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Editorial

Chiloglottis valida D. Jones

The species we thought was *Chiloglottis gunnii* has been named *C. valida* by the Australian orchidologist David Jones.[1]

This orchid was first discovered in 1981 in the Hanmer Forest Park,[2] and later in the Richmond State Forest Park[3] and at Iwitahi.[4] The original Iwitahi site was recently destroyed by its new forestry owners, but transplanted plants are doing well in the native orchid reserve.

Jones wrote in his latin prescription that it differed from the Tasmanian *C. gunnii* in having a more robust habit (hence the name), longer stalk, bigger flower, different laminar calli and wider column wings.[5]

The labellar calli show a quite distinct pattern: there is a major erect proximal gland, with a 3mm stalk whose base is connected by a median ridge to a more distal major sessile gland. The Iwitahi flowers usually have only one pair of sessile glands lateral to the stalked

gland, though Jones wrote that Australian plants may have three pairs.

Overall, the plant is much bigger than the New Zealand *C. cornuta*, with longer and wider leaves, and a bigger and more colourful flower; the flower parts are a deep purple with green tinges, the ant-like calli almost black.

The labellum is surprisingly mobile, fluttering in the breeze to attract the wasps that pollinate it by pseudocopulation in Australia. The attraction is enhanced by the production of pheromones from osmophores (scent-glands) on the tips of the dorsal and lateral sepals.[6]

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Original papers

The annual Taranaki Corybas crawl

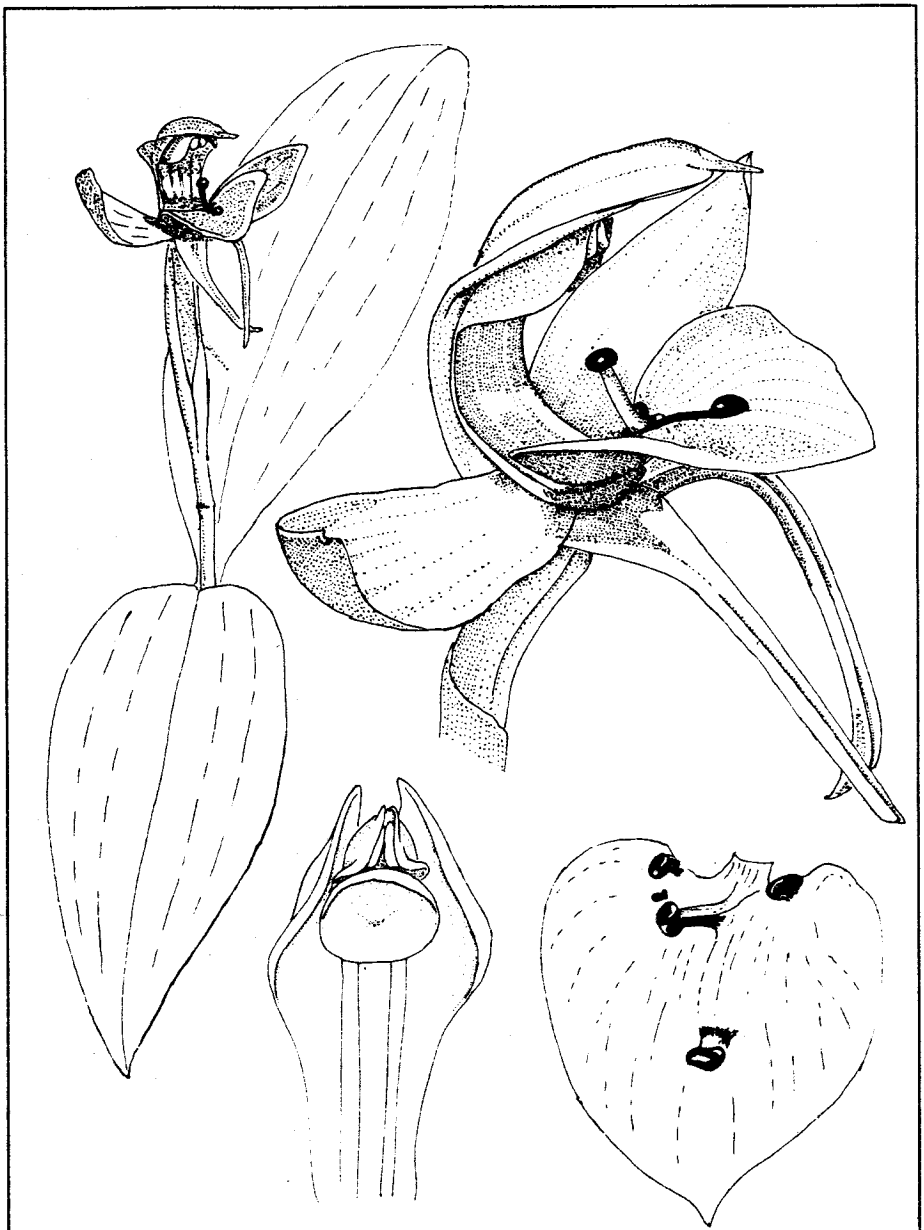
by Audrey Eagle, New Plymouth.

Bruce Irwin's visit to Taranaki was the incentive for the annual crawl. The beautiful day, a rare occurence in September, was an auspicious start for the enthusiastic orchid lovers, nine of the eleven being NZNOG members.

The route taken was along the Moki Road, inland from Mt Messenger. Much of this rugged area of steep papa ridges is still covered in bush. The narrow road clings to the hillsides high above the valleys and occasionally passes through the steep ridges by means of gothic-shaped tunnels, hand-hewn early this century.

The near vertical roadside cuttings and the area's high rainfall have made this an ideal habitat for *Corybas*. Amongst *Dracophyllum strictum*, *Coriaria arborea*, *Gunnera* and a scattering of ferns were seen large and small patches of the following orchids - *Corybas oblongus*, *C. rivularis*, *C. acuminatus* and *C.* "A" (undescribed, but see Irwin J.B. NZNOG *Newsletter* 1989. 32: pl-4). All were in flower and this kept the photographers, Val Smith and Shirley Thomson, busy with their close-up lenses.

The party scrambled up several dry ridges, and on one of these they were urged on by John Dodunski and Ernie Corbett to see what they described as "A must for Bruce", a *Corybas trilobus* with almost round leaves. These plants were also in flower.



Chiloglottis valida, Iwitahi, December 1991

Another ridge-top find, amongst manuka, kamahi, *Gaultheria paniculata* and the occasional hard-beech were small plants of *Pterostylis trullifolia*, about 5cm high and bearing green flowers with purple labella. *P. alobula* was also in flower.

No one was brave enough or perhaps foolish enough to name another *Pterostylis*, one with grasslike leaves newly emerged from the leaf litter.

George Fuller had found a group where *Acianthus sinclairii*, *Corybas trilobus* and *Pterostylis trullifolia* were so close together that he could photograph the three species in one frame.

Other orchids seen, but not flowering, were *Earina mucronata*, *E. autumnalis*, *Dendrobium cunninghamii*, *Bulbophyllum pygmaeum*, *Drymoanthus adversus*, *Chiloglottis cornuta*, *Orthoceras novae-zeelandiae*, *Microtis unifolia* and *Thelymitra* sp.

Several *Corybas* specials were produced by Margaret Menzies at lunchtime for Bruce to look at. They had come from the area of her high country farm, east of Eltham. One she had found particularly surprising was a Mt Messenger form of *C. rivularis* which was growing at an unusually high altitude on a dry bank far removed from any river.

From Moki Road the group went along Kiwi Road and then walked along part of the Rerekapa track, another good place for *Corybas*. On the banks grew *Corybas macranthus*, *C. rivularis*, *C. oblongus*, *C.* "short tepals" (undescribed, see Irwin J.B. *ibid.*) and *C.* "A". There were of course numerous discussions about the various forms of *Corybas*. When it came to observations about the labellum having a single bend, or double bends or even sharply bent bends, it left most of the group, including the writer, "slightly confused".

It was decided that, rather than returning by the long winding route from the south, travelling the 8km north along Kiwi Road would be a shorter distance to the main road. This decision was rewarded by the sight of numerous "tapestries" (as opposed to "carpets") of *Corybas* on the roadside cuttings, thousands of plants. It was decided not to stop to identify the species because the road was very narrow and so soft in some places that it might have been hard to start the cars again. At the end of the road there was a large notice saying thet "Kiwi Road is not a through road" so it was no wonder that the car had nearly grounded at times. Strangely there had been no notice at the southern end to say that the northern part was not a through road.

Altogether twenty species of orchids were seen, seven of them belonging to the genus *Corybas*. This was regarded as a successful day's crawling.

Orchids recorded from gum-scrub areas near Whangarei (Ecological Districts 5.04 and 6.01)

by Noeleen Clements and Dan Hatch

There are still considerable areas of classical gum-scrub remaining around Whangarei. The sterile, podzolised gum-clay, the end result of thousands of years of leaching beneath mature kauri forest (and more recent burning), can now support only stunted associations of manuka/kanuka in symbiosis with mycorrhizal fungi. These include a surprising number of orchid species,

among a ground cover of *Dracophyllum, Lycopodium, Gleichenia, Lindsaea, Schizaea, Juncus, Morelotia* etc. Streams run in the valleys and mature kauri/podocarp/hardwood forest survives in the gullies. Old logging roads along the ridges and down to the swampland provide a perfect habitat for native orchids. These are listed alphabetically and numbered. Comments are by Hatch, and are based on living material.

1. *Acianthus sinclairii*
2. *Caladenia alata* - previously listed from the North Cape to Kaikohe, this is the southernmost record to date.
3. *C. catenata* - as I interpret it - just how far south this species ranges I cannot say. I have seen plants from the North Cape; and from the Waitakere Ranges, where they appear to be confined to the manukau breccia on the west coast. The flower colour varies from pink to dark purple.
4. *C. iridescens* - listed from Kaitaia to NW Nelson, but absent (or not recorded) over wide areas. This record fills part of the gap between Silverdale and Kaitaia. The dark labellum is very variable and the calli may be in 2 or 4 rows, or scattered over the disc.
5. *C. minor* - the sepals are usually greenish on the outside, while the insides of the sepals and the petals are white or pink.
6. *Chiloglottis cornuta*
7. *Corybas oblongus*
8. *C. rotundifolius* - leaves and still-green seed heads. Subject to confirmation. Recorded from this area many years ago by Cheeseman as *Corysanthes matthewsii.*
9. *C. trilobus*
10. *Earina mucronata* - on nikau
11. *Gastrodia cunninghamii* - *c.* 40 flower-spikes growing under *Dicksonia squarrosa*
12. *Genoplesium pumilum*
13. *Microtis parviflora*
14. *M. unifolia*
15. *Orthoceras novae-zeelandiae* - both normal and green-flowered forms with some intermediates
16. *Prasophyllum* "species" - placed in *P. rogersii* by Rupp and in *P. colensoi* by Lucy Moore, these plants don't seem to belong to either species. Are they undescribed?
17. *Pterostylis banksii*
18. *Pterostylis* "rubricaulis"
19. *Pterostylis trullifolia*
20. *Thelymitra aemula*
18. *Thelymitra* aff. *ixioides*
19. *Thelymitra* ?possibly a hybrid between *longifolia* and *pauciflora.* Guesswork! a chromosome count would be necessary to be sure.
20. *Thelymitra longifolia*
21. *Thelymitra pauciflora*
22. *Thelymitra pulchella.*

[Note: *Gastrodia cunninghamii* has been recorded in Northland three times recently and confirmed for Whangarei from living material: (1) Waima Forest, A.E. Wright. *ABS Journal* 1990; 45 (2) July: 47. (2) Russell State Forest, N. Clements. *NZNOG Journal* 1992. 42: 7. (3) Whangarei, V. Hollard, 17 September 1992; about 40 plants to 80cm tall: dark, damp area in gully, specimens sighted by EDH].

The cantankerous *Corybas - C. cryptanthus*

by Bruce Irwin, Tauranga

Readers must be tired of seeing in the NOG *Journal* corrections to tabulations and illustrations published under my name. I must confess to yet another error, a very old one this time, concerning *Flora of NZ Vol II* p115. On the illustration of *C. rivularis* (now *C. acuminatus*), "Pet" (for petal) and "L. sep" (for lateral sepal) have been transposed. I apologise for the resulting confusion. Perhaps I even confused that strange saprophytic orchid, *Corybas cryptanthus*.

There is a general pattern to those NZ species of *Corybas* which possess long filamentous sepals and petals. The sepals and petals each originate above one or other of the six ribs which comprise the developing capsule. The lateral sepals, one on either side of the labellum, arise from the first pair of ribs from the front, meet immediately above the ovary, then sweep upward and backward to snuggle one each side of the labellum, just behind the deflexed and expanded lamina. On the other hand, the petals arising from the pair of ribs nearest the rear, are displaced forward and outward by the earlike lobes (auricles) at the base of the labellum. They are usually noticeably shorter and thinner and are carried well below the upward reaching lateral sepals. Even Australian species with their mean little sepals and petals try hard to conform. Until recently I had assumed that *C. cryptanthus* would follow the same general pattern. Then I noticed what appeared to be a second error in the illustrations on p115 of *Flora II*. The positions of petals and sepals in the drawing of *C. cryptanthus* seemed to be reversed. How could I have been so careless? After a quick check of a pickled flower, I was relieved to find that I had not been in error. The longer thicker pair of filaments reaching high above the flower really were the petals.

Why does *C. cryptanthus* refuse to conform to the accepted pattern? Whatever the reason, the plant has attempted to disguise its disfigurement by wrapping an enlarged bract over the base of the labellum to conceal the points of origin of sepals and petals.

In the past, taxonomists have been fooled by this deceitful behaviour and have stated in error that the petals of *C. cryptanthus* were similar to, but shorter than the lateral sepals. Please don't blame the taxonomists. Clearly perfidious *cryptanthus* is the guilty party.

Flora II could be corrected as follows:

1. on the illustration on p115 of *C. acuminatus* (labelled *C. rivularis*) "Pet" should read "L. sep." and vice versa.

2. p117 the bottom line should read "Petals similar to lateral sepals but longer and more upright".

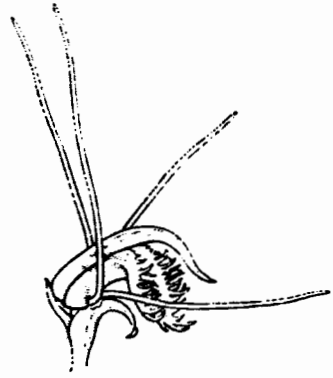
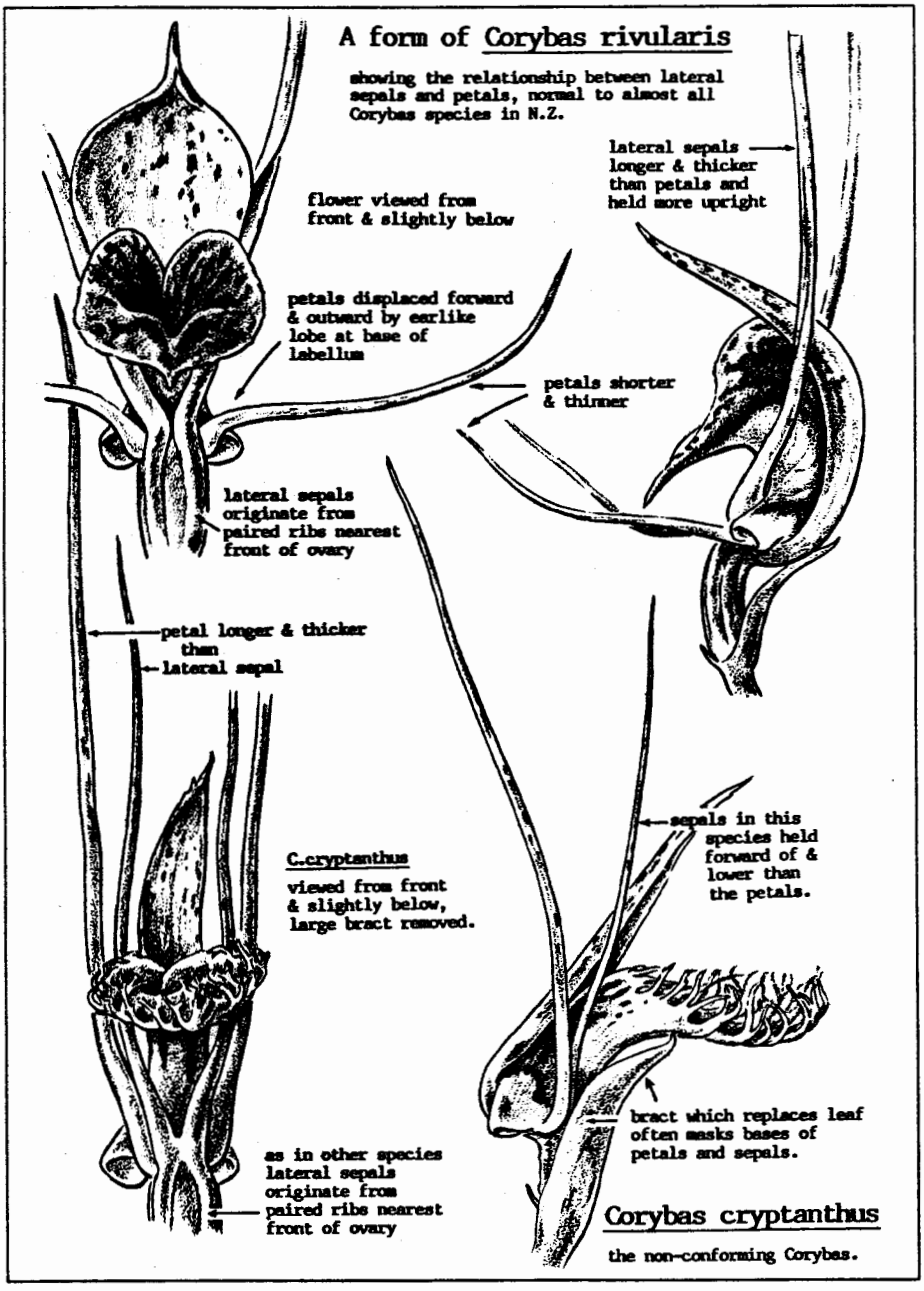


Illustration from p115 of *Flora II*


A form of Corybas rivularis
showing the relationship between lateral sepals and petals, normal to almost all Corybas species in N.Z.
lateral sepals longer & thicker than petals and held more upright
flower viewed from front & slightly below
petals displaced forward & outward by earlike lobe at base of labellum
petals shorter & thinner
lateral sepals originate from paired ribs nearest front of ovary
petal longer & thicker than lateral sepal
C.cryptanthus
viewed from front & slightly below, large bract removed.
sepals in this species held forward of & lower than the petals.
bract which replaces leaf often masks bases of petals and sepals.
as in other species lateral sepals originate from paired ribs nearest front of ovary
Corybas cryptanthus
the non-conforming Corybas.

Growing New Zealand epiphytic orchids from seed: Part A: germinating orchids in Petrie dishes

by T.R. Wilms, New Plymouth

(reprinted from *The Orchadian* 1992; 10 (7): 253-6 with the permission of the author, who notes, "With regard to the injection technique, I have found that better growth of the protocorms and seedlings occurs if every second injection contains a foliar fertiliser at 0.5g/L. It seems that there is insufficient diffusion of the nutrients in the medium to the injected sterile water to sustain good growth. If the dish is crowded with seedlings then there is no harm in having every injection contain the fertiliser. The plastic medicine bottles are useful containers for storing sterile media and solutions but after several months fungal mycelia can grow up the screw thread... use within a month of preparation").

INTRODUCTION

This paper describes a technique for culturing large numbers of orchid seedlings in petri dishes. Other papers give the results of a preliminary trial for transferring small (0.2 - 1.5 cm tall) seedlings to a non-sterile environment, and outline some of the cultural requirements for *Dendrobium cunninghamii*, *Earina mucronata* and *Earina autumnalis*.

MEDIA PREPARATION

A brief history of the development of culture media, and directions for media that can be prepared without the use of an analytical balance are given by Stoutemyer and Cooke (1989). Since the method described here requires the injection of water and nutrient solutions into sealed petri dishes, addition of organic matter to the medium is necessary to assist the transfer of moisture throughout it. The organic matter also acts as a pH buffer, and it can absorb plant secretions that otherwise would surround the protocorms. It may also provide a source of growth promoting factors. Pumpkin extract that includes its pulverised seeds at 150 g l^{-1} was used as the organic matter source because it was found to have a growth promoting effect for New Zealand epiphytic orchids.

For this method, the medium, when cool, should have the consistency of cold porridge rather than be firm as described for media in flasks. The softer consistency assists moisture transfer. Agar at 6 g l^{-1} provides this consistency. The culture medium is raised to boiling point, left to cool for thirty minutes, and bottled to within 1 cm of the top of 200-ml plastic medicine bottles. Rain water is also bottled in the same way. Both the medium and the rain water are then simmered in a water bath for one hour and taken out to cool. The screwcap forms an effective seal, and the bottle partly deforms to accommodate the slight decrease in partial pressure. The bottles can be used five or six times before they start to fail.

Stored culture medium has a short shelf life, probably because the available phosphate combines with the organic matter present. Light and MacConaill (1990) recommend that the culture medium should be used within a month of preparation.

Just before use, the culture medium is melted by heating the bottle in boiling water for twenty minutes. It is necessary to occasionally shake the bottle vigorously to break up the lumps.

SOWING METHOD

All operations are conducted in a clean bathroom that has been steamed by running the hot shower. Contaminants in the air coalesce with the droplets and fall to the floor. Protective clothing that includes a scarf, plastic coat, rubber gloves, and clean gumboots are worn. Items required for the procedure are: sterile petri dishes, bottle(s) of sterile water, bottle(s) of melted culture medium, Pasteur pipette with bulb, two 100-ml containers, two plastic trays, 5-litre bucket containing calcium hypochlorite solution, seed disinfecting solution, watch and vial(s) containing the orchid seed.

One 100-ml container is used for dispensing the seed disinfecting solution, and another is used for dispensing the sterile water. One tray is used for supporting the petri dishes, the other holds the rest of the equipment since drops of calcium hypochlorite can corrode the sink bench. The bucket containing the calcium hypochlorite is used

for disinfecting the Pasteur pipette, the rubber gloves and a 100-ml container for dispensing the sterile water. The bottle(s) of sterile water can also be dipped into this to wet any dust around the caps. The solution is made up by adding two teaspoons of swimming pool chlorine granules to 5 litres of water.

Vials for the seed disinfecting process should have a screwcap, and be of clear glass or plastic. Stoppers are not as aseptic as a screwcap. Seed disinfecting solutions commonly contain sodium hypochlorite to which is added a very small quantity of detergent. A 33% solution of house hold bleach is sufficient to surface sterilise all seeds in quantity. Household bleach normally contains 31.5 g l^{-1} of sodium hypochlorite, and so the solution used is close to a 1% concentration. Kawaguchi (1991) recommends a 0.1% concentration for Australian *Dendrobium* species but such a weak concentration inevitably leaves infected seeds in the two or three thousand that are in the vial. A 1% sodium hypochlorite solution does not affect the germination rate of New Zealand *Dendrobium cunninghamii*. However, the situation may be different with our *Earina* species because germination rate using a 1% solution is very poor.

For the sowing procedure, place out nine petri dishes and pour the culture medium into the deepest dishes, replacing each lid quickly after they are half filled. Pipette the seed disinfecting solution into the vial and note the time. The seed should be in the solution for only five to ten minutes. Try the minimum time first at a low concentration using very few seeds, and if all of the dishes become infected, then increase the solution concentration and/or the immersion time to acquire infection-free dishes.

Shake the vial vigorously and bang it in the palm of your hand for two minutes to thoroughly wet every seed. Let the vial stand for three to four minutes so that the seed can either sink or float, and then the solution can be pipetted out. Rinse out the other 100-ml container, and dispense the sterile water from it. Swirl the seed to disperse them in the water, and pipette 1 - 2 ml of the solution over the medium in each dish, lifting the lid slightly.

With practice, it is possible to achieve an 80 - 90% infection-free success rate. However, in some instances, it may be wiser to use a weaker disinfection treatment, and have fewer infection-free dishes.

CULTURE

The dishes are stacked in a clean draught-free room for five days before they are sealed. This allows the lids to clear, the medium to solidify, and a check can be made for infected dishes. Because moisture evaporates out of the dishes over this period, the positive partial pressure keeps out fungi and infections rarely occur over this time. If the dishes are confined in a cabinet over this period, evaporation may not be as great, and diffusion of spores into the dishes may occur. After five days, the dishes are sealed using sellotape 18 mm wide.

Dishes that become infected can be washed and stored since they can be re-used. Disinfect them by a ten minute immersion in hypochlorite, and just before the culture medium is poured, take them out of the solution and shake off the drops. The plastic repels water and the little that remains reacts with the sugar and the organic matter in the medium.

Recommended culture temperatures are 20 - 25 °C, but light levels for germination can depend on the orchid species. Light and MacConaill (1990) mention that many terrestrial orchids require darkness for germination. Following germination, subdued light levels are often used. Avoid direct sunlight as temperatures within the dishes quickly reach lethal levels.

Place a piece of card on the topmost dish to prevent water accumulation on the inside of the lid. Water dripping from the lid will wash spores that settled and dried there as the media cooled.

IRRIGATING PROTOCORMS

Petri dishes sealed with sellotape lose moisture at about 0.7 ml $month^{-1}$ at room temperature. Losses will be slightly higher than this if temperatures are held at 20 - 25 °C. This moisture has to be replaced every two to three months if seedlings are to be obtained. This is done by firstly swabbing an area of the dish lid with hypochlorite, making a small hole by pushing the red hot needle of a syringe through the lid, retracting it to flare out the plastic in the needle, and then reinserting it to inject up to 3 ml of sterile water into the dish. The little hole is then sealed with glue delivered with a toothpick. Use a 20-ml syringe with a 0.9 x 25 mm needle, thicker needles make too large a hole, thinner ones lose their heat too quickly, and longer ones require greater care during reinsertion. Inject the liquid slowly so that it spreads out rather than pools in one place. To minimise the risk of infection,

plunge the stock bottle in hypochlorite to wet any dust around the cap and only use half the water in it. Dip the handle of the syringe into the hypochlorite, and rinse it occasionally. Wear rubber gloves. The syringe can be re-used. Re-sterilise it in hypochlorite and rinse it just before use.

When working by an open window to permit combustion gases to escape, infection rate has been consistently around 2%. Since there are likely to be seven or eight injections over a year, a 15% overall loss rate may occur before the seedlings are removed.

This cultural method generates wetting and drying cycles. After six months, nutrients may need to be injected since these will either be depleted, lost as gases or fixed with the organic matter in the medium. Prepare a nutrient solution using commercially available foliar fertiliser that contains the macro-nutrients nitrogen, phosphorus, potassium, calcium, magnesium, and sulphur. Use only 0.5 g l^{-1} as stronger solutions will only make the medium too salty. Ensure that this solution is sterilised.

DISCUSSION

This method for growing orchid seedlings was developed for the purpose of growing large numbers of seedlings for selection purposes. It can do this easily, quickly and relatively cheaply. However, success depends on the seeds being able to withstand the disinfection treatment necessary to ensure that all of the seeds are surface sterilised. For orchids that have delicate seeds, growers will need to weigh the options between varying the seed number per dish, sodium hypochlorite concentration, and the time the seeds remain in contact with the disinfecting solution.

This method immerses most of the seed in the culture medium. Since the medium is shallow, seedlings grow through it. Because light reaches the protocorms sitting on the bottom of the dish seedlings 1.5 cm high can be obtained.

From the way in which the protocorms of *Earina autumnalis* lie in the medium, it seems that their orientation is directly related to the orientation of the seed. Seed lying on its side often produces protocorms that lie on their side. Because of the protocorm's wheel-like shape, it is unlikely that they would grow on the firm flat surface of a sterile medium because there would be little contact between the medium and the protocorm. Immersing this seed in a shallow medium will greatly assist protocorm development.

Some orchids have very slow growth rates. Our New Zealand epiphytic orchid *Earina mucronata* takes three months for its embryo to emerge from the seed capsule. Since the available phosphate in the medium will be gradually fixed by the organic matter over time, nutrient addition for these slow growing orchids may be a requirement if seedlings are to be obtained. The injection technique is likely to assist in their cultivation.

Some orchid protocorms, such as those from *Earina*, are non-photosynthetic. In these species, seed germination and protocorm development are best achieved by pipetting the seed into a very shallow, warm medium so that the seed lies just below the surface. This position maximises sugar transfer into the protocorms, and still allows oxygen exchange to take place. Since green protocorms can create their own sugars and oxygen, they can be grown in a slightly deeper medium. Care has to be taken that the very shallow medium (3 - 4 mm thick) does not dry out, and that they are irrigated before fissuring and shrinkage begins.

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Second Australasian Native Orchid Conference and Show, Toowoomba, Queensland, 17-19 September 1993. ***Write to the editor for details.***

Wild orchids in the far south of New Zealand
A NZNOG book by Ian St George, available now at 11 dollars

Focus on orchids
by Gordon Watson, Invercargill

After reviewing the Competition photos and noting some rights and wrongs, may I make a few suggestions?

Firstly and most importantly always bear in mind that **you don't take a photo: you make a photo.**

On finding your subject don't just take a photo then rush on to the next subject. It is a good idea to move round the orchid to find the best position or angle to shoot from to show the flower off to advantage. Frontal photos looking right down the throat of the flower are important but don't forget a side view showing the profile and the foliage structure. This is important. And don't be content with just one shot. Take plenty, because who knows? you may never get that opportunity again. Try different exposures if you are looking for a photo with a difference. Try different lighting to give you that super shot.

Be mindful of the **light.**

The quality of the light reflected off the orchid passing through the lens of the camera onto the film determines the quality of your photo, print or slide. So, realising that your photo is simply the effect of reflected light on the chemicals of the film, you will have to consider the various light factors

1. **intensity**
2. **direction**
3. **angle.**

Intensity of light is measured by your light meter and can be corrected or adjusted by opening or closing the aperture or by regulating the speed of teh exposure. Incidentally it is a good plan to have your meter checked out occasionally by a photographic technician or even matching it with a reliable Weston meter. Now I am discussing this subject while operating a manual camera or an auto camera in the manual mode: more about auto cameras later.

Intense strong light with dark harsh shadows is not conducive to good results. Instead of photographing in open situations, seek conditions with high cloud cover and soft shadows. What we call cloudy bright is ideal when the light is soft. If the light falling on your subject is strong or harsh you may soften it by positioning a friend to prevent the direct sun rays striking your orchid. Even your shirt may do the trick.

To complete this setup it is worthwhile to reflect some light from the opposite side directed onto the flower. Do this with a white handkerchief, cardboard, or better still aluminium foil which is easy to carry in your pack and gives excellent reflection. I find the best method of diffusing this harsh light is by using a sheet of slightly opalised plastic. It is perfect: allowing a sufficient light to pass through giving nice soft tones.

Direction of light. In the early days we were advised to have the sun or light source coming from over the photographer's shoulder (frontal light), but now we find we get more interesting photos with the light coming from other directions. Side lighting, that is with the light coming from the side, preferably with a stronger tone coming from just one side, gives strong lines with dramatic impressions, especially when a reflector is incorporated. Try this method and you won't be disappointed.

Then there is the light coming from the rear of the subject: back lighting. This produces strong outlines, but sufficient light must be on the front of the orchid

to show some detail. Take care that no light shines on the camera lens.

Another direction is top lighting: light coming directly from above. This is used more in the studio than in the field.

With these lights beware of unwanted shadows that will spoil a good photo. This is where reflectors prove their worth.

Angle of light. No matter what direction the light is coming from, it can still come from different angles. As the day progresses the angle of the sun is usually high, but excellent results are obtained in early morning or late afternoon light when the sun is at a,ow angle. Super results are obtained when the sun is low in the sky during winter months, though this will not really apply to orchids in many regions.

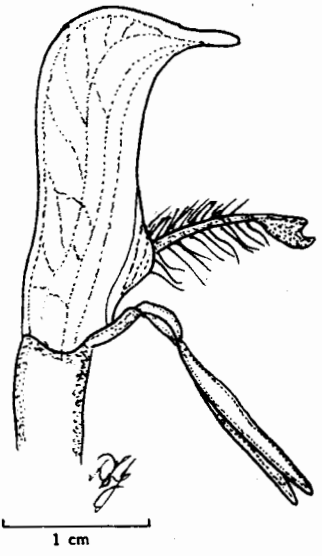
To sum up, light plays a major role in the quality of your photos, so use it to the fullest. Don't be satisfied with just one shot. If it is worth photographing, it is worth doing it properly. Take several shots, varying your position and exposures.

(To be continued).

Notes

❀ Maureen Young wrote (22 December 1992), "During a visit to the far north over Labour Weekend 1992 the following orchids were seen. At Lake Ohia, *Calochilus herbaceus* and *Thelymitra malvina*. On Barbara Hoggard's property at Kaimaumau, a number of plants of yellow-flowered *Thelymitra carnea* were near the end of flowering, and about 30 plants of *Pterostylis plumosa* were also in the late stages of flower. *T. malvina* and *T. aemula* were plentiful, and there were a few plants of *T. pauciflora*. *Cryptostylis subulata* plants had a flower or two, and a tiny pink-flowered *Caladenia* grew among the stunted manuka bushes."

❀ One of Nic Bishop's superb photographs of insects on the wing in *Natural history of New Zealand* shows a Red Admiral (Admirable?) butterfly and *Earina autumnalis*. There are other pictures of native orchids too.



Pterostylis plumosa,
from D. Jones.
Native orchids of Australia.

❀ Karlie Birchall wrote (16 November 92), "Have just come home from a lovely weekend down the East Coast and have another 'find' to add to the list for the Hauparapara River area, Omaio Bay - namely *Caladenia catenata* - the yellow version. In all I counted sixty-four plants and seedlings growing on the verge of an old horse track in ti-tree litter and moss in a very dry site. Couldn't believe my eyes - they are so tiny. I must have walked past them a dozen times and not seen the plants. Also found more colonies of *Corybas* under the banks of the river, and plenty of *Pterostylis banksii* which had almost finished flowering but had set seed.... I love this time of year and spend hours out in the bush checking my favorite spots and taking photographs".

❀ Pat Enright wrote from Dunedin (15 January), "It has been a very interesting year botanically with most plants reacting to the cold weather and late snow by flowering later than usual by two or three weeks.

"In the third week of November I spent a week at Knob's Flat in the Eglinton Valley during a DOC yellowhead survey and during the daily surveys I managed to observe quite a bit of the orchids.

"In flower on the river flats, bush fringes and more open beech forest were at least three Pterostylises, *P. montana*, *P.* aff *montana* (both fairly common) and *P. australis* of which I found only one patch.

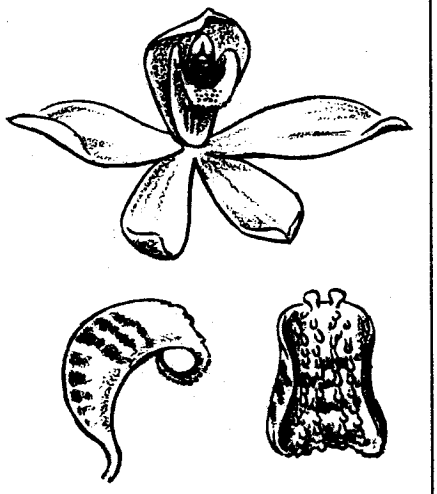
"The beech forest had *Corybas trilobus*, still with the odd flower, and patches of *Adenochilus gracilis* and *Aporostylis bifolia* in bud. *Chiloglottis cornuta* was also present but very patchy.

"Thelymitras were present but foliage only except for a large strap-leaved plant (15") growing in the lakeside gravel at Te Anau Downs, in bud.

"The other item of note was a patch of *Corybas* which Bruce Irwin thinks is *Corybas* "A". They were growing in a fairly wet and muddy place where one of the many creeks from the Earl Mountains drains into the Eglinton.

"George Martin wrote in the first edition of his *Guide to the Plants of Dunedin and the Surrounding Districts* that Maungatua is one of the best places in the country to observe ground orchids. He may have been a little parochial but notwithstanding it was a great trip in early December with the Dunedin Naturalists' Field Club to the Maungatua.

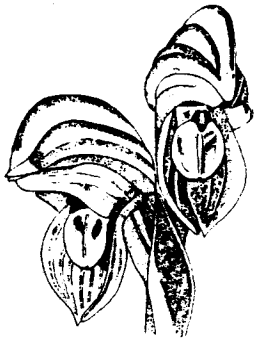
"There were orchids in abundance. Most evident was *Caladenia lyallii*. It was quite abundant with quite a wide range of size and colour on the backs of the petals from pale pink to deep crimson.



Caladenia lyallii
by Bruce Irwin

Aporostylis bifolia was just coming into flower and was not as abundant as the *Caladenia*. A first for me was *Lyperanthus antarcticus* of which I saw but one patch. *Pterostylis* aff. *montana* was growing near a small stream that drains out of the swamp below the transmitter and a small patch of *Corybas trilobus* with but one flower was found on a wet bank below a small waterfall. *Chiloglottis cornuta* grew below some of the large rock outcrops.

"We have a crib at Naseby and usually spend the Christmas holidays up there, so I have quite a bit of time to botanise. For the first time for a number of years the paddock in which I do a bit of wandering had not been grazed and it is amazing what I found as compared to previous years. Perhaps I am just a little more observant but I think the sheep must keep the foliage trimmed. *Microtis oligantha* was growing as 3"-4" plants in some of the shallow depressions. *Prasophyllum colensoi* was everywhere: large and small plants, red and green equally represented. *Pterostylis* aff. *cycnocephala* was common but patchy and required a hands and knees and crawl approach really to find plants in any number.



Pterostylis "aff. *cycnocephala*"

"This particular paddock is at 2500' but contains a number of plants that I usually associate with a much higher altitude on the Ida Mountains. It has a very patchy vegetation cover with quite a bit of *Hieracium pilosum* and much bare ground which seems to suit the small *Pterostylis*. It is found up to 4000' on the part of the Ida Mountains I usually range over, mostly in tussock grassland but also on more exposed gravel benches and even in dirt pockets, along with *Anisotome brevistylis* etc on steep banks and gorge walls where stock cannot reach.

"*Thelymitra longifolia* was in full flower on the rare days the sun shone. It grew on slopes which had the best aspect for receiving the sun. I noted insects on the flowers but gave it no more than passing note until I read that this plant is mainly self-fertilising (*The New Zealand orchids: natural history and cultivation*). The lack of sun prevented any followup but next year I must make the effort.

"Further up the Ida Mountains (3000'-3500') I found my most exciting discovery. A single plant of *Pterostylis tristis*, a species I had not seen before.

"*Corybas* cf *macranthus* grows on wet seepage banks up the East Eweburn river and I have now found a more accessible patch in a small gorged creek in the pine forest. The plants that grow on the wet mossy rocks beside the waterfall on the Little Kyeburn are nearly past flowering by the time I can get access to them as two river crossings in the family car are a bit tricky when the snow is melting and keeping the level up.

"Another interesting point was the small number of *Microtis unifolia* plants that I saw this year. Usually it is common but once again perhaps I was just not keyed into them.

"Locally, I found *Pterostylis* aff. *cycnocephala* on Sandymount: I will be out there earlier next season to see if I can find *P. tristis* there as well. *(Bruce Irwin recorded the latter from this site years ago when he lived in Dunedin, but I never found it there, despite repeated searches - Ed).*

"In midNovember the Field Club went to Shag Point. A friend and I went to the scientific reserve specifically looking for a small native lily (*Iphegenia n.z.*) but keeping an eye out for anything else of note. This reserve has a number of higher altitude plants growing in it. *Corybas macranthus* was quite plentiful along the bases of the cliffs and rock outcrops with some quite large flowered specimens. *Pterostylis* aff. *montana* was the only other orchid found there.

"Down to the coast and the DOC reserve and more species were evident. In the short time available I noted *C. macranthus* growing in very exposed sites in pockets in the rocks right down near the shoreline. These plants had very thick leaves and much reduced petioles. *Caladenia carnea* was represented by a few plants growing in the scrub.

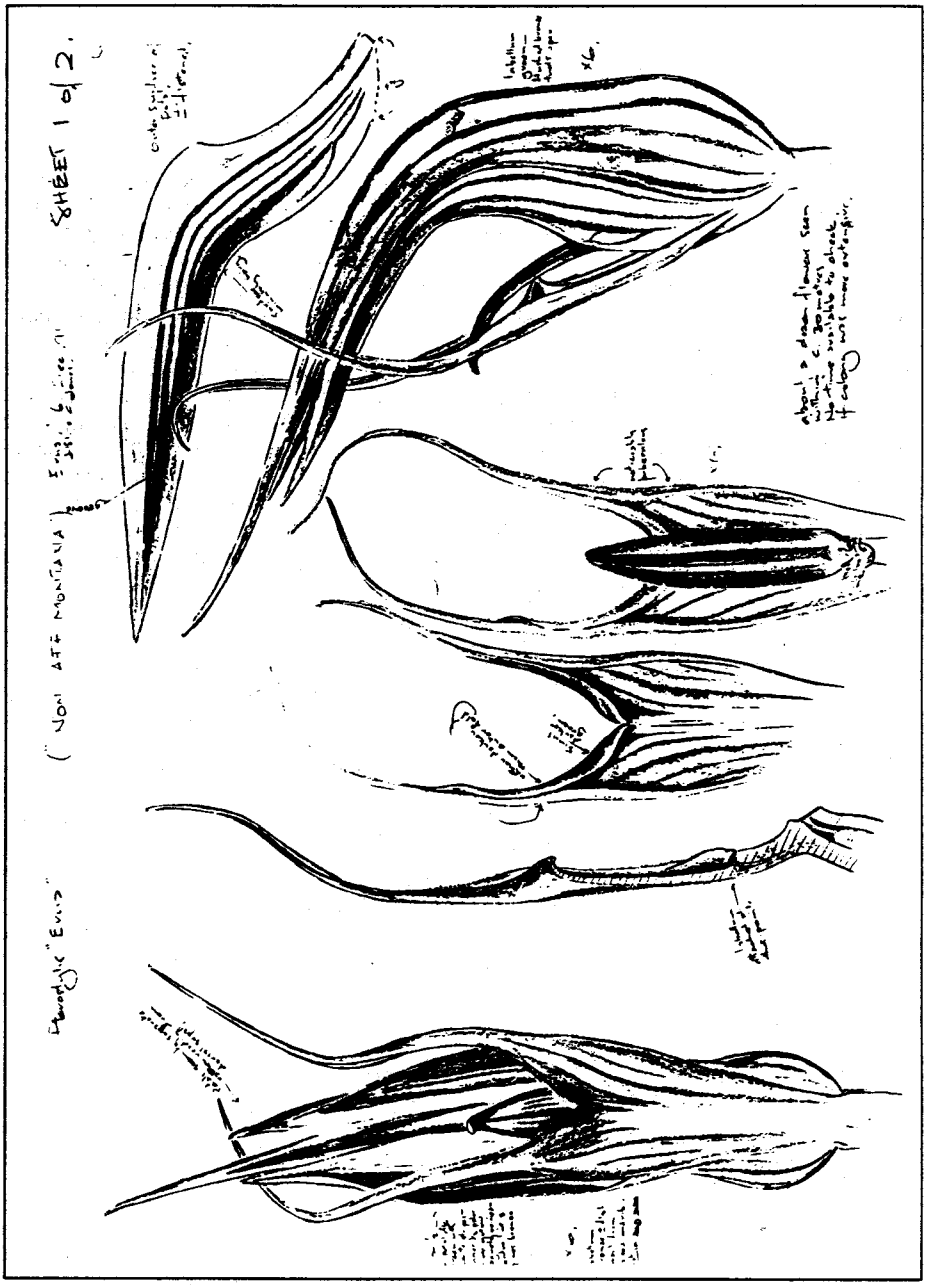
"Brian Molloy was there a few days before our group and noted *P. foliata* and *C. rivularis* as well."

❃ Margaret Menzies wrote (16 January, E.R 24), "On 11 September I found an orchid growing at Omoana on the side of a dry clay bank along with *Corybas trilobus*. It was green and about 11cm tall. There was a scale leaf about 1.5-2cm up the stalk, and it appeared to have five flowers. There was a flower at the base, level with the leaf, but it had gone to seed, and the next flower, 7.5cm above ground, resembled a lizard's head. Val Smith and John Dodunski came out and photographed the plant, and I sent the flower to Bruce Irwin. He thought it was a *Microtis*, possible *M. unifolia*, damaged during growth to cause the flower at its base. Three more flowers emerged at the top, and it was still flowering on 8 December. I will be looking next season to check whether it is something different - or just something to make you keep searching.

"On 27 December I went to check a small red-veined leaf (that I think is *C. oblongus*) and nearly trod on five stalks 10-15cm high, with seed heads. I carefully dug around the base and to my delight found a small white bract and knew that I had found *C. cryptanthus*. I rang Bruce Irwin and he asked me to map them out; on the 28th I went back and found twelve plants, and after careful searching another patch of about 18 plants about 80 metres away. They are white with red flecks, and are growing under manuka surrounded by *C. cheesemanii*, *C. trilobus*, *Pterostylis montana*, *Caladenias*, *Chiloglottis cornuta* and *Thelymitras*. On the way home and looking further afield I found two *Gastrodia cunninghamii*, another first find - so I had great days, even though it was raining on both.

"Since then Bruce Irwin, Malcolm Campbell and two other *Corybas* crawlers from New Plymouth, Val Smith and John Dodunski, have been out to verify that it is truly *Corybas cryptanthus*. By 10 January most of the plants had disappeared, possibly because of the rain.

❃ Bruce Irwin wrote to me on 11 December 1991 with drawings of a "strange lanky *Pterostylis*" with a narrow and tapered labellum, and this year he showed it to me at Erua, on my way to the Iwitahi weekend. It is a large and beautiful *Pterostylis*, different from anything I had seen. Bruce Irwin's drawings of *P.* "Erua" herewith - Ed.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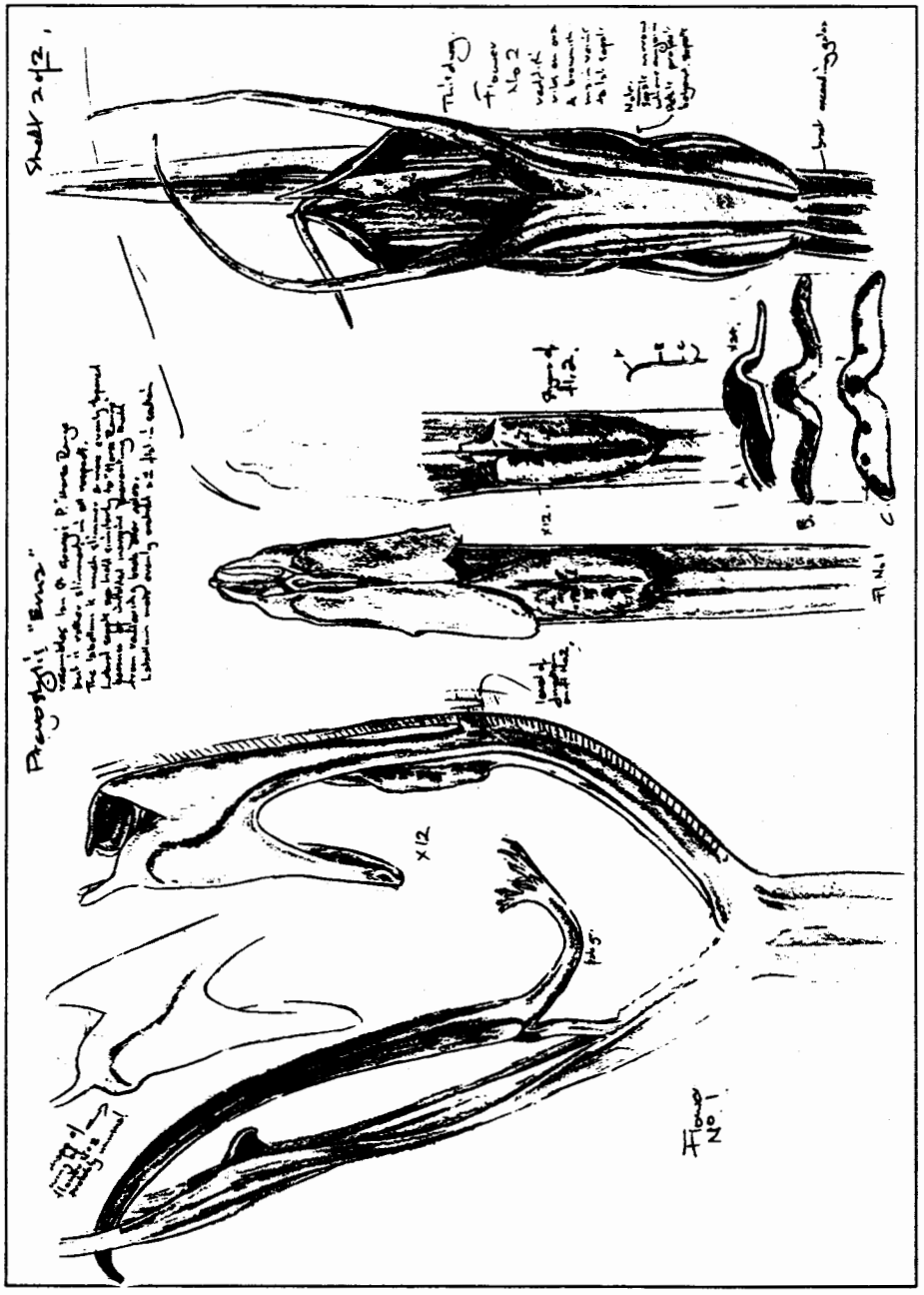


Australian notes

The propagation of terrestrial native orchids - extracts from talks by Rachel Oddie and Letitia Quay (from the West Australian Native Orchid Study and Conservation Group's *Bulletin*, November 1992).

❀ Rachel Oddie: Western Australia has 21 genera of terrestrial orchids containing about 320 species and many of these species are unique to WA with the potential to be developed horticulturally as potted plants. They have very attractive flowers and a wide variety of shapes, sizes, colours and flowering times.

They also hybridize freely, which would be a great advantage to breeding programmes and would be a cinch for a commercial development....

Many of the problems associated with (the propagation of terrestrial orchids) are due to the high dependency terrestrial orchids have on mycorrhizal fungi. Mycorrhizal fungi colonize the roots of most plant species forming a symbiotic relatianship; the fungi receive carbon compounds from the plant and, in turn, the mineral nutrients from the water absorbing properties of the plant root system are improved.

In orchids, the mycorrhizal relationship is quite different - it is quite unique and highly specialised.

An orchid's seed is not well developed and has very little food reserves; it will not germinate under natural conditions unless it is colonized by an appropriate mycorrhizal fungus.

The fungus provides the orchid with a source of carbon and other mineral nutrients. In some species, the movement of carbon continues throughout the plant's life but in other species the movement will stop at maturation of the plant. However, at no stage in this relationship does carbon ever move from the plant into the fungus, leading some researchers to believe that the relationship is actually parasitic; that means the terrestrial orchid is the parasite on the mycorrhizal fungi. There is also evidence that suggests that the fungal infection modifies the orchid metabolism and allows it to use the reserves it does have and to develop properly.

There are two ways that orchid seeds can be germinated in vitro, asymbiotically and symbiotically. Asymbiotic germination was first developed by Lewis Hudson in the 1920s and it involves the germination of orchid seeds in the absence of the mycorrhizal fungus. Hudson replaced the fungus with a rich medium high in sucrose levels and complex organic additives. This method has been very successful in propagating epiphyitic orchids which are mainly found in the tropics but unfortunately it hasn't been very successful with terrestrial orchids.

This is probably because of the higher dependency of terrestrial orchids on the mycorrhizal fungus.

When terrestrial orchids are germinated asymbiotically, generally they germinate and develop very slowly and they tend to be less healthy and less disease resistant than seedlings that have been germinated symbiotically.

The second method for in vitro germination is the symbiotic method. This involves the germination of orchid seed in the presence of mycorrhizal

fungus. The mycorrhizal fungus has to be isolated from an adult plant of the same species and the type of medium that is used must not be too rich, otherwise the fungus will overgrow the seed and parasitize it. So generally a medium of oats and water and a gelling agent are used.

The first sign of germination is the swelling of the seed coat and then the embryo continues to swell until it breaks through the seed coat to form a protocorm.

The protocorm at this stage would not have differentiated with root and shoot meristem. As the protocorm enlarges primordials develop and eventually roots and shoots develop. It depends on the species as to the timing of this....

At the moment the in vitro symbiotic germination of orchid seed is the most reliable method of producing large numbers of orchids; however, the method is not being tried commercially and this is due to a great number of problems associated with it.

There are two major problems. Firstly terrestrial orchids germinate and develop very slowly in vitro compared to natural conditions and, secondly, when these seedlings are potted out they have a very low survival rate and quite often only 5% of them will survive....

❀ Letitia Quay: Rachel has already spoken to you about the importance of mycorrhizal fungi in growing terrestrial orchids because of their greater dependency on nutrition.

I am going to be looking at other methods of propagation of terrestrial orchids and before I go into that, it might be important to have a look at the growth cycle that terrestrial orchids follow so you know the methods by which you can propagate orchids.

Orchids can follow a couple of growth cycles. One would be the sexual cycle whereby flowers are produced and, after pollination, we have seed set and the seeds are dispersed once the seed pods dehisce. They lie dormant over the summer in the soil until the autumn rains come and, upon infection by the mycorrhizal fungi, you get seed germination and seedling development.

The other way orchids can reproduce is by the asexual cycle whereby daughter tubers are produced and they remain dormant over the hot dry summer and once the autumn rains come again, they resprout and mycorrhizal fungi infect the plant and they will produce new daughter tubers every year.

There are various propagation methods. One is vegetative propagation whereby you can have tuberoid removal because, from the asexual growth cycle, we have daughter tubers produced every year. If you remove the tubers, that will hopefully induce more daughter tubers to be produced.

Another method would be by tissue culture; there have been two methods of mericloning whereby the shoot tip or the meristem is placed onto agar medium, which induces the plant tissue to multiply to form protocorms and thus individual plants. Or by micro-propagation where young seedlings can be regenerated by culturing cuttings taken from the orchid plant such as cuttings from the leaves or the flower stalk.

You can also propagate orchids from seed.

One way is in vitro propagation as Rachel has mentioned - either asymbiotic where the agar medium provides all the nutrients, or symbiotic where seeds are germinated with the appropriate mycorrhizal fungi.

Another method is ex vitro germination or in situ sowing....

❀ Jan Brandli of Coates Wildlife Tours writes, "The orchids of the southwest of Western Australia are remarkably diverse and the region provides refuge for an astonishing number of species.... The best time to look is from August to October, when up to 90 species can be found in flower.... We have... developed an enviable reputation for high quality tours specialising in terrestrial orchid/ wildflower tours". *Write for itineraries to PO Box 150, North Beach, Western Australia 6020.*

❀ Australian Orchid Foundation (107 Roberts St, Essendon, VIC 3040) has remaindered the English translation of Schlechter's *Orchidaceae of German New Guinea* at A$50 - 1200 pages on 1500 species. They have also reduced the price of their *Australian Orchid Research* Vols 1 and 2 to $15 each. Add postage; ask for their catalogue of orchid publications.

❀ Chris Munson wrote in the November 92 *Bulletin* of the Macarthur A.N.O.S. Group, "...the ancient Egyptians mummified so many Nile ibises, that about the turn of this century, the Egyptian railroad used the mummified ibises as fuel for their steam trains". About ten million ibises had been dug up. Why weren't they extinct? Simple: their habitat is intact; even such massive culling had not interfered with the ibis's breeding grounds. "Why (do) we hear of tiny remnant colonies of orchids which to all intents and purposes are on the verge of extinction? Enter modern man. We have bypassed the stuffing of mummified Pterostylises and Dendrobiums into the furnaces of steam trains and gone right to their habitats and destroyed them.... In the past it was the pastoralists and planners who unwittingly caused the decimation of 40 million years of evolution, but now it is you and I who have the remnants to preserve."

Orchid artists

Matilda Smith (1854-1926) and John Nugent Fitch (1843-1927)

The great botanical art critic Wilfrid Blunt had but faint praise for Matilda Smith's work -

> "Miss Smith remained to the end a rather fumbling draughtsman *(sic)*, more remembered for her `great pains' and `untiring efforts' than for her skill, but best of all esteemed for the charm of her personality. She was on occasion her own lithographer; but she owed much to John Fitch, who made some attractive lithographs from her rather hesitant sketches." [1]

Although T.F. Cheeseman intended that his 1906 *Manual* should be accompanied by illustrations, it was not until 1914 that the *Illustrations of the NZ Flora* appeared as a separate work.

Cheeseman chose Matilda Smith as his artist. She was born in India, came to England as a baby, and eventually contributed 2300 plates to Curtis's *Botanical Magazine*, and many to other publications. She received many awards, and her work was so admired that two plants were named for her.

The bulb-leaf orchid, *Bulbophyllum tuberculatum*,
part of a monochrome lithograph by J.N. Fitch from a pencil drawing by Matilda Smith,
Plate 191 of Cheeseman's *Illustrations of the New Zealand flora*, 1914.
The key reads "*Bulbophyllum tuberculatum*, drawn from specimens collected near Kaitaia by Mr. R.H. Matthews. Figs 13 and 14, different views of flower; 15 and 16, front and side view of lip; 17, column; 18, ripe capsule".

Cheeseman wrote in the Preface -

". . . there was no intention of producing a series of drawings selected mainly on account of the beauty and attractiveness of the plants portrayed. I assumed that the true object of the work was to issue plates of an educational character, so selected as to present an accurate and comprehensive idea of the main features of the flora, and so designed and executed as to be of real use in the study and identification of the plants of the Dominion." [2]

For years this was the best guide to the N.Z. flora.

Bruce Sampson found Matilda Smith's original pencil drawings in the Auckland Museum, and they are skilful, accurate and scientific - little different from the lithographs. Fitch had added few extra touches.

John Nugent Fitch was the nephew of the greatest botanical illustrator of all, W.H. Fitch, and was second only to his uncle in industry - 2500 of his lithographs appeared in Curtis's *Botanical Magazine*, and he illustrated many other works until his career was brought to a halt by a paralysis of his hands. Between them the Fitches had been sole lithographers for the *Magazine* for seventy-one years.

Fifteen New Zealand orchids are depicted in Cheeseman's *Illustrations*, often two to a page. All are monochrome lithographs, and shown in the figure is the rare bulb-leaf orchid, *Bulbophyllum tuberculatum*. The only New Zealand orchid illustrated in colour by Smith and Fitch appeared with a paper by J.D. Hooker in Curtis's *Botanical Magazine*.[3] It is *Caladenia catenata*, the white-flowered form grown at Kew from an Australian specimen, and the illustration of the pink form taken from Hooker's *Flora Tasmaniae*.

References

1. Blunt W. *The art of botanical illustration*. London, Collins, 1950. p 242.
2. Cheeseman T.F. *Illustrations of the New Zealand flora*. Government Printer, Wellington, 1914. Preface, p 4.
3. Hooker J.D. *Caladenia carnea*. Curtis's Botanical Magazine. Vol 54 of the 3rd Series, 1898. t7630.

Historical reprint

I came across a little gem in the Wellington Library recently - *Plant life in Maoriland* by Marguerite Crookes MA, published by Whitcombe and Tombs in 1926; reproduced below is the section on *Earina autumnalis*. Was this fulsome, resolutely patronising and irrepressably daffy prose really the educational fashion of the time, or did she sound just as silly then as she does today? For those with the stamina, I have available a further section on *Pterostylis banksii*.

A Winter Blossom

At a time when the bush is almost flowerless, when the winter sunshine falls upon a world of green, lit only by orange or scarlet berries, it is a surprise as well as a delight suddenly to find, springing from branch or cliff, sprays of white flowers as delicate, fragrant and ethereal as anything with which the summer can provide us. For the Raupeka (Earina suaveolens) may justly claim to be one of the most exquisite of our New Zealand blooms. It is an orchid, and, like all orchids, has a flower which is strange and interesting as well as beautiful, for this family contains some of the most amazing and complicated flowers in the world. Even our little Raupeka, which is a comparatively simple orchid, turns out on examination to be an extremely ingenious arrangement.

An Insect Helper

Now we all know that flowers exist for the purpose of seed making. But before seed making can take place the flower must be pollinated, that is to say, some of the yellow dust called pollen must be transferred from a particular part of one plant to a particular part of another. (Sometimes a flower is pollinated by its own pollen, but this is not usual, pollen from another flower generally being necessary to produce healthy seed.) The pollen is most frequently transferred from flower to flower by insects or the wind. Now, let us consider the charming little cream and yellow flower of Raupeka and see how it solves the pollination problem. It is impossible to give full details because the flower is somewhat complicated, but what happens is something like this. An insect visitor

alights upon a protruding petal known as the lip, and ornamented with two bright yellow spots. Having settled itself it proceeds to investigate matters by poking its head down into the heart of the flower. Here it comes upon some pleasant-tasting liquid which the flower has provided for it. But the flower does not feed it for nothing. Oh, no! that nice little meal is "for service rendered," and the flower takes very good care to see that the service is performed, as we shall see. Having finished its meal, the insect proceeds to "back out" of the flower, and in so doing it strikes its head against two small projections. Now in an ordinary way nothing might happen, but the plant has already taken the precaution of smearing the insect with a sticky material so that as soon as it comes into contact with these projections they become securely "gummed on" to it. Now these projections are nothing less than the tiny stalks of balls of pollen, which are thus drawn away by the insect. And the flower contrives by a very clever little mechanism that these little pollen balls shall stick on just that part of the visitor's back which will bring them into contact with the right part of another flower, thus fertilising it.

A Living Reservoir

Turning now to the roots of Raupeka, we find them no less interesting than the flowers, since they show such ingenious adaptations to its somewhat elevated situation. Now light is essential to green plants, and since the floor of the bush is extremely shady and Raupeka is rather small, it obviates the difficulty of a light shortage by leaving the ground and perching in some well-lit crevice on branch or cliff. But having solved the light difficulty, our Raupeka is now confronted with the food and water problem. In its enterprising search for sunshine it has abandoned the abundant supplies of nourishment which

would have been ready to hand on the ground below. Well, Raupeka overcomes all these apparently formidable difficulties, in the first place by collecting every available scrap of food or drop of water that comes its way, and, in the second place, by very carefully conserving and storing its supplies. In the nooks and crevices where it perches there is always a certain amount of decaying vegetable matter to begin with, and as it develops Raupeka sends forth a considerable quantity of roots in whose meshes any additional scrap of decaying moss or lichen that falls upon it may be retained to augment the existing food supply. But all this would be useless to Raupeka were it not for the remarkable manner in which it has modified its roots to make a little go a long way.

It has two kinds of roots. (1) "Ordinary" roots, which serve to clamp it firmly into its position on rock or tree; (2) absorbing roots which are specially adapted to secure anything and everything practicable in the way of food. Now the roots of plants living on the ground do not absorb water all over their surfaces, but only through special hairs situated near the root tip. Supplied only with roots of this type, Raupeka would certainly starve. So it proceeds to alter some of its roots so that they can absorb water all over their surfaces. If we examined them under the microscope we should see that for this purpose each root is provided with a band of spongy tissue consisting of about five layers of cells completely enveloping the root. From the outer layer of this spongy tissue project numerous hairs that help to absorb moisture. This spongy tissue consists of dead cells, which are mostly empty, but here and there among them are cells with specially thickened walls which serve to give rigidity to the tissue, and may also act as water vapour condensers. It will be seen at once that this spongy tissue is excellently adapted to soak up with great rapidity any moisture that falls upon

the surface of the roots. But, the reader may think, suppose a shower of rain were followed by strong sunshine, would not the water very speedily be dried out of the absorbing tissue If it remained in these outer layers it certainly would, but it is immediately transferred to the inner part of the root. Just below the spongy tissue there is a layer of cells that most effectively protect the interior of the root from loss of moisture, because it is impervious to water. However, at certain intervals in this layer are cells that admit the passage of liquid, and it is through these that any moisture absorbed by the spongy tissue passes through into the interior. On the top of each of these cells there is a very curious arrangement, which consists of a cell so filled with strands of a hard material as to be almost solid and containing only a small passage for water. It is believed by some scientists that these cells act as water vapour condensers. However that may be, such cells would certainly act as a most efficient vegetable stopper in case the plant should desire to cut off communication between the inner part of its roots and its absorbing tissue. So we see that once water is absorbed and passed to the inner part of the root it cannot be "dried out" again, since it is protected by a layer of cells that is always partly, and may become completely, waterproof.

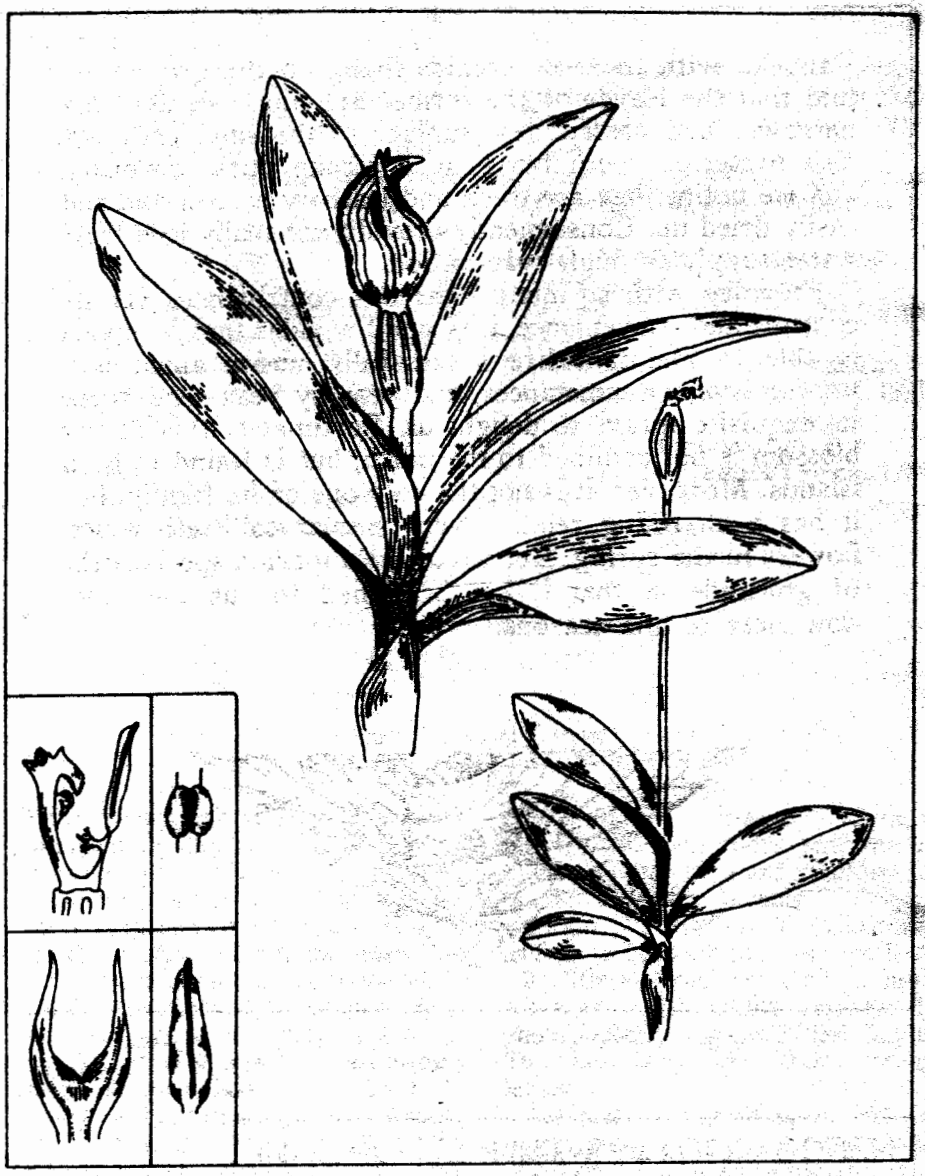
Additional Precautions

We find then that these roots absorb the maximum amount of water in the minimum amount of time, and while bringing about the entry of all available water into the tissue have a very effective method of preventing it getting out again. But all these contrivances would be of little use to Raupeka if too much water was evaporated through its leaves. Now if we compare the leaves of

Raupeka with those of orchids living on the ground we find that the leaves of the former are much smaller and narrower and present less surface to the sun. They are also protected from harm by a strong outer covering, and we notice they are thick and leathery to feel and not easily dried up. Consequently they do not really lose their water supply through evaporation.

Provided with so many ingenious contrivances for its comfort and convenience, it is small wonder that Raupeka is able to maintain life successfully under apparently unpromising circumstances, and year by year send forth its exquisite sprays to delight us. Fortunately this dainty blossom is not confined to the north, but is found in both islands. Moreover, it is not the only one of its family, but it has a charming relative very similar to itself which flowers in the spring. But we owe Raupeka a special debt of gratitude in that it has beautified for us the most flowerless of the seasons.

NZNOG stickers are available from the Editor at $10 per hundred. Help others to become aware of the Group, and thus to begin to cherish our native orchids.



***Pterostylis humilis*, drawn by Dan Hatch**