Primula obconica*; and many members of the Apiaceae (carrot) family.

The extent to which native plant species cause dermatitis appears to be generally unknown, except *Urtica ferox* which is known to cause intense burning, redness and swelling, and may be fatal in severe cases.

Two Waikato Botanical Society members accidentally discovered, earlier in the year, that the native shrub *Phebalium nudum* was a phototoxic species; which when crushed and rubbed on the skin, caused painful and severe swelling, blistering and in the longer term, pigmentation. The reaction did not occur until the affected skin was exposed to light, both artificial and solar, and maintained photosensitivity for up to four weeks.

Anon, Waikato Botanical Society, c/- Biological Sciences Dept., University of Waikato, Private Bag 3105, Hamilton

Plant records

■ *Gunnera hamiltonii*: new information on phenology and distribution

The creeping herb *Gunnera hamiltonii* (Gunneraceae) is classified as endangered in the Threatened Plant List (Cameron *et al.* 1995). It is a Southland/Stewart Island endemic and prior to 1994 it was known from only four natural locations; one on the Southland coast (although a replanted population also exists from the now extinct Oreti River plant (Logan & Holloway 1935)) and three on Stewart Island. *Gunnera hamiltonii* is dioecious, having male and female flowers on separate plants and until recently it was thought that only male plants existed on Stewart Island and only female plants on mainland New Zealand (Wilson 1985, L. Metcalf *pers. comm.*). That being the case, the total natural New Zealand population of *Gunnera hamiltonii* would comprise only four individual plants as reproduction would be solely vegetative.

In 1994, with assistance from the Forest and Bird/Yates Green Earth sponsorship for Threatened Plants, we began to study *Gunnera hamiltonii* (along with other threatened Southland plants) in more detail. Plants had already been collected from each of the natural populations - Omaui on the Southland coast, and Mason Bay, West Ruggedy and Doughboy Bay on Stewart Island - and were being grown on to confirm or determine their sex. In September 1994, the Omaui and Mason Bay plants in cultivation flowered, confirming previous reports of those populations being female and male, respectively. The West Ruggedy and Doughboy Bay plants in cultivation did not flower that year. The observation and timing of flowers and pollen stalks on the plants in cultivation meant that we could, with some confidence, search wild populations at the appropriate time for flowering. The female flowers last approximately one month, however individual male pollen stalks last only a matter of days but are continually produced for about a month or so. Field work confirmed that both the Omaui and Sandy Point populations flowered in the wild and only female flowers were observed.

The flowering plants in cultivation were hand pollinated in September 1994 and, at the end of January 1995, fruiting stalks began to appear and elongate. To our surprise, fruiting stalks also appeared on what we thought were unfertilised populations (i.e., the Omaui and replanted Oreti (Sandy Point) populations), however their appearance was quite different. To verify the difference between the two types of fruiting stalks, samples were sent to Colin Webb who confirmed that the hand pollinated seed was viable whereas the other fruit was infertile, having developed parthenocarpically, i.e., the fruit developed but did not contain seed (Webb 1996). The fertilised seed was picked and sown at various times between April and June but it retained a dry, hard, brown appearance. At no time did the fruit have the fleshy red appearance as suggested in the Flora (Allan 1961), however, early frosts may have affected development. The sown seed germinated in early December 1995 thus producing the first known *Gunnera hamiltonii* seedlings.

In February 1995 a new population of *Gunnera hamiltonii* was discovered at Doughboy Bay by Pete Shaw, Conservation Officer, Stewart Island, and a plant was sent over to be grown in cultivation. In September 1995 the plant in cultivation flowered and was confirmed to be female. A field inspection of both Doughboy Bay populations in October 1995 confirmed only female flowers on the "new" population and found only male pollen stalks on the original population. The two populations are found on the same dune system but are approximately 280 m apart. The original (male) population is to the north of the new (female) population and occupies an area of approximately 100 m x 5 m, the female population occupies an area of 15 m x 8 m. The habitat of *Gunnera hamiltonii* at Doughboy Bay is very different from that of the mainland population at Omaui. The *Gunnera* creeps through a mat of moss and litter within relatively dense grass and flax vegetation extending even into the edge of the forest. It is much more shaded than the site at Omaui and West Ruggedy where the *Gunnera* is totally exposed and lives on hard/sandy substrate without competition from other species. No seedling plants were observed at Doughboy Bay.

Both the success of hand pollination of *Gunnera hamiltonii* and the discovery and verification of a male and female population at Doughboy Bay add considerably to the future recovery planning for this endangered plant.

Acknowledgements

Thanks to Colin Webb, Carol West, Lawrie Metcalf, and Stewart Island Field Centre staff for their assistance.

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■ Some interesting plant distributions in the Eastern Arrowsmith Range, Central Canterbury

The Arrowsmith Range (NZMS 260, J35) is a highland of Torlesse sandstone standing east of the Main Divide of the Southern Alps, and drained by tributaries of the Rakaia, Ashburton and Rangitata rivers, with small glaciers at their heads. The rugged western peaks of the range rise to 2500-2780 m. On the interfluvium between the Cameron and South Ashburton Rivers, at the eastern margin of the range, are high plateaux (1000 m-1600 m a.s.l.), blanketed with glacial till from the two cold episodes before the last (Otira) glaciation 80,000-14,000 years ago; the Waimean (190,000-120,000 years ago), and the Waimaungan (300,000-250,000 years ago) (Oliver & Keene 1990). In wet areas among the extensive red tussock (*Chionochloa rubra*), and snow tussock (*C. macra*) tall grasslands which clothe these plateaux are small cushion bogs. Dominant plants in them are *Oreobolus pectinatus* and *Abrotanella caespitosa*. Other common species are *Breutelia pendula*, *Carex echinata*, *C. gaudichaudiana*, *C. sinclairii*, *Carpha alpina*, *Celmisia gracilentia*, *Coprosma perpusilla*, *Dicranoloma robusta*, *Drosera arcturi*, *Gonocarpus micranthus*, *Netertera balfouriana*, *Pernettya nana*, *Schoenus pauciflorus*, *Sphagnum cristatum* and *Utricularia moranthos*.

Recently we found that one bog, at c. 500 m, contained some plant species known from few localities in Canterbury, but commoner to the south, in Otago-Southland, and, in some cases to the north, in north Westland-Buller-western Nelson and the Central North Island mountains. They are: *Centrolepis pallida*, *Dracophyllum prostratum*, *Euphrasia dyeri*, *Kelleria (Drapetes) laxa* and *Rostkovia magellanica*. All except the *Kelleria* and *Rostkovia* are endemic to New Zealand. The distribution patterns are summarised in Table 1.

It was heartening to find *Rostkovia* in a second Canterbury locality, following Andrew Dobson's discovery of it in the 1970s 60 km further north of the Arrowsmith Range, at Lagoon Saddle, between the Waimakariri and Rakaia catchments (Dobson 1977). At about 43°3'S. latitude this latter site is probably the northernmost world occurrence of the species (which New Zealand shares with southern South America, as well as South Georgia, the Falklands, Tristan da Cunha and our own Subantarctic islands). *Kelleria laxa* is found also in the Bogong Range, southeastern Australia.

Near the same bog, in grassland, the prostrate forb *Lobelia linnaeoides* is present. Nearby, on well-drained stony sites at 1550-1650 m, on bouldery moraines and ridge-crests, and in wind-eroded areas among the grassland, occur the mat-formers *Raoulia hectori* and *R. petriensis*. These three species are commoner further south, in the South Canterbury and Otago mountains. Here in the Arrowsmith Range they reach their northernmost known limit (Table 1). Associated with the two *Raoulia* species are other species commonly present in Canterbury in stony sites, at similar altitudes: *Agrostis subulata*, *Anisotome flexuosa*, *Celmisia sessiliflora*, *C. viscosa*, *Colobanthus acicularis*, *Dracophyllum pronum*, *Haastia sinclairii*, *Koeleria* sp., *Leptinella atrata*, *L. pectinata*, *Lignocarpa carnosula*, *Luzula pumila*, *Myosotis elderi*, *Poa buchananii*, *P. lindsayi*, *Phyllachne colensoi*, *Pygmea pulvinaris*, *Ranunculus crithmifolius*, *Raoulia eximia*, *R. hookeri* var. *apice-nigra* and *Senecio glaucophylla* subsp. *discoideus*.

In Canterbury all of the species noted in Table 1, except *Lobelia linnaeoides* (which occurs in Mount Cook National Park) are absent in the western mountains near the Main Divide. Generally, they inhabit more easterly mountains - Mt Hutt, Mt Somers, Two Thumb Ra., Hunters Hills. The two *Raoulia* species also occur on ranges around the inland Mackenzie Basin.

Perhaps these species are constrained by the lack of suitable habitats in the western mountains. Alternatively, the distributions may be relict, in the sense that they represent contractions of more widespread easterly occurrences, during the Otira Glaciation.

Table 1. Other New Zealand Locations For Locally Distributed Species In The Eastern Arrowsmith Range

Species in E. Arrowsmith Range	Other known locations in Canterbury	Distribution Otago-Southland	Distribution Nelson-Buller-North Westland	Distribution Central North Island
<u>Bog Habitats</u>				
<i>Centrolepis pallida</i>	Mt Somers, Two Thumb Ra.	scattered throughout	a few localities	a few localities
<i>Dracophyllum prostratum</i> *	Mt Somers, Two Thumb Ra.	widespread	-	-
<i>Euphrasia dyeri</i>	Mt Somers	scattered throughout	a few localities	-
<i>Kelleria laxa</i>	Upper Hurunui R., Esk Valley	W. Otago, Fiordland	widespread in W.	a few localities
<i>Rostkovia magellanica</i>	Lagoon Saddle between Waimakariri and Rakaia Rivers	local, W. Otago, Southland, Fiordland, Stewart I.	-	-
<u>Snow Tussock Grassland</u>				
<i>Lobelia linnaeoides</i> *	widespread, S. Canterbury	widespread, Otago	-	-
<u>Rocky or Stony Habitats</u>				
<i>Raoulia hectori</i> *	Mt Hutt, Mt Potts, Two Thumb Ra., Hunters Hills and other S. Canterbury ranges	widespread, Central and N. Otago	-	-
<i>R. petriensis</i> *	Two Thumb Ra., and other S. Canterbury ranges	N. Otago	-	-

The Arrowsmith Range and Mount Somers localities for *Centrolepis* and *Euphrasia* are only 27 km apart. They provide a somewhat tenuous link between sites for more northerly and southerly populations of these species. Some other alpine-subalpine plant taxa have similar eastern distributions in Canterbury to those noted earlier, e.g., *Dracophyllum muscoides*, *Celmisia ramulosa*, *Hebe cheesemanii*, *Kelleria villosa*, *Ourisia glandulosa*, *Pimelea pseudolyallii*, *Ranunculus insignis* var. *monroi*, *Schizeilema roughii*.

The syndrome of easterly distributions in Canterbury that have been noted above points towards a common cause which might be the same as that invoked to explain the scattered distribution of *Nothofagus menziesii* in the same region (Burrows & Russell 1990), namely that the eastern mountains were inhabited by these species in glacial times. It is even possible that some of them lived on the high plateaux of the eastern Arrowsmith Range during the Otira Glaciation, as the glaciers then lay well below the level of the plateaux.

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■ Notes on two bryophytes from the Piripiri Road Caves, Ruahine Ranges

Even to a casual observer entering a cave it is obvious that the vegetation changes. Only a few species are able to survive under the gloomy conditions and they are usually in an attenuated form that is difficult to identify. Even these disappear as the darkness becomes more intense. In a study of the Waitomo Caves (de Lange & Stockley 1987) it is reported that one of the plants found there was an unidentified "thalloid liverwort". Unfortunately all of the specimens collected at the time appear to have been lost, as none are presently held at AK or WAIK. While examining the vegetation of the Piripiri Road Caves, we found a thalloid plant which seemed to resemble the unidentified species reported from the Waitomo Caves. A leafy liverwort which is frequently found in wet locations was also collected. By growing the collected plants in more normal light and moisture conditions, we have been able to identify the thalloid plant found in the Piripiri Road Caves.

The Ruahine Ranges, which lie to the north-east of Palmerston North, are composed mainly of greywacke, but on the western flank there are several outcrops of late Tertiary limestone. In one of these outcrops that lies in the Pohangina Valley, some 50 km from Palmerston North, there are a series of limestone caves known as the Piripiri Road Caves. These are described by Speight and Wild (1924) in their account of the geology of the region and in more detail by Pearce (1988).

The northern most cave, Limestone Grotto, 1 km north of Sixtus Lodge, lies in a bed of limestone at least 16 m thick. The cave takes the form of a natural tunnel in the steep-sided gorge of Limestone Creek, over which Limestone Road passes. Access to the cave from Limestone Road is by a flight of stairs on the southern wall of the gorge.

The steep walls of the gorge are clothed in a pendulous veil of bryophytes which is continually wet and, at the western entrance, constantly dripping with water (Fig. 1 & 2). In the heavily shaded areas closest to the cave entrances the two main bryophytes forming the veil are a liverwort, *Heteroscyphus triacanthus* (Hook.f. & Taylor) Schiffn. and a hornwort, *Megaceros denticulatus* (Lehm.) Steph. The liverwort was predominantly found at the drier eastern entrance, while the hornwort was a major component of the veil at the wetter western entrance. Under these wet and shaded conditions the plants always remain vegetative and rather attenuated. Voucher specimens of the above plants are MPN 18901 and MPN 18902.

The liverwort is readily identified by its 2 rows of flattened lateral leaves, usually 3-toothed at the tip, and a row of small underleaves which are taller than broad, usually 4-spined at the apex, have an arched insertion and are connate with the lateral leaves, with one side being lower than the other. The species was described by Hooker f. and Taylor in Taylor (1846) as *Lophocollea triacantha* and later described and illustrated under the same name in Hooker (1854 - 1855). It was transferred to *Chiloscyphus triacanthus* by Stephani (1908) and under this name it was described and illustrated by Hodgson (1943), and by Allison and Child (1975). The name *Heteroscyphus triacanthus* was used by Engel and Schuster (1984). It is recognised that the form of the plant varies considerably and in fact so much so that it has been suggested that one form found in a shady cavern might be distinguished as forma *cavernicola* Allison (Hodgson 1943). However, several different forms appear to intergrade and no single one is consistently present in all situations.

The hornwort is thalloid with denticulate lobes which tend to overlap in sheets. The species was described by Lehmann (1857) under the name *Anthoceros denticulatus* and transferred to *Megaceros* by Stephani (1916). Later it was identified and illustrated by Campbell (1984). In order to identify the hornwort some plants were collected from the vicinity of the cave entrances on June 6, 1994 and cultured at Massey University on sterilised clay soil in plastic containers under gladwrap covers. Watering was done with 0.5% Knop's solution (Johansen 1940). The new growth in the cultivated plants was observed to be thicker in texture. In March 1995 these plants were found to be dioecious and in January 1996 ripe sporophytes were produced. The spores are of diameter 26 to 34 µm, with characteristic ornamentation consisting of small papillate projections on the proximal face and a mixture of small papillate projections and larger ones on the distal face. Voucher specimens of the cultured plants are MPN 18810 and MPN 18900. One

of the components of the veil, *Heteroscyphus triacanthus*, is known to occur commonly in shaded places near water (Hodgson 1943) and in caves (de Lange and Stockley 1987), but *Megaceros denticulatus* does not seem to have been recorded in association with caves previously.

Acknowledgements

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Fig. 1. Bryophyte veil on rock wall above cave entrance



Fig. 2. Bryophyte veil on rock wall beside cave entrance

■ *Abrotanella fertilis* Swenson from the Huiarau Range

In the last newsletter Swenson and Garnock-Jones reported finding *Abrotanella fertilis* Swenson on Mt Ruapehu and speculated that it may occur further north on the Huiarau and Raukumara Ranges. They are correct concerning the Huiarau Range as there is a voucher specimen for this area lodged in the New Zealand Forest Research Institute Herbarium (NZFRI 14440). The specimen, originally determined as *Abrotanella caespitosa* Kirk, was found in a summit seepage on Mt Maungapohatu on 10 April 1984 by W.B. Shaw and S.M. Beadel, at 1365 m, 38°35'S, 177°08'E. According to Swenson and Garnock-Jones *Abrotanella fertilis* occurs in the high ranges of the North Island and was previously misidentified as *Abrotanella caespitosa* Kirk which is found in the eastern and southern South Island.

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Research Reports

■ A new hebe species: *Hebe tairawhiti* B.D. Clarkson et Garn.-Jones

Hebe, New Zealand's largest flowering plant genus, is still not well known taxonomically. Garnock-Jones & Clarkson (1994) referred to 20 species, 20% of the total accepted by them, which had no name in *Hebe* at species rank. Garnock-Jones (1993) provided the new combinations *Hebe mooreae* and *Hebe masoniae*.

In a paper just published (*New Zealand Journal of Botany* 34 (1)) we have described a new species of *Hebe* from the East Coast of the North Island. It was first recognised as a distinct species by Mrs E. A. Hodgson of Wairoa in the 1940s (A. P. Druce, CHR 165760). Druce (1977) gave the first written justification for its recognition, and R. C. Creswell and N. Potts referred to it by the tag name *Hebe* "Ahimanu" (Hair 1967: 345) (R. C. Creswell, *pers. comm.* 1992). It was illustrated in Eagle (1982 pl. 320) as *Hebe* sp. (n), and has also been widely referred to by the tag name *Hebe* "Wairoa" (e.g., Cameron *et al.* 1993).

Hebe tairawhiti B.D. Clarkson et Garn.-Jones is a hermaphrodite shrub or small tree up to 4.5 m tall (see cover illustration). It can be distinguished from other members of the *H. stricta* complex by long, narrow, sessile leaves which taper evenly from a broad base and on the abaxial surface have a broad yellow midrib which contrasts with the green lamina; and from *H. parviflora* by longer leaves and erect or erecto-patent narrow corolla lobes.

H. tairawhiti occurs only in the North Island and at present is known from Wairoa to Waihou Bay north of Gisborne (Turanganui-a-Kiwa), and west to the Motu River headwaters. Its habitat is mainly coastal in shrub-dominated vegetation on mudstone slopes, but it is also found inland on river banks, road cuttings, and a limestone outcrop at 680 m above sea level. Because of its restricted distribution and the fact that it is threatened by goat browsing, we recommended a classification of "rare" in the New Zealand Botanical Society threatened plant list.

We chose the specific epithet *tairawhiti* as this is the Maori name for the region of the North Island where the species is predominantly found.

Heads (1993) suggested that the affinities of this species (referred to as *Hebe* sp. (n) of Eagle 1982) are with *Hebe parviflora* (section *Hebe* series *Occlusae* Heads). However, although best placed in the series *Occlusae*, it lacks the distinctive curved anther filaments in the bud which are characteristic of *H. parviflora* and a group of related species. In its corolla, with a long tube and short, erect to suberect oblong lobes, it closely resembles species of the *H. stricta* complex, among which it seems most similar to two tetraploid forms ($2n = 80$), *Hebe stricta* var. *egmontiana* and *Hebe stricta* var. *lata*, which together probably constitute an unnamed species distinct from *H. stricta* (cf. Druce 1977; Eagle 1982). *H. stricta* var. *egmontiana*, *H. stricta* var. *lata*, and *Hebe tairawhiti* all occur in the East Coast region, but are separated altitudinally. *H. stricta* var. *lata* is typically found in exposed tussocklands, *H. stricta* var. *egmontiana* in

subalpine shrublands, and *H. tairawhiti* in the lowland and coastal zones. No site is known where *H. tairawhiti* is sympatric with *H. stricta* var. *egmontiana* or *H. stricta* var. *lata*.

H. tairawhiti can usually be found in bud in January and it flowers from February to April, but mainly in March. The flowers are pale violet at first but rapidly fade to white. The seed capsules are dark brown when ripe, and most have dehisced by May or June. Plants can be easily propagated by cuttings with or without the use of rooting hormone. The compact growth habit and distinctive leaf colouration of *Hebe tairawhiti* make it a suitable garden subject. It especially deserves to be a feature of public gardens within its home range, and is already quite widely cultivated, e.g., in Wellington and Christchurch cities.

Acknowledgement

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■ An investigation of the significance of oil bodies in *Marchantia polymorpha* as a snail repellent

It is known that liverworts e.g., *Marchantia* and *Lunularia* can become weeds in gardens and containers whereas other plants are browsed by snails and slugs. Liverworts characteristically have oil-bodies and mucilage within their cells and possible functions have been suggested for these. In some cases they have unique properties. The question arises as to whether *Marchantia* is protected by compounds in the oil-bodies.

Marchantia polymorpha thalli collected from a local irrigation ditch were maintained in a shaded planter tray on a mixture of wet clay and sand, and used in subsequent experiments. Three selective feeding experiments using ten previously starved garden snails (*Helix aspera*) established a consistent preference for cauliflower leaves over those of cabbage, followed by silver beet and then lettuce. Cauliflower leaves were used in subsequent experiments.

Macerates of 100 grm fresh weight samples of *Marchantia* thallus, used as is or diluted to 50% with distilled water, were painted onto the ad- and abaxial surfaces and petioles of young cauliflower leaves, and placed in the snail cages. Overnight, almost total predation of the leaves coated with the 100% macerate occurred. This was delayed by one day for the half-strength coated leaves. At first, minimum predation occurred on the control leaves painted with distilled water, and only 50% after two days. The intact *Marchantia* thallus remained unbrowsed, although snails crossed over it. The trial was repeated five times with similar results.

Counts of the oil-bodies in *Marchantia* showed that there were twice as many in the close-packed cells of the ventral part of the thallus as compared to the number in the dorsal part, and one-third of the number in the gemmae. There are no oil-bodies in the epidermal layer. Microscopic examination showed that the oil-bodies had been disrupted by maceration.

In three further trials, starved snails were presented with a choice (using leaves or intact thalli as controls) between the *Marchantia* epidermis alone and the thallus with the epidermis shaved off, on the premise

that the epidermis presented a physical or chemical barrier to herbivory. The cauliflower leaves were eaten immediately, but, even after six days, the *Marchantia* samples remained untouched.

In a final experiment, repeated three times, a macerate of cauliflower leaf was painted onto *Marchantia* thallus and snails were given a choice between this and piles of either leaf or thallus macerate or a 50/50 mix, using intact leaves and thalli as controls. In this case, entire leaves, leaf macerate and the 50/50 mix were eaten; *Marchantia* thallus and thallus macerate remained untouched. The thalli with leaf macerate coatings were grazed at the thinner dorsal edges; lack of palatability was overcome to a certain extent.

The experiments suggest that, while maceration may alter the properties of the postulated feeding deterrent to some extent (snails eat leaves coated with *Marchantia* macerate) there is no proven link-up between the presence of oil-body chemicals and the lack of palatability. It may be that it is the low nutritive value of *Marchantia* that makes it uninviting to snails. The oil-bodies then, are merely secondary metabolites of no known function for the liverwort.

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■ A Revised Checklist of New Zealand Mistletoe (Loranthaceae) Hosts

Introduction

We present below a checklist of loranthaceous mistletoe hosts (Appendix 1). It is a revision (up to 31 March 1996) of Norton *et al.* (1994), which was a preliminary list soliciting new records. Our purpose in publishing a revised list is twofold; firstly, it introduces new records received from the New Zealand botanical community, secondly, it provides a breakdown of the exact nature of each host record, thereby furnishing a measure of the validity of each record. The need for caution became evident when various literature records cited by Norton *et al.* (1994), and some personal communications of host attachments received from the botanical community were unable to be verified.

Methods

1. Arrangement

The checklist is arranged according to the degree of confidence for each host listed:

1. host verified by a herbarium specimen and/or clear photograph mounted alongside the mistletoe (e.g. Fig. 1);
2. personal communication from a reliable source;
3. host mentioned but not verified on herbarium sheet;
4. literature record.

Of all the host categories presented, the least satisfactory is Literature Record. We have observed that many of these records are merely duplications of earlier and often dubious observations made before the turn of the century. Therefore we have attempted to record the original source for each literature record, and we would stress that no record should be accepted as fact until such time as it is supported by an actual and unequivocal herbarium voucher. We also urge current authors to verify their records to prevent future confusion.

Hosts are arranged alphabetically by family, genus and species (including hybrids) for each mistletoe species. A breakdown of the numbers of indigenous and exotic taxa parasitised is also given. Norton *et al.* (1994) highlighted the danger of accepting host records without verifiable proof of parasitism. Accordingly, while we list all the hosts reported to us, based on herbarium specimens and the botanical literature, we emphasise that only those records supported by *actual* evidence of the host utilised (e.g. Fig. 1) be accepted as valid records.

2. Nomenclature

Nomenclature of mistletoes and host taxa follows that suggested by Cooper (1956), Allan (1961), Barlow (1966), Connor & Edgar (1987), and Druce (1993) for indigenous taxa, and that of Webb *et al.* (1988), Huxley *et al.* (1992), and Tutin *et al.* (1993) for exotics. Herbarium acronyms and other minor nomenclatural decisions follow those recommended by Holmgren *et al.* (1990), and the ICBN (Greuter *et al.* 1994). An asterisk (*) denotes an exotic taxon.

Rejected taxa (*Ileostylus* and *Tupeia* hybrids)

Thomson (1949) briefly discussed and illustrated a putative hybrid mistletoe, *Ileostylus micranthus* X *Tupeia antarctica*, based on collections made from a specimen parasitising a cultivated plant of *Coprosma*



Fig 1. Herbarium specimen showing a collection of the green mistletoe (*Ileostylus micranthus*) and its host totara (*Podocarpus totara*).

two plants, male and female, growing on the same host. This is further suggested by his later observations that seedlings raised from his "hybrid" were either "male or female". We can also add that no further hybrids between these mistletoe genera or indeed between *Alepis* and *Peraxilla* as was suggested by Cockayne & Allan (see Allan 1961:415) have been reported or revealed through our herbarium searches. Indeed, based on their chromosome numbers and karyotypes, hybrids between any of our indigenous mistletoe genera are considered extremely unlikely (Beuzenberg & Groves 1974, B.P.J. Molloy unpubl. data). For all these reasons *Coprosma chathamica* is listed as a host for *Tupeia antarctica*.

chathamica. Thomson considered his plant was this hybrid because of the leaf shape (the paper includes some poor illustrations of these), and apparent differences in the reproductive behaviour of the plant. Allan (1961) included Thomson's observations under his entry for *Tupeia* but without adding further comment. Barlow (1966) dismissed the hybrid as part of the natural range of variation within *Tupeia antarctica*. More recently, Norton *et al.* (1994) considered the hybrid may have been an example of double parasitism between *Tupeia* and *Ileostylus*, an observation supported by the fact that both genera frequently parasitise each other in some parts of the country e.g. Banks Peninsula. Unfortunately, no herbarium specimens of Thomson's putative hybrid exist, so an assessment based on tangible evidence is impossible. However, following a critical reappraisal of the observations made by Thomson (1949), we support Barlow's earlier suggestion that the putative hybrid was *Tupeia*. We have come to this view through our combined experience of the range of leaf sizes, fruit shape and colouration exhibited by *Tupeia*. We have also observed that in many wild populations of *Tupeia* both sexes frequently become intermingled, such that it is often difficult to distinguish separate plants. The fact that Thomson did not observe functionally perfect flowers but rather that "one branch produced male flowers only" while the rest of the "plant" was female, suggests that he had

Preliminary analysis

A more detailed interpretation of the level of host specificity demonstrated by our loranthaceous mistletoes is in preparation (D.A. Norton & P.J. de Lange unpubl. data). However, using only the records verified in the manner we recommend, the numbers of hosts parasitised by the various species are: *Alepis flavida* (7 taxa), *Ileostylus micranthus* (175 taxa), *Peraxilla colensoi* (3 taxa), *P. tetrapetala* (13 taxa), *Muellerina celastroides* (0 taxa), *Trilepidea adamsii* (1 taxon) and *Tupeia antarctica* (28 taxa).

While the present list is more comprehensive than that of Norton *et al.* (1994) it is still far from complete, with many host records not validated with vouchers. For this reason we invite all list users to verify those records presently lacking an appropriate herbarium voucher. We are also interested to receive any additional host records to those listed, especially if they are supported with an appropriate voucher (e.g. Fig. 1).

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APPENDIX 1. Annotated loranthaceous host checklist (Categories: 1. Host verified by a supporting voucher specimen or clear photograph lodged alongside mistletoe voucher; 2. Host reported by a reliable source; 3. Host mentioned on herbarium sheet; 4. Literature record)

Alepis flavida

Family	Genus	Species	1	2	3	4
Araliac.	<i>Pseudopanax</i>	<i>P. colensoi</i>			WELTU 8750	
Elaeocarpaceae.	<i>Aristotelia</i>	<i>A. fruticosa</i>		BPJ Molloy (pers.obs.)		
Epacridac.	<i>Archeria</i>	<i>A. traversii</i>	WELT 44861			
Fagac.	<i>Nothofagus</i>	<i>N. fusca</i>	CHR 218909			
		<i>N. menziesii</i>			CHR 73406	
		<i>N. solandri</i> var. <i>cliffortioides</i>	CHR 201504			
		<i>N. solandri</i> var. <i>solandri</i>	AK 221725			
		<i>N. truncata</i>			WELT 31311	
		<i>N. fusca</i> X <i>N. solandri</i> var. <i>cliffortioides</i>	AK 222049			
Rubiaceae.	<i>Coprosma</i>	<i>C. pseudocuneata</i> s.s.	NZFRI 20319			
		<i>C. propinqua</i>	AK 221707			
5	5	11	7	1	3	0
Indigenous	5	11	7	1	3	0
Exotic	0	0	0	0	0	0

Ileostylus micranthus

Family	Genus	Species	1	2	3	4
Aceraceae.	* <i>Acer</i>	* <i>A. negundo</i>	AKU 18609			
		* <i>A. palmatum</i>	AK 224603			
		* <i>A. pseudoplatanus</i>	AK 222053			
		* <i>A. sp.</i>	AK 224030			
Araliaceae.	* <i>Hedera</i>	* <i>H. helix</i>	AK 222402			
	<i>Pseudopanax</i>	<i>P. anomalous</i>	AK 223954			
		<i>P. arboreus</i>	AK 222388			
		<i>P. crassifolius</i>	AK 223929			
		<i>P. ferox</i>	AK 223955			
		<i>P. simplex</i>				Wilson (1982)
	<i>Schefflera</i>	<i>S. digitata</i>	AK 222392			
Asteraceae.	<i>Cassinia</i>	<i>C. leptophylla</i>			CHR 464592	
	<i>Helichrysum</i>	<i>H. aggregatum</i>	AK 222038			
		<i>H. intermedium</i> var. "tumidum"	AK 221724			
	<i>Pachystegia</i>	<i>P. insignis</i>	AK 227265			
	<i>Olearia</i>	<i>Olearia angulata</i>	AK 222419			
		<i>O. hectorii</i>	AK 227652			
		<i>O. ilicifolia</i>	AK 223938			
		<i>O. paniculata</i>	AK 223947			
		<i>O. solandri</i>			CHR 464592	
		<i>O. virgata</i>			AK 226536	
Betulaceae.	* <i>Alnus</i>	* <i>A. glutinosa</i>	AK 223946			
	* <i>Betula</i>	* <i>B. pendula</i>	AK 223395			
	* <i>Corylus</i>	* <i>C. avellana</i>	CHR 286197			

Celastrac.	* <i>Euonymus</i>	* <i>E. japonicus</i>	AK 223735	
Cornac.	* <i>Dendrobenthamia</i>	* <i>D. capitata</i>	AK 223497	
Cupressac.	* <i>Cupressus</i>	* <i>C. macrocarpa</i>	AK 221696	
Elaeagnac.	* <i>Elaeagnus</i>	* <i>E. Xreflexa</i>	AK 223802	
Elaeocarpaceae.	<i>Aristolelia</i>	<i>A. fruticosa</i>		BPJ Molloy (pers. obs.)
		<i>A. serrata</i>	AK 222389	
	<i>Elaeocarpus</i>	<i>E. dentatus</i>	AK 222390	
		<i>E. hookerianus</i>	CHR 94065	
Epacridac.	<i>Cyathodes</i>	<i>C. juniperina</i>	CHR 417069	
	<i>Leucopogon</i>	<i>L. fasciculatus</i>		NZFRI 13775
Ericac.	* <i>Arbutus</i>	* <i>A. unedo</i>	AK 224280	
	* <i>Erica</i>	* <i>E. arborea</i>	CHR 499557	
		* <i>E. lusitanica</i>	AK 222415	
	<i>Gaultheria</i>	<i>G. antipoda</i>	AK 222046	
	* <i>Rhododendron</i>	* <i>R. ponticum</i>	AK 222413	
		* <i>R. sp.</i>	CHR 286157	
		* <i>R. Kurume hybrids</i>	AK 225894	
Escalloniaceae.	<i>Carpodetus</i>	<i>C. serratus</i>		WAIK 4749
	<i>Corokia</i>	<i>C. cotoneaster</i>	CHR 28178	
		<i>C. Xvirgata</i>	AK 266095	
Fabac.	* <i>Acacia</i>	* <i>A. baileyana</i>	AK 222416	
		* <i>A. dealbata</i>	CHR 286198	
		* <i>A. mearnsii</i>	AK 225893	
		* <i>A. melanoxylon</i>	AK 226814	
		* <i>A. parramattense</i>	AK 226093	
	<i>Carmichaelia</i>	<i>C. australis</i>	WELT 31057	
		<i>C. petriei</i>	AK 222035	
	* <i>Chamaecytisus</i>	* <i>C. palmensis</i>	CANU 18912	
	* <i>Cytisus</i>	* <i>C. scoparius</i>	AK 222041	
	* <i>Laburnum</i>	* <i>L. ?anagyroides</i>	AK 223927	
	* <i>Lupinus</i>	* <i>L. arboreus</i>	AK 223935	
	* <i>Robinia</i>	* <i>R. pseudacacia</i>	AK 223945	
	<i>Sophora</i>	<i>S. microphylla s.l.</i>	CANU 36584	
		<i>S. prostrata</i>	CANU 36582	
		<i>S. tetraptera</i>	AK 222401	
	* <i>Ulex</i>	* <i>U. europaeus</i>	AK 221699	
	* <i>Virgillea</i>	* <i>V. capensis</i>		GT Jane (p. comm., 1996)
Fagac.	* <i>Quercus</i>	* <i>Q. cerris</i>	AK 224596	
		* <i>Q. ilex</i>	AK 224906	
		* <i>Q. palustris</i>	AK 224911	
		* <i>Q. robur</i>	AK 222385	
		* <i>Q. suber</i>	AK 224907	
Griselinia.	<i>Griselinia</i>	<i>G. littoralis</i>	CANU 16943	
Grossulariac.	* <i>Ribes</i>	* <i>R. sanguineum</i>		Bannister (1989)
Hamamelidac.	* <i>Liquidamber</i>	* <i>L. styraciflua</i>	AK 223943	
Laurac.	<i>Beilschmiedia</i>	<i>B. tawa</i>		NZFRI 5392
Loranthac.	<i>Tupeia</i>	<i>T. antarctica</i>	AK 222398	
Magnoliac.	* <i>Liriodendron</i>	* <i>L. tulipifera</i>	CHR 286191	
Malvac.	<i>Hoheria</i>	<i>H. angustifolia</i>	AK 223940	
		<i>H. populnea</i>	AK 222410	
		<i>H. sexstylosa</i>	CHR 286208	
	<i>Plagianthus</i>	<i>P. divaricatus</i>	AK 221700	
		<i>P. regius</i> var. <i>regius</i>	AK 223787	
Meliac.	<i>Melicope</i>	<i>M. simplex</i>	WAIK 14133	
Morac.	* <i>Ficus</i>	* <i>F. carica</i>	AK 224604	
	<i>Streblus</i>	<i>S. heterophyllus</i>	AK 224922	
Myoporac.	<i>Myoporum</i>	<i>M. laetum</i>	CHR 286152	
Myrsinac.	<i>Myrsine</i>	<i>M. australis</i>	AK 222043	
		<i>M. divaricata</i>	AK 223937	
Myrtac.	* <i>Eucalyptus</i>	* <i>E. sp. ?pseudoglobulus</i>		GT Jane (p. comm. 1994)
	<i>Kunzea</i>	<i>K. ericoides</i> var. <i>ericoides</i>	CANU 36909	
		<i>K. ericoides</i> var. <i>linearis</i>	AK 225889	
	<i>Leptospermum</i>	<i>L. scoparium</i>	CHR 353612	

	<i>Lophomyrtus</i>	<i>L. bullata</i>	AK 222383	
		<i>L. obcordata</i>	AK 200873	
	<i>Metrosideros</i>	<i>M. umbellata</i>	AK 222039	
	<i>Neomyrtus</i>	<i>N. pedunculata</i>	AK 222521	
Oleac.	* <i>Forsythia</i>	* <i>F. Xintermedia</i>	CHR 286197	
	* <i>Fraxinus</i>	* <i>F. angustifolia</i> subsp. <i>oxycarpa</i> cv. 'Raywoodii'	AK 222386	
		* <i>F. excelsior</i>	AK 222406	
		* <i>F. ornus</i>	AK 222517	
		* <i>F. sp. ?pennsylvanica</i>	AK 224914	
	* <i>Ligustrum</i>	* <i>L. sinense</i>	AK 223734	
		* <i>L. ovalifolium</i>	AK 224029	
	* <i>Osmanthus</i>	* <i>O. heterophyllus</i>	CHR 439521	
	* <i>Syringa</i>	* <i>S. vulgaris</i>	AK 222394	
Onagrac.	<i>Fuchsia</i>	<i>F. excorticata</i>	CANU 16939	
		<i>F. perscandens</i>	AK 222383	
		<i>F. excorticata</i> X <i>F. perscandens</i>		BPJ Molloy (pers. obs.)
Pinac.	* <i>Pinus</i>	* <i>P. muricata</i>	NZFRI 840	
		* <i>P. radiata</i>	AK 222378	
Pittosporac.	<i>Pittosporum</i>	<i>P. bracteolatum</i> (Norfolk Island)		CHR 229838
		<i>P. crassifolium</i>	AK 223933	
		<i>P. ellipticum</i>		G Platt (p. comm. 1994)
		<i>P. eugenioides</i>	CHR 286206	
		<i>P. ralphii</i>	AK 226097	
		<i>P. tenuifolium</i> subsp. <i>colensoi</i>		FB Overmars (p. comm., 1995)
		<i>P. tenuifolium</i> subsp. <i>tenuifolium</i>	AK 222399	
Platanac.	* <i>Platanus</i>	* <i>P. Xacerifolia</i>	AK 224032	
Podocarpac.	<i>Dacrycarpus</i>	<i>D. dacrydioides</i>	AK 221702	
	<i>Dacrydium</i>	<i>D. cupressinum</i>	WAIK 4936	
	<i>Halocarpus</i>	<i>H. biformis</i>		CHR 417084
	<i>Podocarpus</i>	<i>Podocarpus hallii</i>	OTA 36288	
		<i>P. totara</i>	CHR 461059	
		<i>P. taxifolia</i>	AK 224918	
Polygonac.	<i>Prumnopitys</i>	<i>M. australis</i>	AK 221701	
	<i>Muehlenbeckia</i>	<i>M. complexa</i>	AK 221697	
Proteac.	* <i>Embothrium</i>	* <i>E. coccineum</i>		PJ de Lange (pers. obs.)
	<i>Toronia</i>	<i>T. toru</i>	WELT 31285	
Rhamnac.	<i>Discaria</i>	<i>D. toumatou</i>	AK 222040	
Rosac.	* <i>Cotoneaster</i>	* <i>C. simonsii</i>	AK 222034	
	* <i>Crataegus</i>	* <i>C. monogyna</i>	CHR 219687	
	* <i>Eriobotrya</i>	* <i>E. japonica</i>	AK 224601	
	* <i>Malus</i>	* <i>M. Xdomestica</i>	CHR 286192	
		* <i>M. baccata</i> X <i>M. Xdomestica</i>	AK 222541	
	* <i>Photinia</i>	* <i>P. serrulata</i> cv 'Red Robin'	AK 224930	
	* <i>Prunus</i>	* <i>P. cerasifera</i>	CHR 286158	
		* <i>P. laurocerasus</i>	AK 222515	
		* <i>P. persica</i>	AK 224031	
		* <i>P. serrulata</i>	AK 222407	
		* <i>P. Xdomestica</i>	CHR 286202	
	* <i>Pyracantha</i>	* <i>P. angustifolia</i>	AK 222404	
	* <i>Pyrus</i>	* <i>P. communis</i>	CHR 286157	
	* <i>Rosa</i>	* <i>R. chinensis</i> cv.		J Mason (p. comm. 1995)
		* <i>R. rubiginosa</i>	CHR 286170	
	<i>Rubus</i> [†]	<i>R. australis</i>	CANU 37223	
		<i>R. cissoides</i>	AK 222052	
		* <i>R. fruticosus</i> agg.	AK 222403	
		<i>R. schmidelioides</i>	AK 223953	

Rubiaceae	* <i>Sorbus</i> <i>Coprosma</i>	<i>R. squarrosus</i>	AK 223930			
		* <i>S. aucuparia</i>	CHR 286190			
		<i>C. areolata</i>	AK 222519			
		<i>C. ciliata</i>	AK 223925			
		<i>C. crassifolia</i>	CANU 36908			
		<i>C. foetidissima</i>	AK 223932			
		<i>C. grandiflora</i>	AK 222392			
		<i>C. linariifolia</i>	CHR 286201			
		<i>C. lucida</i>	AK 221871			
		<i>C. macrocarpa</i> subsp. "unnamed"	AK 222214			
		<i>C. parviflora</i> s.s.	AK 219433			
		<i>C. pilosa</i> (Norfolk Island)	AK 223922			
		<i>C. propinqua</i>	CANU 36911			
		<i>C. repens</i>	AK 222455			
		<i>C. rhamnoides</i>	CANU 36588			
		<i>C. rigida</i>	AKU 14554			
		<i>C. robusta</i>	AK 222391			
		<i>C. rotundifolia</i>	AK 222056			
		<i>C. rubra</i>	AK 223803			
		<i>C. tenuicaulis</i>	CHR 129804			
		<i>C. virescens</i>	AK 223951			
		<i>C. wallii</i>		PJ de Lange (pers. obs.)		
			<i>C. sp. aff. parviflora</i> (<i>C. sp. "t"</i> of Eagle 1982)	AK 223931		
			<i>C. propinqua</i> x <i>C. robusta</i>	AK 223801		
		Rutaceae	* <i>Citrus</i>	* <i>C. limon</i>	CHR 219687	
		Salicaceae	* <i>Populus</i>	* <i>P. alba</i>	AK 224935	
				* <i>P. sp.</i>		DR King (p. comm. 1995)
			* <i>Salix</i>	* <i>S. alba</i>	CHR 286170	
				* <i>S. babylonica</i>	AK 224909	
				* <i>S. cinerea</i>	AK 212399	
				* <i>S. fragilis</i>	AK 222057	
				* <i>S. matsudana</i> cv. 'Tortuosa'	AK 223928	
				* <i>S. Xreichardtii</i>	AK 223924	
				* <i>S. sp.</i>	AK 226096	
		Sapindaceae	<i>Dodonaea</i>	<i>D. viscosa</i>	CHR 286147	
		Taxaceae	* <i>Taxus</i>	* <i>T. baccata</i>	AK 222454	
		Taxodiaceae	* <i>Metasequoia</i>	* <i>M. glyptostroboides</i>	AK 224111	
Tiliaceae	* <i>Tilia</i>	* <i>T. xeuropaea</i>	AK 226100			
Ulmaceae	* <i>Ulmus</i>	* <i>U. procera</i> cv. 'Louis Van Houtte'	AK 224908			
		* <i>U. sp.</i>	AK 225888			
Violaceae	<i>Melicytus</i>	<i>M. crassifolius</i>	CHR 212999			
		<i>M. flexuosus</i>	AK 221711			
		<i>M. lanceolatus</i>	AK 222028			
		<i>M. micranthus</i>	AK 223952			
		<i>M. obovatus</i> s.l.		SP Courtney (p. comm. 1994)		
		<i>M. ramiflorus</i> subsp. <i>oblongifolius</i> (Norfolk Island)		CHR 224194		
		<i>M. ramiflorus</i> subsp. <i>ramiflorus</i>	AK 222384			
		<i>M. sp. aff. alpinus</i> (<i>M. "Blondin"</i>)	AK 222037			
		<i>M. sp. aff. alpinus</i> (<i>M. "Brockie"</i>)	AK 221711			
		<i>M. micranthus</i> x <i>M. ramiflorus</i> subsp. <i>ramiflorus</i>	AK 223936			

Winterac.	<i>Pseudowintera</i>	<i>P. colorata</i>	CHR 286161			
48	97	196	175	11	9	2
Indigenous	43	106	93	6	7	1
Exotic	54 [†]	87	81	5	0	1
Norfolk Island	0 [‡]	3	1	0	2	0

Peraxilla colensoi

Family	Genus	Species	1	2	3	4
Betulac.	* <i>Alnus</i>	* <i>A. glutinosa</i>				Allan (1943)
Fabac.	* <i>Robinia</i>	* <i>R. pseudacacia</i>				Cheeseman (1925)
Fagac.	<i>Nothofagus</i>	<i>N. fusca</i>				CHR 200577
		<i>N. menziesii</i>	CHR 286130			
		<i>N. solandri</i>	WELTU 14822			
	* <i>Quercus</i>	* <i>Q. robur</i>				N Baigent (p. comm. 1994)
		* <i>Q. sp.</i>				CHR 288052
Myrsinac.	<i>Myrsine</i>	<i>M. australis</i>				Richards (1956)
Myrtac.	<i>Metrosideros</i>	<i>M. excelsa</i>				K (Colenso)
		<i>M. sp.</i>				CHR 22471
Pittosporac.	<i>Pittosporum</i>	<i>P. sp.</i>				Allan (1961)
Rosac.	* <i>Crataegus</i>	* <i>C. monogyna</i>				WELT 78308
	* <i>Malus</i>	* <i>M. Xdomestica</i>	AK 226753			
	* <i>Prunus</i>	* <i>P. Xdomestica</i>				Cheeseman (1925)
	* <i>Pyrus</i>	* <i>P. communis</i>				Cheeseman (1925)
	* <i>Rosa</i>	* <i>R. sp.</i>				Allan (1961)
7	12	16	3	1	5	7
Indigenous	4	7	2	0	3	4
Exotic	8	9	1	1	2	3

Peraxilla tetrapetala

Family	Genus	Species	1	2	3	4
Betulac.	* <i>Betula</i>	* <i>B. pendula</i>	CHR 286200			
Cunoniac.	<i>Weinmannia</i>	<i>W. silvicola</i>	AK 212173			
Elaeocarpaceae.	<i>Aristotelia</i>	<i>A. fruticosa</i>	CHR 286134			
Epacridac.	<i>Dracophyllum</i>	<i>D. acerosum</i>	CANU 30588			
		<i>D. longifolium</i>	CANU 36604			
Escalloniac.	<i>Quintinia</i>	<i>Q. serrata</i>	AKU 23308			
Fagac.	<i>Nothofagus</i>	<i>N. fusca</i>	AK 212090			
		<i>N. menziesii</i>	AK 221704			
		<i>N. solandri</i> var <i>cliffortioides</i>	CANU 36605			
		<i>N. solandri</i> var. <i>solandri</i>				WELT 78571
		<i>N. truncata</i>				CANU 35171
Loranthac.	<i>Peraxilla</i>	<i>P. colensoi</i>	AK 221706			
Myrtac.	<i>Metrosideros</i>	<i>M. excelsa</i>				K (Cunningham)
Rosac.	* <i>Prunus</i>	* <i>P. Xdomestica</i>	CHR 499327			
Rubiaceae.	<i>Coprosma</i>	<i>C. propinqua</i>	AK 224905			
		<i>C. rugosa</i>	CHR 125581			
Verbenac.	<i>Vitex</i>	<i>V. lucens</i>				K (Cunningham)
11	11	17	13	0	4	0
Indigenous	8	15	11	0	4	0
Exotic	3	2	2	0	0	0

Muellerina celastroides

Family	Genus	Species	1	2	3	4
Myrtac.	<i>Metrosideros</i>	<i>M. ?sp.</i>			P (Raoul)	
1	1	1	0	0	1	0
Indigenous	1	1	0	0	0	0
Exotic	0	0	0	0	0	0

Trilepidea adamsii

Family	Genus	Species	1	2	3	4
Meliac.	<i>Melicope</i>	<i>M. ternata</i>				Cheeseman (1881)
Myrsinac.	<i>Myrsine</i>	<i>M. australis</i>			WELT 7974	
Rubiace.	<i>Coprosma</i>	<i>C. arborea</i>	AK 103908			
		<i>C. sp.</i>				Cheeseman (1881)
3	3	4	1	0	1	2
Indigenous	3	3	1	0	1	2
Exotic	0	0	0	0	0	0

Tupeia antarctica

Family	Genus	Species	1	2	3	4
Araliac.	* <i>Hedera</i> <i>Pseudopanax</i>	* <i>H. helix</i> <i>P. arboreus</i> <i>P. crassifolius</i> <i>P. edgerleyi</i>	CHR 123643 CANU 36940 AK 222544			
Asterac.	<i>Olearia</i>	<i>O. fragrantissima</i> <i>O. paniculata</i> <i>O. traversii</i>		BD Rance (p. comm. 1995)		Smart (1952)
Elaeocarpace.	<i>Aristolelia</i> <i>Elaeocarpus</i>	<i>A. serrata</i> <i>E. dentatus</i>	AK 222396 AK 222397			
Escalloniace.	<i>Carpodetus</i>	<i>C. serratus</i>	CHR 286164			
Fabac.	* <i>Acacia</i> <i>Carmichaelia</i> * <i>Chamaecytisus</i> <i>Chordospartium</i> * <i>Cytisus</i> * <i>Robinia</i> * <i>Virgillea</i>	* <i>A. dealbata</i> <i>C. petriei</i> * <i>C. palmensis</i> <i>C. stevensonii</i> * <i>C. multiflorus</i> * <i>R. pseudacacia</i> * <i>V. capensis</i>	AK 223941 CHR 286165 CHR 286138 CHR 499342 AK 224934			CHR 321051 CHR 140975
Fagac.	<i>Nothofagus</i>	<i>N. sp.</i>				CHR 157512 CHR 97959
Icacinac.	<i>Pennantia</i>	<i>P. corymbosa</i>				
Loranthac.	<i>Ileostylus</i> <i>Peraxilla</i>	<i>I. micranthus</i> <i>P. tetrapetala</i>	CHR 33398 AK 3861			
Malvac.	<i>Hoheria</i>	<i>H. angustifolia</i> <i>H. tyallii</i>	AK 221738 CHR 28226			
Meliac.	<i>Plagianthus</i> <i>Dysoxylum</i>	<i>P. regius</i> var. <i>regius</i> <i>D. spectabile</i>	AK 221740			CHR 405107
Myrsinac.	<i>Myrsine</i>	<i>M. australis</i> <i>M. divaricata</i> <i>M. australis</i> x <i>M. divaricata</i>	AK 222822 AK 221709			
Oleac.	<i>Nestegis</i>	<i>N. apetala</i> <i>N. cunninghamii</i>		PJ de Lange (pers. obs.)		AK 169522 CHR 1841
Pittosporac.	<i>Pittosporum</i>	<i>P. crassifolium</i> <i>P. eugenoides</i> <i>P. tenuifolium</i>	AK 222545 CHR 286167 AK 226754			
Podocarpace.	<i>Prumnopitys</i>	<i>P. taxifolia</i>				MPN 4990

Proteac.	* <i>Embothrium</i>	* <i>E. coccineum</i>		PJ de Lange (pers. obs.)		
Rosac.	* <i>Crataegus</i> <i>Rubus</i>	* <i>C. monogyna</i> <i>R. schmidelioides</i>	AK 226096		CHR 364276	
Ripogoniac.	<i>Ripogonum</i>	<i>R. scandens</i>				Smart (1952)
Rubiace.	<i>Coprosma</i>	<i>C. crassifolia</i>	AK 223942	SP Courtney (p. comm. 1995)		Thomson (1949)
		<i>C. chathamica</i>				
		<i>C. linariifolia</i>	AK 221710			
		<i>C. propinqua</i>	CHR 323025			
		<i>C. parviflora</i> agg.			CHR 45964	
		<i>C. pseudocuneata</i> s.s.	CANU 7753			
18	29	44	28	4	10	3
Indigenous	21	36	22	3	8	3
Exotic	7	8	6	1	2	0

† *Rubus* is the only genus thus far parasitised which includes both indigenous and adventive taxa.

‡ Generic figure excludes *Rubus* which is here included under indigenous through convenience as only one of the five records is an exotic species

§ Three Norfolk Island genera parasitised by *Ileostylus* are indigenous also to New Zealand (*Coprosma*, *Meliccytus* and *Pittosporum*). These taxa have been noted as such under the host species column. However for convenience they have been included in the indigenous subtotal given in this column.

BIOGRAPHY/BIBLIOGRAPHY

■ In praise of the research achievements of older scientists

We all recognise the axiom that botanists never retire and there are many examples in New Zealand.

The theme of retirement in science was considered in an article in 1985 (1) I quote a New Zealand botanist's comment, "Kicking a biologist out at 60 is like putting a bulldozer through a garden that has taken 40 years to reach maturity", and I also refer to the comments of Dr F.W. Dry (1891-1979), the doyen of early New Zealand geneticists (2, 3). Dr Dry retired in 1956 but actively pursued his interests in wool science until his death in 1979 and his major work "The Architecture of Lambs' Coats: A Speculative Study" was published in 1975 when he was 84 (4). The precedent in New Zealand for active research in old age was set by Leonard Cockayne (1855-1934) who, between the ages of 60 and 65, when most scientists have to retire, had not even commenced some of his major research projects, e.g. the tussock grassland and beech forest projects, or his research on hybridization in New Zealand flora. In fact, Cockayne published 55 papers (40% of the total) in the more formal journals after he was 65 and he retained an enthusiasm for botanical research right up until his death in 1934.

In contemporary botanical science in New Zealand Dr Elizabeth Flint (b. 1909) and Dr Ella Campbell (b. 1910) are fine examples of plant scientists who are active in botanical research long after normal retirement. Dr Flint, in her 80's, is still writing books and working on the Desmids of New Zealand. Dr Campbell has remained active in research - in a chronology of her work, 62 articles were published after she formally retired from Massey University in 1976 and some 18% of her total research contributions were published after she had reached 80, and the frequency of her published work continues unabated.

Mention has been made of two overseas scientists who continued research and publication into very old age (5). My former colleague Dr Kenneth M. Smith (1892-1981), a pioneer plant virologist was active in research in his 70's and published books on his speciality into his late 80's. The achievement of Sir John Russell (1872-1965) in completing and publishing his history of agricultural research in Great Britain (6) when he was 93 was especially notable.

However, outdistancing himself from other plant scientists, and indeed scientists in general, is Sir Otto Frankel (b. 1900) who has just published with his colleagues A.H.D. Brown and J.J. Burdon, "The Conservation of Plant Biodiversity" (7). Sir Otto was Director of the former DSIR's Crop Research Division at Lincoln before moving to Canberra in 1951 to become Chief of the CSIRO's Division of Plant Industry.

Sir Otto's long career in plant genetics has virtually embraced the science of genetics not far from its foundation to present-day molecular genetics. Sir Otto has retained links with New Zealand and with his wife Margaret (who is Christchurch born) has visited Christchurch around Christmas time for many years. Sir Otto avers that his present book is "... my last" (8). Even in his 90's Sir Otto retains his sprightly attitude to science, and an independent viewpoint. The present book considers the conservation of plant genes, plant species and plant communities and "This book will be required reading for all those interested in conservation and the environment". When Diane and I met Sir Otto and Lady Frankel in the Christchurch Botanic Gardens Kiosk on 16 February 1996 he was awaiting the reviews of the book with interest.

Acknowledgements

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■ Tribute to Dr Michael Edward Hoare (1941-1996)

Dr Michael Hoare died in Wellington on 22 April 1996 after a long illness. He was 55 and was Director of the New Zealand Police Museum at Porirua. Michael was a leading science historian and author of over 150 lectures, articles, pamphlets, reviews and books on a wide variety of topics, including the history of science in the Pacific, Australia and New Zealand.

Michael was born in England and was a graduate in geographical sciences, German and history of science, with degrees from Hull, Monash and the Australian National University where he completed his Ph.D. Michael came to New Zealand with his wife and family in 1975 as the Third James Cook Fellow. He took as the theme for his research, science history in New Zealand and his three Cook Lectures were published as "Three Men in a Boat: The Forsters and New Zealand Science" (1), "Beyond the 'Filial Piety': Science History in New Zealand A Critical Review of the Art" (2), and "Reform in New Zealand Science 1880-1926" (3). Michael's greatest work of scholarship and his work of greatest interest to botanists was his publication of the edited *Resolution* journal of Johann Reinhold Forster 1772-1775 (4). It is a four volume series published by the Hakluyt Society, London. Earlier, in 1976 Michael's biography of Forster "The Tactless Philosopher: Johann Reinhold Forster (1729-98)" (5) was published. These books are worthy companions to J.C. Beaglehole's publications on James Cook and Joseph Banks. One of Michael's greatest achievements in New Zealand science was his organisation of the first conference on the History of Science in New Zealand at the old Legislative Council Chamber, Parliament House, Wellington in 1983 (6).

Michael was Manuscripts Librarian at the Alexander Turnbull Library from 1978 to 1983 before becoming Director of the Police Museum. He was an office-bearer in the Archives and Records Association of New Zealand, and President in 1981 and 1989. He was on the Editorial Committee of their journal, *Archifacts*. Michael joined the Honorary Advisory Board of the Centre for Studies on N.Z. Science History in 1990. Michael held numerous positions in the Boys' Brigade movement in Australia and New Zealand and joined the movement when he was 12. In 1981 he was appointed New Zealand historian for the Boys' Brigade. Earlier, in 1980 his "Boys, Urchins, Men: A History of the Boys' Brigade in Australia and Papua-New Guinea 1882-1976" was published (7) and "Faces of Boyhood: An Informal Pictorial Record of the Boys' Brigade in New Zealand 1886-1982" was published with Bruce Young in 1982 (8). In 1984 Michael was appointed National Secretary of the Movement for a five-year term.

Michael is survived by his wife Margaret, his daughter Karen and son Craig.

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■ Biographical Notes (22): Bernard Cracroft Aston (1871-1951)

B.C. Aston, agricultural chemist, botanical explorer, and horticulturist was born on 9 August, 1871, at Beckenham, Kent, the eldest of 4 boys and 2 girls. His parents were Murray and Mary Aston, and his grandfather, B.R. Aston M.A. had been secretary to the Ecclesiastical Commissioners (1,2,3).

Bernard Aston attended Horling Grammar School, and then, after the family emigrated, was at Christchurch Boys High School from 1884 to 1886. He did not overlap with Charles Chilton, who taught there from 1881 to 1883, or with R.M. Laing who joined the staff in 1887 (4).

In Christchurch Murray Aston was in business at Duncan's Buildings as "artist, antiquarian, dealer in pictures and curiosities, portraits painted, taxidermist, bird skins prepared" (5). But he soon became Timaru agent for the Mutual Life Association and by 1889 was District Agent in Dunedin (6,7); and from 1886 to 1890 young Bernard was on the clerical staff of this same firm following his father south (8).

In Dunedin the Aston's first lived at Green Island and then from ca. 1891 at St Leonards on the main road to Port Chalmers. By now Murray Aston was special agent for the Government Life Insurance Department with offices in High Street (9). In 1892 he contributed a brief series to the "Otago Witness" entitled "Rural Rambles" dealing with places like Kurow and Milton under headings such as Ecclesiastical, Piscatorial and Sport (10). On 9 May 1893, he was elected a member of the Otago Institute (11).

Bernard's younger sister, Kathleen Daisy (1880-1960), future mother of Professor Geoff Baylis, was the first dux of St Hilda's Collegiate School in Dunedin (10); and Bernard attended the Dunedin Technical College (2) probably in the evening. He summarises his work in Dunedin after 1890 as: "analyst Milburn Lime and Cement Co. 3 years; on licensing acts '91-3 Dun and W'ton" (8). His obituarist, and junior colleague, R.E.R. Grimmett states that after the cement job Aston was appointed a consulting analyst to the Government with accommodation at the University where he was considerably influenced by Professor Black (12). This, together with Aston's association with Professor Easterfield of Victoria College (see below) probably explains his statement that he was educated at Otago University and Victoria College (2), although there is no mention in Calendars of his matriculation or graduation. Anyway, whether at Technical College, at University, on the job, or burning midnight oil, Aston states: "studied chemistry, botany, assaying, bacterial geology" (8).

In 1894 the Dunedin Naturalists' Field Club was reinstated, and as Oliver notes (13) "Aston was its Secretary and it was largely through his energy and enthusiasm that the club became a vigorous institution. Principally owing to his exertions, a very complete and accurate catalogue of the plants of Dunedin and its neighbourhood was published in 1896". He was already in touch with the two leading botanists of the day. Gatherings by Aston from Wickliffe Bay (on the outer coast of Otago Peninsula), Whisky Gully (near Tapanui) and Bluff, are noted by Donald Petrie in a paper read before the Otago Institute on 8 October, 1895 (TNZI 28, 1896) and in a paper read before the Wellington Philosophical Institute on 26 February, 1896, Thomas Kirk noted *Veronica canescens* from Wickliffe Bay collected by B.C. Ashton (sic) (TNZI 28, 1896).

On 12 May, 1896, Aston joined his father as a member of the Otago Institute (14). The first of his many contributions to the *Transactions and Proceedings of the New Zealand Institute* was a supplement to the Dunedin Field Club's plant list (TNZI 31, 1899, Proceedings). It included a small list of fresh-water algae collected locally by J.S. Tennant who was to become Professor of Education at Victoria University and Aston's companion on many expeditions. In 1932, when writing about the Marlborough Harebell (*Wahlenbergia matthewsii*), Aston recalled another important influence from his Dunedin years: "[he] derived considerable information on the growth of New Zealand plants from the frequent visits to the nursery and grounds attached to the Matthews home at Hawthorn Hill, Mornington, some 700 feet above

sea level. The business was carried on by Henry Matthews, who became an enthusiastic plant hunter, and increased the number of species grown, and improved the methods of growing them" (15).

In 1899 Aston was appointed "an Analyst to the Government" as from 1 May (16) and moved to Wellington to inaugurate an agricultural chemistry laboratory. In his first annual report in 1900 as chemist to the Department of Agriculture he noted that a portion of the pathology laboratory have been set aside for his temporary use, and that samples embracing every variety of agricultural produce had been analysed as well as a number of soils. He added: "the most important work done - partly in this laboratory, partly in that of the Victoria College - has been the research into the chemistry of our native flora". In this he collaborated with Professor Easterfield, but noted that "that claims of commercial analysis must, however, be first met" and that his research had been "conducted on holidays and in the small hours of the morning".

Easterfield and Aston published three "Studies on the Chemistry of the New Zealand Flora": 1. The Tutu Plant (*TNZI* 33, 1901); 2. The Karaka-nut (*TNZI* 34, 1902) 3. Rimu-resin (*TNZI* 36, 1904). Aston had also begun to investigate the poison of *Pimelea* at the request of the Government Biologist, T.W. Kirk, and proved the alcoholic extract of the bark to be toxic; and at the instigation of the Government Veterinarian, C.J. Reakes, had extracted the leaf-oil of the ngaio and shown it to be non-poisonous to guinea-pigs. Next year he reported that pukatea bark contained alkaloids. For this early work he was elected a Fellow of the Institute of Chemistry (London). In fact, Aston published 14 items relevant to poisonous plants over the period 1900 to 1935 and is one of the three to whom H.E. Connor dedicated his pioneer account of "The Poisonous Plants in New Zealand" (1951, 1977).

Aston's distinguished career as Chief Chemist, Department of Agriculture, is well outlined in an extensive "Who's Who" entry (2) and by R.E.R. Grimmett (12). It included pioneer investigations on soils and deficiency diseases of stock as well as the initiation of butter testing (1901), field and plot experiments (1905) and testing wheat and its products (1912, 1920-26) (2). His holidays, however, were spent in climbing and plant exploration, and the resulting herbarium and note-books were presented to the Dominion Museum in 1920-21. From these and other sources, Nancy Adams (3) has compiled a detailed itinerary of Aston's botanical excursions. A selection is given below. Both the Tararua and Kaimanawa Ranges were unknown botanically before his explorations.

- 1906 (Jan.) Tararuas: "a three-day trip to Mount Holdsworth with Professor Easterfield, Dr L. Cockayne, and Mr A.H. Cockayne" (17, footnote).
- 1906 (Dec.) Tararuas: "a three-days solitary ramble on Mount Dinnan and in the Otaki Gorge" (17, footnote).
- 1907 (Jan.) Tararuas: "Kaitoke to Otaki with Mr Alfred Jones ("an expert bushman") and W.B. Aston, beginning on Boxing Day" (17).
- 1907 (Jan.) Tararuas: "a three-days ascent of Mount Hector from Otaki, with Messrs. D. Petrie, A. Hamilton, J.S. Tennant, W.C. Davies, and Alfred Jones" (17, footnote).
- 1907 (March) Tararuas: "a three-days journey on Mount Holdsworth with Messrs. G. de S. Baylis [of the Dept. of Agriculture and future father of Professor Geoff Baylis] and Turners (two)" (17, footnote).
- 1907 (9-30 Nov.) Auckland Island (Carnley Harbour): Aston was a member (with Tennant) of the Canterbury Philosophical Institute's Subantarctic Island Expedition. His departmental report remained unpublished until included in the account of the expedition by Godley (18).
- 1908 (Jan.) Tararuas: "three days on Mount Holdsworth with Messrs. D. Petrie and J.S. Tennant" (17, footnote).
- 1908 (Nov.) Tararuas: "a two-days trip up the Hutt Gorge with Mr John Chilwell" (17, footnote).
- 1909 (Jan.) A voyage on the Government Steamer "Hinemoa" to the Snares, Auckland, Campbell, Antipodes and Bounty Islands (19). Among the books of the late Sir Charles Fleming I came across a popular edition of Scott's *The Voyage of Discovery* inscribed "Captain Bollons, NZGS Hinemoa from B.C. Aston: 9 Feb 1909."
- 1911 (Jan.) Kaimanawas: "a week spent with Mr J.S. Tennant M.A., M.Sc., in the Kaimanawa Mountains" (20).
- 1911 (Jan.) Tararuas: on Mount Dundas with W.H. Field, H. Hamilton, H. Girdlestone, and 2 surveyor assistants (photo in 3).
- 1913 (April) Ruahines: "a three-days trip to Makaretu and Umutoi with Mr Frank Hutchinson, jun. (Rissington)" (20).
- 1913 (spring) Tarawera: two visits, the first on 14 September (21).
- 1914 (Jan.) Ruahines: "a ten-days journey with Mr Robert A. Wilson (Bulls) and Mr Frank Hutchinson jun. when a crossing of the mountains was made from Wakarara to Waiouru over what is known as Colenso's track" (20).
- 1914 (Mar.) Ruahines: "a solitary ascent of Whariti" (20).

- 1914 (Dec.) From the Rangitikei River near Taihape, with R.A. Wilson and F. Hutchinson, ascended Aorangi, 4250 feet, thence to the northern end of the Ruahines before climbing Makarako, 5700 feet, in the Kaimanawas and returning to the Rangitikei (13).
- 1915 (1-4 April, Easter) Medway and Ure River Basins, Marlborough, with "Frank Hutchinson Jr., of Rissington (President of the Hawkes Bay Philosophical Society); A. Morris Jones who first piloted me over the Tararua Range; and O'Donohue (sic), the well known amateur guide" (22).
- 1915 (23-25 April) the same area with J.A. Thomson, Director of the Dominion Museum, H.T. Ferrar, "the well known Antarctic geologist", Jones and O'Donoghue (22).
- 1915 (Dec.) Tapuaenuku: climbed to about 6,000 feet (13).
- 1915-1916 (Dec.-Jan.) Tarawera: 2 visits (21).
- 1916 (29 Feb.) Tapuaenuku: with J.A. Thomson, H. Hamilton and A.F. O'Donoghue reached summit, 9465 feet (23).

Aston brought back many novelties and the following authors named species or varieties after him. Petrie: *Poa* (TNZI 1906); *Veronica - Hebe* (1908); *Muehlenbeckia* (1911); *Coprosma* (1912); *Gentiana* (1916). Cheeseman: *Myosotis* (TNZI 1910) ("I have much pleasure in dedicating it to Mr Aston, who is doing so much towards increasing our knowledge of the botany of the Tararua Range"). Simpson: *Carmichaelia* (TRSNZ 1945) ("Specimens of this striking plant, first collected from limestone rock in the Inner Clarence Basin by Mr B.C. Aston, were discussed by Cockayne (1918-167)". Allan: *Epilobium pubens* var. *astonii* (FNZ 1961). Hamlin: *Uncinia* (Bull. Dom. Mus. 1959); *Carex* (Rec. Dom. Mus. 1968).

In November, 1919, Aston was gazetted among the twenty Original Fellows of the New Zealand Institute, and in 1925 was awarded the Hector Medal for the "investigation of New Zealand chemical problems". In his Presidential Address in January, 1928, he advocated the "Preservation of Natural Monuments", mentioning the fossil forest at Waikawa Bay, Southland; the Moeraki Boulders; the Sandymount basaltic pillars; the lava fields and volcanic cones at Auckland City; and the raised beaches at Turakirae which he had described in 1912 (TNZI 44). Further interest in conservation is seen in his membership of the Tongariro National Park Board (1926-31) and as a Councillor and President of the Forest and Bird Protection Society (2, 13).

Throughout this time Aston had been creating a garden at 26 Espin Crescent, Karori, where he "experimented on the growth of New Zealand plants under domestication" (2); and much of his long experience is recorded in the *Journal of the N.Z. Institute of Horticulture* e.g. "Superior New Zealand Plants suitable for Cultivation" (1930, 1931); and "New Zealand Shelter Trees and Shrubs" (1932, 1932). Aston retired in 1936 and in 1948 was elected a Companion of the Most Excellent Order of the British Empire (C.B.E.). He died on 31 May, 1951, and is buried in the Karori Cemetery (1). He was one of our most versatile and industrious scientists, and a bibliography of his published work is long overdue. According to Bailey (24) photographs show a short, rather chubby man with a relaxed open face; but Aston's nephew, Geoff Baylis, describes him as well-built, 6 feet tall, and cultivating a dour sardonic image (10). His letters to Cheeseman from 1901 to 1922 are in the Library, Auckland Institute and Museum (25).

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For help with this note I am very grateful to Professor Geoff Baylis (Dunedin).

References

- (1) Death certificate; (2) *Who's Who in N.Z.* 3 Edn.; (3) Nancy M. Adams *Tuatara* 24, 1980 (with group portrait); (4) *The Years Between. Christchurch Boys High School 1881-1981*; (5) *Wises NZPO Directory 1885-86*; (6) *Wises 1887-88*; (7) *Stones Otago and Southland Directory 1889*; (8) *Who's Who in N.Z.* 5 ed. 1951; (9) *Stones 1892*; (10) Geoff Baylis *pers. comm.*; (11) TNZI 26, 1894 (Proceedings); (12) R.E.R. Grimmatt TRSNZ 80, 1952 (with portrait); (13) W.R.B. Oliver TRSNZ 80, 1952; (14) TNZI 29, 1897 (Proceedings); (15) B.C. Aston *J.NZ Inst. Hort.* 3(2), 1932; (16) *NZ Gazette* 4 May, 1899; (17) B.C. Aston TNZI 42, 1910; (18) E.J. Godley *Tuatara* 23, 1979 (with group photo); (19) E.J. Godley NZJB 27, 1989; (20) B.C. Aston TNZI 46, 1914; (21) B.C. Aston TNZI 48, 1916; (22) B.C. Aston *On the botany of the Kaikoura Mountains. Part 1: The Medway and Ure River Basins*. Unpublished typescript among Aston reprints CHR; (23) B.C. Aston, *The Botany of Tapu-ae-nuku, New Zealand* Kew. Bull. 1916: 7; (24) R.W. Bailey *Dict. NZ Biography* 3, 1996; (25) J.E. Bellingham, MS 58, T.F. Cheeseman.

E.J. Godley, Research Associate, Manaaki Whenua - Landcare Research, P O Box 69, Lincoln

PUBLICATIONS

■ Journal received

New Zealand Native Orchid Group Journal 59 (June)

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3. Pollination studies.
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9. *Cotesia ruficrus* (Braconidae) probable pollinator of *Microtis unifolia* in NZ.
10. *Dasytes* beetle suggested pollinator of *Prasophyllum aff. patens*.

Original papers

12. Flies on NZ native orchids. Eric Scanlen.
15. *Corybas* "trilobus roundleaf" - and *C. Crawlers* become *Thelymitra* Thralls. Eric Scanlen.
22. The *Pterostylis* pterodactyls, Potoema the pump and *Pterostylis micromega*: a tale of missed targets and unexpected bullseyes. Eric Scanlen.

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27. John Barkla on *Pterostylis micromega*. Doreen Abraham on orchids by the Kawakawa track.
28. Orchids on the Tararuas, near Ruapehu and around Waikaremoana.
29. Lois Dougherty's hybrid *Sarcocaulis* "Little Sparkle". Catherine Beard on two forms of *Thelymitra cyanea*. Gael Donaghy and *Bulbophyllum* in NW Nelson. *Spiranthes* at Paraparaumu. How do you spell "Zealand"? A freak *Thelymitra aff. longifolia* flower.
32. How's your nose? A crane-fly on *Bulbophyllum tuberculatum*. *Corybas iridescens* and *Corybas papa*.
33. Bob Goodger photographs insects on orchids. The sun on *Pterostylis* and *Thelymitra*.

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34. Gleanings from Trevor Nicholls's Internet column.
36. Three British *Spiranthes* species, engraved by Walter Hood Fitch.
37. A presumed insect pollinator for *Corybas oblongus* in 1918. Observations of pollen vectors on a putative hybrid swarm of *Microtis* R.Br. By R. Bates.
39. Val Smith.
40. Virus in Australian natives.
41. *Orthoceras novae-zeelandiae* in Australia? *Prasophyllum odoratum*. *Gastrodia sesamoides*. *Prasophyllum australis*. *Cyrtostylis* vs *Acianthus*.
42. Third ANOS Conference and Show, Adelaide.
45. New Zealand Native Orchid Group members, 1996.
47. ANOS website.

Editors

FORTHCOMING CONFERENCES/MEETINGS

■ A Selection of Plants: Etienne Raoul and the Botany of Banks Peninsula

Second notice

On 23 November 1996, at the University of Canterbury, the Canterbury Botanical Society is hosting a one day symposium "A Selection of Plants: Etienne Raoul and the Botany of Banks Peninsula", to commemorate the sesquicentenary of the publication of Raoul's book "Choix de plantes de la Nouvelle Zélande". The speakers and their topics are listed below. If you wish to have further information about the symposium, and a registration form, please contact Colin Burrows, Department of Plant and Microbial Sciences, University of Canterbury, Private Bag, Christchurch, by 30 September 1996. We hope that the registration costs will be quite low.

Symposium speakers

Dr Peter Tremewan, French Department, University of Canterbury, Christchurch
"Etienne Raoul at Akaroa and in Paris"

Dr Warwick Harris, Lincoln
"The Raoul collections in Paris and Choix de Landcare Research Plantes..."

Dr Murray Parsons, Landcare Research, Lincoln
"Raoul and Banks Peninsula algae"

Dr David Galloway, The Retreat, Teviot Road, Teviot, Central Otago
"Banks Peninsula lichens - Raoul's legacy"

Bryony Macmillan, Landcare Research, Lincoln
"Mosses and liverworts in the Raoul collections"

Thelma Strongman, 194A Ilam Road, Christchurch 4
"Native plants in our gardens from Raoul to the present"

Dr Josephine Ward, Plant & Microbial Sciences Dept, University of Canterbury, Christchurch
"Raoulias and others - the past, present and future"

Hugh Wilson, Hinewai Reserve, Akaroa
"Living in Raoul country - the changing flora and vegetation of Banks Peninsula"

Dr Eric Godley, Port Levy Road, Pigeon Bay
"Summing up Raoul's contribution to Canterbury and New Zealand botany"

Editors

■ Exhibition announcement

Beauty in truth: the botanical art of Margaret Stones

Venue: National Gallery of Victoria, Melbourne, Australia
Dates: 17 October - 16 December 1996
Catalogue: A fully-illustrated catalogue will be published
Exhibition Curator: Irena Zdanowicz, Senior Curator of Prints and Drawings

The exhibition will trace the career of the internationally renowned Australian-born artist, Margaret Stones, from her earliest drawings made in the mid-1940s to her most recent work.

Editors

DESIDERATA

■ Request for fresh fruit of indigenous species

I am working on a large (multi-species) comparison of flower and fruit characters between New Zealand and Australian congeners, testing for divergences between species within genera suggested by differences between the two countries in pollinator and disperser faunas.

As part of this I need to obtain fresh fruit from the following, mainly northern, species. I would ideally like 5 fruit from each of 4 plants but can use as few as 5 fruit from one plant. I would also like 4-5 mature undamaged leaves from the same plant(s). Store the fruit in a paper bag inside a plastic bag as this appears to be the best way of avoiding rotting. Clearly label with location and collecting date and post as soon as possible to the address given below.

Species required

Cordyline indivisa
Beilschmedia tarairi
Dysoxylum spectabile
Elaeocarpus dentatus
Litsea calicaris

Nestegis (any species is acceptable)
Planchonella novo-zelandica
Syzygium maire
Toronia toru
Streblus (any species)

Janice Lord, Botany Dept, University of Otago, PO Box 56, Dunedin, Ph (03) 479-5131, Fax (03)479-7583,
Email JLORD@PHYTON.OTAGO.AC.NZ

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