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Editor: Ian St George, 22 Orchard St, Wadestown, Wellington;

phone 04 4994227, fax 04 3895725, Email pgradisg@wnmeds.ac.nz.

A.N.O.S. Liaison: Brian Molloy, Landcare Research Ltd, POB 69 Lincoln, Canterbury.

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**The various contrivances by which New Zealand orchids are fertilised by themselves**

by Ian St George, Wellington

*Adapted from an address given at the Australasian Native Orchid conference, Toowoomba, 1993.*

Charles Darwin's book on orchid fertilisation first appeared in 1862, and a second edition renamed *The Various Contrivances by which Orchids are Fertilised by Insects* appeared in 1904.

The great Darwin scholar Stephen Jay Gould has pointed out that Charles Darwin was mortal, a man of his time, influenced by the ideas of his time; that the unregulated, competitive, survival-of-the-fittest elements in his evolutionary theories were in fact borrowed from the contemporary monetary theories of the economist Adam Smith. They are deregulatory, competitive ideas that have never worked in monetary practice, but which have nonetheless been picked up in modern times by the followers of Hayek and Friedman, and they are ideas that have been the cause of a good deal of embarrassment to many of us in New Zealand in recent times.

Darwin disliked the idea of self-pollination. In 1862 he wrote in the first edition of his book,

"It is hardly an exaggeration to say that Nature tells us, in the most emphatic manner, that she abhors perpetual self-fertilisation."

Despite observations that the British Bee orchid always self-pollinated, he wrote in 1860, "... in other districts, or during particular seasons, it may be visited by insects...(and) would almost certainly receive the benefit of an

occasional cross-pollination". He would not accept the evidence of his eyes.

You can trace a gradual softening of Darwin's stance on the subject, from incredulity bordering on disgust in the early 1860s that self-pollination was even possible, through to acceptance fifteen years later that it happened, though obviously only when normal, healthy cross-pollination by insects had somehow failed, and then only temporarily. In the early seventies he would list the orchid species in which "self-fertilisation habitually occurs" but would add,

"I believe that the few orchids which do not now intercross, either did formerly intercross, or that they will do so at some future period under different conditions, unless, indeed, they become extinct from the evil effects of long-continued close interbreeding."

Your great Australian orchidologist, Robert Desmond FitzGerald wrote, in a famous preface in 1876,

"Mr. Darwin's proposition regarding 'the contrivances by which Orchids are fertilised' is, that they 'have for their main objects the fertilisation of each flower by the pollen of another flower.' As far as I could investigate the subject in Australia, I have not been able altogether to verify this proposition; for though the great majority appear to be frequently

impregnated by pollen brought from other flowers, I believe they are also frequently fertilised by their own...."

Darwin doubted the accuracy of FitzGerald's observations on the self-pollination of *Spiranthes*, suggesting that it should be ascertained whether insects ever visit the flowers.

Even in the second edition (1904) of his book, he would write,

"Whether any species which is now never cross-fertilised will be able to resist the evil effects of long-continued self-fertilisation, so as to survive for as long an average period as the other species of the same genera which are habitually cross-fertilised, cannot of course be told."

I am aware that van der Pijl and Dodson rejected some papers on self-pollination on the basis that they "... are negativistic in approach, based on an iconoclastic satisfaction of overthrowing Darwinistic views", but I think Darwin *was* fallible here, a mere man of his time, again borrowing from contemporary ideas. I think he saw self-pollination as being the same as what was in the mid-nineteenth century called self-pollution, self-abuse, the secret vice, or the sin of Onan: in a word, masturbation. Big books of health advice from that time (I collect them) are full of baleful advice on the evils of masturbation; none of it true, of course — it's a harmless enough pastime — but all of it couched in the same sort of language that Darwin used when he railed against self-pollination in plants.

Here is what Darwin said about the offspring of plants after self-pollination,

"The offspring from the union of two

distinct individuals... have an immense advantage in height, weight, constitutional vigour and fertility over the self-fertilised offspring...."

And here is what the Reverend Sylvanus Stall told Victorians would happen to the offspring of a boy who masturbates,

"... his children after him must suffer to some measurable degree the results of his sin.... his offspring will show it in their physical, mental, and moral natures. So you see that even a young boy may prepare the way to visit upon his children that are to be, the results of vices and sins committed long years before they were born."

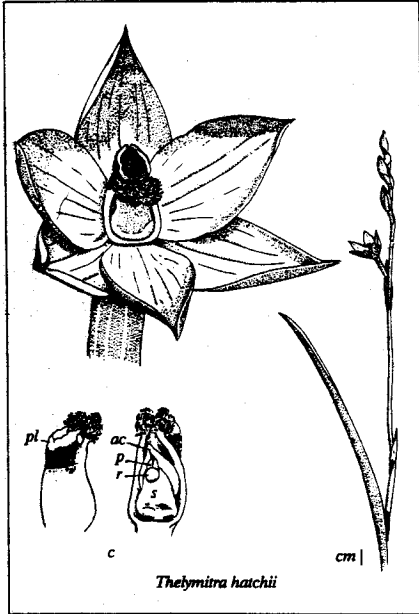
### **Self-pollination in New Zealand orchids**

But I digress. I want to tell you about self-pollination in the New Zealand orchids. Much of what I have to say (hereafter) is taken from Brian Molloy's chapter in the New Zealand Native Orchid Group's 1990 book *The New Zealand native orchids: natural history and cultivation*. I have also referred to van der Pijl and Dodson's 1966 book, *Orchid flowers, their pollination and evolution*.

Consider the lily — lilies, like orchids, have three petals and three sepals, but they have six "male" anthers, and they have three "female" stigmas fused into a single central structure.

The orchid has three sepals and three petals, usually of course rather less similar in shape in species other than the *Thelymitra hatchii* shown in Figure 1, but it has evolved a unique central column,

with a single fertile anther, and a single two-lobed stigma, which in some species retains its third lobe as a rostellum — a shelf of modified stigmatic tissue between the anther and the stigma.



With few exceptions, if pollination is to take place, the pollen from the male anther must come into contact with the female stigma. Insects may help in this. Perhaps 97 percent of the world's orchid species are insect-pollinated. But in New Zealand the position appears to be quite different. Many of our orchids are predominantly self-pollinating, to some extent perhaps because of the paucity of pollinating insects here. Perhaps 60 percent of New Zealand orchids show autogamy, or self-pollination.

Captain James Cook wrote in 1776,

"Insects are very rare. Of these, we only saw two sorts of dragon-flies, some butterflies, small grass-hoppers, several sorts of spiders, some small black ants, and vast numbers of scorpion-flies, with whose chirping the woods resound."

Brian Molloy compared reported insect faunas and reached the same conclusion (Table 1).

Others have suggested that there are plenty of insects in New Zealand, and that on the right day many insects are available to visit flowers. Certainly we do have some insect-pollinated orchids too.

What we perhaps have in New Zealand is an orchid flora originating as set out in Table 2. Thus many of the self-pollinating species have been derived from insect-pollinated ancestors, and still show some of the anatomical structures that suggest insect pollination.

These characteristics that suggest insect pollination include many that Darwin observed (see Table 3). They do not prove insect-pollination, but may simply indicate the persistence of ancestral features that have evolved elsewhere.

I am most familiar with southern South Island species, and I will use them to illustrate the points I want to make. Apart from the field commentaries of G.M. Thomson around the turn of the century, few *observations* on New Zealand's southern species have been recorded, but characteristics that suggest self-pollination include those shown in Table 4.



**TABLE 1.**

Comparison of recorded insect faunas, from Molloy, 1990

NOTE: Figures in brackets are the percentages of the world fauna.

	New Zealand	Australia	World
Beetles, weevils	4,300 (1.3)	c.28,000 ( 8.7)	320,000
Flies	1,870 (1.2)	c. 8,000 ( 4.3)	150,000
Butterflies, moths	1,490 (1.3)	c.15,364 (13.7)	112,000
Wasps, bees, ants	400 (0.4)	c.11,500 (10.5)	110,000
<b>TOTAL</b>	<b>8,060 (1.2)</b>	<b>c.62,864 ( 9.1)</b>	<b>692,000</b>

**TABLE 2.**

The possible origins of the New Zealand orchids

- A. derived from insect-rich countries (Australia, Malaysia) where their ancestors were
1. insect-pollinated, and the NZ species have
    - 1.1 remained insect-pollinated, *or*
    - 1.2 adjusted to life in an insect-poor country by becoming adapted for self-pollination, *or*
  2. self-pollinating, and they have remained self-pollinated, *or*
- B. endemic, either insect-pollinated *or* self-pollinated.

**TABLE 3.**

Signs of predominant insect-pollination

- Large colourful flowers that open wide and long,
  - Flowers that produce nectar or scent;
  - A large, colourful (or irritable) labellum as a landing platform for insects,
  - Adherent masses of pollen (pollinia),
  - Wide separation of the anther and stigma,
  - A prominent rostellum forming a barrier between anther and stigma,
  - A floral stance that would cause falling pollen to miss a stigma that is flat and narrow
  - Scant seed production,
- Because of cross-pollination individuals in a geographical region may show variation within a species to an extent that they may be regarded as different species.

**TABLE 4.****Signs of predominant self-pollination**

Buds that do not open,  
 Small, few flowers,  
 Flowers that barely or only briefly open,  
 Flowers that do not produce nectar or scent,  
 Flowers that are non-resupinate (labellum uppermost) or lack a conspicuous labellum,  
 Flowers that have noncoherent mealy pollen that will fall easily onto the stigma,  
 Have the pollen-bearing anther close to the stigma,  
 Lack a prominent rostellum separating anther and stigma,  
 Show a floral stance with a column disposed to allow falling pollen easy access to the stigma,  
 Have a prominent stigma that easily catches falling pollen,  
 Produce plentiful seed as a result.  
 Because of the inbreeding that self-pollination implies, individuals in a geographical region tend to show little intra-specific variation.

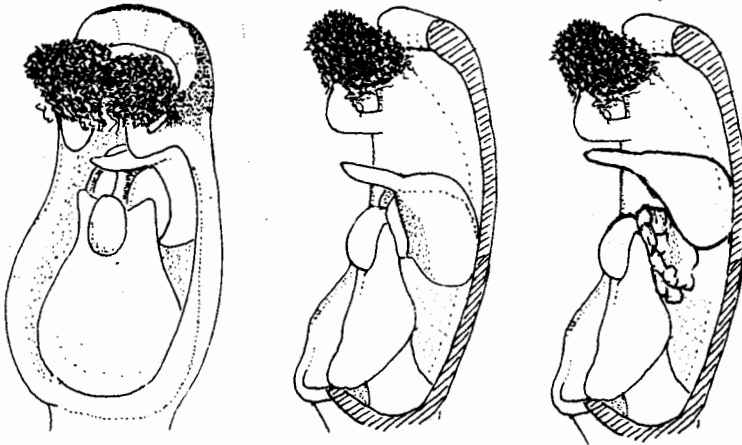


Figure 2: *Thelymitra longifolia* showing separation of the anther cap, leaving pollen above and behind the stigma

(We have often, in New Zealand, rather coyly talked of the pale and "delicate beauty" of our flowers, which others have been cruel enough to call "inconspicuous"; we don't have the masses of colour of a Swiss alpine meadow — but then neither do we have to wear leather pants to keep the insects at bay).

**Buds that do not open:** *Thelymitra longifolia* buds often remain steadfastly closed, and after a while one becomes aware that the ovary is swelling, and the flower will never open. The famous New Zealand botanist Thomas Frederic Cheeseman wrote on *T. longifolia*, that the two anther cells split to expose the pollinia when the bud is still closed, and that these pollinia adhere to the sticky upper surface of the rostellum. The column then lengthens, so the anther-case leaves the pollinia hanging there in the narrow space between stigma and column.

"The upper part of the stigma is thin and membranous, and has its margin slightly revolute, even when in bud. After expansion (of the flower) this rolling back is carried to a greater extent, so that the edge of the stigma, and even a small portion of its anterior surface, comes into contact with the pollen masses hanging directly behind it. Pollen-tubes are at once emitted into the substance of the stigma, usually so rapidly that before a flower has been expanded more than a single day the pollinia are glued so firmly to the margin

of the stigma that they could not be removed by insects, even if they visited the flowers."

(Which he had noted earlier in the paper, they do not). I have attempted to show this in Figure 2.

Other characteristics that suggest predominant self-pollination are *small, few flowers with mealy pollen*, as in *Gastrodia minor* (Figure 3) and *Microtis oligantha*; *flowers that barely or only briefly open*, as in *Bulbophyllum pygmaeum*; *flowers that do not produce nectar or scent*; *flowers that are non-resupinate* (labellum uppermost), such as *Prasophyllum colensoi* (Figure 4) or *Genoplesium nudum*; or *lack a conspicuous labellum* (*Lyperanthus antarcticus* — Figure 5).

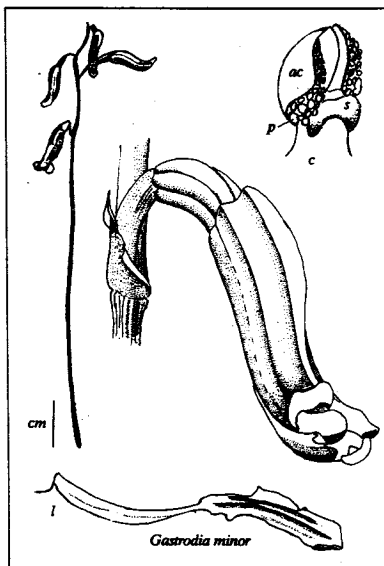


Figure 3: few flowers and mealy pollen

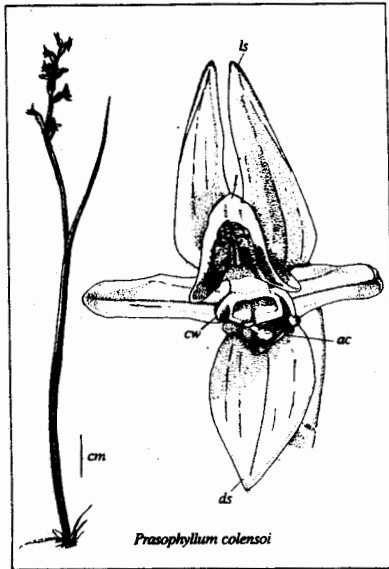


Figure 4: nonresupinate flowers

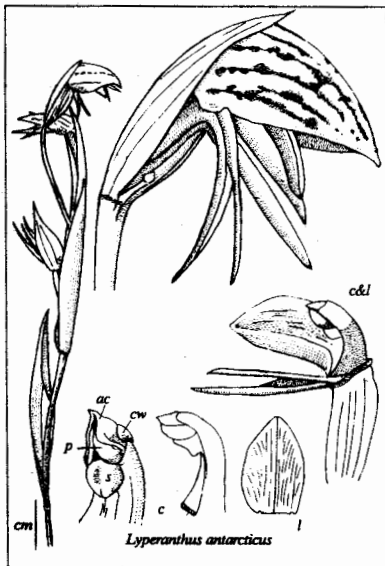


Figure 5: the labellum is hidden by the dorsal sepal; there is no rostellal shelf separating pollinia from stigma

Characteristics that suggest predominant self-pollination also include flowers that have *noncoherent mealy pollen* that will fall easily onto the stigma, or have the pollen-bearing *anther close to the stigma*: here it is useful to compare the short column and mealy pollinia of the predominantly self-pollinating *Gastrodia cunninghamii* (Figure 6) with the long column of the predominantly insect-pollinated *G. sesamoides* auct NZ (Figure 7). The unnamed species tagged *Gastrodia* "long column" has a long column similar to that of *G. sesamoides* but is self-pollinating by the flowers turning upward from their pendant habit as they mature.

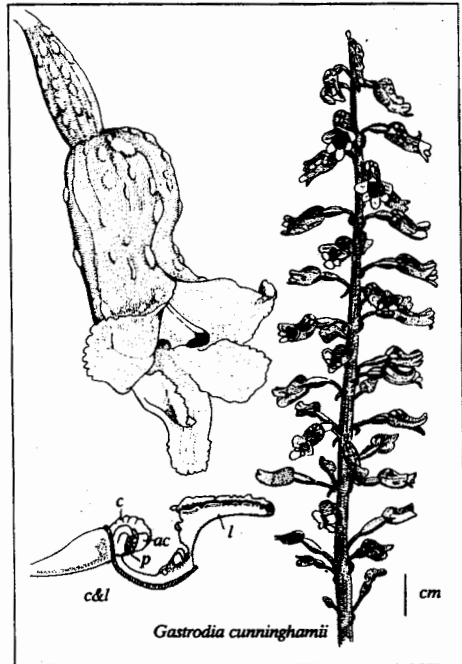
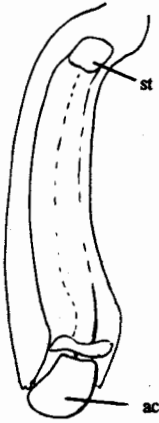
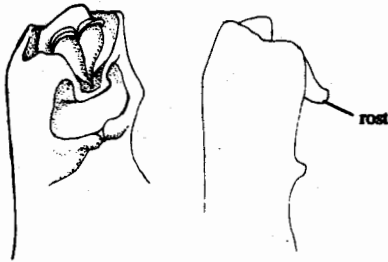


Figure 6: a short curled column places the mealy pollen directly onto the stigma



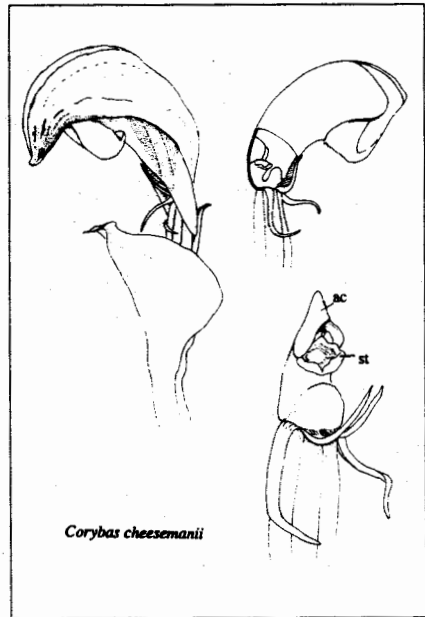
*Gastrodia sesamoides* column



*Earina autumnalis* column

Self-pollinating species often *lack a prominent rostellum* separating anther and stigma, as in the case of *Lyperanthus antarcticus* (Figure 5); in contrast, *Earina autumnalis* (Figure 7) is predominantly insect-pollinated and shows a prominent rostellar shelf.

Self-pollinators often show a *floral stance* with a column disposed to allow pollen falling from above easy access to the stigma, and have a *prominent stigma* that easily catches falling pollen. Compare for instance the column of *Corybas cheesemanii* (Figure 8, where the anther has bent forward over the upfacing stigma) with the horizontal column of insect-pollinated *C. trilobus* (Figure 9).



*Corybas cheesemanii*

Figure 7: Two insect-pollinated species; the stigma of *Gastrodia sesamoides* is well above the pollinia in the drooping flower. The column of *Earina autumnalis* has a prominent rostellar shelf separating pollinia from stigma

Figure 8: the bent-forward anther allows pollen to fall into the upfacing stigmatic basin.

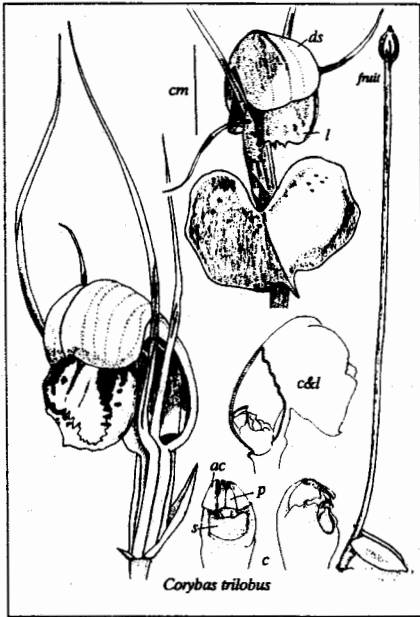


Figure 9: an insect-pollinated species that has a horizontal column, preventing pollen from falling onto the stigma.

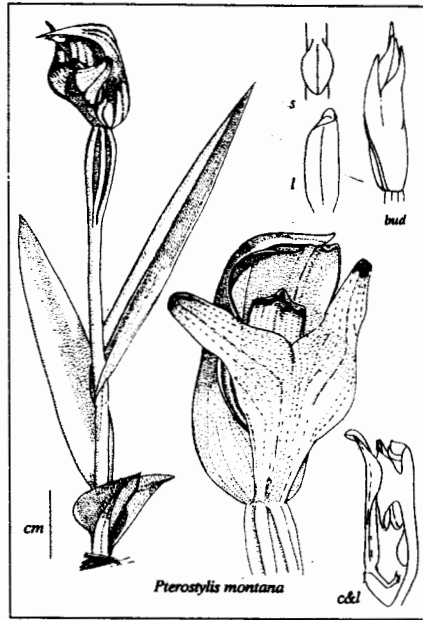


Figure 10: an upright flowered *Pterostylis* — with a prominent stigma to catch falling pollen.

Compare also the vertical stance and prominent stigma of the self-pollinating *Pterostylis montana* (Figure 10) with the forward lean and flat stigma of *P. areolata* (Figure 11).

Self-pollinating species **produce plentiful seed** as a result; and because of the inbreeding that self-pollination implies, individuals in a geographical region tend to show **little intra-specific variation**.

Figure 11: an insect-pollinated *Pterostylis*, → the flower leaning forward, the stigma flat.

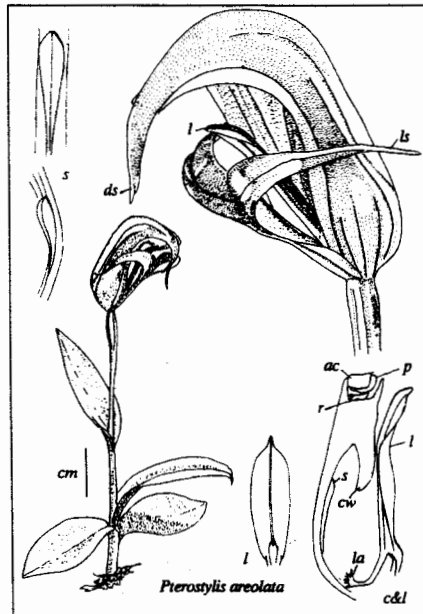


TABLE 5.

Predominantly insect-pollinated  
species of the far south of  
New Zealand

*Acianthus sinclairii*  
*Aporostylis bifolia*  
*Caladenia lyallii*  
*Corybas acuminatus*  
*Corybas macranthus*  
*Corybas rivularis*  
*Corybas trilobus*  
*Dendrobium cunninghamii*  
*Drymoanthus adversus*  
*Drymoanthus* "spotted leaf"  
*Earina autumnalis*  
*Earina mucronata*  
*Pterostylis areolata*  
*Pterostylis australis*  
*Pterostylis banksii*  
*Pterostylis graminea*  
*Pterostylis* "aff. montana"  
*Pterostylis* "Catlins"

There is another mechanism for self-pollination — penetration of the stigma from behind. Bruce Irwin observed it and wrote to me,

"The pollinia of *Orthoceras novae-zeelandiae* were said to be 'ill-defined', so I made careful drawings of them. When I tipped the anther back, the pollinia were withdrawn because they were cemented to the back of the stigma, presumably by germinating pollen tubes. This suggested that pollen tubes penetrate through the back of the stigma.

TABLE 6.

Predominantly self-pollinating species  
of the far south of New Zealand

*Acianthus viridis*  
*Adenochilus gracilis*  
*Bulbophyllum pygmaeum*  
*Caladenia catenata*  
*Caladenia* "green column"  
*Chiloglottis cornuta*  
*Corybas cryptanthus*  
*Corybas oblongus*  
*Corybas orbiculatus*  
*Gastrodia cunninghamii*  
*Gastrodia minor*  
*Gastrodia* "long column"  
*Lyperanthus antarcticus*  
*Microtis oligantha*  
*Microtis unifolia*  
*Prasophyllum colensoi*  
*Pterostylis foliata*  
*Pterostylis montana*  
*Pterostylis tristis*  
*Pterostylis venosa*  
*Pterostylis* "aff. cynocephala"  
*Spiranthes sinensis*  
*Thelymitra cyanea*  
*Thelymitra decora*  
*Thelymitra formosa*  
*Thelymitra hatchii*  
*Thelymitra pauciflora*  
*Thelymitra pulchella*  
*Thelymitra longifolia*

"Having made drawings of the first flower I tipped back the anther of the second flower to make sure I had not been misled. I was surprised that in this case the pollinia were not

this case the pollinia were not attached to the back of the stigma. I returned the anther to its normal place and re-examined it 24 hours later. By then two pale slightly swollen areas could be seen, one on each pollinium. After a further 24 hours one pollinium was attached to the back of the stigma." (Figure 12).

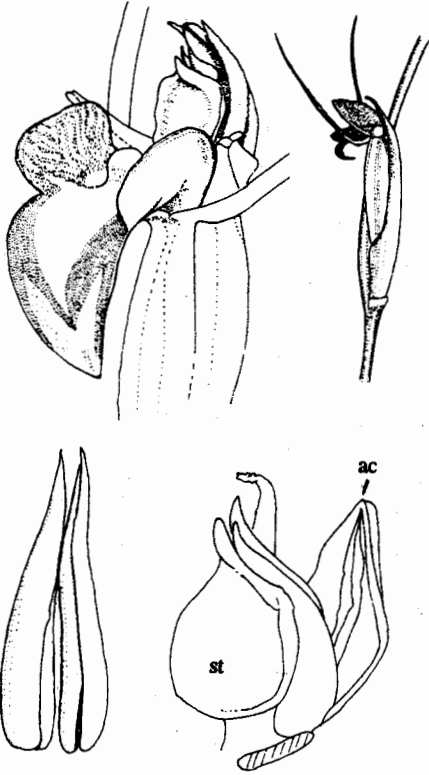


Figure 12: the long pollinia of *Orthoceras novae-zeelandiae* stick to the back of the stigma when the anther cap is lifted.

All the southern South Island species of *Thelymitra* appear to be self-pollinating. All the epiphytes, most species of *Corybas* and half the southern species of *Pterostylis* are among those that appear to be insect-pollinated (see Tables 5 and 6).

Darwin did suggest that self-pollination may be a fall-back position adopted by species that are normally insect-pollinated. Even he admitted that self-pollination was better than extinction.

The advantages of cross- over self-pollination may have been exaggerated. There may be other methods of achieving variety in the gene pool.

"Lower" organisms that reproduce asexually have built-in safeguards to achieve it. The influenza virus keeps ahead of our human immune systems by mutating every few years; the yeast *Candida albicans* (the one that causes "thrush") also mutates easily, with transfer of genetic material during mitosis. We don't know about higher plants, and indeed the uniformity of structure in self-pollinating orchids in contemporaneous populations might suggest that such genetic change is uncommon.

But clearly there has been modification in some of our species since their ancestors left Australia, and that change has even occurred in species that were self-pollinating in Australia — the New Zealand *Corybas cheesemanii* (Figure 8) and its cousin the Australian *C. aconitiflorus* are examples.



## Hybrids using New Zealand native orchids: *Drymoanthus adversus*

by Malcolm Campbell, Hamilton

On 12 October 1990 I pollinated *Sarcochilus ceciliae* using pollen from *Drymoanthus adversus*, and also the reverse cross. The reverse cross was a problem because I wasn't prepared for the four pods set, when I had only pollinated one. I thought I could remember the one I did but this subsequently proved to be wrong because although the seed grew the plants were straight *D. adversus*.

However with *S. ceciliae* as the pod parent there were no problems. The seed pod split and the mature seed was flaked on 2 May 1991 (= 6.5 months), so could probably be sown from green pod at 5-5.5 months. Germination in about two weeks was very good and protocorms were quick to grow.

Ron Maunder was given one mother flask which he replated onto his medium. His replates grew faster than mine, and as an experiment he put the two biggest plants into separate flasks with the idea of growing on to flowering in the flask.

The biggest plant of the grex was indeed flowering in the flask in September 1993, 2 years 4 months from sowing seed.

The honour of first to flower went to Ewan Perrott, who flowered one of the first plants to be deflaked on 20 June 1993 (2 yrs 1.5 mths from sowing seed).

I sent a photograph of these flowers with the application for registration and the name *Sarcomoanthus* Emarcy Gem was accepted on 9 August 1993.

These hybrids are proving to be small but vigorous plants that for the most part

flower in their first year out of the flask, often with two or three sequential spikes of three to eight strong pink flowers which are twice the size of *D. adversus*.

The biggest and last plant to be deflaked already had four lead growths and three flower spikes, one of which was flowering when deflaked. It never looked back and continued to flower all through summer until March, by which time it had ten spikes which I have left on the plant for verification.

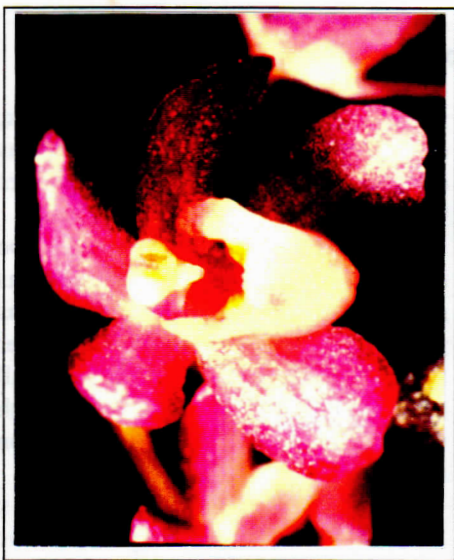
I have tried many *Drymoanthus* x *Sarcochilus* since but only two have produced protocorms, one with *Sarcochilus falcatus* and the other with *Parachilus* Perky.

There seems to be only one precedent for registering a *Sarcomoanthus* and that was registered as *Sarcomoanthus* Maungatapere by O. Blaumhardt of Whanagrei in January-February 1992.

I would be interested to hear from anyone who has similar hybrids in the pipeline. Dates involved were

- 12 October 1990 pollinated;
- 2 May 1991 flaked (= 6.6 months to ripe seed);
- 20 June 1993 first flower (= 2 years 1.5 months from sowing seed, or 2 years 8 months from pollinating);
- 9 August 1993 registered.

Another hybrid in the pipeline is *Dendrobium cunninghamii* x *D. mohlianum* but this is very slow in the flask, and at the present rate of growth could be another two years to deflasking. That's if they live that long.



*Sarcomoanthus* Emarcy Gem



**Seek and ye shall find**  
by Bruce Irwin, Tauranga

Seek for the orchids listed in *Flora of New Zealand*, Vol II and in time you will find most of them. But, if you seek long enough and if you examine all your finds critically, the rewards will be much more exciting. Almost certainly you will discover species not yet described. You don't believe me? I'll try to explain.

My interest in native orchids goes back a long way. With two or three schoolfriends, I explored bush areas close to Wanganui, at first studying native plants in general, but quite soon the orchids took over as a very special interest. Later when I started work at New Plymouth, that interest was whetted by the abundant orchid flora of Egmont and the adjacent ranges. The father and son team of Sid and Owen Gibson shared my interest. We relied on Cheeseman's *Manual of the New Zealand flora* for identifications, and rather naively presumed that any orchid we found would match one of the species described in that august volume. Whenever a specimen failed to match any particular description, we assumed that the species description which came closest must be the correct one. The possibility that our specimen might be an undescribed species was barely considered. After all, when Cheeseman completed his 1925 edition, he brought together the combined knowledge of many competent botanists, amassed during the 85 years of European settlement. Surely the *Manual* must be complete and accurate? How I underestimated the difficulties faced by

those early botanists!

In 1949 Owen and I spent several days near Kaitaia hoping to find rare orchids recorded prior to 1930 by RH and HB Matthews. We sought *Thelymitra matthewsii* [1], but found instead *T. sanscilia* [2], until then unknown and still of uncertain status. We also sought unsuccessfully two *Corybas* species, *C. matthewsii* and *C. carsei* [3], and were still seeking them as we turned homeward. Near Wellsford Owen discovered a very strange seeding *Corybas* quite unlike any previously described. We showed our find to Dan Hatch, with whom we had been corresponding. He shared our excitement, and our belief that the plant was an undescribed species. The following year after finding a flower, Dan described the plant as *Corybas saprophyticus* [4] (now *C. cryptanthus*).

**Seek and ye shall find.** True, but what will you find? Be prepared for some surprises. Before he finally reached home, Owen received yet another surprise. He found another unnamed orchid, a large dark red *Corybas*, almost as large as *C. macranthus*. The full significance of this third find was not realised until many years later. Because we were aware of several distinct forms of *Corybas* near New Plymouth, all presumably falling within the concept of *C. rivularis* (then known as *C. macranthus* var. *longipetalus*), we tentatively regarded "Big Red" as yet another, though very superior, form of

*Corybas rivularis*. We did wonder why so much variation occurred between populations, but at that time had never seen two or more forms growing side by side.

Altered circumstances resulted in less attention to the orchids for the next twenty-five years, but when I retired to Tauranga in 1980, I had ample time to resume my interest. I now owned a binocular microscope which enabled me to study and draw orchids in far greater detail, and most importantly, I had picked up much useful botanical knowledge through collaboration with Dr Lucy Moore. Sadly the eagle-eyed Owen had died some years previously. My thoughts turned to his *Corybas* "Big Red". I managed to locate his original colony and soon afterwards a second colony 100km further north near Waitomo. When I showed the Waitomo flowers to Tony Druce, he unhesitatingly said that they were new to him and must be an undescribed species. "Big Red" came to be known by the tag name *Corybas* "A".

If I could find *Corybas* "A" growing together with other forms within the *C. rivularis* complex, yet remaining distinct and without intermediate forms, I could be certain that it warranted species rank. Luck was with me. Early in September 1987 Rob Ward and Ernie Corbett took me to the Rerekapa track in North Taranaki to see a strange *Corybas* they had found there. Near the start of the track we found *Corybas* "A" flowering profusely. To my delight it was growing alongside flowering plants of the small green *Corybas* which is common on Mt Messenger. No intermediate forms were

seen. Clearly *Corybas* "A" and *Corybas* "Mt Messenger" must be two separate species. A further surprise awaited me. When we reached Rob's strange *Corybas*, I immediately recognised it as the plant I had found in 1947 near Wanganui, which I had dubbed *Corybas* "extralongipetalus" and had at that time presumed to be a freak form of *C. rivularis*. Again, although growing in association with *Corybas* "A" and *Corybas* "Mt Messenger", this form (*Corybas* "short tepals") remained distinct and without intermediates. Clearly at least three distinct species were masquerading as forms of *C. rivularis* [5].

Every September since, I have explored areas of Taranaki, mapping the several forms of *Corybas*. In this I have been helped by an enthusiastic band of local NOG members, who have themselves been seeking and finding. For instance, on 11 November 1992 John Dodunski showed NOG members, including Brian Molloy and myself, a tiny, narrow-lipped *Corybas* near his New Plymouth home. It reminded me of a flower from the same general area which I had drawn many years previously, but it differed from any form recently recorded in Taranaki. Was this a freak form, or perhaps a flower not yet fully open? My doubts were laid to rest later that season when I went "seeking" *Corybas* in Dan Hatch's shadehouse. I was surprised to find apparently identical plants which had come originally from Kerikeri. The number of distinct *Corybas* species was getting out of hand!

The following season Val Smith, also of New Plymouth, complicated the situation

even further. As early as 4 July Val found a *Corybas* flower at Pukeiti which matched Dan Hatch's plant from Waiouru, *Corybas macranthus* var. *longipetalus* [6]. It seems that Taranaki accommodates at least six quite separate forms of *Corybas*, at present included within *Corybas rivularis*. One of these however (*Corybas* "short tepals") has been identified by Brian Molloy as Colenso's *Corysanthes* (*Corybas*) *orbiculata* [7].

In 1985, south of Turangi, the Goodgers and I found a small, green-flowered *Corybas* (*Corybas* "rest area"). I made drawings, but at that time I was not aware how variable the forms within *Corybas rivularis* could be. In 1992, by then realising that these drawings were anomalous, I tried several times to relocate the colony. However the quotation from the Bible seemed to be faulty. I sought but did not find. During the last, unsuccessful, search on 28 October, I did notice a fine colony of *Pterostylis humilis*. I concluded that this rather more robust orchid had survived competition from coarse sedges, whereas the *Corybas* had been completely overwhelmed. I placed a marker over the *Pterostylis humilis* because I knew that Ian St George had not yet seen that species. Then I followed a "hunch". I drove to my "enchanted" wetland at Rangataua. This wetland is sheer magic. If I were ever to find *Corybas* "rest area" again, I should look for it at Rangataua. Sure enough, that afternoon I did find it, but a single flower only. Should I give the local leprechauns another night to rearrange the flora, as is their habit? My

scheme worked. Next day, when I followed precisely the same route through the wetland, I found perhaps a hundred perfect flowers all matching those of the original "lost" colony. There is a rumour circulating that I always lose my way in the Rangataua wetland. That just is not true! Incidentally the leprechauns are active throughout the National Park area. When Ian followed my directions, he found the *Pterostylis humilis* colony without difficulty, just three metres north of a fine colony of — *Corybas* "rest area"!

The finding of several species at present included within *Corybas rivularis* raises an interesting point. Which form is the one originally found by Allan Cunningham near Whangaroa in 1826 [8]? Perhaps in Northland, just as in Taranaki, there are several different forms. Perhaps the true *Corybas rivularis* is a form which I have not yet encountered.

*Pterostylis* [9] and *Thelymitra* [10] are two genera which, like *Corybas*, will be shown to conceal a number of undescribed species.

Obviously there is much more seeking and much more finding to be done.

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### Observations on the pollination of *Corybas* "A"

by George Fuller, New Plymouth

The "fernery" at Pukekawa Park, New Plymouth, proved to be a very desirable location in which to carry out the following observations because, though sheltered from the elements, the growing conditions otherwise are a close parallel to nature. Structurally, each "house" is simply a chamber excavated into a south-facing slope. Each is roofed with glass and interconnected with tunnels dug through the unique volcanic subsoil, providing both coolness and a very attractive form of access and egress. The sloping banks forming the "walls" of the chambers are festooned with native ferns growing in situ and the frequent application of water required to meet their needs also favours several colonies of *Corybas* species introduced into cleared areas of the banks many years ago. In the unheated and freely ventilated yet moist environment, the colonies had spread to cover several square metres of dense population at the time of the observations.

Initial study was confined to an area of about a square metre containing literally hundreds of plants of two distinct clones which had become intermingled. When it comes to identifying these two, it would be an understatement to suggest that the naming of taxa within the genus *Corybas* has for the past few years been in a "state of flux", and that keeping apace of developments has been a daunting task. Although much of the dust has settled over corrections to the earliest nomenclature, especially with Brian Molloy's latest revelations over reinstatement of *Corybas orbiculatus* (Col.) in the *NZNOG Journal* as recently as September 1994 [1], the jury is still out over the naming of the two taxa involved in this particular study. Both are extremely prevalent in Taranaki and have been under the close scrutiny of Bruce Irwin for a great many years, one under his designation, *Corybas* "A", and the other *C. orbiculatus* (complex) "Mt Messenger" [2, 3]: the latter would now be *C. rivularis* "Mt Messenger".

It was while viewing this mixed colony on 16 August 1979 that I noticed the presence of small mosquito-like insects, three of which were bearing conspicuous creamy-white masses on their backs. When one fly was observed in a struggle to extricate itself from a flower of *Corybas* "A" my suspicion was confirmed - I was observing the insect responsible for pollination.

The long, ungainly legs rendered this fly a very unlikely candidate for the task but for reasons I could not detect, there was great determination to persevere and I was able to photograph the flies, but not all bearing pollen.

Ten days later *C. "Mt Messenger"* was in full flower. It became very noticeable, however, that though in many cases the flowers were almost touching those of *Corybas* "A", the flies exhibited no interest whatsoever. In contrast, they became very agitated, even performed frenzied dances when close to flowers of *Corybas* "A" which seemed to have some form of irresistible attraction.

On this occasion I was able to capture a specimen bearing pollen, though I had no means of determining the pollen's exact origin. The insect was identified as a female of *Mycetophila diffusa* Tonnoir 1927, a fungus gnat [4].

On 9 September several gnats were noticed to be paying attention to a later flowering colony of *Corybas* "A" growing apart from those previously mentioned. They were extremely active, and one was caught having exited from a flower but without pollen. This one was a female of *M. colorata* Tonnoir 1927, which bears a spot on its wing [4].

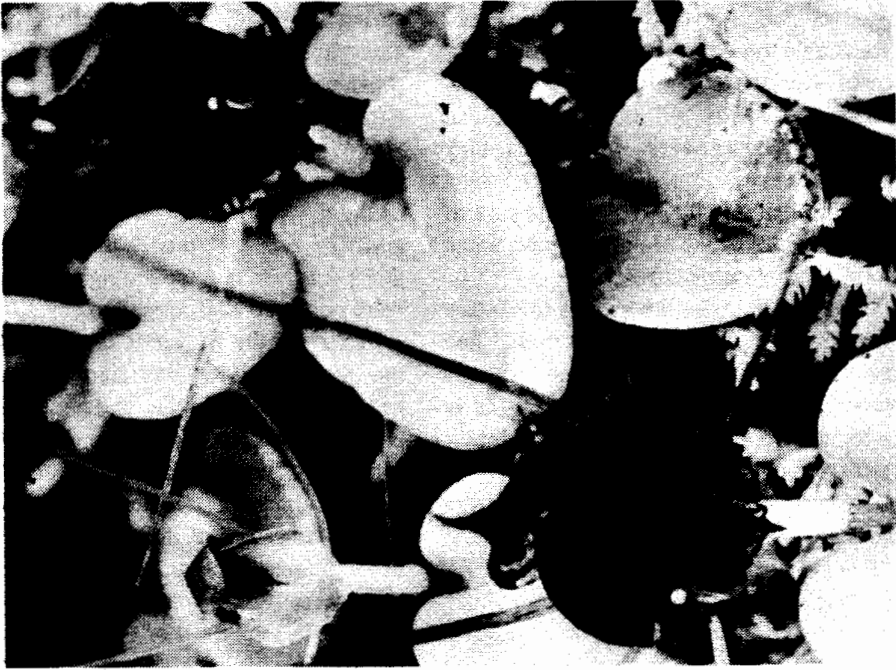
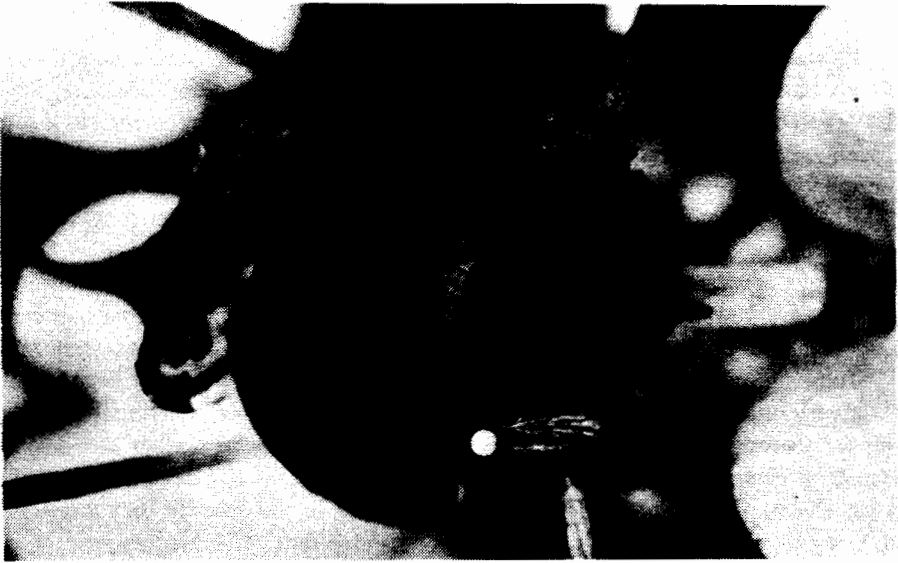
Another gnat was caught in the vicinity, but it had not been seen actually to alight on a flower. This was a female of *M. subspinigera* Tonnoir 1927, with no spots but a striped abdomen [4].

Flowering by this time was well advanced, especially for *Corybas* "A" which was almost over but despite the continuous presence of gnats, none had been observed on *C. "Mt Messenger"*.

By 26 September the *Corybas* "A" on which a pollen-bearing gnat was observed on 3 September had developed a seed pod, as had several others of that species in the vicinity, but this was not the case for *C. "Mt Messenger"*.

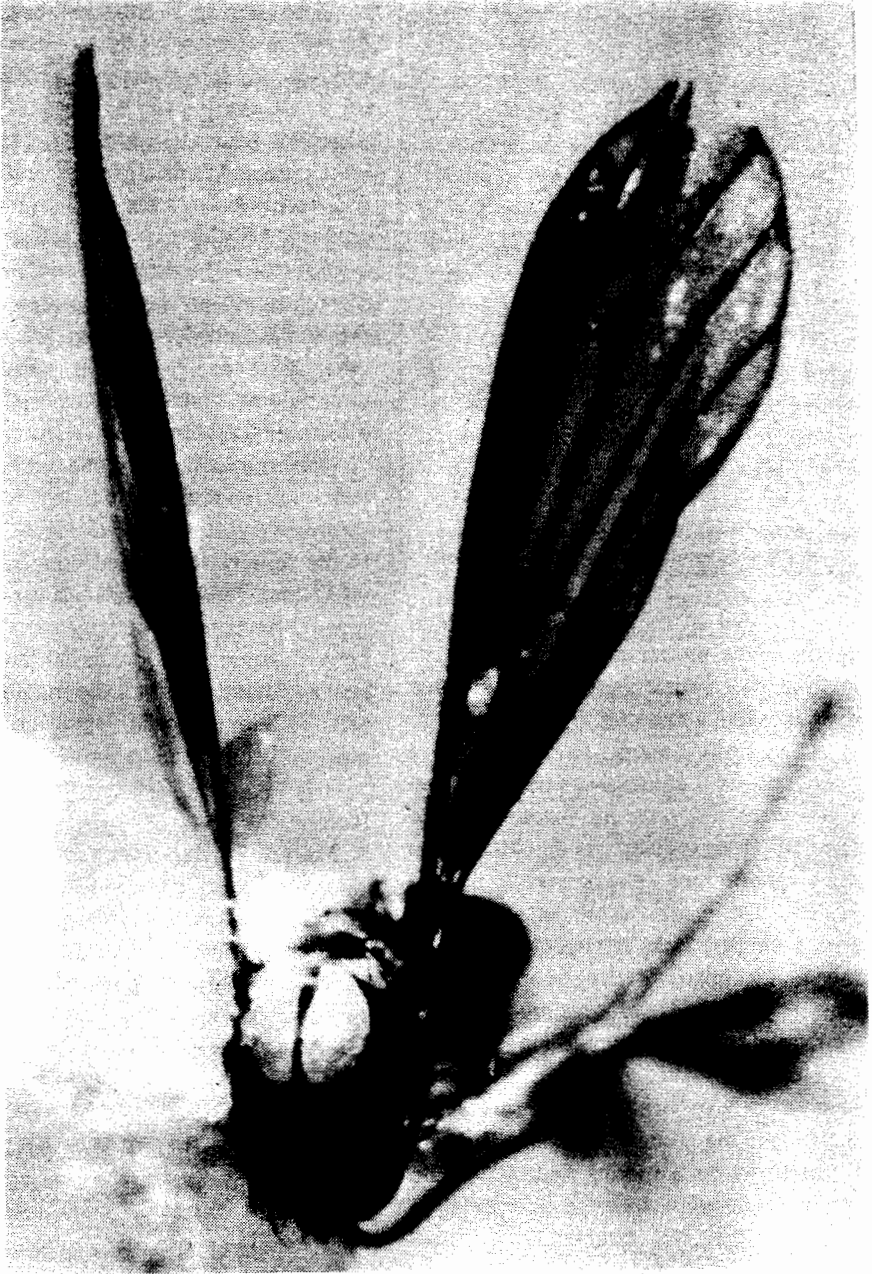
Observations were continued in the spring of 1980, with a similar pattern emerging. The gnats were very prevalent, but *C. "Mt Messenger"* held no attraction for them. When *Corybas* "A" was at its peak, about half of a hatch of gnats captured were bearing pollen, but as the *C. "Mt Messenger"* began to peak and *Corybas* "A" wane, the number of gnats subsided correspondingly, and none were observed bearing pollen.

Entry to the flower is demanding for the gnat, involving considerable folding of the long legs, so the enticement must be exceptionally strong to justify the effort. Longitudinal sections of both flowers drawn by Bruce Irwin (Fig.1) reveal a significant structural difference in the throat, *Corybas* "A" having a more acute restricting angle; though the clearance to the back of the flower is still greater than in *C. "Mt Messenger"* (8mm vs. 2mm).

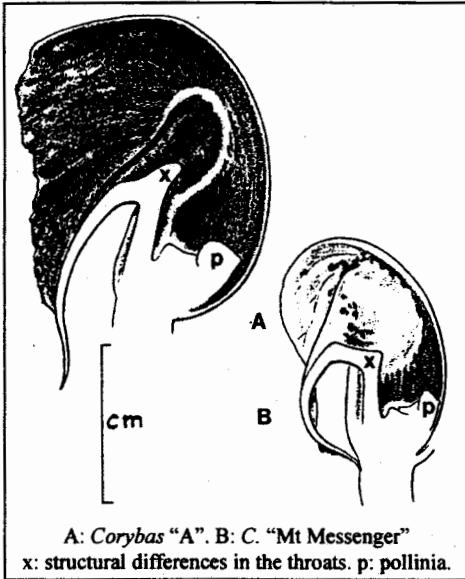


Upper photograph: Pollen-bearing fungus gnat on labellum of *Corybas* "A"  
Lower photograph: two *Corybas* "A" flowers, with a *C.* "Mt Messenger" flower at top left.





Fungus gnat photographed from in front, the bent-over thorax bearing pollinia



The head of the fungus gnat is bent down, so the thorax appears hunched. It is thus the thorax (not the head) that dislodges and carries off the pollen mass.

The study gives rise to further questions. Is it coincidence that the three gnats were not only all females but of three different species? Is the attractant a male pheromone so powerful that it ensures the gnats avoid entry to the wrong flower, even by accident? All of the many gnats observed approaching flowers seemed to become highly motivated even before alighting.

I once observed two dissimilar gnats near a flower behaving in a manner which at the time I perhaps naively assumed to be a mating routine. With hindsight, a more accurate interpretation could be that two females of different species were sparring over entry to the same flower!

In the spring of 1980 I embarked on a campaign of catching the greatest number of gnats possible in order to resolve some of the mystery over how many species were involved and whether only females were attracted to the flowers. My hunting was successful and the results sent off for analysis but at the time of writing I cannot trace records of any outcome. Shortly after, my health took a turn for the worse, and delving into life histories other than my own lost considerable momentum. I am still trying to trace any information that might have emerged.

Unfortunately, in the intervening years encroaching growth of ferns has seriously threatened the *Corybas* colonies in the fernery (as indeed happens in the wild) and retirement has separated me from close contact, but my puncture has been repaired, and preparing this paper just may have provided the momentum to set about once again trying to resolve more fully this fascinating mystery.

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## Vegetation of the Central Volcanic Plateau

by Cathy Jones, botanist, Dept of Conservation, Turangi

**ABSTRACT:** A broad picture of the geology of the Central Volcanic Plateau is given, outlining the results of sedimentary, tectonic and volcanic processes. This provides a basis for a general description of the likely pre-human vegetation of the area. Modifying factors are then used to explain current

vegetation types and patterns. The threatened plants of the region are put into this context and the Department of Conservation's management of them explained. Finally local orchids are mentioned with an emphasis on the species which are at risk

### *Corybas* in New Zealand

E.D. Hatch, Laingholm.

*This paper is published with the Iwitahi conference papers in tribute to the father of modern New Zealand orchidology, Dan Hatch, who was unable to attend.*

*Corybas* Salisb. *Paradisus Londinensis* t83 (1807)

Genotype - *Corybas aconitiflorus* Salisb. *ibid.*

Named for the Phrygian Corybantes who danced (after becoming suitably sozzled), in honour of the goddess Rhea Cybele.

The genus was pirated by Salisbury from Robert Brown's then unpublished *Corysanthes bicalcarata*. Pardonably annoyed by Salisbury's skulduggery, Brown refused to recognise *Corybas* and went ahead in 1810 and published *Corysanthes*.

In 1853 J.D.Hooker erected the genus *Nematoceras* to accommodate the long-sepalled NZ species, but in 1864, realising that related and intermediate forms occurred in Malaysia and Indonesia, he transferred them to *Corysanthes*.

The Australasian species continued to

be listed under *Corysanthes* until the early 1940's, when the International Committee for Botanical Nomenclature found in favour of *Corybas*. The majority of the NZ species had already been transferred to *Corybas* by H.G.Reichenbach in 1871.

A genus of some 100 species, the number depending on whether the author is 'lumping' or 'splitting'. They range from the Himalayas and southern China, through the Philippines, Malaysia, Indonesia and New Guinea, to Australia, New Caledonia, Tasmania, New Zealand and on to the islands of Polynesia.

New Zealand has 10 recognised species, all endemic, 3 of them derived from Australian species and 7 with Malaysian affinities. There are in addition, 2 undescribed endemic species in the Malaysian group - *Corybas* 'A' and aff 'trilobus' - which are being attended to by Brian Molloy.

The plant structure consists of a branching rhizome with alternating nodes and internodes. All growth stems from the nodes, which bear buds for leaf and branch, and the relative development of the leaf buds depends on whether they are above the surface (leaves), or below the surface (bracts). The 'roots' are elongated internodes and the 'tubers' swollen terminal nodes [1].

The genus is strongly mycorrhizal and tends to saprophytism and leaf reduction, particularly in those species which inhabit deep debris layers - moss, twigs or leaves (including needles in exotic pine forests).

Small rhizomatous herbs, often forming large colonies on the forest floor. Plants aestivate during dry (and in the south, cold) periods, by tubers formed from the enlarged terminal nodes of the rhizome branches.

Leaf - 1, rarely 2, 2-lobed at the base and varying from broad-cordate, through oblong-orbicular to acuminate, and changing shape from juvenile to adult. Various constricted and lobed.

Flower - 1, rarely 2, largely composed of the labellum and dorsal sepal, the other segments filiform and often reduced. Seeding peduncle elongating after fertilisation of the flower, presumably to facilitate seed dispersal. This occurs also in *Chiloglottis*. Flower colour is in various shades of green and red. The red pigment however is sometimes lacking and the flowers are then greenish-white.

Bruce Irwin [2], pointed out that the lateral sepals arise from the frontal pair of capsule ribs, and are normally longer and stronger than the petals which arise from the rear pair of ribs. In *C. cryptanthus*

however (q.v.), this position is reversed and the petals are the more robust.

The flowers are adapted for insect-pollination, but should this method fail are often self-pollinated.

Apart from the 2 species (*macranthus* and *oblongus*) illustrated in Hooker's 1853 *Flora NZ*, no other NZ orchid genus has been more subject to error and confusion.

**1: *Corybas acuminatus* M.Clements & Hatch NZJB 23(3): 491 (1985)**

= leaf shape

Syn. *Corysanthes rivularis sensu*

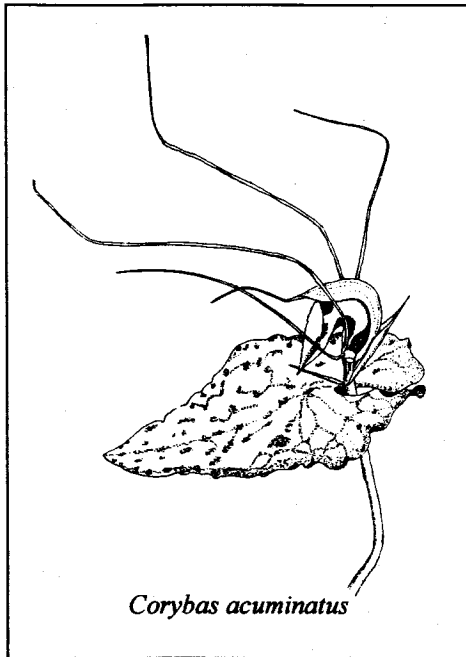
Cheesem. *Manual NZ Flora* Ed.1: 694/5 (1906) - not of A.Cunn.

Since 1867, when Thomas Kirk found it on the Great Barrier Island, until 1985, when Clements & Hatch corrected the error, this species was mistakenly known as *Corysanthes/Corybas rivularis*.

A very distinct species, it has in the mature stage, an acuminate leaf with reddish veining on the under side, very long filiform lateral sepals and petals, and a long filiform cauda to the dorsal sepal. Leaves of young plants lack the reddish markings, are reniform or broadly cordate, and have an apiculate tip which points the relationship to the round leaved species. It occurs in mixed forest, usually montane, but occasionally coming down to sea level, particularly in the south.

Distribution - North, South, Stewart and Auckland Islands.

Flowers - September-December.



**2: *Corybas carsei* (Cheesem.) Hatch  
TRSNZ 75: 367 (1945)**

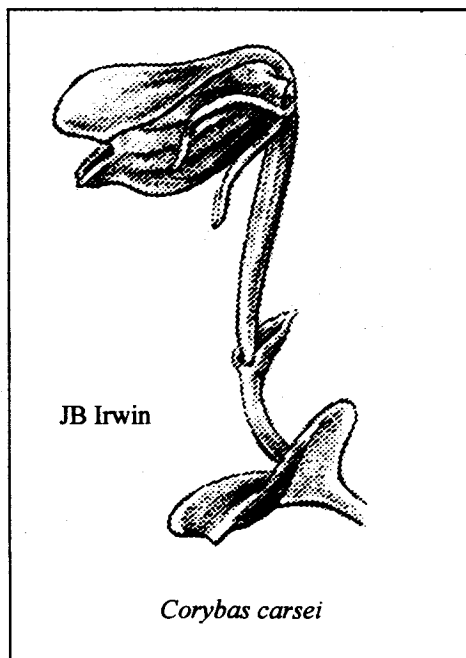
Syn. *Corysanthes carsei* Cheesem. *TNZI* 44: 162 (1911)

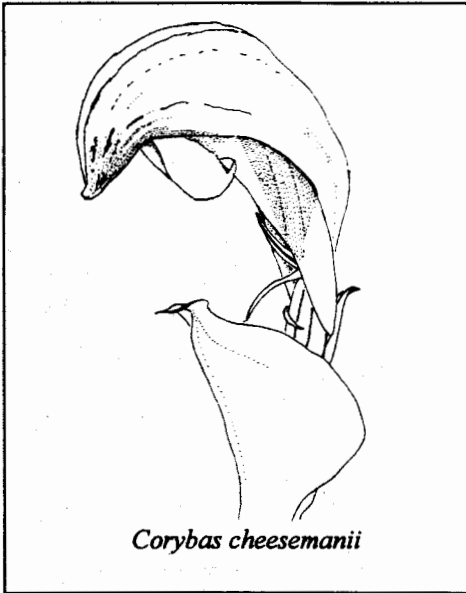
Named for Harry Carse, who with H.B. Matthews discovered this species in the Lake Tongonge bog near Kaitaia in 1910. It is very close to (I believe identical with) the Australian *Corybas fordhamii* which grows in a similar habitat.

Superficially similar to *rotundifolius*, it is a much smaller plant, confined to *Empodisma* bogs and readily distinguished in the field by the cleft apex to the dorsal sepal.

This orchid has long since gone from Lake Tongonge. The draining of the lake in 1912 didn't immediately extinguish the species (there are Matthews specimens in Kew dated 1919 and marked 'very rare'), but undoubtedly hastened the drying out of the bog. The main cause of the plant's disappearance from Kaitaia would seem to be over-collecting. There are a great many specimens in the various herbaria. One sheet alone of Matthews's displays 21 flowering plants!

The species was later found to be quite common in the raised bogs of the lower Waikato and Hauraki basins, but has now gone from all but one spot, partly due to draining the surrounding land and lowering the water level of the bogs. This has probably encouraged the taller growth of the vegetation, so choking the orchid out. Burning the bogs has been suggested as a conservation measure. With the possible exception of *Thelymitra matthewsii*, this must be the most endangered orchid in NZ. Flowers Sept.





**3: *Corybas cheesemanii* (J.D.Hook.)  
O.Kuntze *Rev.Gen.Plant.* 2: 657 (1891)  
Syn. *Corysanthes cheesemanii* J.D.Hook.  
ex Kirk *TNZI* 3: 180 (1871)**

Named for T.F.Cheeseman, for 50 years curator of the Auckland Museum. First discovered by Thomas Kirk at Blockhouse Bay on the Manukau harbour, this is the only NZ species with 2 closed conical spurs at the base of the labellum and so is easily identified. It was included by Rupp (who was 'lumping'), in the related *C. aconitiflorus*, and this arrangement was followed by Hatch and later by Lucy Moore. Australian botanists are now tending to 'split' (the pendulum swings), and *C. cheesemanii* is in favour again. *Corybas cheesemanii*, while normally a green leaved plant with flowers borne above the surface, becomes on occasion

saprophytic, loses its leaf and chlorophyll, and the flower does not rise above the surface litter. In this condition it can be confused with *C. cryptanthus*, so look for the conical spurs [3/4].

Distribution - North Island and the Sounds/Nelson district of the South Island. In the north it prefers mature kanuka/manuka scrub, or taraire forest.

Flowers - May-August.

**4: *Corybas cryptanthus* Hatch *TRSNZ*  
83: 577 (1956)**

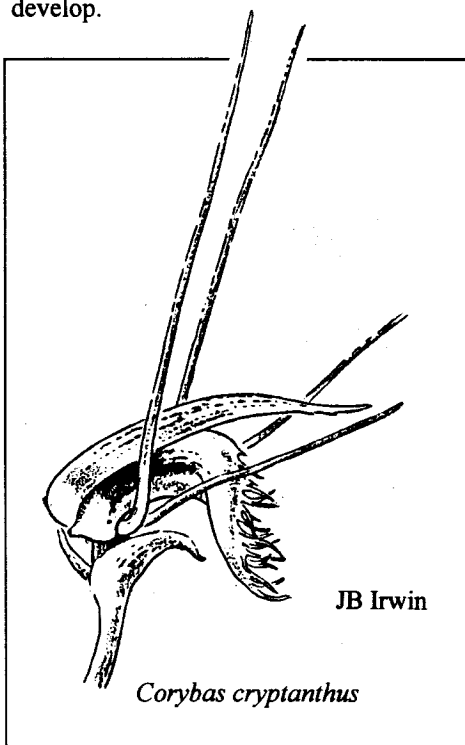
= hidden flower

Syn. *C. saprophyticus* Hatch *TRSNZ* 79:  
366. t71 (1952) - not of Schlechter

Described from material collected in the Dome Valley north of Warkworth, by Bruce Irwin and Owen Gibson in October 1949 and supplemented by Hatch, this plant had been gathered on several occasions back to 1880, but was never properly understood or described. Lucy Moore [5], considered that Colenso's description of *Corysanthes hypogaea* (= 'underground'), included elements of *C. cryptanthus* and this may well be so, but his type material at Kew is one of the forms of *trilobus*, complete with expanded green leaf [6]. *C. hypogaea*, as Ian St George suggests, may turn out to be a valid species. Certainly it is unlike *trilobus* as we know it here in the north.

*C. cryptanthus* lacks chlorophyll and an expanded leaf, and the relatively large flower does not usually appear above the moss and litter in which the rhizome lives, (but see Margaret Menzies) [7]. Consequently, unless discovered by accident (such as being sat on for lunch!),

the first indication of the species' presence is the tall, leafless, red-flecked seeding peduncle. Some flowers however, lack the red pigment, in which case the peduncles are also colourless, but always of course without an expanded basal leaf. This can be confusing when the plant grows, as it sometimes does, with *C. cheesemanii*. Minute rudimentary tubers are present in the axils of the rhizome bracts, but seldom develop.



As pointed out in the introduction, the petals in this species are longer and more robust than the lateral sepals, and this has caused confusion in the taxonomic descriptions of both Hatch and Lucy Moore, where the petals are referred to

erroneously as sepals. Checking my original illustration I find that I did draw it correctly, showing the longer petals arising from the rear pair of ovary ribs. The error lay in my interpretation.

When the flower is fertilised the elongating peduncle, in order to protect the developing ovary, bows its head so to speak and shoves upwards with its shoulders, straightening out once it is clear of the clutter. This bending over of the growing shoot, familiar for example in sprouting beans and podocarps, has been recorded in plants from Eastbourne, Wellington [8], and the Oxford State Forest in Canterbury, (Dean Pendrigh photo). In the other species, which open their flowers above the surface and are protected in the bud by both the floral bract and the folded leaf, the peduncle grows straight up.

Recorded habitats are manuka scrub, sometimes shared with *C. cheesemanii*, and beech forest (*Nothofagus solandri* and occasionally *fusca*), often in company with *C. trilobus*.

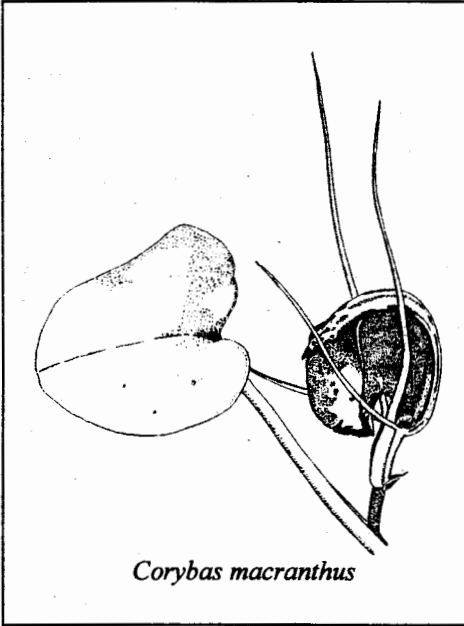
Distribution - North and South Islands  
Flowers - July-August.

**5: *Corybas macranthus* (J.D.Hook.)  
H.G.Reichb. Beitr.Syst.Pflk. 67 (1871)  
= large flower**

Syn. *Nematoceras macrantha* J.D.Hook.  
*Flora NZ* 1: 250. t57A (1853)

The oblong-orbicular, apiculate leaf is carried on a long petiole which raises it above the flower. The petals are about half the length of the lateral sepals.

Plants forming loose colonies (in contrast to the tightly packed groups of *C. acuminatus* and *trilobus*).



Distribution - North, South, Stewart, Chatham and Auckland Islands. Also recorded from Macquarie Island, which makes it the southernmost orchid known.

Flowers - October-January.

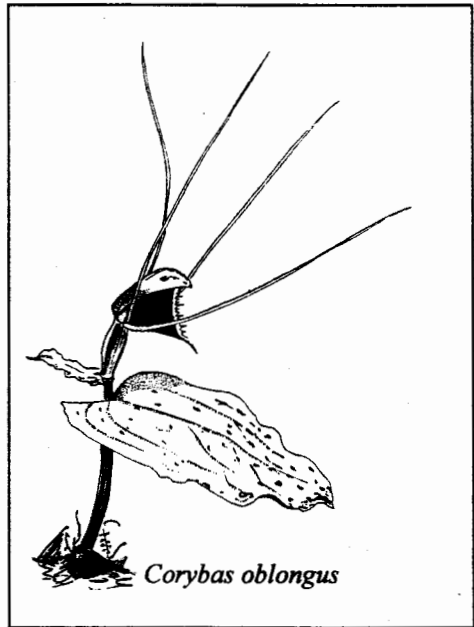
**6: *Corybas oblongus* (J.D.Hook.)**  
**H.G.Reichb. Beitr.Syst.Pflk. 67 (1871)**  
 = leaf shape  
 Syn. *Nematoceras oblonga* J.D.Hook.  
*Flora NZ 1: 250 t57B (1853)*

This species is easily distinguished by the pale fimbriate edge to the reddish labellum, and the oblong apiculate leaf which in mature plants has reddish veins

on the underside. The juvenile is usually 2-leaved and this character is often carried over to mature plants. The petals are slightly shorter than the lateral sepals.

Distribution - North, South, Stewart, Chatham, Auckland and Campbell Islands

Flowers - October-January.



**7: *Corybas orbiculatus* (Col.)**  
**L.B.Moore Flora NZ 2: 118 (1970)**  
 Syn. *Corysanthes orbiculata* Col. *TNZI*  
 23:389.(1891) *Corybas* 'C', *Corybas*  
 'short tepals'

Brian Molloy, examining Colenso's type material, found that *orbiculatus* was in fact the plant named 'C' and 'short tepals' by Bruce Irwin, and was not part of the *rivularis* complex as Moore supposed [9].

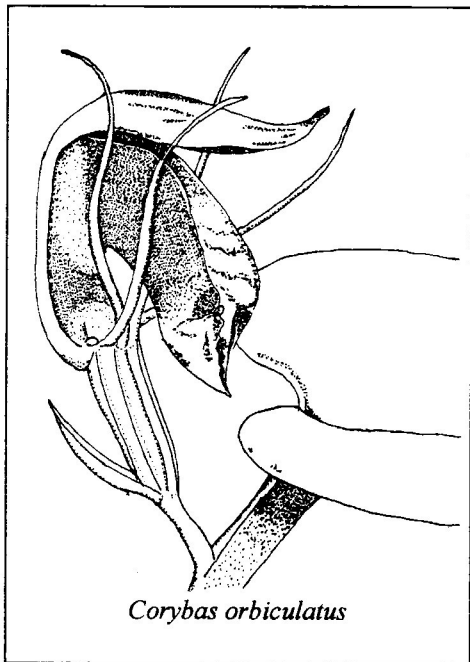


Labellum disc dark red, the margins inrolled to produce a narrow-acuminate appearance. Petals and lateral sepals conspicuously short, only slightly longer than the labellum.

(1906) - not of J.D.Hook.

*Corybas orbiculatus sensu* L.B.Moore  
(1970) - not of Colenso

A much misunderstood plant, discovered by Allan Cunningham on 6 November 1826 in a gorge near Wangaroa, and named by him *Acianthus rivularis*, this species was misinterpreted as *Corysanthes rotundifolia* by Thomas Kirk in 1864, and until 1970, when Lucy Moore erroneously resurrected for it Colenso's name *Corysanthes orbiculata* q.v., *rotundifolia* and its variety *pandurata* Cheesem., were the names by which it was known. It was not in fact until 1983, when Mark Clements found Cunningham's type material at Kew, that the mystery was finally solved. See under *C. acuminatus*.

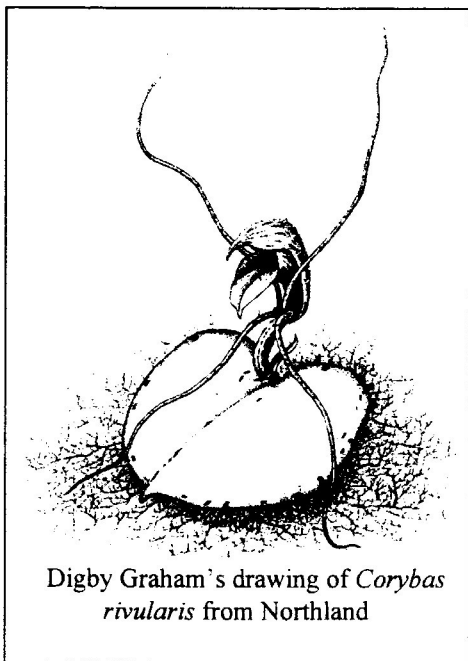


*Corybas orbiculatus*

Distribution - vide Molloy [9]. 'Central, western and southern North Island; Nelson, Canterbury, Otago and Southland; Stewart and Chatham Islands'.

Flowers July - October.

**8: *Corybas rivularis* (A.Cunn.)**  
**H.G.Reichb. Beitr.Syst.Pflk. 67 (1871)**  
 = pertaining to streams  
 Syn. *Acianthus rivularis* A.Cunn.  
*Comp.Bot.Mag.*2: 376. (1837)  
*Corysanthes rotundifolia sensu* Cheesem.



Digby Graham's drawing of *Corybas rivularis* from Northland

'Bruce Irwin [10], has divided the complex into 7 more or less distinct forms, among them *Corybas macranthus* var *longipetalus* Hatch. Brian Molloy is working on this problem also.

Forms large colonies in wet places, stream banks, cliff face seepages etc. The leaf is near orbicular, apiculate, often with a row of dark blotches near the margin. The petals are usually as long as the lateral sepals, while the labellum and dorsal sepal are green, with or without red markings.

Distribution - North, South, Stewart and Chatham Islands

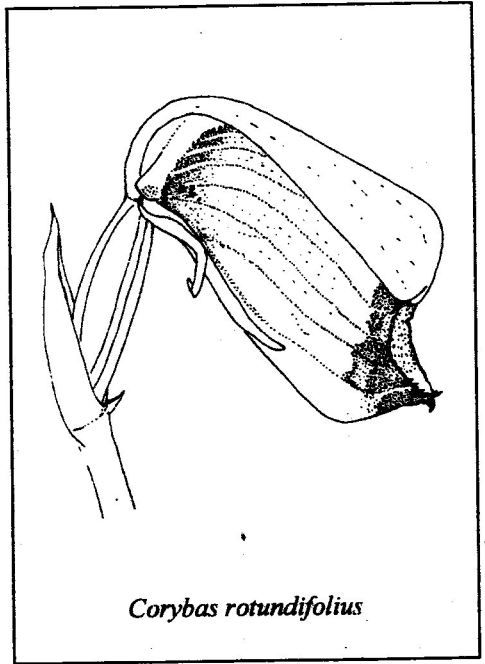
Flowers - September-October.

9: *Corybas rotundifolius* (J.D.Hook.)  
H.G.Reichb. *Beitr.Syst. Pflk.* 67 1871)  
= leaf shape

Syn. *Nematoceras rotundifolia*  
J.D.Hook. *Flora NZ* 1: 251 (1853)  
*Corysanthes matthewsii* Cheesem. TNZI  
31:351.(1899)  
*Corybas* aff 'unguiculatus'

Another misunderstood species. First collected by Colenso on 2 April 1846, near the village of Puehutai, on the upper Manawatu river, it was described by Hooker as *Nematoceras rotundifolia*. Unaware of this (or rather of the nature of Hooker's species), Cheeseman redescribed it from Kaitaia in 1899 as *Corysanthes matthewsii*, and this was the name by which it was known until 1945, when Rupp, who was 'lumping', included it in the Australian *C. unguiculatus*, where it stayed until 1989 when the 'splitters' reinstated it as an endemic

species with the tag name aff 'unguiculatus'. Meanwhile Brian Molloy obtained Colenso's original Puehutai material from Kew and discovered that *rotundifolius* was in fact the plant described by Cheeseman as *C. matthewsii* [11]. (To confuse matters further, Thomas Kirk in 1864 had mistakenly used the name *rotundifolia* for the plant now known to be *rivularis* q.v.).



*Corybas rotundifolius*

Distribution - This species is now confined to scrub and light forest between Warkworth and the North Cape. Specimens in herbaria suggest that it once extended much further south. It is larger than *C. carsei* and lacks the cleft dorsal sepal.

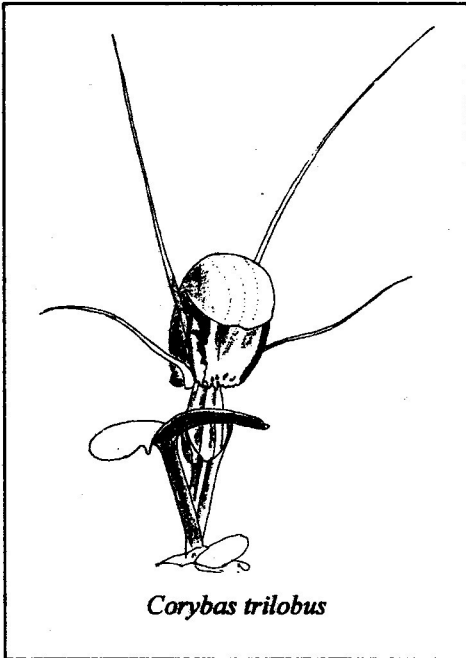
Flowers July.

10: *Corybas trilobus* (J.D.Hook.)  
H.G.Reichb. *Beitr.Syst.Pflk.* 67 (1871)

= leaf shape

Syn. - *Nematoceras triloba* J.D.Hook.  
*Flora NZ* 1: 250 (1853)

*Corysanthes hypogaea* Col. TNZI  
16:336.(1884) = underground



*Corybas trilobus*

Probably the best known of the *Corybas* species. The leaf is usually wider than long, a constriction near the tip producing a 3-lobed effect, hence the name. Both

leaves and flowers however are very variable and more than one species is probably included in *trilobus* s.l. (*C. hypogaea* and aff 'trilobus' for example). Forms very large colonies, often with *C. cryptanthus*, more rarely with *Yoania australis*. The petals are about a third of the length of the lateral sepals.

Distribution - North, South, Stewart, Chatham, Auckland and Campbell Islands

Flowers - June-December.

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- 1: Hatch E.D. *NZNOG Newsletter* 2: p4 June (1982)
- 2: Irwin J.B. *NZNOG Journal* 45: p6 March (1993)
- 3: Ross K.F. *NZNOG Newsletter* 24: p5 December (1987)
- 4: Hatch E.D. *ibid.* 25: p2 March (1988)
- 5: Moore L.B. & E.Edgar *Flora NZ* 2: p120 (1970)
- 6: Lectotype - *NZNOG Journal* 49: p8 March (1994)
- 7: Menzies M. *ibid.* p15
- 8: St George I.M. *ibid.* p19
- 9: Molloy B.P.J. *ibid.* 51: p12 September (1994)
- 10: Irwin J.B. *ibid.* 47: p7 September (1993)
- 11: Hatch E.D. *ibid.* 38: p4 June (1991)

#### A *Pterostylis* from Taranaki in 1866 - a sequel

by Randal Springer, Wanganui

By an odd coincidence I was shown a copy of an extract from the Group's *Journal* of June 1994 which records the

letter from E B Dickson and the *Pterostylis* specimen he had found "in marshy soil near the Huatoki stream". At

the same time I had just transcribed the inscriptions on several old herbarium sheets in the Whanganui Regional Museum which had been collected by the same E B Dickson.

These sheets are in two separate herbaria and there now exists a probability that many of them formed the collection of E B Dickson. In a folder containing six orchid specimens is one for which the inscription reads - "Boggy ground on Huatoki;- abt 1 1/2 miles from Town. ? Novr 1866. Ord i-B-Orchidaceae (xii/8) *Pterostylis* Nov: Sp: (?) *Ochroleuca*. 731 a." The day of the month in November is shown as a query because the actual date has long since vanished down the intestines of silverfish! A photocopy of the pressed specimen mounted on the herbarium sheet is at the end of this essay. I am grateful to Kate Pinkham, Registrar of the Whanganui Regional Museum for permission to photocopy this old relic.

Although the size of the specimen is smaller than that in the sketch made by Dickson and copied in the June article, it seems likely that this could be the plant which Dickson was describing.

You will no doubt be interested to know that the other orchid specimens in the folder are *Pterostylis banksii* found in the "Woods nr Upjohn's Henui N.Plymouth." (no date), *Earina mucronata* found "Nr Kennedy's Bay", *Acianthus sinclairii* found on Great Barrier Island in April 1869, *Thelymitra longifolia* found in Auckland in 1862, and *Sarcochilus adversus* found "Nr Lake Pupuke" (no date). It is not known at this

stage if Dickson collected all these but it is a possibility.

I was intrigued by the June article and especially by question 5 in the notes - Who was the writer? Although my research into this is not yet complete I can add to the information already supplied. He was born Elwin Brodie Dickson in Pimlico, London, ca. 1828, the son of John Dickson a London solicitor. He attended the Durham Cathedral Grammar School and the Durham University, was a Latin and Greek scholar, arrived in New Zealand (paying his own passage) in about 1854 after which he was in Wanganui as tutor to the children of Captain Moses Campbell an early and influential settler. This is probably the time when he met the Taylor family who he refers to in his letter of Novemebr 1866. This was the family of Rev Richard Taylor (he of the *Dactylanthus*) who were friends of the Campbells. Dickson married in Auckland in 1858 and after 1869 returned to Auckland being connected with the Native Department and in about 1886 returned to Wanganui as Registrar of the Native Land Court until 1890. He died in Wanganui in 1891 and is buried with his wife in the old Heads Road cemetery.

The letter of November 1866 was the only one that gave an insight into Dickson's botanical activities until I found in the archives of the Whanganui Regional Museum another letter, handwritten and addressed to E B Dickson Esq, a transcription of which reads -

Karangahape Road  
Auckland  
18th Feb 1865

My dear Sir

Can you identify the enclosed? At first sight of the fern when growing I supposed it to be *Davallia Schimperii* or *D. Lindeni* - however in the hasty examination I have had time to make I have only been able to come to the certain conclusion of my own ignorance.

I have just had a days ramble in the Titirangi Ranges & picked the plant when walking home - in the bottom of a deep gully - with deep water holes - I picked but little & my species are immature. More luxuriant ones were in view but could only be reached by wading - as however it was dusk & I had a walk of least 8 miles partly over unknown ground before me - the acquisition of a better supply was postponed for a more favourable opportunity

My health has improved not a little during the last few days - wife however does not gain strength as could be wished.

Hooker's Handbook not yet in Auckland & I have no information about it as yet. With kind regards to Mrs Dickson and yourself.

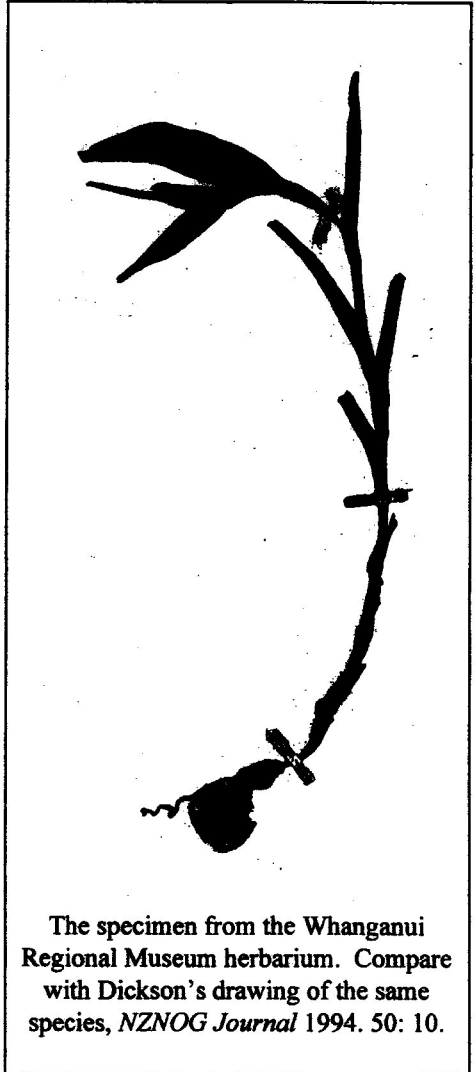
Yours sincerely  
Thos Kirk

E.B. Dickson Esq

I fear the fronds will be somewhat shrivelled as they are but just picked

(The fronds are still in the letter)

In view of Kirk's opinion of Dickson's ability one could assume that there must somewhere be further evidence of Dickson's involvement in botany. Any further information would be most welcome for a biographical essay now in preparation.



The specimen from the Whanganui Regional Museum herbarium. Compare with Dickson's drawing of the same species, *NZNOG Journal* 1994. 50: 10.

### ***Caleana minor*: will it survive in New Zealand?**

by Chris Ecroyd, New Zealand Forest Research Institute, Private Bag 3020, Rotorua

**ABSTRACT:** *Caleana minor*, the small duck orchid, is an endangered species in New Zealand. A member of a small genus of about five species, the small duck orchid is widespread, but not common, in Australia. It was first found in New Zealand by the Rev. F.H. Spencer in 1890 at Rotorua and a few years later R.H. Matthews found it near Kaitaia. It was not recorded in New Zealand from 1924 until 1979 when a single plant was found in Rotorua.

The Rotorua site has been monitored over the last 15 years and the number of plants gradually increased to 57 in October 1991. However, over the last four years the number of plants has

declined and only 37 were found this year. None of the plants have flowered since 1990. It is suggested that the decline in numbers of plants is due to the change in habitat from very open shrubland with numerous small clearings to dense shrubland. It is hoped that by clearing away the competing vegetation we will increase the vigour of the remaining small duck orchid plants and reverse the downhill trend. But should we endeavour to save this plant in New Zealand, since it is not an endemic species and could be considered just a temporary Australian migrant?

### **Ecology and conservation of *Corybas carsei* in restiad bogs**

Bruce D. Clarkson\*, Peter J. de Lange\*\* & Beverley R. Clarkson\*

\* Manaaki Whenua — Landcare Research NZ Ltd, PB 3127, Hamilton.

\*\* Science & Research Division, Dept of Conservation, PB 68908, Auckland.

**ABSTRACT:** *Corybas carsei*, a small ground orchid, once grew in several restiad bogs in New Zealand, but numbers have recently been severely reduced because of widespread drainage and habitat modification, and it is now classified as "critical". In order to assist in recovery management [1], we have been researching population and community dynamics at Whangamarino Wetland, its sole remaining locality. This has involved monitoring fire successions and manipulating bog vegetation to simulate the effects of fire.

### **Population dynamics**

Populations at two sites in Whangamarino, one of which was cleared of dense wire rush (*Empodisma minus*)-dominated vegetation before the project began, were studied over two growing seasons [2]. In the second growing season, shoots of *C. carsei* increased more than fourfold at the manipulated site, which was then dominated by sparse *Schoenus brevifolius*, but the shoots had all died back by late summer. Numbers at the control site were all slightly down from the previous season, but one third of

these shoots were still present in late summer. While removal of the wire rush-dominated vegetation undoubtedly resulted in a population increase, it also contributed — along with an unseasonable, cool dry summer — to truncation of the growing season.

Less than 30 percent of the total shoots produced a bud, and the only flower observed did not develop a capsule. Browsing by crickets and slugs and dessication were probably the main factors causing failure of flower development. There was no evidence of successful sexual reproduction by *C. carsei* over the monitoring period.

### Community dynamics

Early observers noted that the largest populations of *C. carsei* occurred in open sites and were prominent on the banks of freshly-dug ditches or after recent fires. We have focussed mainly on vegetation changes following fire, in order to determine the potential role of fire in *C. carsei* population dynamics. Our results show that after "cool" fires at Whangamarino Wetland, the vegetation recovered to virtual pre-fire condition within six years [3]. Species whose rhizomes survived the fire, e.g. *S. brevifolius* and *Baumea teretifolia*, were able to resprout and grow rapidly in the initial post-fire period. Species that were killed, e.g. wire rush and manuka (*Leptospermum scoparium*), had to re-establish from seedlings and thus underwent a slower recovery. *C. carsei* is probably adapted to survive fire by underground tubers which are able to resprout and multiply in the early post-

fire years following removal of dense overtopping vegetation. If seed production were successful, seed dispersal to sites newly opened up by burning should occur so that, depending on the fire frequency and intensity, vegetative or sexual reproduction would vary in importance. As the vegetation recovers and develops to the dense wire rush type, the orchid may be outcompeted. Until about the last twenty years fires regularly swept across Whangamarino Wetland and these maintained open sites suitable for *C. carsei* populations. At the experimental sites, however, the last fire occurred before 1970 and the long period of vegetation recovery since then has probably resulted in a decline of *C. carsei* numbers.

### Continuing research

Additional experiments are still in progress. At Moanatuatua Bog we have cleared *Sporadanthus traversii*/wire rush vegetation to determine whether *C. carsei* recorded there twenty years are still present as dormant tubers, or whether it can invade by seed. At Whangamarino Wetland we have placed wire mesh cages over some plants to protect developing flowers from browsing, and at nearby sites we have undertaken localised burns. In the future we envisage transplant experiments of *C. carsei* to sites at other wetlands with apparently suitable habitat.

**Prospects and future status of *C. carsei***  
Prospects for population maintenance of *C. carsei* and its future status will be discussed in the context of this research.

### Acknowledgements

This research was funded by the Foundation for Research, Science & Technology (CO9405; CO9420), the Dept of Conservation, and the World Wide Fund for Nature New Zealand.

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3. de Lange PJ, Clarkson BD. Swamp helmet orchid (*Corybas carsei*), Orchidaceae: Recovery Plan (2nd Technical Draft). Threatened Species Unit, Protected Species Policy Division, Dept of Conservation, Wellington, 1994.

## Orchid artists

### Fanny Bertha Good (1860-1950)

Fanny Good became deaf at age seventeen and began painting. She was born at Hawera, and taught to paint by her father, Captain Thomas Good, himself no mean artist.

Captain Good had emigrated in 1845 to New Plymouth, settled at Omata and was a member of the Provincial Council for a time. He planned the Omata Stockade, and was Captain of the bush rangers during the Taranaki Wars. In the sixties he was in charge of the Urenui outpost, and brought his large family up on 400 acres of land there.

Miss Good lived most of her life at Hawera, only moving back to New Plymouth at age eighty-nine a year before her death. It was then that much of her work came to light, and when she died an exhibition of two hundred of her paintings of Taranaki scenes was on display at the Museum. Her obituary in the Taranaki Daily News stated -

"... according to a relative, she never thought the fruits of her lifelong study of trees and flowers and her sketches of Taranaki landscapes would be of



*Dendrobium cunninghamii*, *Earina autumnalis* and *Earina mucronata*, oil painting by FB Good, c.1925. Taranaki Museum Collection.



any general interest." <sup>1</sup>

Some of her oils of native flowers and animals had been exhibited at the Dunedin and South Seas exhibition of 1924, but it was not until 1948 that her work was recognised by an exhibition in Taranaki — and then only at the instigation of friends.

In 1984 the museum mounted a full exhibition of her botanical works. The exhibition toured the country and in 1987 I saw it in Dunedin — the little bulb-leaf orchid *Bulbophyllum pygmaeum* was

there, in a painting of *Leptospermum scoparium* (pink teatree) and a *Gaultheria* (snowberry).

In the Taranaki Museum collection are two oil on canvas paintings of orchids: the greenhood *Pterostylis banksii* (Hawera 1925), and the perching orchids *Dendrobium cunninghamii*, *Earina autumnalis* and *Earina mucronata* (no date).

#### Reference

1. Taranaki Daily News, 16 Dec 1950.  
"Taranaki artist dies at 90 years".

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### Claire Scott, Lydia and Eleonore Blumhardt.

by Eric Scanlen

You never cease to surprise me. Your *Journal* 51 has those delightful watercolours of orchids painted by my great aunts Lydia and Eleonore Blumhardt and Lydia's staunch companion Claire Scott. As a child and youth I visited Tante Lydie (as we had to call her) several times at Beckenham Ave. Although I was already into native orchid photography and their reputations for sensitive watercolours were legendary, I was unaware of their achievements in this field.

The card of Claire's requires some minor editing; the spelling of Eleonore is anglicised; also the Arthur's Pass place was her holiday cottage, her parents did not live there. Eleonore lived for many years in Christchurch. (Vera) Doreen Blumhardt (now CBE) stayed with her from 1931 to 1940 and spent holidays with her at Arthur's Pass before becoming a celebrated head of the Art Dept. of

Wellington Teacher's College from 1951 to 1972. Dr (hon) Doreen still has an active interest in botany and busily throws and fires her own ceramics in her eyrie in Northland, Wellington. She is 80 now. My information, from my sister Marie's family tree and the NZ Listener of 16 July 1983, says that Doreen "...lived with her aunt Eleonore, a competent botanical artist. There is a suite of artistic and factual studies of native flora by her in the Auckland City Art Gallery."

Doreen herself wrote on 6 September 1994, vetting the above and adding, "Eleonore painted a very comprehensive and botanically accurate series of over 100 native plants which she herself presented to the Auckland museum in the 1960s or earlier. It is interesting that after all these years Tante Elle's native plant paintings are coming to the light of day. She had always hoped that they might be published, and although I tried

to do something about it in her lifetime I didn't find a publisher who was interested."

There is an affinity between orchids and no less than five of Lydia's and Eleonore's nephews. Herbert (Bert) Blumhardt was a life-time devotee and our colleague, Allan Ducker married Bert's daughter Leonne who is an adept orchid propagator. Also nephews of Eleonore are brothers Albert and Oswald Blumhardt who are active in the orchid

world in Whangarei. The writer spent a memorable fortnight in the Fiji group with them collecting high altitude specimens some of which Os is now growing in his nursery at Maungatapere. Os reported the expedition in *Orchids in New Zealand*, Vol. 12, Nos 5 & 6, 1986. The fourth is Henry (Heinrich) Belin, a retired apiarist of Stillwater, another orchid enthusiast and the fifth, his late brother Rudolph (Melbourne) was no less.

## Notes

### \* Waitakere Ranges classic

Eric Scanlen wrote, "Allan Ducker set up a classic expedition from Huia Lodge, a tramper's haven built around the old Huia School by ARC Parks. It was a classic wet day in the middle of a drought, 25 June 1994, attended by a classic group of 15 stalwart orchidians. The weather only really dampened the spirits at lunch which was spent standing among the kauris as all the sitting places were getting wetter and wetter. None of the water seemed to get into Lower Huia Dam which attracted some of the party's morbid attention, as it lay nearby, half empty.

"Orchidwise, the route had been well researched and several clumps of *Corybas cheesemanii* and *C. trilobus* were thoroughly examined and photographed, despite their minuscule dimensions. All the *C. trilobus* had minute leaves at this time of year but a

large proportion of them were in flower.

"A couple of months later you may find reefs of large leaved plants but flowers will be few and far between or absent at that time.

"The Southerners among the group were happy to lay eyes on *Pterostylis rubricaulis* and screeds of *P. trullifolia*, *P. brumalis* and *P. alobula* along the Parau, Kakamatua, Farley tracks loop. Some intriguing reddish topped *P. trullifolia* and some reddish *Acianthus sinclairii* came in for attention and had their pictures duly taken. A "normal" green flowered *A. sinclairii* at Mt Donald McClean, photographed for comparison, turned out to be another variant with a maroon inside to the labellum. Its portrait illustrated shining calli on the maroon patch reminiscent of *Chiloglottis cornuta*. There didn't seem to be any normal all-green ones there at all.

"No one said anything rude about the promised *C. rotundifolius* which Allan had found in seed and which turned out to be *C. cheesemanii*. It's an easy mistake to make and several of us had got fishy about the prevalence of the rare *C. rotundifolius* when it turned up in seed with seed stalks extended to 120 mm at Huia, Mt Auckland and Camp Sladdin, Clevedon. The leaves were reduced to little green circular blobs, hence the misidentification. That was in December last... Incidentally Allan has since videoed some real *C. rotundifolius* in flower at Ngunguru.

"Getting back to Huia, the party identified twelve orchid species, seven of them in flower; not bad for a drizzly June day, which improved with the party's spirits in the afternoon.

"Back at the Lodge, a fine space heater fuelled with Graham Marshall's best wood, warmed the cockles and dried out the damp gear. A catered meal at \$10 a head was first class. Allan's close up videos of... what else but native orchids?.. were well received and the writer's slides of some 60 species produced some rewarding ohs and has. Bruce Irwin corrected the identification on several of the depictions only to learn that Dan Hatch, who had already gone home, had confirmed the original identifications. If one could only get them together to argue the point, just think....

"My thanks to Noel Townsley who saved the day by bringing his projector over at short notice."

John Dodunski added, "The trip was both informative and entertaining with

Allan amusing us with his unique style of orchid identification. Many a joke was flung around at the dinner put on by our intrepid organiser, followed by a video show produced by him with various discussions.... I thank Allan Ducker for a great and enjoyable weekend. I also strongly recommend any future trips as I reckon it's a great way to meet other members and learn more about our native orchids".

#### \* Yates Green Earth sponsorship

*Forest & Bird* (1994; 273: 35) carried a paper by Mike Harding titled "New hopes for New Zealand's threatened plants". He wrote that this year a number of conservation projects are under way aimed at preserving, not the usual birds and other animals, but threatened native plants. The Yates Green Earth sponsorship, coordinated by Forest & Bird, has provided \$30,000 in the first year, to fund eight projects. Among them are two involving orchids.

"Forest Research Institute scientist Chris Ecroyd is coordinating a project in the steamy shrublands of Rotorua's geothermal area. Nestled in low manuka scrub within sight of bubbling mud pools is New Zealand's only population of the small duck orchid *Caleana minor*. Threatened by trampling, burning and digging, the orchid population, numbering only about forty plants, requires active management to survive against competing vegetation and disturbance. With the assistance of local Forest & Bird members, Chris aims to carefully manage the site, monitor the plants, and develop conservation

techniques that can be applied to other orchid populations.

“Further south, Yates funding will assist Forest & Bird’s Napier branch with its plans to survey the Hawke’s Bay area for populations of rare plants. The project will seek out the wood rose..., kaka beak..., mistletoe species, and a rare orchid (*Pterostylis micromege*).”

\*. I was delighted to find a white form of *Corybas trilobus*, exactly matching Max Gibbs’ photograph in our book, on the Waikareiti track in the Urewera National Park (18 September). About ten plants in an area 50cm across, quite distinct from a colony of smaller red forms nearby. And by the Black Beech track I saw masses of *C. acuminatus*: I had seen small colonies in the south, but never in such profusion as here, where it was the dominant *Corybas* - Ed.

\*. Barbara Hoggard wrote (29 September), “When the most recent orchid *Journal* arrived, I noted that ‘*Thelymitra* leaves were showing’ (Betty Seddon 17 July). The *Thelymitra* here did not appear before 17 September. Only a few *Microtis unifolia* leaves were visible. The first *Caladenia lyallii* were found today - very late for this district - only three plants. The *Thelymitra* have appeared very quickly since 17 September. Two heads of *T. carnea* are showing colour today - very scarce - with no signs of the yellow variety”. *Dan Hatch showed me well-coloured pink buds (unopened flowers) of T. carnea at Laingholm on 24 September. I have seen them as late as December in the northern South Island - Ed.*

\*. Allan Ducker wrote (9 October), “I was out and about in the Hunuas with seven other orchid buffs in the Mangatangi Dam area and came across a colony of *Corybas trilobus*. All the colonies I know up north and in the Waitakeres have set seed and have been elongating; this colony was in full flower and the leaves were larger than the ones I have seen before, except for the ones in Taranaki, and I feel that the leaf shape could be the same. We also found *Earina autumnalis* with canes of 1.2m, and *Dendrobium cunninghamii* with canes of equal length (or could have been longer), growing nearly at eye level; we also found in flower *E. mucronata*, *C. trilobus*, *C. macranthus*, *C. acuminatus*, *C. oblongus*, *C. rivularis*, *Cyrtostylis oblonga*, *Caladenia iridescens*, *Pterostylis graminea*, *P. trullifolia*, *P. rubricaulis* and lots of *Drymoanthus adversus* in bud with some nearly open. Lots of *Thelymitra* in leaf but quite a way off flowering.

“Was up in my favorite haunt on 1 October and found in flower *Corybas macranthus*, *C. oblongus*, *Genoplesium nudum*, *Earina mucronata*, *Cyrtostylis oblonga*, *Caladenia iridescens*, *Pterostylis banksii*, *P. graminea*, *P. trullifolia*, *P. alobula*, *Chiloglottis cornuta*, and in seed, *Corybas trilobus*, *C. cheesemani*, and in bud ready to open *Thelymitra carnea*, and lots of others to keep one’s eye on. I also found *Orthoceras novae-zeelandiae* in leaf, and old flowers on *Bulbophyllum*. Had quite a time.”

✠ Pat Enright showed me *Corybas orbiculatus* ("short tepals") from the Waima River catchment, Inland Marlborough (ER 42), flowering 25 October. He also brought in a green form of *Corybas oblongus* from Taita on 31 October.

✠ I wrote (St George IM. *Corybas trilobus* in Otago. *NZNOG Newsletter* 1988; 28: 10-13) about a curiously large, dark, late-flowering form of what I took to be *C. trilobus* at Trotters Gorge, Otago.

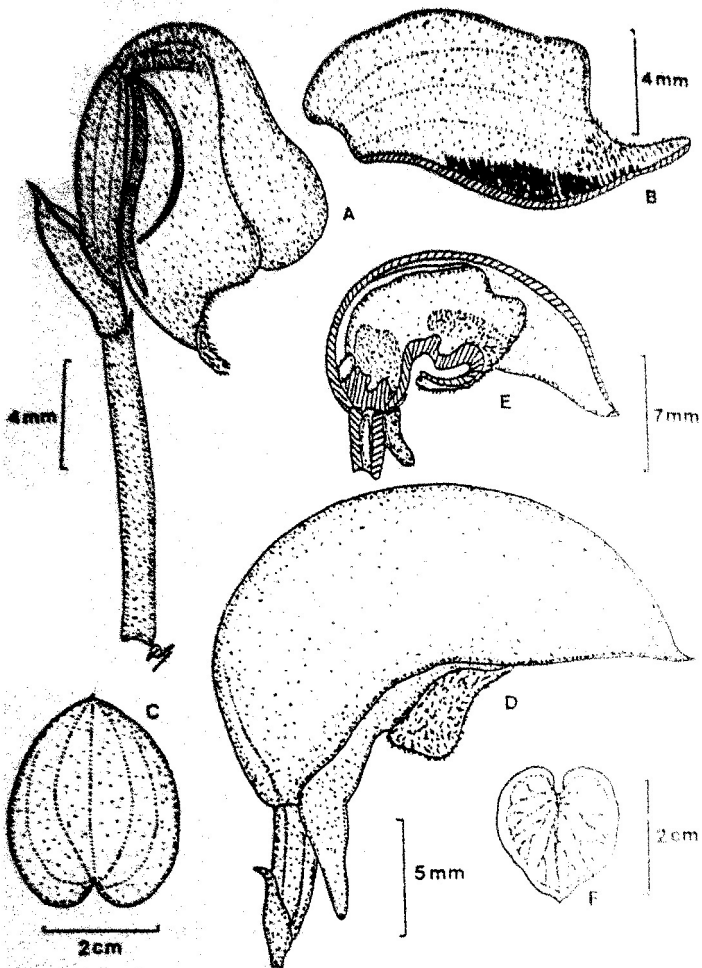
I photographed fungus gnats pollinating them in exactly the way George Fuller describes above for *Corybas* "A". I have seen no other colonies of *C. trilobus* like that one, before or since; across the track was a colony of *C. macranthus*, and the local form of *C. rivularis* is *Corybas* "A". If the curious *C. trilobus* at Trotters Gorge is in fact a hybrid (*C. trilobus* x *C. "A"* perhaps), fungus gnats might try to pollinate it in the same way. - *Ed.*

### Australian notes

✠ More on Cymbidium Mosaic Virus: Mark Philips wrote in *NOSSA Journal* 1994; 18(6): 57, "I have noticed that *Pterostylis* do have the ability to 'throw off' the virus as in 1989 my only pot of *Pterostylis X ingens* was badly affected and only a few small tubers were produced and these were hard and cracked at potting time. I discarded most of these, keeping only four better looking tubers from the edge of the pot. Surprisingly after potting in fresh mix in a small pot the leaves in 1990 were free of the disease and the plants increased to forty healthy specimens in 1993".

✠ I did not realise that *Corybas unguiculatus* and *C. aconitiflorus* had been split yet further (Jones DL and Clements MA. New orchid taxa from south-eastern Queensland. *Austrobaileya* 1988; 2 (5): 547-553). You will note

from Dan Hatch's paper above that New Zealand's *C. carsei* and *C. rotundifolius* are nowadays seen as distinct from the former, and *C. cheesemanii* as distinct from the latter. The new Queensland species *Corybas montanus* is distinguished from *C. unguiculatus* by "its longer peduncle, reddish rather than purple flowers and the surface round the orifice of the labellum being covered with short, erect teeth". The new Queensland species *Corybas barbarae* is distinguished from *C. aconitiflorus* by "much larger flowers of a crystalline white coloration, a dorsal sepal twice as wide, a strongly hirsute labellum lamina and larger labellum auricles which project forwards from the ovary.... It is remarkable that such a well-marked species has been confused with *C. aconitiflorus* for so long".



Drawings by D. Jones, from *Austrobaileya* 1988, 2 (5): 547-553  
*Corybas montanus*. A flower from side. B longitudinal section of labellum C leaf  
*Corybas barbarae*. D flower from side. E longitudinal section of flower. F leaf

\* Garry Guide reported (NOSSA *Journal* April 1994) a field trip to Emu Wren Swamp on 13 February, "... orchids — lots of them. Hundreds of pink *Spiranthes* on which we observed several species of native bee at work. The *Spiranthes* flowers were sweetly scented and in full sun.... In the middle of the swamp we were excited to find the rarer, late flowering, tall, white, self-pollinated race of *Spiranthes*. These looked quite different in habit, colour and flower shape from the other *Spiranthes* and were duly sent to David Jones in Canberra who suggests they are a new species".

R. Bates and V. Maloney reported (NOSSAJ 1994, 18 (4): 34), "For the first time David Jones has had a good look at South Australian *Spiranthes*. He is convinced that at least two species are involved: neither of them *Spiranthes sinensis* in the strict sense".

\* Leona Woolcock has written *Eden in a bog*, a description of a Mt Lofty (Adelaide) Ranges swamp. Several orchids are illustrated, including unnamed *Spiranthes* and *Microtis*.

\* ANOS Victorian Group *Bulletin* (Sept 1994) discussed **Cemeteries: a refuge for biodiversity**: "Cemeteries have a role to play in conserving Australia's biological diversity as they often provide a refuge for endangered or rare plant species. Much Australian vegetation has been cleared or modified which has resulted in the populations of many species being reduced to small remnant patches. "Native species usually occur in small communities in parts of the cemetery not used frequently or along paths or on grave plots. Mowing of paths does not deter the plants - which also survive in cracks on gravestones, spaces between graves, along grave surrounds and edges, on fenced-off graves, and near perimeter fences. "However, natural vegetation in cemeteries faces a number of threats. Caretakers can maintain the area with the view to keeping the cemetery neat and tidy, consequently destroying the natural vegetation and preventing any revegetation. Remote cemeteries, on the other hand, can be left to become overgrown - usually with weeds overtaking the natural vegetation...."

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### **The *Thelymitra nuda* — *T. pauciflora* complex in South Australia**

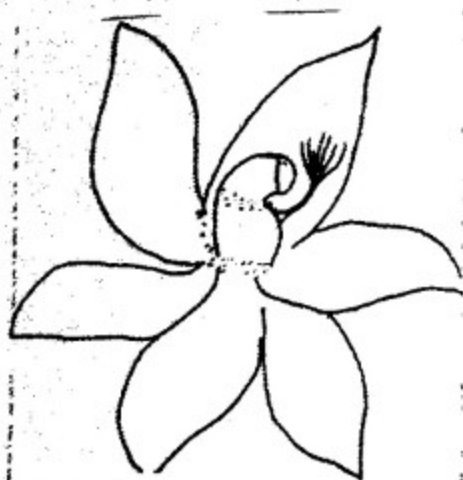
by R. Bates (from NOSSA *Journal* 1994; 18 (7): 68-69)

This group of blue (lilac, white) flowered Sun-orchids can be recognised by the simple column structure with its rounded hood and white brush-like hair tufts in front. But if the flowers are simple the taxonomy of the group is not!

There are several obvious species which have been split off as *Thelymitra mucida* with its distinctive waxy bloom on the column hood and red and yellow flecks in the column hair tufts. *T. malyra* with its bright pink hair tufts and long narrow column hood (this species is known only from one site in our South-east) and *T. holmesii* the last of the complex to flower in S.A. but amid the plants currently determined as *Thelymitra nuda* and *T. pauciflora* are a whole series of constant entities which are both geographically discrete and habitat specific!

Once pressed it is difficult to tell these entities apart but that doesn't mean that one couldn't recognise them from dried material, it could just be a matter of experience! Certainly one can recognise them from live plants when in flower. (Another difficulty with the group is the tendency for flowers not to open - how can one recognise flowers when they remain tightly closed except on the rare occasion conditions are conducive to them opening?).

The name *Thelymitra nuda* is commonly applied to those taxa with usually large, scented, freely opening, insect pollinated flowers. There is certainly more than one species in S.A. at present labelled as *T. nuda*, perhaps none of them are *T. nuda* in the strict sense



*Thelymitra pauciflora*

Throughout the mallee the commonest *Thelymitra* is an early flowered '*T. nuda*' with erect dull green leaves having a red or purple base, the flowers having a spicy aroma. In the ranges however grows a late flowered '*T. nuda*', with long strap like leaves covered with a glaucous bloom and no red base, the flowers lilac scented. Obvious evidence that the two are different species comes from Mambray Creek C.P. in the Flinders where the two grow together without intermediates one beginning to flower after the other has finished. There are other '*T. nuda*' also as the tiny late flowered plants from coastal limestone may represent a subspecies of the mallee *T. nuda*, and the dwarf species from Red-stringy bark forest in Spring Gully C.P. with its much incurved cleft column-top like in *T. holmesii*. Curiously it is only the insect pollinated '*T. nuda*' species which extend out into the dry country - perhaps because there is more sunshine and warmer weather but more likely it is because they prefer the fertile soils of the wheat belt.

The self pollinated '*T. pauciflora*' species are abundant in colder damper areas extending into the really poor soils where '*T. nuda*' never grows. There are even more 'forms' of *T. pauciflora*

The most familiar of these is the small, linear-leaf taxon which lives up to the name '*pauciflora*' by having only 1 to 4 flowers. This taxa comes in both blue and white flowered forms. In the Adelaide Hills the white form almost predominates. The top of the column in this form is yellow (with a darker band on the blue flowered form).

Just as well known is the 'cayenne pepper' top taxon which has broad strap-like leaves, a pinkish tinge to the flowers and a bright orange-red column top. This taxa prefers the poorer boggy soils. It was during a four week trip through Tasmania, Victoria and NSW in 1986 when I noted identical plants to the S.A. ones growing in the same habitat in those states that I realised they were a constant species and decided to look at the group in more detail! On the same trip interstate I noticed a tall forest form which often had 10 to 15 pale blue flowers, about twice the size of other *T. pauciflora* and with green stripes on the outside of the sepals. These grew only on very fertile well drained soils. I recorded this information and sure enough in 1987 in S.A. I found that the same species occurred in the same habitat in the Mt Lofty Ranges!



In 1982 I had photographed a tiny filiform leaf *T. pauciflora* with a column bright blue throughout. My notes showed it grew in damp sand over clay under *Leptospermum*. In 1987 I investigated all such similar habitat in the southern Adelaide Hills and found this taxon at three sites. This habitat has unfortunately been 99.9% converted to dairy farms so the 'blue top' *pauciflora* is now endangered.

As early as 1974 I had been intrigued by *T. pauciflora* in the Southern Flinders which lacked hair tufts on the column arm. Investigation in 1988 showed it to be a distinct taxon, early flowered on fertile loams, features including leathery leaves, pale thin textured sepals and pallid column, with hair tufts sparse or absent. I suspect it had once been common in the Mid-north, but fertile soils there are now 99.9% ploughed up!

There is little doubt that some of these taxa do hybridise to form hybrid swarms but this occurs on disturbed ground. In undisturbed bush the above species remain constant!

It seems that these various entities represent separate species in the biological sense. To the taxonomist used to dealing with dried material sorting them out would be a nightmare and most would be tempted to lump them all under the earliest name *Thelymitra longifolia*. However I do not believe this should be done.

There is a lot more field work to be done to sort out all the various taxa. On expeditions interstate I noted other taxa which I have not seen in S.A. Some of these ie *Thelymitra graminea* from W.A. have already been named but certainly most of the S.A. ones have not. I shall be conducting further research this coming Spring and would be pleased to hear from others who would like to look in more depth at the S.A. members of the *T. nuda-pauciflora* complex.

## A list of the NZ orchids

by Ian St George

This is a list of what I understand to be the current names of the NZ orchids; I have made references to changes, especially those made since the publication of Flora of NZ Volume II in 1970. I am aware that a major taxonomic revision is in progress, and that a number of these names may shortly change again.

*Aclanthis sinclairii* (in *Flora II* as  
*Aclanthis fornicatus* var. *sinclairii*)

*Aclanthis viridis* (has also been known  
as *Townsonia viridis*, *T. deflexa*)

*Adenochilus gracilis*

*Aporostylis bifolia*

*Bulbophyllum pygmaeum*

*Bulbophyllum tuberculatum*

*Caladenia alata* (in *Flora II* included in

*C. carnea* as *C. exigua*. See Hatch

E.D. and McCrae D. NZNOG

Newsletter 1989. 32:5-6)

- Caladenia catenata*** (in *Flora II* included in *C. carnea*. See Jones D. *Native orchids of Australia*. Reed, Frenchs Forest, 1988. p96)
- Caladenia carnea*** (in *Flora II* as *C. carnea* var. *bartlettii*. See Jones D. *Native orchids of Australia*. Reed, Frenchs Forest, 1988. p95-96)
- Caladenia iridescens*** (in *Flora II* as *C. carnea* var. *minor* forma *calliniger*. See Hatch E.D. *NZNOG Newsletter* 1985. 16: 1. But is it *C. calliniger*? see also McCrae D. *NZNOG Newsletter* 1988. 25: 11)
- Caladenia minor*** (in *Flora II* as *C. minor* var. *minor*)
- Caladenia* "green column"** (undescribed)
- Caladenia lyallii*** (there may be two species currently included - see Gibbs M. *NZNOG Journal* 1990; 35: 19, and *The NZ orchids: natural history and cultivation* t20)
- Caladenia* "aff. lyallii"** (see above)
- Caleana minor*** (no longer regarded as a *Paracaleana*)
- Calochilus herbaceus*** (in *Flora II* as *C. campestris*. See McCrae D. *NZNOG Newsletter* 1987. 24: 9)
- Calochilus paludosus***
- Calochilus robertsonii***
- Chiloglottis cornuta***
- Chiloglottis formicifera*** (probably extinct in New Zealand)
- Chiloglottis valida*** (not in *Flora II*; has been included by mistake in *C. gunnii*, but now described as a new species by Jones D.L. *Aust. Orch. Res.* 2. 1991. 43-4, 154)
- Corybas acuminatus*** (in *Flora II* as *C. rivularis*. See Clements M. and Hatch E.D. *NZ Journal of Botany* 1985. 23 (3): 491)
- Corybas carsei*** (in *Flora II* included in *C. unguiculatus*. See Irwin J.B. *NZNOG Newsletter* 1987. 23: 8)
- Corybas cheesemanii*** (in *Flora II* included in *C. aconitiflorus*. See Clarkson B.D. *Vegetation of Egmont National Park* 1986. p87)
- Corybas cryptanthus***
- Corybas macranthus***
- Corybas oblongus***
- Corybas orbiculatus*** (this is not the species named *C. orbiculatus* in *Flora II*, but is the species that has been known as *C. "short tepals"*; see Molloy B, *NZNOG Journal* 1994. 51: 12-14).
- Corybas rivularis*** (there are perhaps six structurally distinct species currently in this complex; one was misnamed *C. orbiculatus* in *Flora II* and is now known by the older Hatch name *C. macranthus* var. *longipetalus*; others include *Corybas* "A" [Irwin J.B. *NZNOG Newsletter* 1989. 32: 1-4], and *Corybas* "Mt Messenger"; see Irwin J.B. *NZNOG Journal* 1993. 47: 7-9. The identity of the original *Acianthus* [*Corybas*] *rivularis* has not yet been determined)
- Corybas rotundifolius*** (was included in *C. unguiculatus* and later tagged *C. "aff. unguiculatus"* - see Hatch E.D. *NZNOG Journal* 1991. 38: 4-5)
- Corybas trilobus*** (there may be more than one species currently included in this name - e.g. *Corybas* "aff. trilobus")

- Cryptostylis subulata* (not listed in *Flora II*. See Graham D.K.F. *NZ Journal of Botany* 1976. 14: 275)
- Cyrtostylis oblonga* (in *Flora II* as *Acianthus reniformis* var. *oblonga*. See Jones D. and Clements M. *Lindleyana* 1987. 2 (3): 156)
- Cyrtostylis reniformis* (in *Flora II* as *Acianthus reniformis* var. *reniformis*. See Jones and Clements *ibid*)
- Dendrobium cunninghamii*
- Drymoanthus adversus*
- Drymoanthus* "spotted leaf"  
(undescribed, but see St George I.M. *NZNOG Journal* 1989. 29: 8-9)
- Earina aestivalis* (reinstated; illustrated in *The New Zealand orchids: natural history and cultivation* 1990. t4. f13)
- Earina autumnalis*
- Earina mucronata*
- Gastrodia cunninghamii*
- Gastrodia minor*
- Gastrodia* "aff. *sesamoides*" (now regarded as different from the Australian species - see Ogle C. *NZNOG Journal* 1994. 51: 9)
- Gastrodia* "long column" (in *Flora II* included in *G. sesamoides*. See Wilson H. *Field Guide - Stewart Island plants* 1982. p294)
- Genoplesium nudum* (was *Prasophyllum nudum* - see Hatch E.D. *NZNOG Newsl.* 1991. 37: 18).
- Genoplesium pumilum* (was *Prasophyllum pumilum* - see Hatch E.D. *NZNOG Newsl.* 1991. 37: 18)
- Lyperanthus antarcticus* (probably not a member of *Lyperanthus*)
- Microtis oligantha*
- Microtis parviflora*
- Microtis unifolia*
- Orthoceras novae-zeelandiae* (was regarded as identical with *O. strictum*, but see Clements M.A. *Australian orchid res.* 1989. 1: 100)
- Prasophyllum colensoi*
- Prasophyllum* "aff. *patens*" (was regarded as identical with the Australian *P. patens*, but now thought to be an undescribed New Zealand species)
- Pterostylis alobula*
- Pterostylis areolata*
- Pterostylis australis*
- Pterostylis banksii*
- Pterostylis brumalis*
- Pterostylis cardiostigma* (not listed in *Flora II*. See Cooper D. *NZ Journal of Botany* 1983. 21 (1): 97)
- Pterostylis* "aff. *cycnocephala*" (was regarded as identical with the Australian *P. cycnocephala*, but now thought to be an undescribed New Zealand species)
- Pterostylis foliata*
- Pterostylis micromega* (has been confused with *P. furcata*, but now regarded as distinct)
- Pterostylis graminea*
- Pterostylis* "aff. *graminea*" (undescribed)
- Pterostylis humilis*
- Pterostylis irsoniana*
- Pterostylis linearis* (treated by Hatch in 1949 as a variety of *P. furcata*, and included in *Flora II* under *P. micromega* - now considered to be a valid species)
- Pterostylis montana*
- Pterostylis* "aff. *montana*" (undescribed, but see St George I.M. *NZNOG Newsletter* 1988. 25: 12-14)

*Pterostylis nutans* (extinct in New Zealand?)

*Pterostylis oliveri*

*Pterostylis patens* (was included in *P. banksii*, now regarded as distinct)

*Pterostylis tasmanica* (in *Flora II* as *P. barbata*; has also been confused with *P. plumosa*. See Molloy B. *NZNOG Journal* 51: 14-16)

*Pterostylis puberula* (was included in *P. nana*, but recognised as distinct)

*Pterostylis tristis* (in *Flora II* as *P. mutica*. See Molloy B. *Proc. 2nd Int. Orch. Conf.* 1985. p2)

*Pterostylis rubricaulis* (treated as a variety of *P. montana* by Hatch and as a variety of *P. graminea* in *Flora II*, now considered a valid species)

*Pterostylis trullifolia*

*Pterostylis venosa*

*Spiranthes sinensis*

*Spiranthes* "motutangi" (undescribed)

*Thelymitra carnea*

*Thelymitra cyanea* (was confused - e.g. in *Flora II* - with the Australian *T. venosa*)

*Thelymitra decora*

*Thelymitra formosa*

*Thelymitra hatchii*

*Thelymitra acuminata*

*Thelymitra ixioides*

*Thelymitra longifolia*

*Thelymitra malvina* (not listed in *Flora II*. See Clements M.A. *Australian orchid research* 1991. 1: 141)

*Thelymitra matthewsii*

*Thelymitra pauciflora*

*Thelymitra pulchella*

*Thelymitra sanscilia* (see *Flora II* p130 - may be reinstated as a species)

*Thelymitra tholiformis* (considered to be *T* "intermedia" by Moore, and included in *T. aemula* by Hatch: but see Molloy B.P.J. and Hatch E.D. *NZNOG Journal* 1990, 35: 20-24)

"*Thelymitra dentata*" (a sterile hybrid *T. pauciflora* x *pulchella*)

*Thelymitra* "aff. longifolia"

(undescribed species including those tagged as *T. "Ahipara"*, *T. "darkie"*, *T. "rough leaf"*. Unlike *T. longifolia*, at least some of these

appear to be insect-pollinated)

"*Thelymitra intermedia*" (now regarded as identical with *Thelymitra pauciflora*)

*Yoania australis* (probably not a member of *Yoania*, but may be an endemic New Zealand genus).