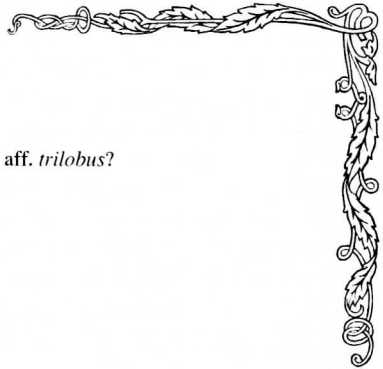


*Caladenia bartlettii*

Drawing by J Bruce Irwin.

From the 2001 edition  
of the Group's *Field guide*.

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**Editor:** Ian St George, 22 Orchard St, Wadestown, Wellington, phone 04 4994227, fax 3894178, [istge@rnzcgp.org.nz](mailto:istge@rnzcgp.org.nz). **Conservation officer:** Peter de Lange, Department of Conservation, PO Box 68908 Newton, Auckland, phone 09 307 9279, email [pjdelange@xtra.co.nz](mailto:pjdelange@xtra.co.nz). **ANOS liaison:** David McConachie, 15 Battersea Place, Palmerston North, phone 06 3586559, email [pleione@ihug.co.nz](mailto:pleione@ihug.co.nz).

**Field trips:** Eric Scanlen, 4 Sunny Park Ave, Papakura, Ph. 09 2984868, email [eascanlen@xtra.co.nz](mailto:eascanlen@xtra.co.nz).

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## From the editor Atypical orchids

**Acknowledgement:** this paper is based on a chapter by Pierre Delforge in his *Orchids of Britain and Europe* (Collins Photo Guide 1995).

### Colour

The violet-purple pigment found in many orchids is anthocyanin. Its presence is inherited, but its intensity can also be affected by the brightness of light and the acidity of soil. In a large population (of *Caladenia lyallii* or *C. minor* for instance) there may be a gradient from some plants with heavily pigmented flower parts, leaves and hairs, to others that have pale green leaves and pure white flowers. Some European orchids are paler at higher altitudes – is our white version of *Corybas* aff. *trilobus* a separate taxon, or is the colour lack simply a reflection of the high altitude where it is usually found?

**Hypochromy** is said to be present when anthocyanins are completely absent as the result of a genetic anomaly. The plant almost entirely lacks red or blue pigment, the leaves are unspotted, and the flowers are pure white, yellowish or greenish. The yellow anthoxanthin or green chlorophyll pigments show through. All orchids that have anthocyanins sometimes show hypochromy, and indeed it has been reported among many NZ orchids; the green version of *Orthoceras novae-zeelandiae* is hypochromic in relation to the purple form; the brownspotted and green-leaved versions of *Aporostylis bifolia* may just represent pigment differences. The genetic anomaly is said to be less frequent in self-pollinators – indeed the “white” forms of *Corybas cheesemani* and *C. oblongus* appear to be rare. Hypochromy can be confined to a small part of the flower.

**Albinos** are plants entirely lacking in any pigment, including chlorophyll; they cannot derive their nutrition from photosynthesis so are obliged to depend on an association with

soil fungi for nutrition. I have seen almost pure white forms of *Gastrodia cunninghamii*, and some very pale *Pterostylis* (typically, of course, *P. paludosa*).

**Hyperchromy** is an excess of anthocyanin pigment, and is said to be very rare.

### Abnormal shapes

Any organism can suffer a genetic abnormality and produce an abnormal form: in orchids, that means oddly-shaped flowers, and sometimes the shape is so odd, orchidologists think it is a new taxon – NZ's *Petalochilus* is a prime example, a *Caladenia* with a petaloid labellum and abnormal column. In some orchids the flower may occasionally be entirely made up of bracts, or any perianth segment can be missing, deformed, fused to another, or doubled up.

All three petals may resemble the labellum, or conversely, the labellum may lose its differentiation and take the form of the other two petals; again, *Petalochilus* is an example; in Australia *Calochilus robertsonii* may have a cleanshaven petaloid labellum; in the Catlins a decade ago Jean Jenks found a colony of *Aporostylis bifolia* with labella no different from the other two petals.

Flowers of *Thelymitra* aff. *longifolia* with a column consisting of three staminodia have been reported in this Journal; *T. formosa* is well known for its frequent third column lobe; double columns are common among thelymitra.

Thelymitra with fused tepals are common. I have reported a colony of *Pterostylis* aff. *montana* with its petals “unzipped” from the dorsal sepal, the whole flower having an “exploded” look.

Abnormalities can be acquired, rather than genetic, and in such cases the abnormality would not be expected the following year. Orchids close to roads and tracks suffer the effects of herbicides and fertilisers (a spotted *T. hatchii* near Invercargill; spirally coiled leaves on trackside *Thelymitra* in the Rimutakas, for examples). Parasites and late frosts

can cause anomalies in the buds as tissues form. Odd “siamese twins” occur, with incomplete separation of two flowers; I have seen this in *Pterostylis patens*.

Strange-shaped orchids should not stimulate the description of new taxa unless there is compelling supporting evidence: consistency of the differences, and wide geographical distribution of the form for instance. Is Max Gibbs’s *Gastrodia* “city” (see *Original papers* in J78) one or the other?

### Hybrids

Hybridisation among plant species is much more common than among animal species. Interspecific hybrids are common in the wild orchid flora of most countries; some European orchids produce natural intergeneric hybrids, and M. Bradhurst recently reported *Caladenia caerulea* x *Glossodia minor* from New South Wales, but I know of none in NZ.

Occasional hybrids are generally rare, and flower among large numbers of both parents. When the number of hybrids exceeds the numbers of the parents, it is called a hybrid swarm or hybrid population.

A hybrid should be different from all the usual variations of colour and shape of its parents: one aberrant character is not enough, but many characters must be considered – habit, leaf shape, flower shape, colour, floral parts, column parts, flowering time, etc; most of these must be intermediate between the parents, though new characters can appear.

When a hybrid is sterile, it is genetically isolated, but if it is fertile it can interbreed with one or both of its parents. When they share the same pollinator, the hybrids can cross with themselves and their parents and set up hybrid swarms or populations. This of course does not apply to self-pollinating species, so in NZ, where only 40% of the species are insect-pollinated, few such instances have been reported. Nonetheless Mark Moorhouse observed recently, “I found an interesting conglomerate at Kikiwa with *Pterostylis patens*, *banksii*, *australis* and *areolata* features in

varying degrees....” I have seen colonies with similar characteristics in the Eglinton Valley, and in Aorangi SFP. These pterostylises are all insect-pollinated and appear to form hybrid swarms.

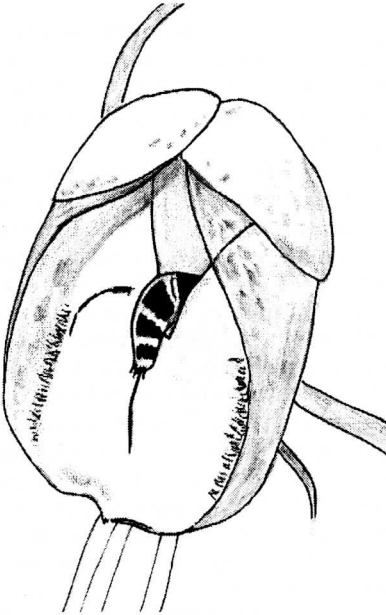
And Peter de Lange wrote after a visit to Great Barrier Island, “I now have some serious doubts about the validity of splitting of *T. pulchella*, unless we have a massive hybrid swarm on GBI – I found fimbriate (yellow/orange), kelp-like, and unbranched, simple column arms in the same population(s) of orchids in numerous sites on GBI. I could see no differences beyond these slight variations in the column arm adornments. I think Lucy Moore’s cautious approach is still warranted. I would like to see consistent morphological/ecological distinctions before I went further reinstating the various names available.” *T. pulchella* is itself regarded as a stable amphidiploid hybrid between *T. cyanea* and *T. longifolia*, so is this variation within the Great Barrier colonies simply the range of normal *T. pulchella*? or a hybrid swarm among *T. pulchella* and its parents? or a hybrid swarm among the various taxa Lucy Moore included in *T. pulchella* (*T. fimbriata*, *T. caesia*, *T. pachyphylla*)?

Occasional apparently sterile interspecific hybrids do occur in the NZ insect-pollinated taxa: *T. xdentata* (*T. longifolia* x *T. pulchella*) is well known; *T. “comet”* appears to be sterile and is probably another, of questionable parentage; *Corybas macranthus* crosses with *C. “Trotters”* on the Pinnacles track in southern Wairarapa.

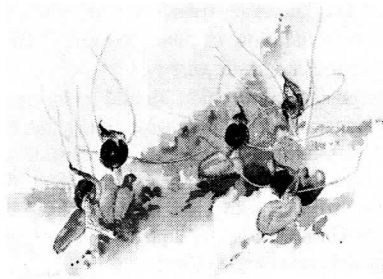
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## An insect-pollinated form of *Corybas* aff. *trilobus*?

I referred [J77 p7] to a new round-leaved *Corybas* aff. *trilobus* growing with *C. “Trotters”* by a muddy streamlet at Craigie Lea in the Eastern Wairarapa. I have now had time to do sketches of the dead insect in a decaying flower.



A degenerating flower of *Corybas* aff. *trilobus* showing the decaying abdomen of a dead insect jammed in the V of the labellum.



## Field guide to the New Zealand orchids

2001 edition  
by Ian St George,  
Bruce Irwin, Dan  
Hatch and Eric Scanlen

The extensively updated 2001  
edition is \$20 to members:  
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# The Irwin Orchid Symposium

This is an announcement and first call for papers for a  
symposium on New Zealand

Native Orchids

to be held at

Iwitahi 7-9 December 2001

to mark the 80th birthday of

**Bruce Irwin**

and to acknowledge his work on  
New Zealand native orchids, and his efforts for  
the NZ Native Orchid Group and its aims.

## Programme

Friday 7 December	7.30pm	Scientific session 1
Saturday 8 December	9am	Scientific session 2
	1pm	Field foray 1
	7.30pm	Scientific session 3
Sunday 9 December	9am	Field foray 2

A detailed programme will appear in the September Journal.

If you wish to contribute to the programme, please contact  
Ian St George, 22 Orchard St, Wadestown, Wellington  
([istge@rnzcgp.org.nz](mailto:istge@rnzcgp.org.nz)).

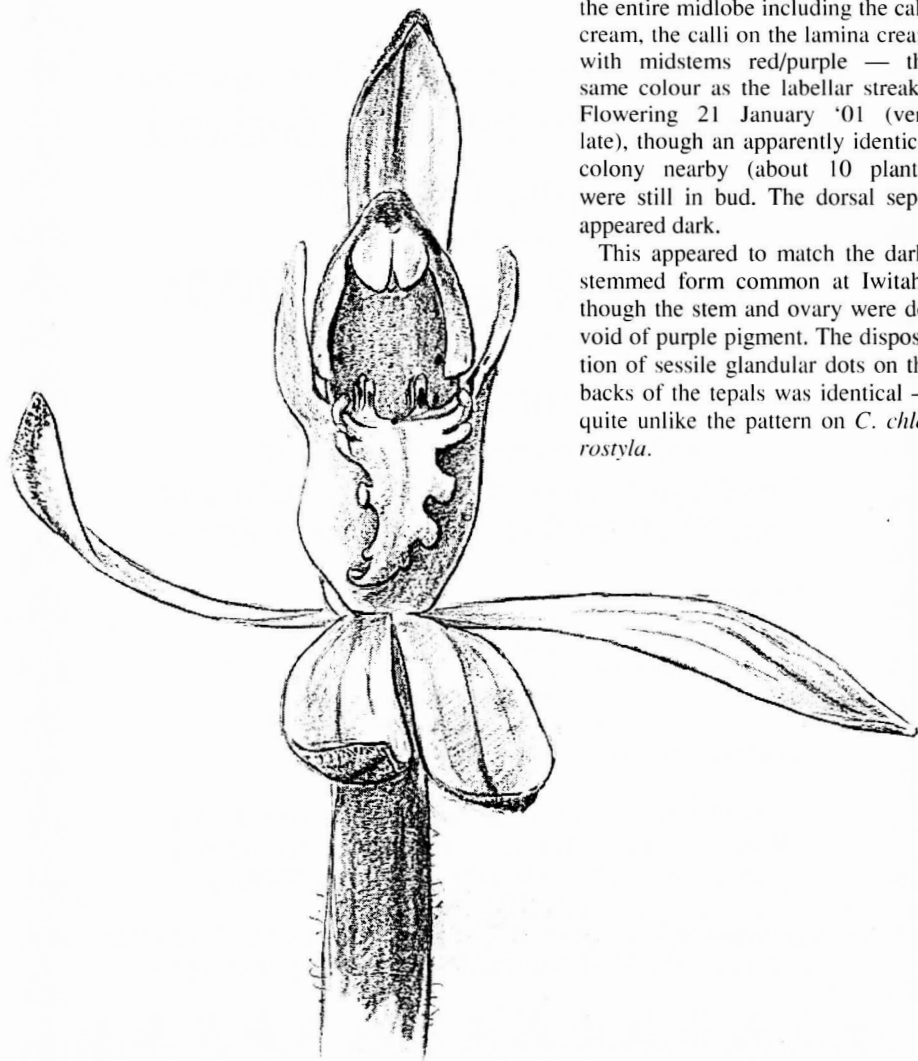
For information on accommodation and other arrangements, please contact  
Trevor Nicholls, 33 Hinekura St, Taupo ([nicholls@reap.org.nz](mailto:nicholls@reap.org.nz)).



## Original papers

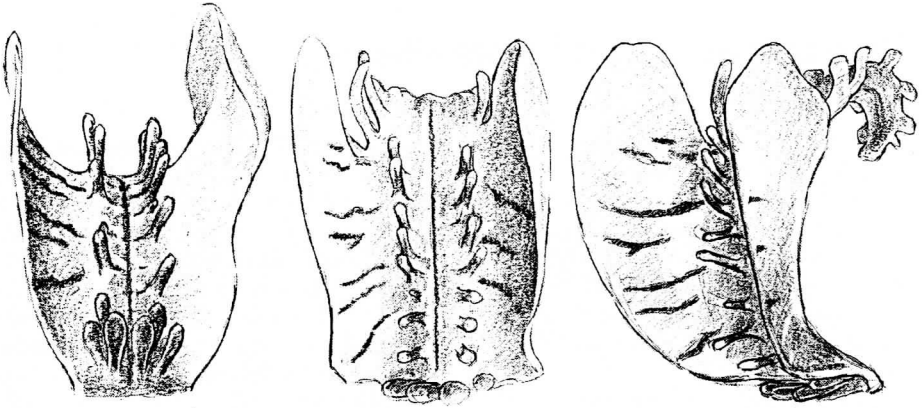
### A small *Caladenia* from Turoa

By Bruce Irwin, Tauranga

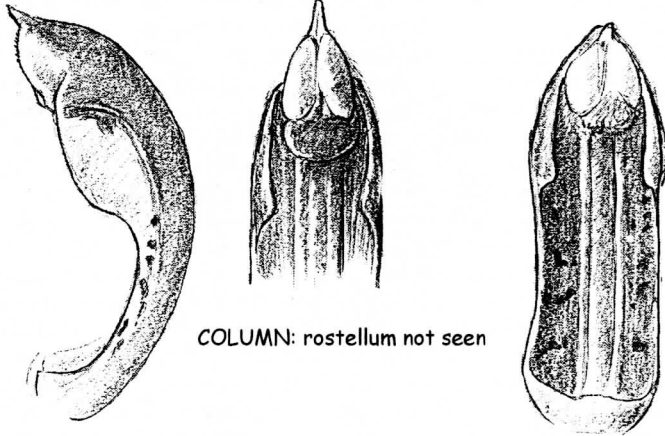


This flower was pale cream, some areas greenish but the tepals just cream. Very little red streaking inside the labellum and on the column, the entire midlobe including the calli cream, the calli on the lamina cream with midstems red/purple — the same colour as the labellar streaks. Flowering 21 January '01 (very late), though an apparently identical colony nearby (about 10 plants) were still in bud. The dorsal sepal appeared dark.

This appeared to match the dark-stemmed form common at Iwitahi, though the stem and ovary were devoid of purple pigment. The disposition of sessile glandular dots on the backs of the tepals was identical — quite unlike the pattern on *C. chlorostyla*.



**LABELLUM:** laminar calli almost straight, cream-tipped, reddish midsection, barely swollen at apices.



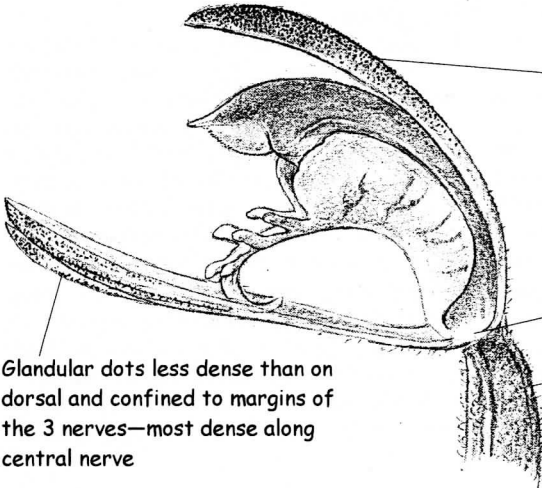
**COLUMN:** rostellum not seen

Midline of slightly raised dots over a thin reddish brown stripe; dots decrease towards base, virtually none in lower third. Back of column nude.

Nearside petal removed.

Short pale hairs, some dark gland-tipped.

Glandular dots less dense than on dorsal and confined to margins of the 3 nerves—most dense along central nerve





## Making identifications more difficult

by J. Bruce Irwin, Tauranga

In 1907, Dr R.S. Rogers, reviewing *Prasophyllum* in South Australia, said - "The genus *Prasophyllum* is admittedly the most difficult and perplexing one in the whole of the *Orchideae*. Not only are the flowers frequently of very small size, but there are so many intermediate forms that almost every species may be said to blend insensibly into another" [1].

Others have echoed Rogers's views; so when on 28 January 1998, unusually tall and elegant flowered *Prasophyllum*s were found at Middle Road, Horopito, and several NOG members said they must be a species other than *P. colensoi*. I was loathe to agree, despite having seen very similar plants in a wetland on Kapoors Road, west of Mt Tongariro in late January 1992. These plants were regarded by some Botanical Society members as *Prasophyllum* aff *patens* because they were growing virtually in water, however the flowers were much smaller and lacked the conspicuous white labellum of that species. I had seen it again on 4 February 1996, again in water in the large wetland NW of National Park Village. This time I dissected and drew a flower yet continued to wear mental blinkers until I read that David Jones had stated that *Prasophyllum colensoi* could be distinguished from the Australian species *P. alpinum*, by its column appendages being as long as or longer than the anther [2].

That statement contradicted all my drawings of *P. colensoi* including that shown on p149 of *Flora II*. Furthermore it seemed to contradict Hooker's original description in which he said "Column very short with very low two-lobed lateral pieces" [3]. How could Jones have made such an erroneous statement? One possible explanation was that the subject for Jones's illustration of *P. colensoi*, collected at Lake Lyndon, Canterbury, may have been a *P. colensoi*

look-alike with column appendages as long as the anther. From that time I began to examine apparent *P. colensoi*, always finding that the appendages were only half anther length - until Anne Fraser drew my attention to a plant roughly half way up the road to the Turoa Skifield [J75 p15]. That plant structurally resembled *P. colensoi* very closely indeed, except that the appendages were very nearly as long as the anther.

The tall elegant semi-aquatic *Prasophyllum* mentioned above also has appendages almost as long as the anther, but should not be confused with *P. colensoi* nor the *P. colensoi* look-alike because it shows several consistent differences in structure. Clearly it is a species not previously found in New Zealand. Anne and I now refer to it as *Prasophyllum* "B".

As for the *P. colensoi* look-alike which we now regard as *Prasophyllum* "A", we did notice that the flower stem was a strange blackish-purple. The colour showed also on ovary ribs and on the outer surface of tepals. I could not remember seeing similar colour on any undoubted *P. colensoi*. Maybe this could be an aid to identification? Unfortunately the season was too advanced to let us make comparisons.

Anne and I confidently expected to sort out all the problems this present flowering season. On 11 January 2001 the search was resumed in earnest above Mangawhero Falls, where we found that plants of *Prasophyllum* "A" had adopted fashionable new colours, ranging from clear yellow/green, through reddish to almost black. The blackish flowers were no problem, but the yellow/green ones looked more like *P. colensoi* than ever. Wherever we searched, and we searched for four days, the plants appeared to vary much more in colour than those found last season.

It became more urgent to locate true *P. colensoi*, but they lived up to the reputation

*Prasophyllum colensoi*

column appendage  
much shorter than anther

bract  
truncate

lat. sepals  $1\frac{1}{2}$  times  
labellum length

column appendage  
almost equals  
anther

*Prasophyllum "A"*

dorsal sepal  
ovate

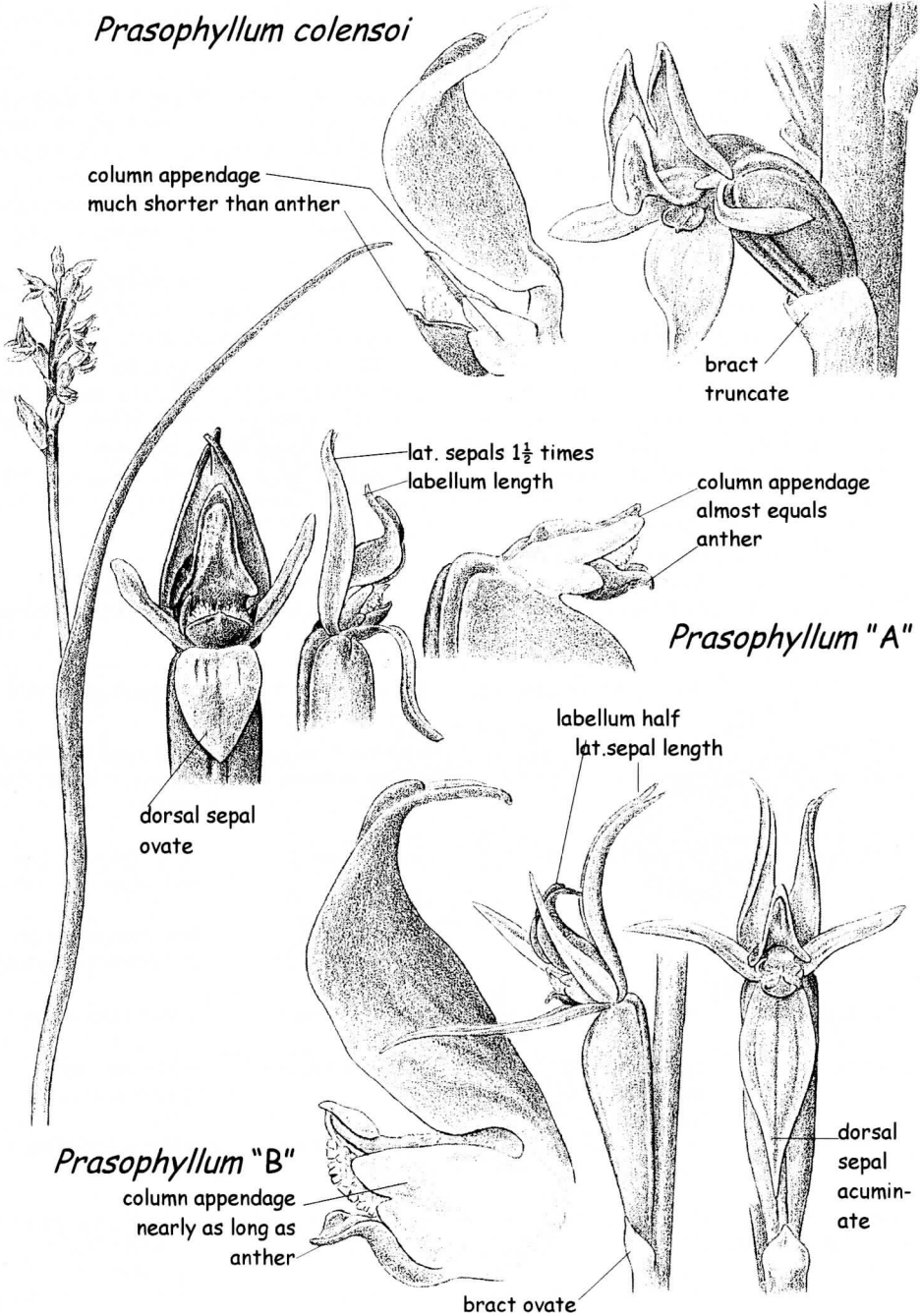
labellum half  
lat. sepal length

*Prasophyllum "B"*

column appendage  
nearly as long as  
anther

dorsal sepal  
acumin-  
ate

bract ovate



Rogers had bestowed on them. They were deliberately difficult. There is no other way to explain why, when we searched for *P. colensoi* in known localities, they either transformed into *Prasophyllum* "A", or were absent without leave. Towards the end of January 2001 I was almost convinced that true *P. colensoi* was absent from Ruapehu. But what about the plants found during previous seasons with very short appendages? Were they mere figments of my imagination? Had I lost my marbles?

Anne rang on 28 January to say she had spent the day on Ruapehu checking a colony of very late-flowering white *Caladenias* which we had observed previously in bud. Also she had found magnificent flowers of a form of *Pterostylis* aff *montana* on which leaf and flower were an unusual, almost blackish-green, and finally, high on the track to Waitonga Falls. two *Prasophyllums*, one reddish which Anne presumed was *Prasophyllum* "A" and the other yellow/green

which looked like *P. colensoi*. Did I think it was worth coming down again? I certainly did.

2 February was a great day. The *Caladenias* were at the peak of flowering and more common than we expected. The tall, elegant, dark-leaved *Pterostylis* was magnificent as always, and as a bonus *Thelymitra* "Whakapapa" was wide open in warm sunlight.

The trip had proved well worthwhile already, but would that yellow/green *Prasophyllum* disappoint me? No. It really was the elusive *P. colensoi*, its appendages barely half anther height. What a relief to find it at last and to realise I hadn't lost my marbles. Well, not all of them anyway.

After our tussles with *Prasophyllum* this season, we make the following tentative comments -

1. Rogers's statement can't be faulted.
2. Two unidentified taxa have been found on

	<i>Prasophyllum colensoi</i>	<i>Prasophyllum</i> "A"	<i>Prasophyllum</i> "B"
<b>General appearance</b>	usually <15cm. flower segments rather short.	very like <i>P.colensoi</i> ; colours probably more Variable.	taller spike, often more flowers, tepals slender, elegant.
<b>Habitat</b>	prefers moist soils.	as for <i>P.colensoi</i> .	very moist soils, can grow in shallow water.
<b>Flowering time</b>	peak - Dec-Jan.	probably as for <i>P.colensoi</i> .	later than others at comparable altitudes.
<b>Floral bract</b>	very short, truncate.	as for <i>P.colensoi</i> .	longer, apex acute.
<b>Dorsal sepal</b>	ovate, apex often rather blunt.	as for <i>P.coensoi</i> .	ovate/lanceolate apex acuminate.
<b>Labellum</b>	about • lateral sepal length.	as for <i>P.colensoi</i> .	about ½ lateral sepal length.
<b>Column appendages</b>	½ length of anther.	almost equal to anther.	as for <i>Prasophyllum</i> "A" but rather less consistent.

Ruapehu, one of them, *Prasophyllum* "A", is so like *P. colensoi* in general appearance that it can only be distinguished with certainty by the length of the column appendage being about twice that of *P. colensoi*. On Ruapehu that difference is constant, but if intermediates are found in other areas, sub-species rank may be more appropriate. *Prasophyllum* "A" appears to be much more common on Ruapehu than *P. colensoi* s.s.

3. The other new taxon, *Prasophyllum* "B", looks like a taller, more elegant form of *Prasophyllum* "A", but is clearly distinct from that form and from *P. colensoi*. It probably does not occur at such high altitudes and flowers later than *Prasophyllum* "A" and *P. colensoi* at comparable altitudes.

4. David Jones's statements suggest that *Prasophyllum* "A" or a form very like it, is probably widespread in New Zealand.

5. Until now, if a *Prasophyllum* did not have a prominent white labellum, and provided that the flowers were not so minute as to be

mistaken for *Genoplesium*, then it had to be *P. colensoi*. But if our musings are correct, it will now be necessary to prostrate yourself before the plant, probably on wet ground, hold it steady with one hand and with another hand push the small petal aside, then peering through a 10x lens held in your third hand, if you are lucky enough to have one, decide whether the column appendage is much shorter than, or almost as long as, the anther. Well! Rogers did warn us that *Prasophyllums* were difficult.

**Stop Press** - Gary Pennial has sent me slides taken at Pureora 7 February 2001, which are clearly *Prasophyllum* "B".

#### References

1. Rogers R.S. A critical review of South Australian *Prasophylla*. *Transactions Royal Society South Australia* 197 - 222 (1909)
2. Jones D.L. Resolution of the *Prasophyllum* R.Br. complex in mainland South Australia, Tasmania & New Zealand. *Muelleria* 9:51-62 (1996)
3. Hooker J.D. *Flora Novae Zelandiae* 241 (1853)

## Orchid hunting in the Southern Ocean

by Angela Abernethy, Christchurch

Locating and identifying terrestrial orchids is all about timing. I applied for a scholarship from the Enderby Trust so I could observe the distribution of terrestrial orchid species on the subantarctic islands. Orchid emergence times are reasonably well known on the mainland of New Zealand, but not well documented for the offshore islands. For this reason, I was uncertain how many orchids would be identifiable or even present during my visits to the various islands. I was therefore pleasantly surprised by the number of orchids I found and was able to identify on my voyage. The highlight from an orchid point of view was Tuku reserve on the Chathams.

### Enderby Island - Auckland Archipelago

While on Enderby Island, I encountered two species. The first was *Thelymitra longifolia*, located amongst *Dracophyllum* scrub. The handful of specimens I found all showed sign of foliage damage, either through frost or intense sunlight. Such damage affects the plants' ability to accumulate carbohydrate reserves, thus limiting their ability to reproduce. Only a single flowering specimen was discovered, displaying a spike containing four (closed) florets. My PhD research at the University of Canterbury has shown that *T. longifolia* tends to reproduce every second

year on the mainland. An exception to this is when the plant has been acclimatised to a high light environment, allowing greater accumulation of carbohydrate reserves, thus allowing the plant to reproduce annually. The second species observed was a *Microtis* sp. found in and around *Bulbinella rossii*. Accurate identification in this genus is not possible without flowers. Unfortunately, my visit preceded the flowering time at this latitude. Other orchids reported (but not observed) in the Auckland Islands are: *Acianthus viridis*, *Aporostylis bifolia*, *Chiloglottis cornuta* and *Waireia stenopetala*.

#### Macquarie Island

The only orchid known to occur on Macquarie Island is the endemic species *Corybas dienemus*. This orchid is rarely seen by the ANARE staff, although discussions with the sole botanist on the island revealed a small population has been identified approximately 8 km from the ANARE base. It would appear that very little is known about the phenology or ecological requirements of this orchid. No formal mapping studies have been performed. New Zealand has a very similar orchid, *Corybas orbiculatus* which occurs on Stewart Island as well as selected ecological regions throughout the South and North Islands. Further research into *Corybas*, especially genetic analysis, would establish if these species are separate or whether they are a subspecies or the same with the variations in appearance a result of environmental conditions. Time constraints precluded visiting the population on Macquarie Island, but probably the endemic species follows a similar life cycle to other *Corybas* which predominantly flower in winter through early spring.

#### Col Lyll Ridge - Campbell Island

Walking up the track to Col Lyll Ridge, I identified two terrestrial orchid species: *Aporostylis bifolia* and *Chiloglottis cornuta*. In both cases they were significantly smaller than plants I have studied throughout South

and Stewart Islands. *Chiloglottis cornuta* specimens displayed foliage damage much like *T. longifolia* found on Enderby, though most of the plants were flowering. Other terrestrial orchid species known to occur, but not encountered on Campbell Island include; *Corybas oblongus*, *Corybas trilobus* and *Waireia stenopetala*. Prior to embarking on this voyage I had talked to others who had visited the island, and been shown spectacular photographs of the Campbell island megaherb species. Sadly, my time on the island was early in the flowering season, and only *Bulbinella rossii* and *Stilbocarpa polaris* were flowering. The intriguing *Hebe benthamii* was also in flower, but I would have dearly liked to see the *Pleurophyllum* and *Anisotome* species in bloom.

#### Tuku Reserve - Chatham Islands

What a find, this reserve is - an orchid hunter's dream come true! I found sixteen species all within this reserve. There is more diversity in this reserve than in any of the dominant forest types on the mainland. Orchids identified were: *Adenochilus gracilis*, *Aporostylis bifolia*, *Caladenia* aff. *carnea*, *Caladenia lyallii*, *Chiloglottis cornuta*, *Corybas macranthus*, *Corbyas trilobus*, *Earina mucronata*, *Microtis unifolia*, *Pterostylis australis* (a new find for me), *Pterostylis banksii*, *Pterostylis* aff. *montana*, *Pterostylis venosa* (a new find for me), *Thelymitra cyanea*, *Thelymitra longifolia* and *Thelymitra pulchella*. I would recommend this reserve as a 'must see' for any orchid hunter. However, the amount of 'pig rooting' evident in this reserve is cause for concern, both for regenerating vegetation, and the endangered Taiko, which is believed to nest in burrows in this reserve.

**Acknowledgements** I would like to thank Enderby Trust for awarding me this scholarship as well as the staff, crew and passengers on board who made this voyage 'simply the best'. I thank you all.

## Danhatchia

by 'Tricia Aspin

After being approached by Eric Scanlen to do a day-by-day study, I can give you the following facts, figures, feelings and frustrations gleaned from a study of the recent season of *Danhatchia australis* at Matakawau. I hoped to be able to note such things as the length of time one could observe this orchid, when one could expect to find the flowers open, if there was any evidence of insect pollination or if there was a perfume present and to observe the growth patterns.

I began observing on 8 December 2000 and concluded on 12 February 2001. Because time is precious to me and the area is only 4 km from my home, most times I would bike there and back and so complete my training for the day at the same time. I visited doggedly every 2 or occasionally 3 days mostly in the late morning. Some visits were made in the afternoon, one was at the crazy hour of 5 am and another in the early hours of darkness.

The original discovery (January 1999) site has had colonies emerging in the two subsequent years but in widely varying numbers. Sites are levelish on a gradual west-facing slope receiving dappled sunlight. All have young nikau, mature taraire, puriri, ponga and kauri nearby. There seems always to be more than one colony per site. This year yielded 3-5 colonies per site. Measurements between colonies range from 1.3m-1.8m so if one is found then a hunt within a two metre range will most likely produce more.

Year one yielded two sites — one of three colonies, one of one colony.

Year two yielded three sites with a total of 44 colonies as noted by Peter de Lange.

Year three yielded five sites with a total of 61 stems in only 18 colonies — quite frustrating after the prolific previous year. The total area of colonies so far discovered, encompasses about 7500 square metres.

One of the original colonies (Stella

Christoffersen's) from year one did not emerge this time. The habitat has changed. There is now greater under-storey growth and a very thick germination of taraire seedlings. There is less light and it is cooler than previously.

Because *D. australis* is an epiparasite lacking chlorophyll, sunlight shouldn't need to be a factor but my observations have led me to believe it is. A certain level of warmth and airiness, an ideal amount of shade and a lack of competition from under-storey growth, all give clues as to an ideal habitat for this orchid.

Studies were conducted over two sites, one of three colonies totalling 17 stems and one of one colony with 4 stems. Other sites were noted but not studied in detail.

Eric had given me a few pointers as to what I could look for. He had told me how some pollinating bugs get hungry through the night so the crack of dawn is a good time to catch them in action if they exist. I had not observed any insect activity inside the flowers during the day so I thought I'd better check this out.

It was a beautiful morning on 3 January at 5:10am — the first light in the east, the last bright stars still quite clear, the skylarks, the tuis, Nancy's rooster, Brian's dog rounding up his cows (hey, it's eleven years since I had to get up to cows. The things one does for orchids). My footsteps are so loud in the bush — why does broad daylight muffle them so? My light shows many flying moths. Maybe . . .

The two sites with open flowers were visited. Light and lens reveal nothing new — no bugs, no perfume. Mosquitoes have a feed of me! Five thirty a.m. and I'm back in bed wondering at the sanity of the orchid enthusiast. By the way, I did cheat a bit — I went by car! Then I got to thinking about whether those insects did their visiting in the

early part of the night and wondered if the flowers reacted to sundown and closed up at all? Another torch-light visit eventuated, this time at 8:30pm 13 January. It was dark within the bush but again the flowers were still wide open and again there were no bugs and no perfume. I'm getting strange looks from the locals too.

Lack of space restricts full details of 67 days of observations but the following is a summary of flower development as observed. All buds lie against the stem during all or part of the time. The top bud forms the apex of the stem. Tired looking buds with the ovary swelling, I have called spent, a swelling ovary with shrivelled flower is called a capsule, the matured capsule with seeds dispersed is referred to as being cast and a dried, unfertilised bud is called shrivelled. New stems are visible in pale mushroom pink at 3cm height. Bud development begins at this stage and the final number of buds on each stem develop there from the 3-7cm growth stage over 10 days.

There are four "behavioural forms" of flowers. Three are quite distinct:

- 1.those which remain closed and lie against the stem,
- 2.those which remain closed but turn at right angles to the stem from 2-13 days and then return to lie flat against it again,
- 3.those which open fully and are observed as a true flower and
- 4.those which open partially, just a slight lifting of the sepals and a slight opening of the petals but not enough to see inside to the column. These usually turn out from the stem also.

Of the 73 buds studied, only four opened fully. Subsequently, 3 others opened fully on colonies outside the study area. No insects were ever observed in the flowers. (NB none through the same hours and none at dawn or in the dark on the two special visits). No perfume was detected at any time. The ovaries start swelling after 18-22 days. The flower parts remain fresh looking for a further 10-14 days before shrivelling when the full

seed capsule is formed. The capsule ripens quickly and the seed is cast 33-41 days after emergence.

The flowers that did open remained so for 11, 18, 20 and 22 days respectively. The part opened ones, remained so for 6-8 days and all were pollinated.

Of the 73 buds studied, 39 matured to cast seed. Of these, 19 buds did the "right angled" thing, 15 of them matured but four shrivelled up, unfertilised. Four became fully open flowers none of which were pollinated nor were the other 3 open flowers outside the study area. All 7 shrivelled giving a total of 11 shrivelling without pollination. Eighteen were eaten by bugs or slugs and so were lost to the study. The remaining stems still had 6 buds present at the end of the study.

**Conclusions.** *Danhatchia australis* was found from early December 2000 to late February 2001.

Stem growth was rapid during the first week after emergence but then slowed down until the full height of around 12cms was reached after about 3 weeks. During this stage the flower buds developed and displayed one of the 4 behavioural forms.

The average reproductive cycle lasted 38 days. Part open flowers were found over a period of 47 days (18 Dec to 3 Feb). Fully open flowers were not common but were observed for an average of 18 days, not briefly as previously implied. From first open to last closed for these was 39 days (26 Dec to 3 Feb). The number of open flowers was usually one or two at the most this season, compared with four open simultaneously on one stem last season when flowering was comparatively prolific.

My observations confirm that this is a self-pollinating orchid. Wide open flowers not pollinating could indicate that the species is still striving for cross pollination by some fluke of nature. Dan Hatch pointed out [1 pp42-44] that "... incoherent pollinia merge with the top edge of the stigma at a very early stage of development and the barely visible rostellum seems redundant." But this process

seems not to occur in flowers which open wide. Of course the significance of this behaviour did not become apparent until the study was nearly completed! Something for someone more expert in these matters to study up next season.

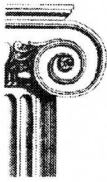
And so to the future. Obviously more studies are needed on the open flower phase. I can only pose questions on some of the flower

behaviour patterns. Why the right-angled thing? Why did part-open flowers pollinate but not fully opened ones? Is this always so or was it just this season? No doubt other questions will spring to mind as you read this.

**Illustration: Fig. 10, p19.**

**Reference**

1. St George, I & McCrae, D *The NZ orchids natural history and cultivation* NZNOG 1990.



## The column: Eric Scanlen - 1. *Pterostylis puberula* quest

*Pterostylis puberula* once fairly widespread is now “critically endangered” [1] as its sunny, wet habitat diminishes. Peter de Lange, DoC’s Endangered Plant Officer, had chided the Column for not disclosing a celebrated colony’s site on the Billy Goat Track, Kauaeranga. A maintenance gang, it seems, had dug through it but the Column wasn’t about to be the Billy Goat scapegoat. In a field party [J59, p19] of 2 Dec 95 he was shown a colony by Bruce Irwin and Ian St George with only one late mutant still open but had no idea that DoC were unaware of the presence of the colony.

Allan Ducker also lacked a photo-record of this gem, so they hiked the Webbs, Billy Goat Track loop on a calm, clear 10 November. Both tracks had somehow got steeper in the intervening 5 years even at orchid hunters’ pace. A lone *P. banksii* diverted a camera lower down. Two patches of flowering *Corybas* “Kaimai” diverted both higher up but legions of *C. oblongus* var. “aestivalis”, stole the show with their beds of disc papillae in darkest purple. No double headers were seen but one group of 4, sported well figured leaves up to 60mm long (Figs. 1 & 2). In the 3-D view, the orchids and their wavy edged leaves stand clear of the moss camouflage. Allan stopped at the exact spot described by Catherine Beard, 5 years before, and spotted a

spent *P. puberula* on the track edge. Some juvenile rosettes there were examined for ID purposes. One other Webbs colony of juveniles was located. Allan paused to video some bugs running in and out of *Earina mucronata*, lost his footing on the slippery slope and wrenched his shoulder whilst shielding his videocam. What this doughty orchid hunter goes through only for your reading and viewing pleasure?

Lunch was taken luxuriating in the view of our target colony of *P. puberula*. A trumper, flushed from an ascent of the Pinnacles, paused to chat so the Column unwisely showed him the prizes. The unimpressed trumper — normal for his ilk — took one fell step to indicate some “bigger ones further back” and flattened 3 prime flowers! He retired confused but unrepentant leaving a muttering pair to film the remains. (Fig. 3) The labellum, usually the showiest petal in an orchid, has *not* been triggered, it is just too short to be seen, making it unique among NZ *Pterostylis*.

Allan remembered seeing another colony down the Billy Goat before its rarity was appreciated, so the hunt continued. Three more colonies were found in damp locations, and code-flagged for Peter. One healthy plant in full sun, had its portrait made (Fig. 4) on a bank of wet, black, mould, blobbed with algal



jelly. Sir J.D. Hooker [2] named *P. puberula* in 1853 for the white pubescence seen on the peduncle. Monty Rupp, in the 1932 heady days of lumping, [3] put NZ's taxon back to Robert Brown's *P. nana* [4]. Mark Clements, realising the error, returned it in 1989 to *P. puberula*. [5 & J34, p3]. The Column could not possibly comment.

In common with many *Pterostylis* the lateral sepals can be sprung down with a twig without damaging the flower. So Allan videoed the inside of the galea. The lateral sepals were then wriggled back into the grip of the lateral petals for any errant insect which might blunder into this normally self pollinating flower.

Curiously, *P. puberula* was the commonest *Pterostylis* on the Billy Goat Track at this late time of season. None of the *P. tasmanica* were spotted. Peter appreciated the e-mail report re the 6 colonies located and realised belatedly that Allan and the Column had missed, and were unaware of the celebrated colony, the one dug through by the track maintenance team, remember?

#### References

1. de Lange, P.J. et al, Threatened and uncommon plants of N.Z., N.Z.J.B. 1999, 37: 603-628
2. Hooker, J.D. Flora Novae Zelandiae, Part 1, 1853, 249.
3. Rupp, H.M.R., Vict. Nat. Melb. 49, 1932, 152
4. Brown, R. Prodromus Florae Novae Hollandiae et Insulae Van-Diemen. 1810
5. Clements, M.A. Australian Orchid Research, 1, 1989

## 2. *Corybas* "whiskers" agg.

17 October '00. During an intriguing side issue to "Tracking down *Caladenia bartlettii*" [J78], Jean Smith nee Bartlett, showed Allan Ducker, Gloria Scanlen and the Column, her *Corybas* (Fig. 5) in a sizeable colony on Mahoenui\* Stream bank, near her home at Coatesville. Gloria was non-

committal, the Column guessed it was *C. "whiskers"*, Allan wasn't convinced and Jean called it *C. orbiculatus*, as universally accepted in the 1950s for all the *C. rivularis* aggregate.

What constitutes *C. "whiskers"*? It is the last of Bruce Irwin's 7 or 8 babies born from the round leafed *C. rivularis* aggregate [J55, p24] and it is widespread, occurring from Eastern Northland to Nelson. It has its labellum covered with papillae or "whiskers" so dense as to obscure the veins and has its purple flecked, green peduncle visible above the leaf. Taxonomists doubt specific status for it because herbarium specimens are difficult to separate from Bruce's *C. "Kaimai"* and *C. "rest area"*.

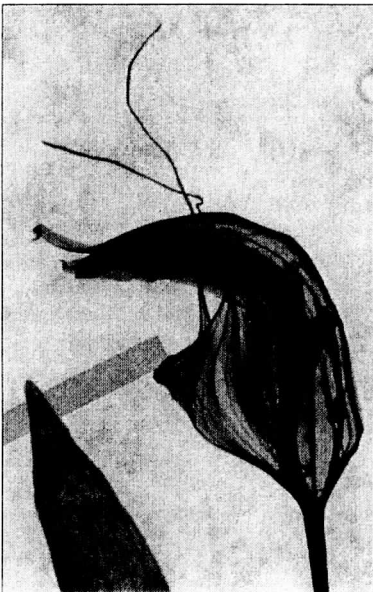
The Column's old *C. "whiskers"* slides show specimens with invisible (turned under) apiculi [J74 p15, Fig. 4, not 6] on convex labellum bibs and a straight dorsal sepal on fresh flowers, from Waitakeres (Fig. 6), Te Mata Bridal Veil Falls, Ongarue and Browning Tk, Nelson. But all Mahoenui specimens had prominent apiculi on narrower Veed labella and that eagle's-bill dorsal sepal. Bruce said that Jean's *Corybas* was a taxon of *C. "whiskers"* similar to one of his first from inland Wanganui. His elegant drawing [J55, p24] shows the eagle's bill but a flattish labellum bib. Further ratting through the slides came up with Dr. Brian Molloy's *C. "whiskers"* (Fig. 7) from the Tinline River, with a prominent apiculus also on a flattish bib, straight but speckled dorsal sepal and a purple peduncle, (obscured by leaf cup) as in most *C. rivularis* s.s. Graeme Jane's from Cobb River [J69, p13] is a close ally of Brian's. All 4 key out as *Corybas "whiskers"*; but all differ! Jean's, with that Veed labellum is as different as they come. Should we tag all 4 separately?

Jean kindly sent the Column photocopies of a bundle of priceless letters from orchid experts of the day to her father, the late Frank Bartlett. They were intriguing voices from the past, Monty Rupp, Dan Hatch (*see Historical reprint in this issue—Ed.*), Ella

\*Not the Mahoenui of giant-wetas-in-the-gorse fame.

the past, Monty Rüpp, Dan Hatch (see *Historical reprint in this issue—Ed.*), Ella Campbell, Lucy Moore and others from 50+ years ago. With the letters came an envelope of pressed *Pterostylis* specimens for identifying, from the Silverdale area. Jean had found them loose in various books of Frank's. Most, including *P. puberula*, were recognisable but three from Alf Poynter's, at Silverdale, had a jug spout sinus to the lateral sepals like *P. brumalis* and the straight dorsal sepal of *P. alobula*. Two specimens had normal *P. alobula* leaves (one was in seed) but on the other two, the upper two bracts were short and broad. The three lower bracts were elliptic/spathulate similar to juvenile leaves on *P. puberula*, the centre one being 9mm wide and 20mm long plus a 10mm petiole. Back lit

Fig. 9. *Pterostylis* "Poynter"



**Figs. 8 & 9** show the labellum and column silhouetted right through the galea. Hybrid *P. alobula/brumalis* springs to mind but *P. brumalis* wasn't on Dan Hatch's/Frank's 23 April '49 exhaustive list of 30 Silverdale orchid species. *P. alobula/puberula* hybrid is the Column's shot-in-the dark. Both species were present and their flowering periods overlap. What do you think?

Back-lighting of a specimen sheet taped to a sun-lit

**Figures: Page 18: from top, anticlockwise**

Fig. 1 & 2. *Corybas oblongus*. When the L & R eyes focus on L & R pics, one 3-D picture springs out. A viewer with two magnifying glasses makes it easy but with a little practice free viewing becomes second nature.

Fig. 3. *Pterostylis puberula*. Note; labellum too short to see; inward turning sinus to lateral sepals.

Fig. 4. *Pterostylis puberula* in a sunny spot with ground water oozing all year round.

Fig. 5. *Corybas* "whiskers" Mahoenui, Coatesville 17 Oct 00 with level to upheld lateral petals, Eagles bill dorsal sepal and out-thrust Veed labellum.

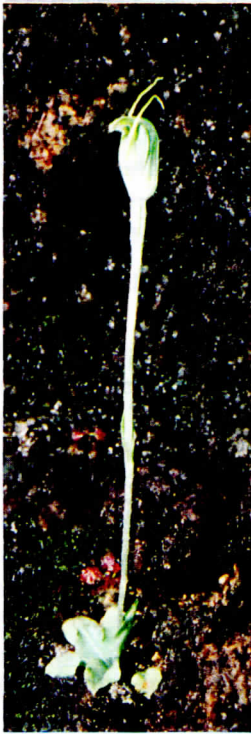
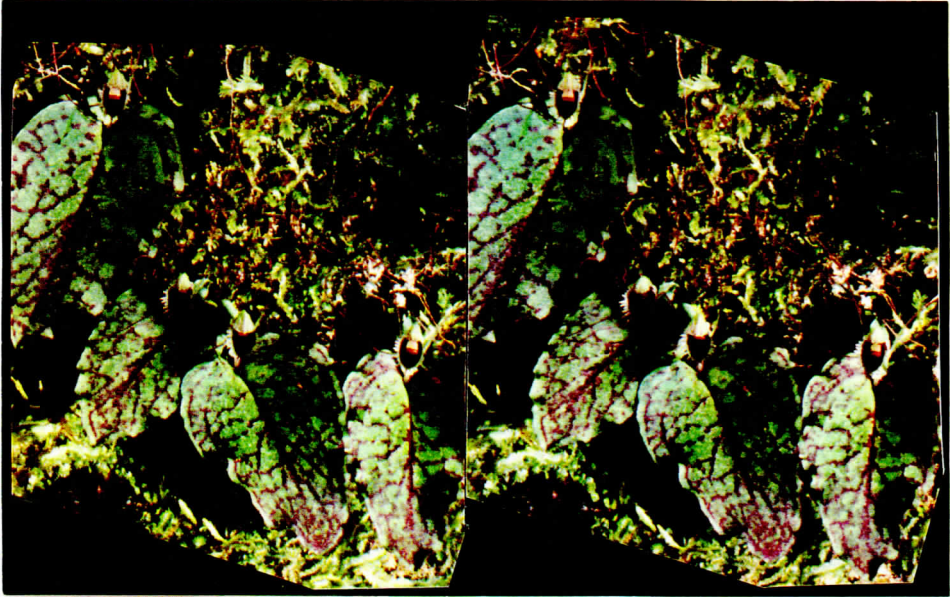
**Page 19: from top left, clockwise:**

Fig. 6. *Corybas* "whiskers" , Waitakere Stream 19 Sept 98. Note down thrust lateral petals, unusually up-turned dorsal sepal tip with recurved labellum edges and apiculus.

Fig. 7. *Corybas* "whiskers" from the Tinline River, Ecological region 40. Note cupped leaf and speckled dorsal sepal.

Fig. 8 (& 9 ←). *Pterostylis* "Poynter" from Silverdale c. 1950. Can you identify it?

Fig.10. *Danhatchia australis* at Matakawau. This colony of 18 stems on 24 January 00







## Historical reprints

### Correspondence: Hatch to Bartlett

Dan Hatch and Frank Bartlett of "Bankside", Silverdale (see biographical notes by EJ Godley in *NZ Bot.Soc.Newsletter* June 1995) became acquainted in the midforties. Hatch suggested naming a new *Caladenia* for Bartlett in his letter of 21 October 1946; he apparently rejected Matthews's manuscript name "*Caladenia nitido-rosea*" because he regarded the plant as no more than a

4. *Caladenia carnea* var ? ( this the pink flowered form. Matthews wanted to call it something-rosea but I feel it is only another variety of the already crowded *carnea* species ( 6 or 7 varieties so far ). It is quite new and so far not described. Do you know if it mixes with the greenish-flowered form ? When I do *Caladenia* I shall describe and name it . What about var. bartlettii ? I feel I owe you something. I should be glad of all the information you can get about it and one two dried specimens in ~~xxx~~ due season. The green stuff is excellent for dissection but the segments lose their shape for pressing. )

Hatch's contemporary understanding of *Caladenia* is interesting: the most recent work on *Caladenia* had been Cheeseman's 1925 edition of his *Manual*, where *Caladenia minor*, *C. exigua* (now identified with *C. alata*) and *C. lyallii* were the only three species recognised in NZ: Hatch was breaking new ground. He read his paper "*Petalochilus* Rog. and the New Zealand forms of *Caladenia* R.Br." before the Auckland Institute on 22 October 1949. He had married in that year and he and his wife had visited the Bartletts one Saturday in the spring. The photograph was one of several taken during the visit—four of them intended to illustrate a planned joint paper on the botany of Bankside.



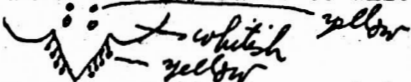
Dan Hatch and Frank Bartlett  
at Silverdale, spring 1949

The photograph of the scientists is referred to in a letter dated 15 October 1949. Importantly for us, Hatch also drew the labellar midlobes of all three *Caladenias*.

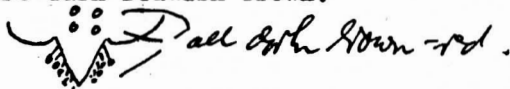
Dear Frank,

I hardly know where to begin -  
 I attach one more name for the list ( Ginger ), also photos taken the other Saturday. I think the calves are perhaps the prettiest ? I dont think much of the scientists do you ? I have numbered the others 1-4.  
 1 is no good I must have moved the camera or a cloud got in the way or something. Nevertheless its a good view and I must take it again another time. ( note the dog.)  
 2 is quite good - shows well the original trees, their offspring and their relationship to the teatree.  
 3 is also good, shows the creek bank and the proportions of Eucalypt and teatree.  
 4 is a bit too close , but still may be useful. shows the poplars and loquat and bits of the ginger.  
 They are at any rate a beginning and I will know where to improve on them for next time I come up. Also they will refresh my memory for the writing up.

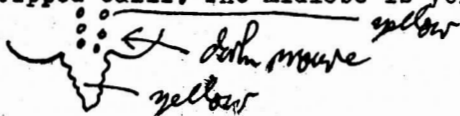
So to the specimens and enclosed note. Thelymitra ixioides, Corybas macranthus typicus AND ALL THREE Caladenias, C. minor Jord 1, ditto Jord. ii, and bartlettii. The three are similar in general form and liable to be confused. In minor J.i. the labellum is whitish with pink bands, the midlobe of the labellum has several calli on either side and all the calli are tipped with yellow which usually fades to white.



In minor j.ii. the morphology is the same but the whole labellum, including the midlobe and the calli - tips are dark reddish brown.



In bartlettii the labellum is dark mauve with 2 rows of yellow tipped calli. The midlobe is yellow and has no calli.



Hatch's 2 "jordanons" of *C. minor* are what we would now call *C. minor* (*C. chlorostyla*) and *C. atradenia*; his *C. carnea* var. *bartlettii* is now *C. bartlettii*. Of less happy interest is their discovery of ginger.



## Notes, letters, questions, comments

**P**eter de Lange wrote "I was most impressed with Max Gibbs excellent account of variation within urban and Iwitahi *Gastrodia* aff. *sesamoides* populations. There is one minor quibble I wish to make. I was not responsible for the *Gastrodia* aff. *sesamoides* illustration used in the NZNOGJ reproduction of my original AK.Bot.Soc.Jour. article. As Eric Scanlen full well knows I am a hopeless plant photographer and as such I have tried not to ruin good film on orchids - my partner usually takes my plant photographs, and - as some might agree - one photographer in the family is more than enough! In so saying it happens I did try to photograph *Gastrodia* aff. *sesamoides* at the Symonds Street site some years after my original Ak. Bot.Soc.Jour article was published. The photograph is hideous, serving as further confirmation that I won't even try to photograph any orchids in the future. But it does show that this urban population at least had (the population has since been destroyed) WHITE not DARK sepal tips - as my herbarium specimens show (AK!). As to how the *Gastrodia* aff. *sesamoides* picture appeared in the NZNOGJ reproduction I can only presume that the editor, Ian St George, having first sought my permission to reproduce my originally faceless text in the NZNOGJ felt that a picture of the orchid discussed might liven the page (if not the story) up, and used one that he had taken from Iwitahi". *Indeed, they were, as they were labelled, Iwitahi specimens, and my photographs* - Ed.

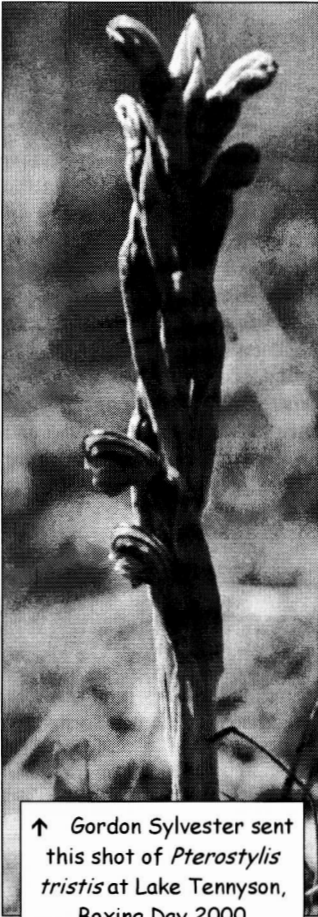
**P**at Enright wrote (in NZ Bot.Soc. *Newsletter* 63 [March 2001]: 10) of a visit to the Clifden Limestone in Southland on 3 January. "Some of the group then made their way down to the beech forest beside the river where a number of *Gastrodia cunninghamii* plants were in full flower. These were heavily



John Dodunski sent this shot of a triple-header *Pterostylis* aff. *montana*, taken at the Ihaia track on Mt Taranaki.

scented and the perfume permeated the air. Funnily enough some people could not detect the perfume and other comments ranged from it being delightful to rather cloying and unpleasant."

**B**ob Bates wrote on **necrophyllly and drought resistance** in South Australian orchids (NOSSA *Journal*), "South Australia is the driest state in the driest continent. Many of its native orchids have evolved strategies for beating or avoiding drought, e.g. growing only in damper microclimates, having a short



↑ Gordon Sylvester sent this shot of *Pterostylis tristis* at Lake Tennyson, Boxing Day 2000

growing season or developing strategies for avoiding water loss. To avoid water loss many species have tough leaves with a waxy surface, some store water in special tissues and some simply get rid of their leaves once dry conditions develop. Getting rid of their leaves is not a matter of dropping them. Our native orchids simply remove all moisture and food reserves from the leaves and place

these reserves in the new tuber (or fleshy flowering scape). The leaves are then effectively dead or necrotic - hence the term necrophyllly.

"At least 20% of South Australian orchids use the technique. The best known ones are the so called 'Rufa group' *Pterostylis*. South Australia probably has about 30 species of these, most of them undescribed.

"Each September when the temperature rises and daylight lengthens, the leaves simply shrivel up. This often happens even if the soil is kept damp. For some species it can be quite a rapid process, the leaves looking fresh and green in the morning but "gone" by nightfall but for most species it happens gradually over a week or so.

"Flowering may already have begun before the leaves die but the late flowering species may not even have developed scapes before leaf senescence. The most noticeable of these is *Pterostylis* aff. *despectans* from Eyre Peninsula. The leaves of this species shrivel in September but flowering does not start until November - up to 8 weeks later and flowers may continue to develop up to 3 months after necrophyllly. I have actually dug up some of these species in bud, pulled off the new tuber and watched as the plant, simply sitting on a bench with no soil or water provided, goes through with its flowering, produces a new tuber and even develops seed to maturity.

Many other genera have some species which flower after the leaves are gone, *Caladenia* for example has the aptly named *C. necrophylla* but most of the dryland species will flower after the leaf has shriveled - e.g. *C. cardiophylla*, *C. roxochila* and *C. clavula*.

I have seen *Prasophyllum odoratum* complex species in the desert pushing out a juicy flower spike from a totally desiccated leaf. Even *Microtis arenaria* will flower after most of the leaf is dried out. Some of the late flowered *Thelymitra* like *T. aff. nuda* "November" and *T. benthamiana* can be seen in good flower after leaf senescence. Of course not only does flowering proceed after leaf loss but seed capsule development must continue for weeks after that!

Then there are our autumn flowered species - *Eriochilus* and *Leporella* - these must initiate all growth from the tuber without a leaf at all, but they do quickly form a leaf to help out as soon as flowering begins.

Let's hope South Australians themselves learn to manage our water resources as effectively.

**O**ops! As Eric Scanlen kindly pointed out, in J78 "Plate 9" bottom of p34 should read "Plate 13". Ten lines on, on p35, "Plate 11" should read "Plate 9".





# Some orchid keys

By Graeme Jane, Tauranga

They say that pictures speak a thousand words and so the *Field guide*, with its sketches of all the species, is an essential companion on field trips. But sometimes it takes a quite bit of puzzling or debate to sort out which species you have. Often the debate hinges around one or two key features distinguishing the species. This means getting to grips with the terms used to describe orchids or even using new words to describe what is meant. Keys can highlight these differences and help sort out the distinctions.

A key then, focusses on and highlights

the distinctive features of species. Traditionally keys are used by starting at the beginning (step 1) and making a series of choices until an answer is arrived at. Others use them to find out information about a species not covered in a description. They can also be used to find the key difference between two species by working upwards from the end point of two species until they appear on opposite sides of a couplet. Thus the key difference between *Corybas papa* and *C. iridescens* in the key below is at step 8 or in the lower key at step 2 - *C. papa* leaf is sessile.

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## 1. Key to *Corybas*

The following key is almost a synoptic key to the genus because related species (and some of the more widespread related tag named forms) are kept close together. Tag named forms are grouped under or near closely similar species.

- |   |   |                      |
|---|---|----------------------|
| 1 | Plants leafless, colourless, flowers in litter, plant seen only at seeding                                | <b>cryptanthus</b>   |
|   | Plants with at least a leafy bract  | 2                    |
| 2 | Lateral sepals almost absent  | 3                    |
|   | Lateral sepals well developed   | 5                    |
| 3 | Dorsal sepal much larger than labellum  | <b>cheesemani</b>    |
|   | Dorsal sepal equal to tubular labellum  | 4                    |
| 4 | Dorsal sepal cleft, plants of <i>Empodisma</i> bogs   | <b>carsei</b>        |
|   | Dorsal sepal rounded at tip, plants of scrub and light forest   | <b>rotundifolius</b> |
| 5 | Labellum tubular with a frilled front margin  | <b>oblongus</b>      |
|   | Labellum broadly flared, usually frilled only on the lower margin   | 6                    |
| 6 | Dorsal sepal blunt or notched, capping labellum   | <b>trilobus</b> 15   |
|   | Dorsal sepal acute or acuminate   | 7                    |
| 7 | Lateral sepals scarcely reaching the top of the labellum  | <b>orbiculatus</b>   |
|   | Lateral sepals greatly exceeding labellum   | 8                    |
| 8 | Leaf distinctly, often long-petiolate   | 9                    |
|   | Leaf sessile or very shortly petiolate  | 11                   |
| 9 | Dorsal sepal narrow, acuminate  | <b>macranthus</b>    |
|   | Dorsal sepal broadening considerably over the labellum top and then narrowing sharply to an acuminate tip | 10                   |

10	Outer surface of labellum distinctly rough throat with a bead-like callus	<b>iridescens</b>
	Outer surface of labellum smooth, callus absent from the throat	"Waiouru"
11	Leaf strictly sessile, labellum flared with a ragged lower edge	12
	Leaf very shortly petiolate, labellum more or less boat-shaped	<b>rivularis</b> 14
12	Flowers almost totally green	<b>papa</b>
	Flowers with a red labellum tube, striped white with pale yellow face	13
13	Auricle down-pointing, mostly green	"Kaimai"
	Auricle forward pointing, red flecks on dorsal sepal and elsewhere	"whiskers"
14	Dorsal sepal curved upwards, leaf tip rounded	"rest area"
	Dorsal sepal curved downwards	<b>rivularis</b>
15	Flower lacking red	"alba"
	Flower with at least some red	16
16	Flower deeply coloured with outer edged of the labellum strongly incurved	"darkie"
	Flower with much yellow or green, outer edges of labellum flared outwards	17
17	Dorsal sepal beak-like, pointed	18
	Dorsal sepal rounded or notched	19
18	Flower oval, dorsal sepal scarcely longer than labellum	"Rimutaka"
	Flower round, dorsal sepal much exceeding the labellum	"round leaf"
19	Flowers usually above the leaf, early flowering, before main leaf flush	"pygmy"
	Flowers usually below the leaf, late flowering, with main leaf flush	"Trotters"

This key attempts to use the leaf or longer lasting features of the flower so that flower buds or dead flowers can be used to get close to identifying the species after the flower is over.

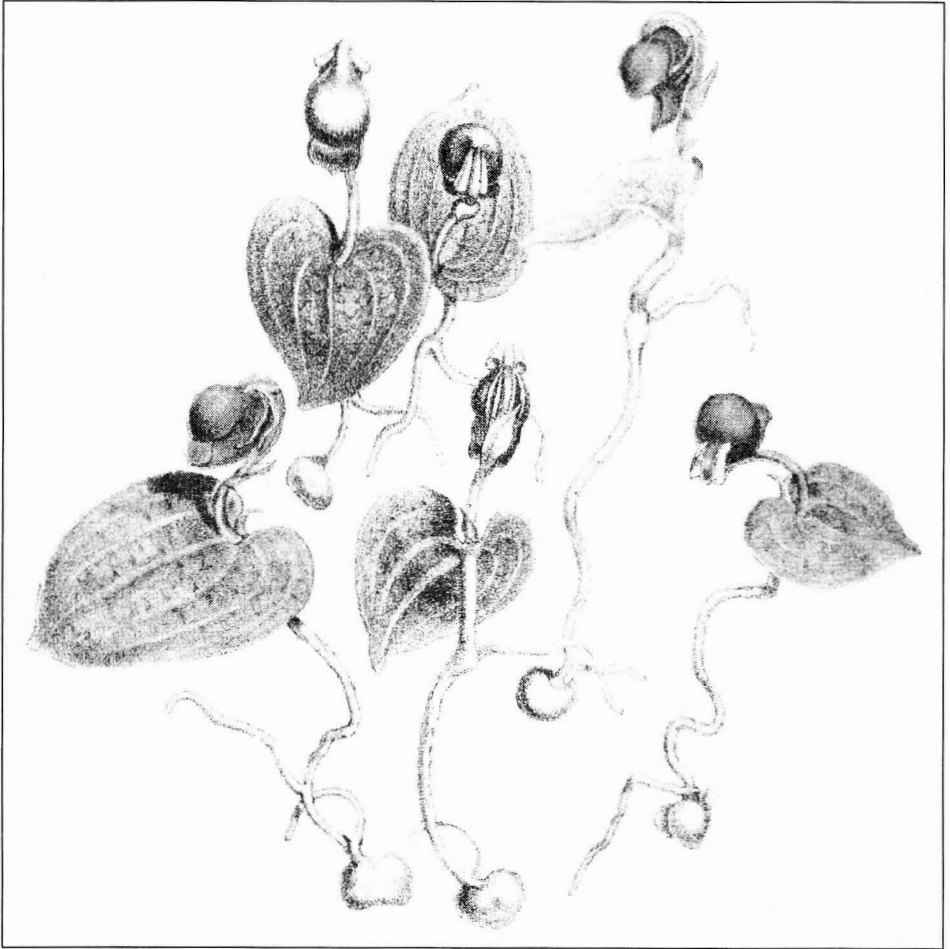
1	Plant leafless, flowers in litter, plant seen only at seeding	<b>cryptanthus</b>
	Plant with at least a small green leafy bract at seeding	2
2	Leaf sessile with petiole entirely clasping the stem if present, flower pedunculate	3
	Leaf distinctly petiolate and free from the stem	8
3	Leaf small, often hidden in the litter at maturity	<b>cheesemani</b>
	Leaf well developed	4
4	Lateral sepals much shorter than the labellum	5
	Lateral sepals much longer than the labellum	6
5	Dorsal sepal cleft, plants of <i>Empodisma</i> bogs	<b>carsei</b>
	Dorsal sepal rounded at tip, plants of scrub and light forest	<b>rotundifolius</b>
6	Leaf thin, wavy, often brownish green	7
	Leaf thick, flat, bright green	<b>papa</b>
7	Leaf triangular with a long acuminate tip, flower trumpet-shaped	<b>acuminatus</b>
	Leaf ovoid, acute but not acuminate, flower tubular	<b>oblongus</b>
8	Leaves about as wide as they are long, usually more or less kidney shaped	<b>trilobus</b>
	Leaves oval or oblong	9
9	Dorsal sepal narrow, acuminate	10
	Dorsal sepal broadening considerably over the labellum top and then narrowing sharply to an acuminate tip	<b>iridescens</b>
10	Leaf distinctly long-petiolate	11
	Leaf shortly petiolate	<b>rivularis</b>
11	Lateral sepals not much taller than labellum	<b>macranthus</b>
	Lateral sepals greatly exceeding the dorsal sepal	<b>orbiculatus</b>



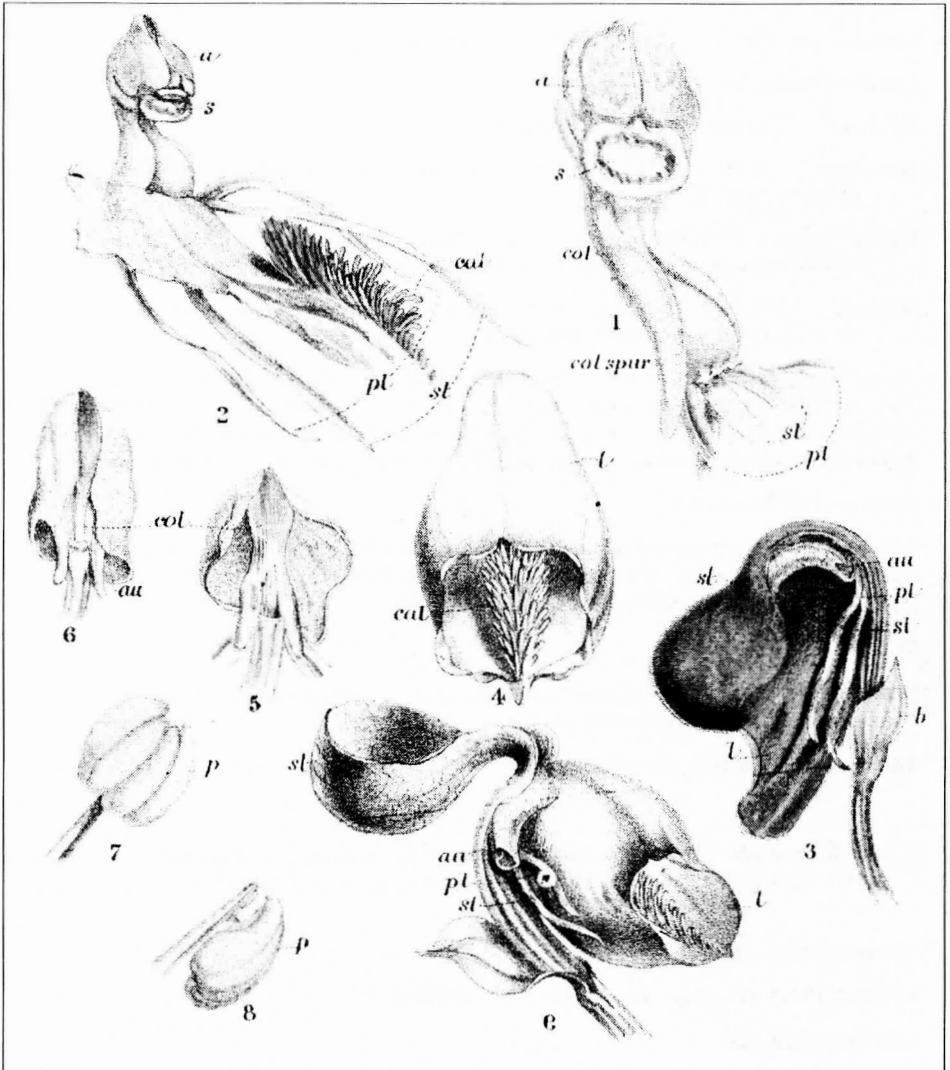
## Close relations: orchids like ours

### *Corysanthes unguiculata* (*Corybas unguiculatus*)

drawn by Robert Desmond FitzGerald, and published in his *Australian orchids* Vol.1, part 2, 1882 (reprinted 1977).



This is the species which was for many years regarded as identical with New Zealand's *Corybas carsei* and *Corybas rotundifolius*.



# Profile of a threatened NZ orchid: 7

## *Pterostylis irwinii* D.L.Jones, Molloy et M.A.Clem.

**Family:** Orchidaceae

**Endemic to:** Central North Island [and northern South Island].

**Common name:** Greenhood

**Ranking:** Unranked.      **In cultivation:** Yes.

**Descriptor:** A tall, slender, grass-leaved, greenhood orchid with large, red-tinted, minutely hairy flowers.

**Conservancy:** TT, NM. Earlier known only from a single site at Erua. but recently confirmed at Takaka Hill (B.P.J. Molloy pers. comm. 1999).

**Habitat:** Amongst *Polystichum* and in a seasonal wetland with small trees and shrubs, e.g. *Coprosma wallii* and *Olearia virgata*.

**Threats:** Uncertain. Extremely uncommon (possibly naturally so). However, in recent years plants have become harder to find amongst the dense *Polystichum* fern. It is possible that plants are being shaded out through the aggressive growth of this fern. Flooding from the river may impact on the plants; flooding occurred in 1997 but the impacts have yet to be assessed.

### Work undertaken to date

Species taxonomically described in 1997. Searches have been made for the species in the vicinity of the known site, and regular counts of plants have occurred in each of the last three years; *Polystichum* was trimmed back in October 1997.

### Priority sites for survey

Uncertain. Virtually nothing is known about the ecology and habitat requirements of this orchid, which was only discovered in the mid 1990s.

### Monitoring: objectives and priority sites

-

**Research questions** What are the habitat requirements, autecology and population dynamics of *P. irwinii*? How does *P. irwinii* respond to the opening up of its habitat? What are the threats to *P. irwinii*?

### Management needs

Research; threat mitigation once threats are established.

### Selected references

Jones, D.L.; Molloy, B.P.J.; Clements, M.A. 1997. Six new species of *Pterostylis* R.Br. (Orchidaceae) from New Zealand. *The Orchadian* 12: 266-281.





## Australian notes: David McConachie

**Using genetics to answer taxonomic questions or “to split or not to split”** by Doug Bickerton (*Abridged from a two-part article from the Journal of the Native Orchid Society of South Australia Dec. 2000/ Feb. 2001*)

### Part 1

The Lofty Block Threatened Orchid Project is a partnership between Threatened Plant Action Group and Dept. Environment & Heritage. The focus is the conservation of a number of nationally endangered or vulnerable orchid taxa found in South Australia. In some circumstances it has been difficult to distinguish whether plants in a population are sufficiently different from other populations to be labelled a distinct species. Sometimes there are minor morphological differences such as labellum shape or veins on the leaf, and perhaps the population is found in a different type of habitat, or many kilometres from a similar population. But perhaps there is some other difference that cannot be distinguished by sight, feel, smell or intuition.

Exactly what is meant by a species varies according to which taxonomist you talk to. When I was at high school I was told that different species had different numbers of chromosomes, and therefore a cross between species (i.e. a hybrid) would not produce viable offspring. Nobody told me about the Orchidaceae, which seem to produce more viable hybrids than non-viable ones! Therefore the best way to determine the relationship between two populations is to examine their genetic material.

Earlier in the year it was decided to use a process called Allozyme Electrophoresis to answer some questions about three taxa.

### *Pterostylis* aff. *nana*

Bob Bates and some other NOSSA members have known of a patch of “*P. nana*” at Hale CP for over a decade. The population covers a mere 0.25m<sup>2</sup> and in recent years has 70 – 170 plants. They are smaller than the typical *P. nana*, with a brown-orange hood and a “dolichochila”-type pointy lip. The popula-

tion is found in micaceous soil with long-leaf box/native pine woodland (*Eucalyptus gonio-calyx/Callitris rhomboidea*). In 1999, NOSSA members on a field trip 80 km away in Ferries McDonald Conservation Park, discovered a similar patch of orchids in sandy soil with mallee woodland. Since the two populations are apparently rare, but growing in different habitats, there was some doubt that they were of the same taxa.

In August 2000, with the assistance of David Pettifor, the Bridles, the Houstons, and other NOSSA members, I located the two *Pterostylis* aff. *nana* populations and collected a leaf from 20 plants at each site. I also took 14 or 15 leaf samples from the Adelaide Hills form and mallee form of *P. nana*. These were immediately stored cryogenically (in liquid nitrogen) to prevent deterioration, and taken to Mark Adams at the Adelaide Museum within a few days.

The material was then brought out of storage, crushed and subjected to a number of electrophoretic gels that highlight certain loci (or the positions of genes on the chromosomes). The reading from each gel indicates whether the highlighted gene is identical to other samples or similar. It also shows if a gene is heterozygous (a mix of dominant and recessive characteristics) or homozygous. This process indicates whether there are genetic differences between samples without showing what the differences are. That is, if a gel gives an identical reading for both samples of material then we know that the gene is identical in both plants, but we don't know the purpose or importance of the gene.

The tests indicated that the Hale CP and Ferries McDonald CP population are of the same taxon, distinct from the Adelaide Hills and mallee forms. Also the samples within each population were identical, although the populations are not identical to each other.

This means that both populations are clonal, i. e. only reproducing vegetatively (by tuber). The tests on the Adelaide Hills form and mallee form indicated that these latter forms are of one species. Furthermore, there was little variation within samples of the latter forms, indicating that most reproduction is by tuber division, but some spread also happens from seed.

These results answer some questions for us, but in the process other questions are raised. Perhaps it should not be surprising that the Hale/ Ferries-McDonald form is spreading vegetatively because there are numerous plants in a very small area, but why are they clonal when Bob Bates has been hand-pollinating the Hale population for more than a decade? And why are they found in such different habitats? One suggestion put to me is that each population began from a hybrid from two common species (e.g. *P. nana* with *P. robusta* or *P. dolichochila*), which produces sterile seed. Another is that the seed is not sterile, but simply no recruitment has resulted from the seed at these two populations. Bob Bates believes that a *P. aff. nana* common to Eyre Peninsula is the same taxon, and these populations near Adelaide may be outliers.

Needless to say, further research needs to be conducted to answer these questions.

## Part 2

In this article I detail the work done on another taxon, and mention another not-quite-so successful story.

### *Caladenia gladiolata*

This small but distinctive plant could once be seen in woodlands in at least 10 places between Dutchman's Stern CP in the Flinders Ranges and Scott Ck CP south of Adelaide. Now it is apparently limited to Mt. Remarkable NP and Scott Ck CP. The two latter parks are separated by 300 km, and some NOSSA members had noted that photographs of *Caladenia gladiolata* individuals taken at both Parks showed differences in appearances. The Scott Ck plants are smaller, with lighter-coloured sepal tips. So the question

was raised: Are they the same taxon?

In September last year tissue samples were taken from plants at three populations: 10 each from two populations in Mt. Remarkable NP and 20 from Scott Ck. The Allozyme Electrophoresis analysis indicate that the Scott Ck plants are the same species as the Mt. Remarkable ones.

What does this signify? It means the species was probably much more widespread before European settlement. The nearest population of *C. gladiolata*, now presumed extinct, is at Tothill Range, 150 km away. If these populations had been separated for say 10,000 years one could expect allopatric speciation to occur (i.e. when two populations of a species become separated geographically and evolve into two species), but it hasn't happened. It is likely there were many more *C. gladiolata* around until 200 years ago, and there may still be populations out there waiting to be discovered.

### *Pterostylis aff. biseta* (Mt. Brown)

Unfortunately not all forays into the brave new world of gene technology meet with resounding success.... In 1994 when Bob Bates was helping the Nature Conservation Society with a botanical survey of the newly formed Mt. Brown CP, he discovered nearby a small group of greenhoods that appeared to be closely related to, but distinct from, *Pterostylis biseta*.... I decided to find out how closely related they were. Last year, armed with a liquid nitrogen canister, I set off to collect some tissue samples of *P. biseta* from five sites including Sandy Creek, Mt. Remarkable NP, Mt. Brown CP and the nearby population of particular interest.

Following my return, we discovered to our dismay that the samples had not frozen properly apparently due to insufficient liquid nitrogen in the canister. Mark Adams was able to run some tests, and find that the apparently different plants probably aren't so different, but the material gave very poor readings and the results are far from conclusive. So the best laid plans of mice and men, or geneticists and orchidologists, have been laid waste. Better luck next time.





## From the internet

A correspondent asked, “**How long can an orchid live sub-surface?**”

“A case is described by Hanne N. Rasmussen (of the) mass occurrence of flowering *Cypripedium calceolus* 2 years after a forest clearance in a locality where the species had not been recorded in recent times.

“In her table 8.2 Rasmussen gives some data, and an extract is as follows

- *Cypripedium acaule*: 1-12 years underground
- *Epipactis helleborine*: 3 years
- *Listera ovata*: 1-2 years
- *Spiranthes spiralis*: 1 year
- *Dactylorhiza sambucina*: 1 year
- *Orchis mascula*: 1 year
- *O. simia*: 1-2 years
- *Ophrys apifera*: 1-3 years
- *O. sphegodes*: 1-2 years

“To this list I can add my own observation: After at least two consecutive years of flowering, a plant of *Dactylorhiza fuchsii* stayed underground for 2 (maybe 3) seasons after which another fertile stem was created during each of the following four springs.

“On p304 Rasmussen summarizes research which seems to show that it takes at least 4 years for young plants of *Coeloglossum viride* to develop the first aboveground parts, but that the rate of development depends on the habitat, the plants developing more rapidly in warm, open places.”

A contributor wrote, “This season, in the area I watch, the first shoots of *Corallorhiza trifida* were registered on May 9, raising to a maximum number of 28 at the end of the month. At the beginning of June, however, more than half (15) the shoots had disappeared prior to flowering.

The question I ask is why?

“Literature gives the following facts: in early fall, the next season’s shoots (4 mm in diameter and 1.5 - 2.5 cm tall), are formed from nodes of the coralloid rhizome about 4 cm down in the substrate - whether moss or forest soil. [1: p50]. In the following spring, aboveground shoots are created and the time of flowering is accelerated by dryness [2: pp49,125] and perhaps the amount of light present [3: p135]. In this phase, plants of *C. trifida* contains sufficient amounts of photosynthetic pigments for diffuse daylight to bring the aerial shoot above compensation point, i.e. the point where the production of oxygen by photosynthesis exceeds the consumption of oxygen in the respiratory process [4: pp352-353]. Although the flowers are visited by small insects, no one has been able to conclude that the insect visitors were actually affecting pollination and autogamy (self-pollination) via movement of pollinia to the stigmatic surface seems to be the rule [5: p31]. Seeds produced presumably germinate in the autumn of the same season [4: p353].

“My observations indicate that the disappearance of the stems prior to flowering happens only when this period is very wet due to heavy rainfall. Of course, during such periods, the number of insects visiting the flowers is smaller, but given the lack of involvement in pollination (*cf.* above), this should make little difference. On the other hand, **could it be that rain reduces the probability of autogamy?** Some indirect support for this may be found in the fact that dryness accelerates flowering.

### References

1. Joyce M. Reddoch and Allan H. Reddoch: The Orchids in the Ottawa District: Floristics,

- Phytogeography, Population Studies and Historical Review. *The Canadian Field Naturalist*, 111:1 (January-March 1997).
2. D. M. Turner Ettliger: *Notes on British and Irish Orchids*. 1997.
  3. Arvid Ohlsson: *Svenska Orkidéer*. 1967.
  4. Hanne N. Rasmussen: *Terrestrial orchids - from seed to mycotrophic plant*. 1995.
  5. John V. Freudenstein: A Monograph of *Corallorhiza* (Orchidaceae). *Harvard Papers in Botany*, No. 10, April 1997.

When needles of *Pinus sylvestris* and *Pinus nigra* were put (separately) in closed glass jars and kept moist, the needles of *P. sylvestris* became rather slowly infested with sparse growing mycelium of mainly *Ceratobasidium cornigerum* (a very widespread, cosmopolitan fungus which can be found in different kinds of soil) while needles of *Pinus nigra* developed a more abundant fungal garden of mainly so-called sugar-fungi, such as *Penicillium* and *Mucor*. When seeds of the orchid *Goodyera repens* were introduced, they germinated on needles of *P. sylvestris* (an interesting method to propagate this species), but were rapidly parasitized by the *P. nigra* flora. Inoculation of *P. nigra* needles with *C. cornigerum* was never successful.

A Dane wrote, "I am looking for the definition of the terms of Taxonomy as there are Species; Subspecies; Varietas; Forma; Lus. Are there defined requirements or stipulated conditions to be complied with a plant to put it to one of the categories?"

"In his paper 'Species concept and guidelines for infraspecific taxonomic ranking in *Dactylorhiza* (Orchidaceae),' (*Nord. J. Bot.* 18(3) 1998), Henrik Ærenlund Pedersen states that recent classifications of *Dactylorhiza* recognize from 6 to 49 species in Europe alone. I believe this shows that no such agreed terms exist.

"Further, Pedersen uses a study of

*Dactylorhiza* populations to set up the following rules (here quoted from the paper's Conclusions):

**For species:** As "species" are designated taxa complying with the biological species concept in a modern, botanically focused sense. In addition to mutual reproductive isolation they are distinguished by basically different genome compositions - a fact that can be utilized when assessing the rank of allopatric taxa. It is tentatively suggested that autotetraploid taxa should be treated as conspecific with their diploid progenitors.

**For subspecies:** As "subspecies" are designed taxa complying with the ecological, but not with the biological species concept. All subspecies of the same species have basically similar genome compositions, but their ploidy levels may differ.

**For varieties:** As "varieties" are designated taxa complying with the phenetic, but neither with the biological nor the ecological species concept. All varieties of the same subspecies have identical ploidy levels and basically similar genome compositions.

"Based on these definitions, Pedersen concludes that the tetraploid *D. maculata* s. str. (genome FFFF) and *D. majalis* s. str. (FFII) should be treated as different species. On the other hand, *D. majalis* and *D. purpurella* s. str. have the same genome composition (FFII), but should be given subspecies rank based on the existence of pre-pollination barriers: Geographic separation and time of flowering (*D. purpurella* s. str. is northern, late-flowering whilst *D. majalis* is southern and early-flowering). Thus, according to Pedersen, the correct taxonomy here should be *D. majalis* ssp. *majalis* and *D. majalis* ssp. *purpurella*."

*Apply this logic to Pterostylis and what do you get? - Ed*



# The NZ Native Orchid Group 2001

**Akaroa:** Hugh Wilson, Long Bay Rd, RD 3. **Ashburton:** Angela Abernethy, 50 Short st. **Auckland:** Mrs Marjorie Newhook, 24 Landscape Rd, Mt Eden. ED Hatch, 25 Tane Rd, Laingholm. Alva W. Gosling, 14 Reisling Place, Western Heights\_Henderson. Harold Waite, PO Box 24-108, Royal Oak. Ron Whitten, 5 Thorley St, Mt Eden. Noel Townsley, 6 Woolley Ave, New Lynn. Sandra Jones, 14 Park Rd, Titirangi. Mrs PH Morton, 120 Aberdeen Rd, Castor Bay. Annette & John Scott, 145 Manuka Rd, Glenfield. Cath Mayo, 79 John St, Ponsonby. Chris Hubbert, PO Box 3451. Dr Ross E. Beever, Landcare Research, PB 92170. Graham Marshall, 106 St George's Rd, Avondale. Mrs Sandra Moore, 4 Monterey St, Glendowie. Mrs Wilma Fitzgibbons, 11 Budock Rd, Hillsborough. Paul Left, 1Rhodes Ave, Mt Albert. Pauline Lawes, 31 Glen Var Rd, Torbay ECB. Peter de Lange, Department of Conservation, POBox 68908 Newton. Sue and John La Roche, 35 Geraldine Place, Kohimarama. Ewan Cameron, Botany Dept, Auckland Museum, Private Bag 92018. **Awanui:** Mrs BV Hoggard, RD 1. **Balclutha:** MC Miller, 4 Cherry Lane. **Cambridge:** Mrs Betty Seddon, 11 Grey St. Tim Oliver, RD 2. **Christchurch:** Maurice Sinclair, Hoon Hay Valley. Rodney Boon, 57 Townshend Cres. Jennifer Manning, 258a Mt Pleasant Rd. Mrs KE Blackwell, 1 Taupata St. Joy Talbot, NZ BotSoc Journal Editor, 23 Salmond St. Matthew Walker, P O Box 13-907, Armagh. Dean Pendrigh, 6 Rue de la Mare. Dr Brian Molloy, 20 Darvel St, Riccarton. K Gwatkin, 256 Westminster St. Richard Walker, 65 Innes Rd. **Dunedin:** Treasurer, Dunedin Naturalists' F.C., PO Box 6184. **Eltham:** Clive Perry, 234 Bridge St. Margaret Menzies, No 19 R.D.. **Foxton:** Mrs LP Chrystall, 489 Highway One, RD 11. Susan Hansard, Box 176. **Gisborne:** Mrs Nancy Adye, 30 Adair St. **Greymouth:** Paul Lambert, 45 Lydia St. **Hamilton:** Bruce & Bev. Clarkson, 7 Lynwood Pl. Max Gibbs, 27 Balfour Cres. Ian Reid, 629 Grey St. Jean Coe, 20 Birdwood Rd, Horotiu RD 8. Merilyn Merrett, Private Bag 3127. Mrs Diane Willson, 11B Arcus St. W.H. Fransen, 6 Wedgewood Place. **Hastings:** Mr David and Mrs Sally Hansen, Poukawa, RD 11. **Invercargill:** Mrs I Lankshear, 292 Racecourse Rd. **Johnsonville:** Fraser Broom, 24 Kipling St. **Kaiaua:** MrG. Stacey, PDC Private Bag 2. **Katikati:** Shirley Kerr, 10 Clive Rd. **Levin:** Brian Tyler, 4 Byrd st. Ian Cooksley, Manakau North Rd, RD 31 Manakau. **Lincoln:** Landcare Research NZ Ltd Librarian, Biodiversity & Conservation, PO Box 69. **Linden:** John SD Gregory, 329 Main Rd. **Marton:** LJ Gibbs, 21 Milne St. **Masterton:** Ian Hankin, PO Box 563. Mrs Lyn Coley, c/- Mokau, RD 2. Mrs Phyllis Jackson, Fire No 72 Mauriceville, RD 2. **Matata:** John Groom, PO Box 1. **Napier:** David & Beverley Lowe, 12 Alexander Ave, Onekawa. PC Shapcott, 35 Titoki Cres. WF Liddy, 8 Thurley Place, Bayview. **Nelson:** Cathy Jones, Flat 2, 5 North Rd. Gordon Sylvester, 345 Sherry River Road, RD 2 Wakefield. Mark Moorhouse, 10 Tainui St, Stoke. Mr Shannel Courtney, Dept of Conservation,

Private Bag 5. Mrs JM Jenks, RD 2, Upper Moutere. **New Plymouth:** Barry Hartley, 12a Ronald St. Ernie Corbett, 10 Protea Place, Bell Block. John Dodunski, 22 Hartland Place. Miss Ina McLellan, 6 Aubrey St. Mr G Fuller, 6 Torbay St. Mr Ken Davey, 211 Ngamotu Road. Mrs Val Smith, 80 Mill Rd. Roger Watkins, 413 Devon Street East, Strandon. **Oamaru:** Julie and Gary Speer, 11 Ure St. Mrs Barbara McGann, 4a Rother St. **Oxford:** Mrs B Pickering, Coopers Creek. Thom Pendrigh, 230 High St. **Paeroa:** ND Neilson, 135 Captain Cook Rd, RD 1. **Palmerston North:** (Serials) Librarian, Massey University, Private Bag 11054. Barbara Elliott, 36 Ronberg St. **Palmerston North:** Dame Ella Campbell, 26 Frederick St. David McConachie, 15 Battersea Place. Don Isles, 33 Swansea St. Elaine Glasgow, 14 Dorset Cres. Lynette Fischer, 11 Karamea Cres. Yvette Cottam and Bruce Sinclair, 329 Kahuterawa Road, RD4. **Papakura:** Eric Scanlen, 4 Sunny Park Ave. **Pukekohe:** Merle McNamara, 141 Edinburgh St. **Raglan:** Val Hollard, PO Box 22. **Rotorua:** Chris Ecroyd, 33 Raniera Place. Mr MC West, 3 Millar Rd, Lake Okareka. Wildland Consultants Ltd, 5B Owkata Rd, PO Box 7137 Te Ngae. **Stewart Island:** Chrissy Wickes, PO Box 203, Oban. **Taranaki:** Mr GE Penniall, 55 Hickman Rd, Urenui RD 45. **Taumarunui:** E. Anne Fraser, RD 4. Mrs CL Aston, 29 Golf Rd. **Taupo:** Ken and Jean Scott, 80 Taharepa Rd. Mr DS Mitchell, 13 Robinson Tce. Mr Trevor Nicholls, 33 Hinekura Ave. Mrs DE Abraham, 14 Nisbet Tce, Kinloch RD 1. Sue and Robbie Graham, 141 SH1, Waitahanui. **Tauranga:** Mrs Pauline Mayhill, 177 Maple Close, Welcome Bay. Beryl and Bob Goodger, 9 Somerset Grove. Gael Donaghy, 52 Anne Rd. JB Irwin, 192 Bellevue Rd, Otumoetai. WJ Forrest, 33 Upland St, Otumoetai. **Timaru:** Mrs DJ Barron, Hadlow Rd, RD 4. **Waihi:** Mrs JP Green, 37 Consols St. **Wairoa:** Geoff Foreman, 6 Rimu Drive. Margaret & David Fraser, 48 Black St. Sue Clough, 45 Mitchell Rd. **Waitara:** Ross Bishop, 3 Ngarue Place. **Waiuku:** Patricia Aspin, Hatton Rd, RD 4. Stella Christoffersen, 34 Cooper Rd, RD4. **Wanganui:** Michael Pratt, Waikupa Rd, RD 12. Mr and Mrs Robert L. Macnab, PO Box 36. Mr Colin Ogle, 4 Brassey Rd. Mrs YJ Cave, Seafield, No.4 RD. Ross Macdonald, 12 Bens Place. **Wellington:** Mr Philip Tomlinson, 14 Putnam St, Northland. Tony Robinson, 61 Moana Rd. Gordon Purdie, 19 Thatcher Cres, Crofton Downs. Anne Southern, 31 Haunui Rd, Pukerua Bay. Annette Fairweather, 50 Ponsonby Rd, Karori. Cesar Zapata, PO Box 11-969. Mrs Dorothy Cooper, 26 Kapiti Rd, Paraparaumu 6450. Pat Enright, 19 Gaya Grove, Ngaio. RW Hornabrook, 27 Orchard St, Wadestown. Suzan Dopson, Biodiversity Recovery Unit, Dept of Conservation: PO Box 10-420. **Whangarei:** Albert Blumhardt, 15 Tainui St, Onerahi. Anne Putnam, PO Box 194. Dept of Conservation, Te Papa Atawhai, PO Box 842. Hazel and Bob Major, 8/1 Bayswater Place, Onerahi. Mrs Penny Berks, 31 Third Ave. NJ & J Hewinson, Rushbrook Rd, RD 1 Kamo: Matarau. **Australia:** Ruth Rudkin, 18 Lyle Ave, Lindfield, NSW. Warren Simpson, RMB 8510 - Hill End, VIC 3825. Graeme Bradburn, 10 Jaylang Place, Figtree 2525 - NSW. **Switzerland:** Rudolf Jenny, Mooseweg 9, 3112 Allmendingen.

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