



Editor: Ian St George, 22 Orchard St, Wadestown, Wellington;  
phone 04 4994227, fax 04 3895725, Email pgradisg@wmmeds.ac.nz

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

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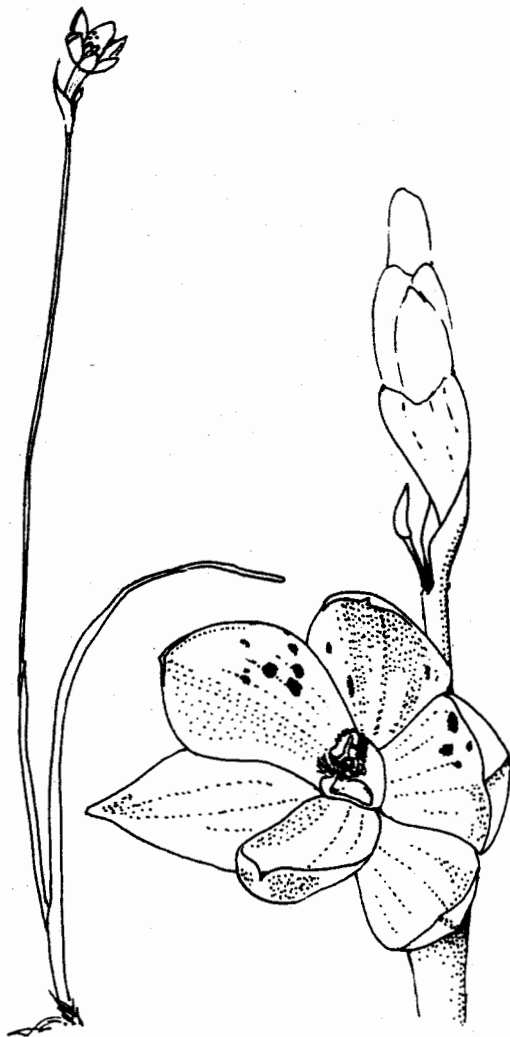
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*Thelymitra* aff. *ixioides* from Waihaha, west of Taupo.

Compliments for the festive season to **AZAOBJ** readers

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## Editorial

### Back to basics: I – Jurassic park

If you are ever down in the Catlins, southeast Otago, and you travel west towards Invercargill, you will see a sign pointing to Curio Bay. It's well worth a visit – the stone stumps, fallen logs, and occasional fossil leaves of kauri-like trees petrified on the shore are relics of the Jurassic period. It began 180 million years ago – dinosaurs ruled the land, the air was loud with the harsh shrieks of pterodactyls, and the vegetation was dominated by ferns, cycads, mosses and conifers. It ended 140 million years ago with the demise of the dinosaurs, perhaps by the dust from major meteorite impact obscuring the sun, wrecking photosynthesis, and reducing plant food. Perhaps.

New Zealand's ancestral landmass, along with early India, Australia, Africa, South America and Antarctica, had formed the great continent of Gondwana, and in Jurassic times this enjoyed a temperate climate, hospitable to the kauri, frogs, ferns, tuatara and kiwi that shared it.

At the start of the Cretaceous period, about 140 million years ago, the great landmass split, and ancestral New Zealand formed a part of West Gondwana. The first Angiosperms are thought to have evolved in the West Gondwana rainforests, and the sequence of split-up of the continent determined where families of ancient flowers were established. Lilies were formed, and later, perhaps 80-100 million years ago, the first terrestrial orchids.

The Tasman Sea opened up 60-80 million years ago, setting New Zealand

adrift from Australia, along with its West Gondwana plants, among them some primitive orchids.

By the Eocene epoch (54-38 million years ago) flowering plants and insects were diversifying rapidly. In Australia they formed the unique plant-insect pollination partnerships seen today. In New Zealand few such partnerships developed, and most of our orchids adapted to self-pollination.

Later windborne seed from Malaysia and Australia made effective landfall here, sometimes accompanied by the necessary pollinating insects.

This is all semi-literate guesswork of course – no orchid fossils have been found in any parts of old Gondwana. Two plant fossils thought to be orchidaceous were found in Eocene rock in Italy – *Protorchis monorchis* and *Palaeorchis rhizoma* – and orchid fruit from the Pliocene (2.5-10 million years ago) have been found in Germany.

So where does that leave us? Ancient orchids from West Gondwana were part of our plant heritage when we broke free 60-80 million years ago, and since then more have arrived on the westerlies. A bit ho-hum really.

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**TABLE: Geological time and the development of orchids (after Adams [1])**

Epoch	Million years ago	Events
Pleistocene		<i>Homo erectus</i> evolves.
—2.5		
Pliocene	4.4	Oldest fossils of primitive man.
—10		
Miocene		Peak expansion of orchids.
—27		
Oligocene		
—38		Diversification of orchids, flowering plants (and associations with insect pollinators in Australia).
Eocene	54	Development of different forest types.
—54		
Paleocene		
—66		Tasman Sea separates Australia & New Zealand.
Upper Cretaceous		Origin of major orchid groups (early types) - epiphytes and lithophytes. Mammals appear.
—110		Origin of early terrestrial orchids.
Lower Cretaceous		Origin of lilies.
—140		
Late Jurassic		Origin of flowering plants in West Gondwana rainforests. Conifers, ferns, cycads, mosses. Dinosaurs succumb.

## THIRD AUSTRALASIAN NATIVE ORCHID CONFERENCE AND SHOW

at Flinders University in Adelaide 26-30 September 1996

"It will be a tremendous event and we promise a great time for all who attend.... We are hoping to be able to present the largest and most spectacular display of native Australasian orchids ever staged; one that will be talked about for years to come".

There is a *raffle* (tickets \$1) for a bound copy of WH Nicholls's original three volumes of *Orchids of Australia*. Your editor has raffle tickets, instructions for the poster display, forms for exhibitors, entry forms for the photographic competition, and conference registration information.

## Back to basics: II – evolution and structure

### Evolution

There have been some key evolutionary changes (Great Forward Leaps, or GFLs) that provided such a competitive edge that they guaranteed success for plants or animals that possessed them.

For instance there crawled out of some ancient lagoon a salamander-like creature that had evolved from a fish. From its two ventral and two anal fins it developed four very special limbs, each with one bone emerging from shoulder or hip, then two for rotation, then a series of small ones for complex movements, then five hinged digits for grasping.

This creature was so capable, compared with its competitors, that it would give rise to all the reptiles, birds and mammals that ever inhabited the earth. The five-digit limb would reach an advanced state as the seal's flipper, the bat's wing, the whale's tail, the horse's hoof, the pig's trotter, the cat's paw and the human hand.

Flowering plants similarly took GFLs, two of which were to provide such a competitive edge that they would give rise to all the orchids that inhabit the earth.

### A few terms first

But let's stop and define some terms (source: Moore & Edgar. *Flora of NZ* Vol 2, 1970).

**sepal:** one part of the outer, usually greenish whorl (called the calyx) of flower parts.

**petal:** one part of the inner, usually

showy whorl (called the **corolla**) of flower parts.

**anther:** the pollen-bearing part of the male organ, along with the supporting stalk forming **stamen**.

**stigma:** the receptive part of the female organ; along with the ovule-bearing **ovary** forming the **carpel** (stigma and ovary connected together by a **style**).

### The GFLs

The first Great Forward Leap by the ancestral monocotyledon was the development of five concentric whorls of flower parts – three sepals outside three petals, outside six stamens, outside three carpels. Lilies retain six stamens and three joined stigmas (Fig 1).

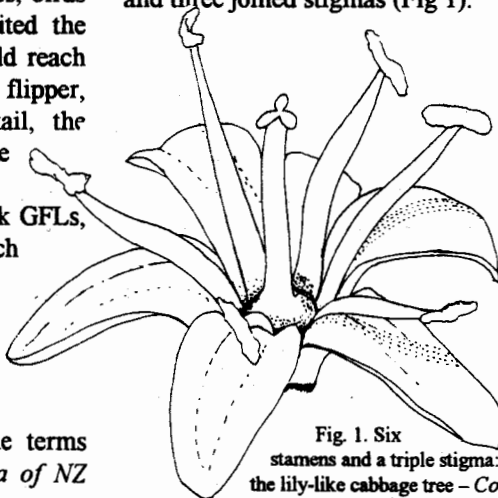


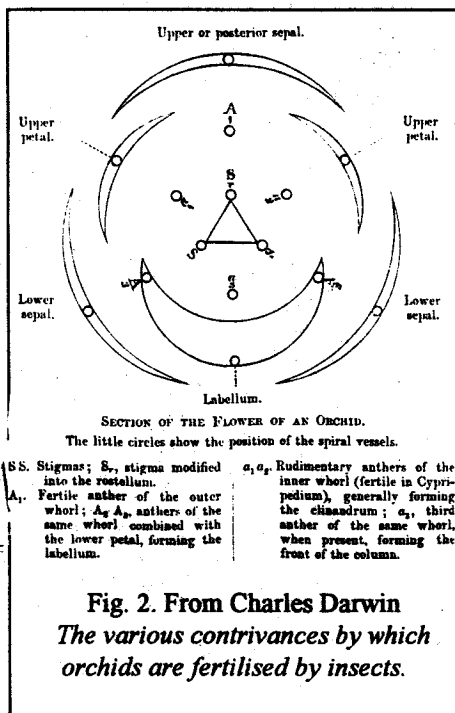
Fig. 1. Six stamens and a triple stigma: the lily-like cabbage tree – *Cordyline*

The second GFL by the ancestral orchid was the modification of most of the carpels and stamens into a single structure called the **column**.

Darwin illustrated this arrangement, (Fig. 2). Three sepals enclose three petals, but now the lowermost petal includes vestiges of two anthers, and is enlarged to form the **labellum**). The petals in turn enclose the column.

The column of NZ orchids has a single fertile anther (unstalked stamen), and two **column-wings** formed from **staminodes** (two other barren stamens).

Two of its three stigmas form a double-lobed stigma, with the third sterile and modified into a **rostellum**.



The **stigma** is connected to a single ovary (derived from three and thus three-lobed) by the style.

Sticky material on the rostellum forms the **viscidium** (viscid disk), often attached by a thin stalk, or **stipe** to the **pollinia** (aggregated pollen).

Just as when you lie face-down you are prone, so when you lie face up you are supine. Orchid flowers usually twist during the bud stage to be face-up – i.e. are **resupinate**. Those, like *Prasophyllum* that keep their labellum uppermost (facing down) are not called prone, but are called **nonresupinate**.

Just as each of your feet has a left and a right side, so each also has a **dorsal** (top) and **ventral** (sole) “side”. A shark has a dorsal fin on top. In a flower too the dorsal is above, hence the **dorsal sepal** is topside in resupinate orchid flowers.

### A few more orchid nouns

**auricle**: an ear-shaped structure.

**bract**: a modified, usually much reduced leaf (when associated with the flower, is a **floral bract**).

**callus**: a thickened, often hardened part.

**cauda**: a tail (caudate = tail-like).

**cilium** (plural **cilia**): eyelash-like hair.

**claw**: the narrowed stalk-like base of a petal or sepal – in orchids usually of the labellum, attaching it to the **column-foot**.

**fimbria**: fringe (fimbriate = fringed).

**galea**: hooded part of flower – in *Pterostylis* the fused dorsal sepal and lateral petals.

**gland**: a secreting organ (not just a swelling, as it is often misused).

**habit**: the general appearance of a plant

**inflorescence:** a collection of flowering parts.

**internode:** the distance between nodes on an axis.

**lamina:** a thin flat part, usually the blade of a leaf.

**nectary:** a gland secreting nectar.

**node:** a place on a stem marked by the attachment of one or more leaves.

**papilla:** pimple (papillose = pimply).

**pedicel:** the stalk of an individual flower in a compound flower.

**peduncle:** the stalk of a solitary flower or the main stalk of a compound flower (pedunculate = stalked thus).

**perianth:** the whole flower.

**petiole:** the stalk of a leaf (petiolate).

**placenta:** the part of an ovary where the ovules are attached.

**pseudobulb:** the thickened part of an aerial stem, e.g. in *Bulbophyllum*.

**raceme:** an unbranched inflorescence with stalked flowers.

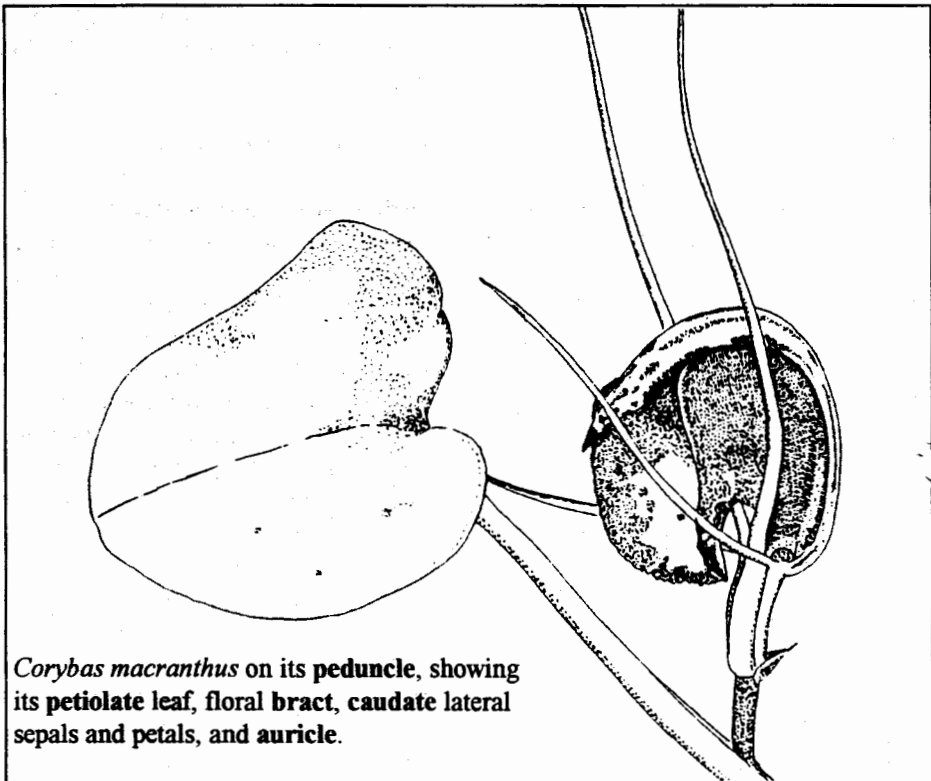
**rhizome:** an underground stem.

**scale:** a small leaf-like part.

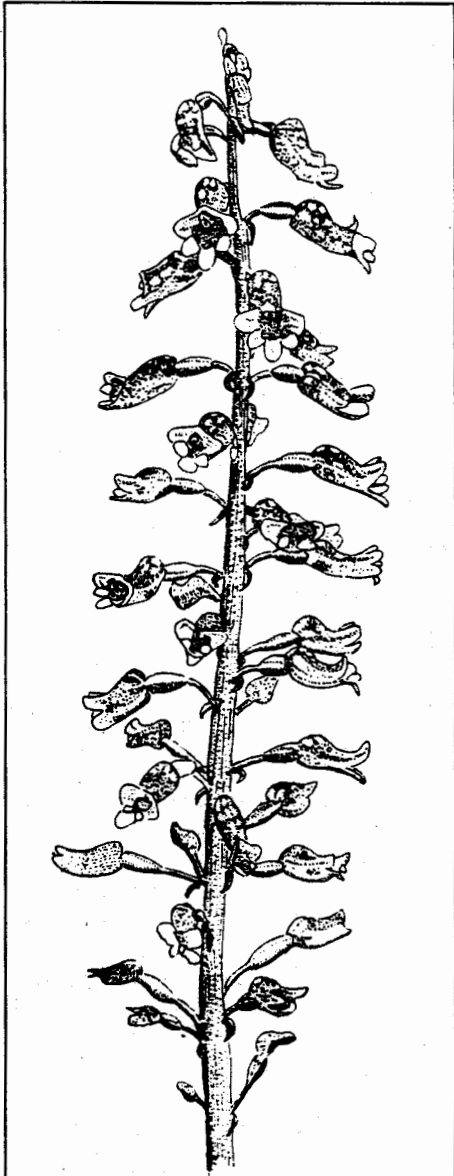
**spike:** an unbranched inflorescence with unstalked flowers.

**tepal:** a sepal or petal.

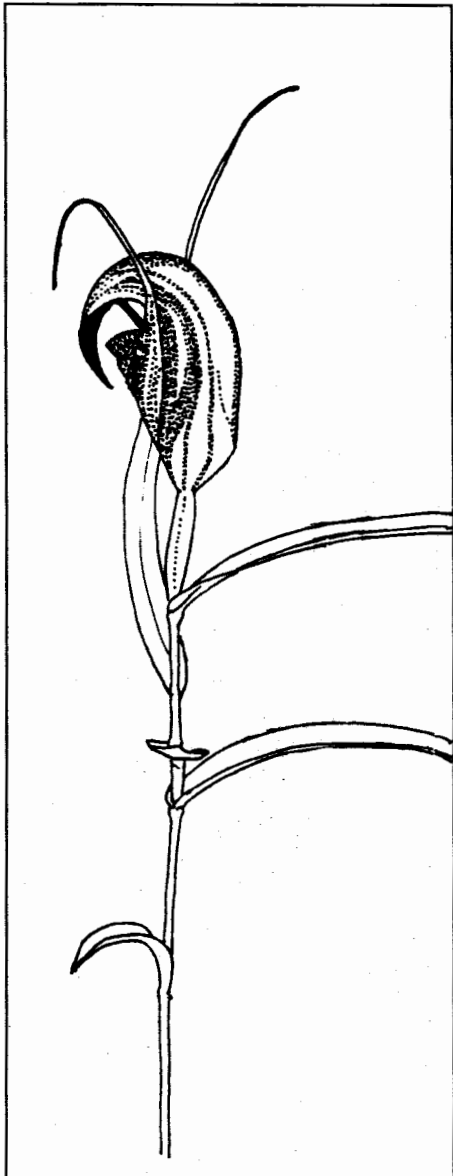
**tubercle:** a little nodule (tuberculate = lumpy).



*Corybas macranthus* on its peduncle, showing its petiolate leaf, floral bract, caudate lateral sepals and petals, and auricle.

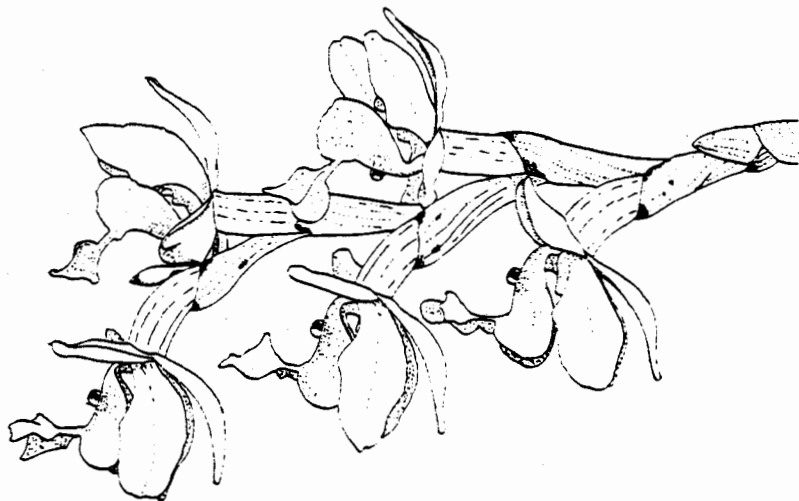


The flower spike of *Gastrodia cunninghamii* on its peduncle, showing scale leaves and tuberculate flowers



The leaves of *Pterostylis brumalis* arise from nodes on the peduncle: caudate lateral sepals rise above the galea





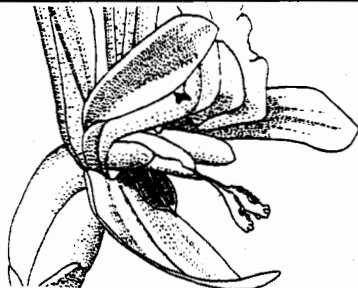
A raceme of *Earina mucronata* flowers, each on its own pedicel.



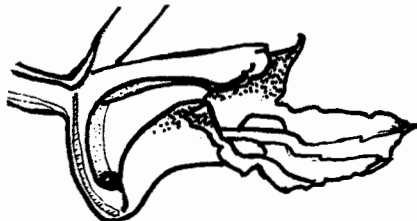
Column-arms of *Thelymitra hatchii* bear cilia



Those of *T. pulchella* bear fimbria

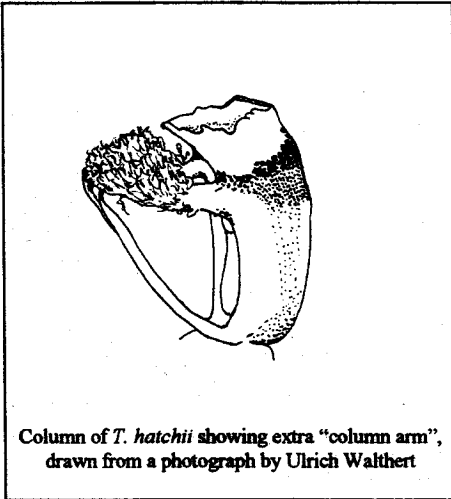


*Prasophyllum* "aff. *patens*" column has its pollinia displaced but still attached by a stipe to the rostellum; the anther-cap is empty, and the two prominent column-wings can be seen as vestigial sterile stamens, or staminodes



The labellum of *Dendrobium cunninghamii* is attached by a claw to the column-foot.

## Back to basics: III – abnormal structures

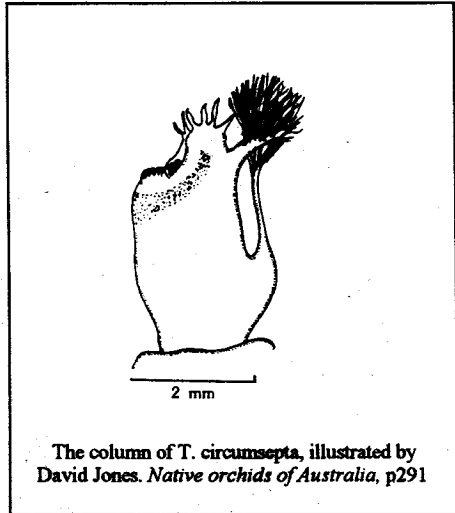


Ulrich Walthert, a Westland photographer, produced a calendar some years ago showing his photographs of native orchids. Among them was one of *T. hatchii* showing an extra column lobe.

Bruce Irwin wrote, after reading the paper on *Thelymitra ixioides* and *T. circumsepta* reviewed in *Australian notes* in this issue, "Actually I'm puzzled by the apparent absence of *T. formosa* from Australia. Quite a number of *T. formosa* in the North Island possess the extra column lobe of *T. circumsepta* though they seem always to retain the stronger colours of *T. formosa*. The two species must be very closely related".

Bruce added, "I have seen extra column arms variously developed in *T. hatchii*, *T. 'pseudopauciflora'*, *T. 'rough leaf'*, *T. aemula*, *T. tholiformis* and *T.*

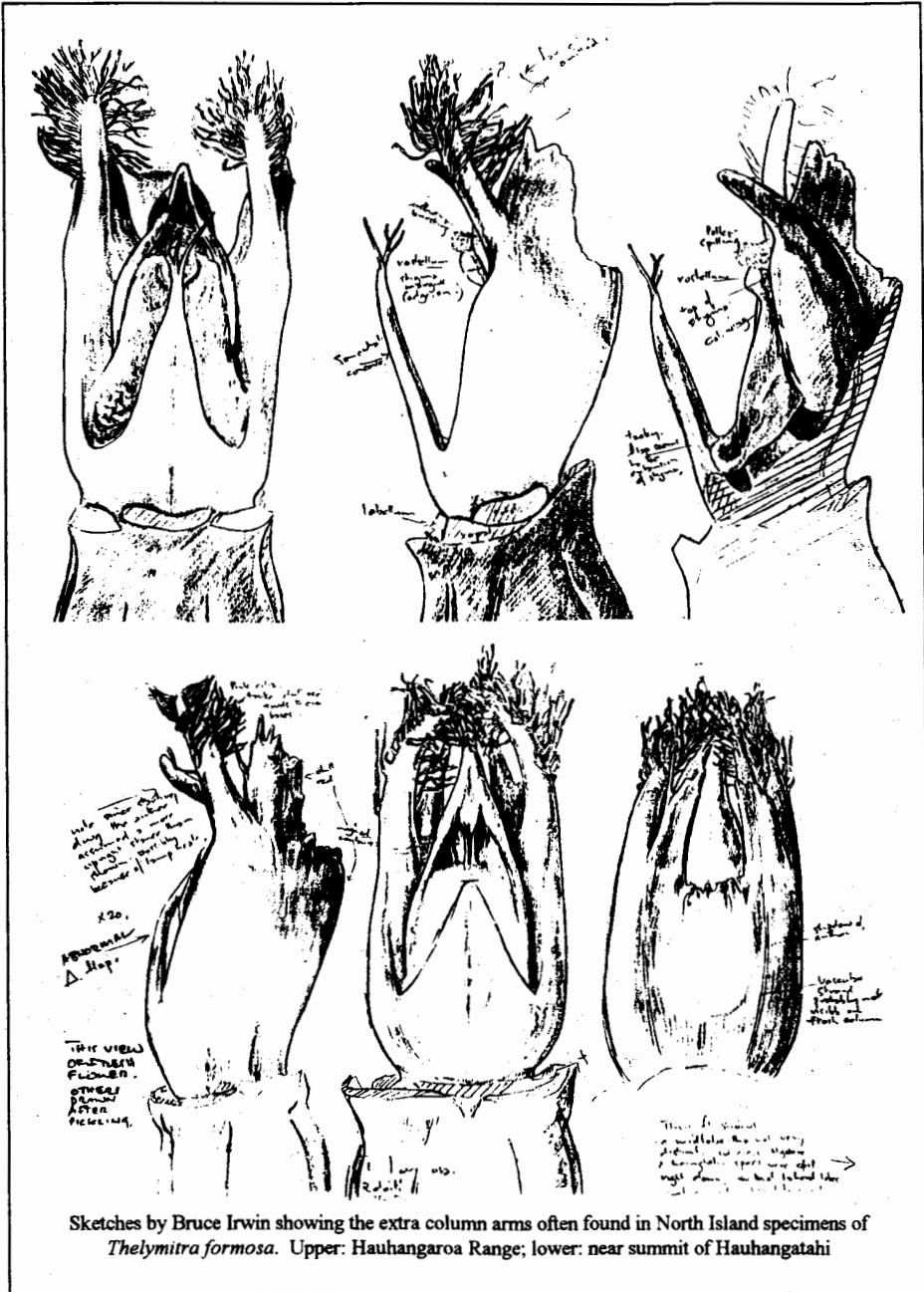
*formosa*. Usually it is a simple triangular structure, notched in *T. aemula*, and sometimes elongated in *T. hatchii* and *T. formosa*".

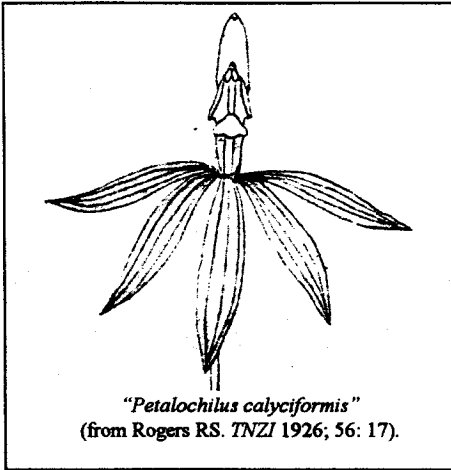


That extra arm is interesting in evolutionary terms.

One "proof" of the evolutionary origin of a structure is the occasional reversion to a more primitive form. For instance a colony of *Caladenias* in Northland was found with labella similar to the other petals and sepals – "proof" that the labellum was once just another petal. The colony was mistakenly thought to be a new genus, and was called *Petalochilus* by RS Rogers in 1924.

Jean Jenks told me several years ago that she had found in South Otago a colony of *Aporostylis bifolia* with petaloid labella.





"*Petalochilus calyciformis*"  
(from Rogers RS. *TNZI* 1926, 56: 17).

Dan Hatch wrote in 1949 (*From Hatch E.D. Petalochilus and the NZ forms of Caladenia. TRSNZ; 77:398*) -

"...The undifferentiated labellum (of *Petalochilus*) is not of itself important. The specialised labellum of the average orchid is a petal adapted to the requirements of pollination. When that function is taken over by another organ as happens in *Petalochilus* (and *Thelymitra*), the labellum falls into disuse and thence into decline, reverting in this instance to its original petaloid condition. *Petalochilus* then appears to be retrograde to *Caladenia* rather than the representative of a primitive form. Nicholls (*Victorian Naturalist* 1945; 61:207 figs.k,l,m) has demonstrated that *Caladenia* could give rise to such a form as *Petalochilus*. He describes a couple of teratological specimens of *Caladenia menziesii*, in which the labellum has become petaloid, although still retaining vestigial calli, and the column-wings have fused to form a

cavity embracing the lower two-thirds of the column. The staminoid appendage, which distinguishes *Petalochilus* is, however, absent in these *Caladenia* specimens. *Calochilus imberbis* is another example of a petaloid labellum in a genus which normally has a most complicated labellum".

It happens to people too - the commonest "birth defect" in humans is partial "syndactyly" - part joining of the fingers or toes by skin - an incomplete reversion to a primitive flipper-like hand or foot whose digits were fused together. Curiously enough this anomaly is common among Rwandan mountain gorillas, and there it has been attributed to consanguinity as the gorilla population shrinks and the gene pool diminishes.

The primitive orchid *Neuwiedia* still has three fertile stamens (see figure).



*Neuwiedia* flower, drawn by P. Fawcett (from van der Pijl & Dodson)

In these *Thelymitras* (remember? we were talking about *T. hatchii*, *T.*

*formosa* and *T. circumsepta*) the front of the column appears to have elongated – suggesting that that part of the column was originally a separate structure. It was indeed separate – it was a stamen. The column-wings in many orchid species are called staminodes to indicate their origin, and, as Dan Hatch points out (see his paper which follows), a third stamen is confluent with the front of the column where it sometimes appears as a staminoid appendage.

(If you were to remove the column-arms and the anther and stigma, that staminoid appendage would make the “mitra” of the *Thelymitra* even more like the bishop’s mitre after which it was named.)

Certainly, as Bruce Irwin pointed out, the extra arm would seem to hinder insect pollination. Oh no! Could this “birth defect” be a symptom of habitual self-pollination (“consanguinity”) in these self-pollinating *Thelymitras*?

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## Back to basics: 4

### - the structure of the orchid flower in New Zealand

by ED Hatch, a paper commissioned by the editor, and updated June 1995

*This note was first published in the Newsletter of the Auckland Botanical Society in 1964 [1] and was based on Darwin's theory [2]. I have altered this version slightly and updated it.*

The monandrous orchid flower is peculiar because it is adapted for cross-pollination by specific insects. There are as many flower variations as there are insect types to pollinate them. Wasps, flies, bees, ants, moths, spiders and chewing beetles are all catered for. The attraction is centred in the middle petal (labellum) and may be perfume, colour or nectar, or perhaps edible calli. Sometimes the labellum assumes the form of the insect concerned, and near-mechanical devices, traps and pitfalls are not uncommon. The pollinating mechanism of our native orchids has been largely evolved outside New

Zealand and the local insect fauna is not sufficiently diverse to do it justice. Consequently there is a strong secondary tendency towards self-pollination or even cleistogamy (self-pollination within the unopened flower).

The flower of the orchid is basically liliaceous, but the relationship is often hard to trace. The ovary is inferior, i.e. below the flower; is ribbed, and opens by longitudinal slits. This is a useful point of identification. We may imagine the hypothetical orchid ancestor as having three sepals, three petals, six stamens in two whorls, and a single style with a tri-fid stigma. The fusion of four of the stamens with the already confluent styles would seem to have developed in different ways to produce different groups of orchids, but in all of them it would appear to have

preceded the specialised perianth. With the organs of reproduction in confluence, normal pollination became impossible, and the next logical step in the flower's development was the modification of the abaxial segment (in this case the middle sepal) to form a landing stage for insects. But the middle sepal, being an outer covering segment, could not lend itself to the delicate modifications which eventually took place, so the ovary became twisted through  $180^\circ$  to bring the middle petal (labellum) into the abaxial position, where it could be more easily adapted to the formation of nectaries and calli and the finer shades of colour and form. At the same time the middle sepal came round into the dorsal position where by reason of its heavier texture and protective nature, it could serve as an awning over the anther. The modification of the labellum was completed by its fusion with the two remaining free stamens. Most orchids begin with the flower in its original position and the ovary twists during development. In *Prasophyllum*, *Genoplesium* and *Gastrodia* the flower is inverted with the labellum uppermost – actually the right way up! Has the ovary in these species not twisted at all? Or has it twisted through the whole  $360^\circ$  and so come back to its starting point?

All the New Zealand orchids belong to the subfamily *Orchidoideae*, which has only one fertile anther and two fertile stigmas. The structure of such a flower may be summarised as follows.

Theoretically there are 15 segments in five whorls of three. In each whorl two

of the segments are paired and the third is usually different in form or function or both.

**Whorl 1:** three styles, each capped by its stigma, confluent to form a single structure (column) in the centre of the flower. Two of the stigmas are paired and combine to form the stigmatic plate on the front of the column. The third stigma, or a portion of it, appears to be modified to form the rostellum at the top of the column.

**Whorl 2:** three stamens, two of them paired and confluent with the sides of the column to form the column-wings (very prominent in *Thelymitra*, where they supersede the insect-attractive function of the labellum), the third stamen confluent with the front of the column where it sometimes appears as a staminoid appendage. (*Th. hutchii*, *circumsepta* etc.)

**Whorl 3:** three stamens, two of them paired and confluent with the labellum to form the various labellar calli, the third (the only fertile stamen in the subfamily *Orchidoideae*) usually confluent (but not in *Thelymitra*) with the back of the column and carrying the two-celled anther, which overtops and usually rests on the rostellum. (In *Pterostylis* the two paired stamens of this whorl do not usually enter the labellum proper but appear as the ciliate processes of the labellar appendage, or sometimes produce labellar calli (*Pt. irsoniana*). In *Thelymitra* they are included in the front edges of the column-wings and finally extruded as the cilia of the secondary lobes).

**Whorl 4:** three petals, two of them

similar, the third (labellum) rarely similar (*Thelymitra*, *Petalochilus*), usually much modified to form an attractive landing-stage for insects.

**Whorl 5:** three sepals, two of them similar, the third (dorsal) sometimes similar, usually much enlarged, its main purpose being to canopy the anther.

Most orchid genera are subject to reversion and odd ancestral features, free stamens, petaloid labella etc. may be found from time to time. Such are as a rule infertile and their peculiarities die with them. Once in a while however, these mutations do not interfere with the

reproductive processes and we get forms like *Petalochilus*, which become quite abundant until man interferes with the habitat. Ordinary malformations are also common. Repressed or enlarged organs, twin labella, petals etc, double or multiple flowers. These are often due to insect or fungus diseases or to purely mechanical causes.

#### References

1. Darwin C. *The various contrivances by which orchids are fertilised by insects* p236 (1904)
2. Hatch E.D. Auckland Botanical Society Newsletter p2 November (1964)

## *Gastrodia cunninghamii* and *Gastrodia orobanchoides*

by Ian St George

Although the *Index Kewensis* noted in 1893 that *Gastrodia cunninghamii* and *G. orobanchoides* Mueller from the New Hebrides were identical, Lewis & Cribb (in their *Orchids of Vanuatu* 1989 [1]) claimed the latter as a new synonym for the former. J. Renz also mentioned a *G. orobanchoides* in Nasir & Ali's *Flora of Pakistan*, 1984 [2]. What is the history?

**1847** Falconer found a Himalayan orchid that he thought looked like an *Orobanche* so he called it *Gamoplexis orobanchoides* [3].

**1853** JD Hooker described *Gastrodia cunninghamii* [4]. William Colenso thought it looked like an *Orobanche*, so he wrote (in 1884), "It is leafless, and has a strange appearance, reminding one at first sight of the larger British species of *Orobanche* (Broom rape)" [5].

**1873** the Rev. Fraser collected an orchid on the island of Eromanga (now part of Vanuatu, but then the New Hebrides) and sent it to Melbourne to Ferdinand von Mueller who thought it was a *Gastrodia* and looked like an *Orobanche* – so he called it *Gastrodia orobanchoides* [6]. The specimen is in the herbarium at Melbourne. Von Mueller would not have known of the Himalayan species, for it was not until ten years later, that in

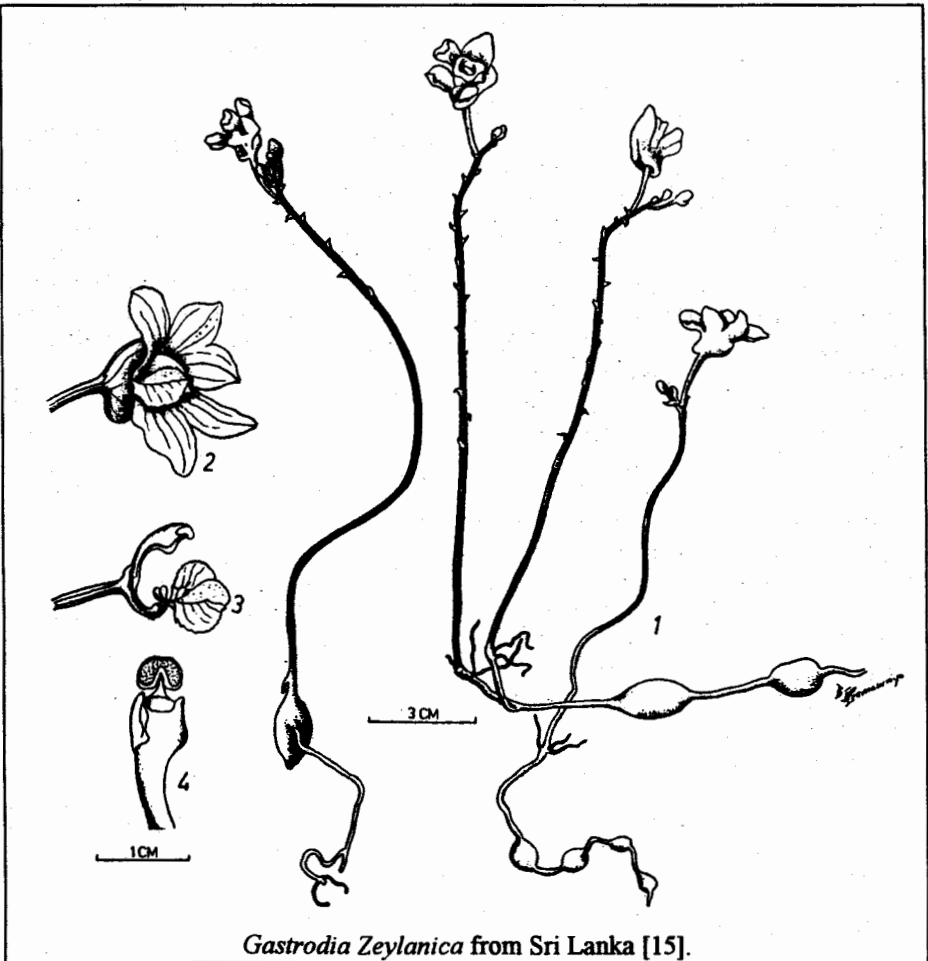
**1883** Bentham saw that the Himalayan plant was a *Gastrodia*, and it became *Gastrodia orobanchoides* (Falc.) Benth. [7]. A careful illustration by S. Hameed [2] (reproduced in NZNOG *Journal* 51: 5) shows a long column and a plant that is quite unlike *G. cunninghamii*. There are thus two species involved. Von Mueller's name would have become invalid in

1883, and in any case, in 1893 *Index Kewensis* identified *G. orobanchoides sensu von Mueller* as *G. cunninghamii*, and in 1989 Lewis & Cribb [1] followed suit.

New Zealand has two *Gastrodia* with a long column (*G. aff. sesamoides* and *G. "long column"*), and two with a short column (*G. cunninghamii* and *G. minor*). The only record of a *Gastrodia* with a short column outside New

Zealand is that single specimen from Vanuatu.

Lewis & Cribb did write, "More information is needed on this species in Vanuatu", and now more information is available. David Jones has examined the Melbourne specimen in Canberra. It is not a *Gastrodia* but a *Goodyera*, a different genus entirely (D. Jones, *personal communication*).





All the Australian *Gastrodia* (seven at last count [8]) have long columns, as do *G. elata* in China [9]; *G. gracilis*, *G. nipponica*, *G. verrucosa*, *G. elata*, *G. javanica* in Japan [10, 11]; *G. dioscoreirhiza* in Taiwan [12]; *G. javanica* (*syn. G. malayana*) and *G. zeylanica* in Sri Lanka [13, 14, 15]; *G.holttumii* and *G. verrucosa* in Malaysia [13, 16, 17]; *G. papuana* in Papua New Guinea [18]; and *G. javanica*, *G. hasseltii*, *G. callosa*, *G. crispa*, *G. abscondita* and *G. verrucosa* in Java [19]. (According to Jones, *G. sesamoides* has become naturalised in South Africa after "accidental introduction" in 1944 [20]).

I have not found descriptions for all of the *Gastrodia* listed in *Index Kewensis* – some may have been renamed. The *Index* includes *G. exilis* (Khazia: 1895), *G. shikokiana* (Japan: 1895), *G. africana* (Africa: 1900), *G. dyeriana* (Himalaya: 1900), *G. viridis* (Japan: 1905), *G. celebica* (Sulawesi: 1915), *G. mairei* (China: 1915), *G. siamensis* (Thailand: 1925), *G. grandilabris* (Borneo: 1935), *G. lutea* and *G. taiwaniana* (Taiwan: 1935), *G. boninensis* (Bonin islands, Japan: 1940), *G. hayatae* (Thailand: 1950), *G. madagascariensis* (Madagascar: 1950), *G. taiensis* (Thailand: 1950), *G. crassisejala* (PNG: 1960), *G. augusta* (China: 1985), *G. arunachalensis* (India: 1985), *G. flabilabella* (Taiwan: 1985), *G. shimizuana* (Japan: 1985), *G. tuberculata* (China: 1985), *G. autumnalis*, *G. fontinalis*, *G. hiemalis*, *G. peichatieniana* (Taiwan: 1990).

No *Gastrodia* are listed from New Caledonia [21], the Solomons [22], or from Tonga, Fiji, Niue and Samoa according to the appropriate Floras.

*G. sesamoides* is pollinated by a small native bee in Australia [20]. *G.* "long column" appears to be self-pollinating by its flowers turning upward on the stem as they mature, allowing pollen to fall onto the stigma (B. Molloy, *personal communication*). The short columns of *G. cunninghamii* and *G. minor* place the crumbly pollinia squarely onto the stigma – an insect would not be able to get between them to change this obligate self-pollination.

Did the long-columned species drift around from Africa, Madagascar, Sri Lanka, India, Pakistan, the Himalayas, China, Japan, Taiwan, Borneo, Indonesia, Sulawesi, Thailand, Malaysia, PNG, Australia to New Zealand? Was New Zealand the ancestral home of the short-columned *Gastrodia*, the mutation enhancing its self-pollinating ability to the extent that *Gastrodia cunninghamii* and *G. minor* would become highly successful here?

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## More curious capers recorded by the *Corybas* crawlers' columnist: Eric Scanlen

### 1. Ngunguru, *Corybas rotundifolius* and all that

It being the middle of winter and wet with it, seven hopelessly hooked NZnoggers travelled from as far as New Plymouth to join one of Allan Ducker's celebrated expeditions on 7 July, this time to ferret out *C. rotundifolius* at Bratty's Reserve, 2 or 3 km west of Ngunguru. "Hopelessly hooked" might seem a bit harsh but why else would anyone go so far, to lie in the leaf mould and the rain just to gaze upon a diminutive plant that fits life sized onto a 35mm slide?

A break in the journey at Eaves Reserve in Orewa, to a chorus of tuis, showed the symbiotic value of seven pairs of eyes. Seven species in flower were quickly identified (see Table) near

the ridge top on this old Maori pa site. Cameras and dirty knees at once became evident.

The muddy kneed ragamuffins did not improve NZNOG's image at a shopping stop in Wellsford including a footpath encounter with an immaculately clad Minister of Education.

After establishing itself at Muriel Blumhardt's bach at Langs Beach, the party first pored over massed *Drymoanthus adversus* on totara by the road then it spread out along the ridge at Bream Tail Reserve where native orchids are plentiful. Twenty four species have been counted by Allan and it doesn't include *Pterostylis brumalis*, possibly because of the paucity of its

close associate, the kauri. Six species were in bloom this Friday, and there were some surprises which got the cameras flashing or rolling as the case may be, including:

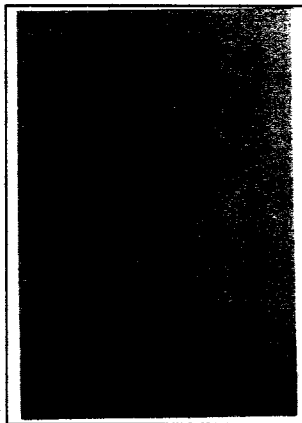
- several *Acianthus sinclairii* with pale green leaves covered with orchid pink spots! These were quite healthy and growing side by side with regular dark green leaved ones.
- reddish topped *Pterostylis trullifolia*, just outside the reserve. There was more red on them (on the dorsal sepals) than on many of the plentiful *Pterostylis rubricaulis*
- some *Corybas* with deeply veined, rounded leaves that Allan had spotted previously. His war whoop temporarily deafened those nearby when he discovered that it was *Corybas rotundifolius* in the flesh pink. Only one plant was in bloom and it wasn't properly open. Allan "put his foot in it" back at the cars where Bob Talbot and Malcolm Campbell had gone on ahead; he asked them if they'd heard the Yahoo? at which opportunity the column made an indiscreet and entirely regrettable remark.

Back at the bach for a fine dinner, we were regaled with a little red and white and some snippets from Malcolm (who was still convalescing), about his beastly colostomy! What a character.

Saturday saw the two car loads off early to follow their magnificent obsession to Ngunguru. Here we found a new notice from the Department of Conservation, proclaiming "Brattys Reserve", but no entrance. So we

stalked in through private property, skirted through the owner's bit of bush to avoid his barking dogs and clambered over his 12 gauge, high tensile fence into almost a lawn of *Cyrtostylis oblonga*. It was in bud but not open anywhere, much to the disappointment of Margaret Menzies and other southerners who hadn't spotted it before.

Graham Marshall had a great eye for *Corybas cheesemanii* which were thick in places, and he seemed to be able to find it under any heap of tea tree debris that Malcolm pointed to.

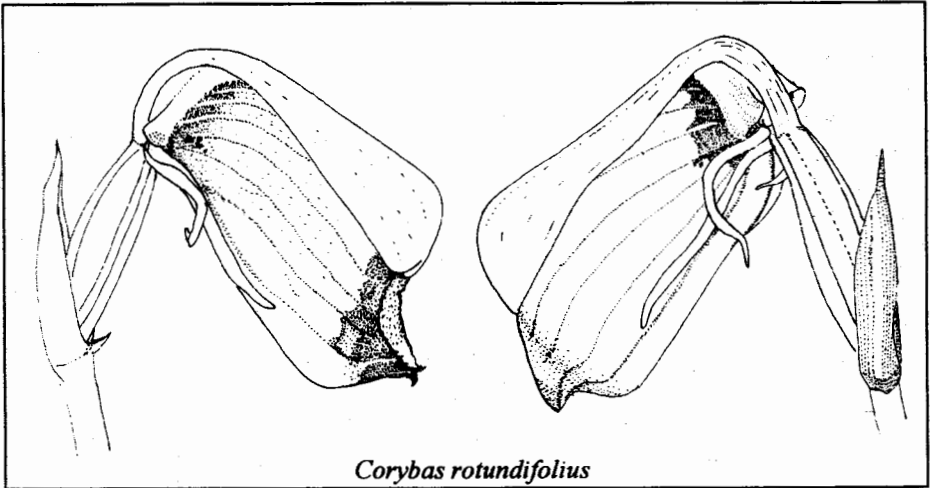


*Corybas cheesemanii*, painting by Eleonore Blumhardt, Whangarei, c. 1930

Sue Bergersen found *Bulbophyllum tuberculatum*, surprisingly at knee height on kauri but that find was overshadowed by the big event - *Corybas rotundifolius*. There were some 50 or more plants, many in full flower as predicted by Allan after he and Al Blumhardt had done a reccy four weeks previously on advice from Noeleen Clements. The party was

intrigued with this unique pink dot, with its off-white to palest pink dorsal sepal and its minute filamentous tepals. This may mean that *C. orbiculatus* or "Short tepals" will have to be renamed "Medium tepals". These transparent sepals and petals were jutting forward and appressed to the pink (or more properly, pale maroon) labellum and would be respectively only 5 and 4 mm long; the petal end sometimes dropping

down to cross the sepal. A strong lens looking through the 2 mm x 2 mm, Veed and minutely toothed opening, revealed reverse facing orchid pink whiskers on the kelson of the labellum. Illogical thoughts of a shady affair with a *Calochilus*? The flower stands above the leaf and the plant grows close to *Cyrtostylis oblonga*, as did everything else in this unique bit of bush.



Back to earth, the party started to straggle out towards lunch and got a clear view of those furiously barking dogs; two Doberman Pinschers were bounding back and forth, unleashed! This glimpse saw Malcolm clutching at his colostomy bag and the vanguard of three retiring with all dignified haste to the bush and that fence. For the record, the dogs did not attack and the owner was quite polite but insistent that an entrance track and stile should be

organised into this reserve. Are there any DOC personnel out there?

A picnic lunch at Ngunguru beach preceded a drive home with one last stop at Top O' The Dome Tearooms between Warkworth and Wellsford. The symbiotics soon picked up five species in flower before the gale, the gathering gloom and a heavy downpour drove them (in stockinged feet of course) to a hot coffee in this excellent establishment at the end of the track.

The three from south of the Bombays, who stayed at Ducker's, were treated that evening to close-up videos of the "captives" from the two days' outing

(was it only two days?) A thoroughly satisfying time was had by all.

Thank you Allan.

**TABLE**

**Species found in flower at the reserves 7 & 8 July**

Reserve	Eaves Orewa	Bream Tail	Brattys Ngunguru	Top O The Dome
<i>Acianthus sinclairii</i>	✓	✓	✓	✓
<i>Corybas cheesemanii</i>	✓		✓	✓
<i>C. rotundifolius</i>		✓	✓	
<i>C. trilobus</i>	✓	✓		✓
<i>Pterostylis alobula</i>	✓	✓	✓	✓
<i>P. brumalis</i>	✓		✓	
<i>P. rubricaulis</i>	✓	✓	✓	
<i>P. trullifolia</i>	✓	✓	✓	✓



*Drymoanthus adversus*, painting by Claire Scott, Whangarei, c.1930, Auckland Museum.

## 2. The Menzies/Talbot *Corybas cryptanthus* expedition

Write down 5 August, central Taranaki, in your NZ orchid diary as the time to find *Corybas cryptanthus* open. Don't think you are going to find it then unless you had previously been out in the tea tree (the *Leptospermum scoparium* variety) in December, found the leafless seed pods standing straight up out of the leaf litter on pellucid stalks, and marked the spot. The wretched things open their huge flowers (for *Corybas* that is) completely under the tea tree compost and unless you mark the seed pod sites, looking for it in August would be worse than looking for the needle in that hay stack.

Margaret Menzies and Bob Talbot had marked two such ridge-top sites for the NZniggers and they had monitored these sites near Omoana for weeks beforehand; then on 5 August they unearthed two pink flecked flowers as pellucid as their seed pods, for the contingent to gaze upon, video, photograph and wonder why they had come to such an outback place for this oddball plant.

The two dozen or so obsessives had met the night before at Mangamingi, in Duncan and Margaret's artistically appointed lounge and by a blazing log fire to discuss tactics and to get allocated one of the several shearing quarters up the road. Margaret had thoughtfully commandeered these (and helped clean them out) ahead of the forestry workers who had done their bit by churning up the road beyond! She also remembered to put the test match on video during the tactics-talking so that long-suffering Duncan and others

could watch it into the small hours, after the mob had gone.

Saturday dawned fine, despite an overnight deluge, and cars could be seen negotiating that muddy bench called a road, around the steep papa gully sides unique to Taranaki. Those in the know parked at the foot of the rendezvous driveway where 4WD wagons with 4 wheel chains were just out of sight loading *Pinus radiata* seedlings. But the column, in a 2WD wagon, blundered on past that lot with rising panic, and survived only by dint of the metal under the mud, some blurted Allan Ducker instructions and good fortune.

Our film crew had already stopped and photographed some early flowering *Corybas* "As" on seeping, south facing and vertical to overhanging road batters. These batters become completely wall-papered (it could not be termed "carpeted") with dampness-loving plants which sometimes outweigh their adhesion and peel off *en masse*, exposing unweathered papa beneath. The dark maroon flowered *C.* "As" had unusual iridescent gold speckles on the dorsal sepals. It appeared as though the speckle had darkened in more mature flowers but this opinion was disputed by some of the pundits who thought that speckle-sepal was a different form or variety. The column's underexposed slides show a crimson speckle.

The high point of the trip was of course the leafless, saprophytic *C. cryptanthus* and although it couldn't be called beautiful, it had the magnetism to draw the trudging contingent around the mud roads in the face of rowdy 2-stroke

forestry Mokes. It was almost a relief to find that this is one *Corybas* which doesn't grow at Iwitahi or why else was Trevor Nicholls present? But the trip had nearly been cancelled because only site-two specimens had flowered and they were late to boot. The celebrated pure whites which had flowered the previous year above the moss (Bob has a spectacular 'photo to prove it and he stoutly denies that he picked and repositioned the flower), had refused to show this year – but they will wait. As a bonus, *Pterostylis alobula* was everywhere and *C. cheesemanii* was also out but sparse.

After lunch a majority, not trusting the road, climbed onto the back of the Menzies' 4WD pick-up with sheep rails, standing room only and Bob driving, to view some *Corybas trilobus* and *C. orbiculatus* further west. The column's sub-group dawdled down the road picking up *C. rivularis* (was *orbiculatus*), in bud with tightly wound tepals showing, some *C. oblongus* in early bud and some few, typically dark maroon *C. orbiculatus* (was *C. "C"*), with the usual meandering short green tepals. But across the road from the first big rimu, was a *C. orbiculatus* with straight, vertical green tepals and a broad labellum like *C. "A"*. It was duly filmed and videoed then, (wrongly) labelled *C. "B"* because it was intermediate between *C. "A"* and *C. "C"*. Is all that clear? it wasn't easy to write.

That evening, at the Mangamingi Hall, a fine dinner prepared by Clive Perry and served up by Ann Talbot, Duncan, Joe and Clair Menzies, was enjoyed by all as were some quite brilliant slides of Bob's NZ orchids and

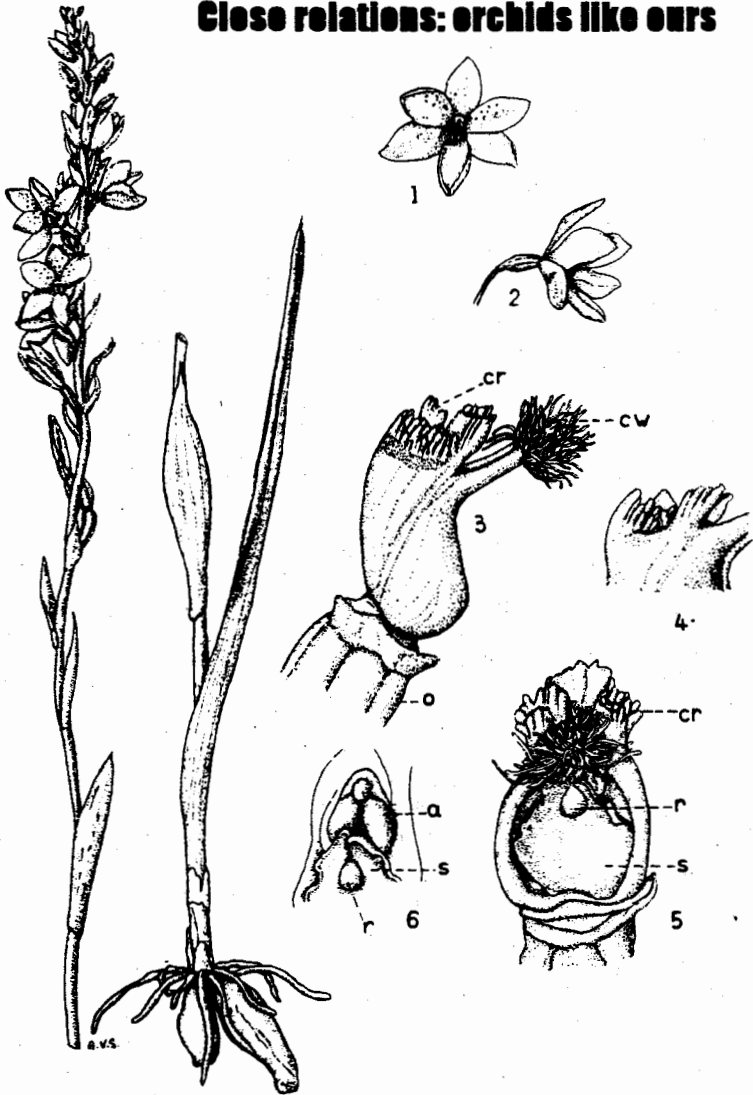
Rob Graham's Western Australian ones. Also appreciated was Colin Ogle's intriguing run-down on the past and present orchids in the nearby Ngaere Swamp. Participants with 20-20 vision were treated to a 3-D close up view, through a binocular microscope, of a flawless *C. cryptanthus* bloom which Margaret assured us, "just fell off" when they were excavating in the leaf litter.

At the do, Ernie Corbett was at pains to explain to the column that *C. "B"* was indeed *C. "Mt Messenger"* and that Bruce Irwin had attached the A, B and C labels to the above three when Ernie had pointed out to him their clear differences. Bruce, also at the do, made an announcement that both *C. "A"* and *C. "Mt Messenger"* were to earn specific titles (which he did not disclose), in about three months time. The column for one, was relieved because this will sure clear up a lot of confusion.

The real *C. "Bs"*, *en masse* at the Mt Messenger saddle, were filmed by the home-going sub-group on Sunday the 6th. It wasn't easy either! One full bearded, long haired cameraman and another too old for this sort of thing, took turns at teetering on one leg atop a stumpy log propped in the water table of State Highway 3, but they were blasé by now to the puzzled stares of passing motorists. Lesser distractions, as you can imagine, have caused terrible accidents! Getting back to the orchids, most of the almost wholly green plants, still had unravelling knotted tepals but some few were wide open and what a picture they made; a fitting finale to a well organised and memorable expedition.

Thank you Margaret and Bob and all the other hard working contributors.


**Close relations: orchids like ours**



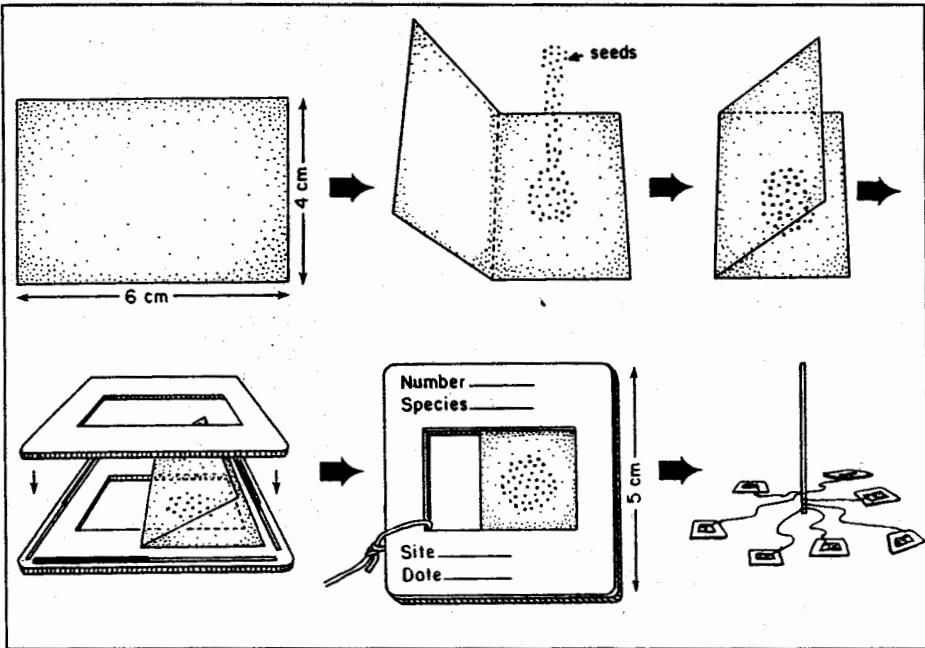
*Thelymitra ixioides*, line drawing by G.V. Scammell, from Rupp H.M.R. *The orchids of New South Wales*, facsimile edition, National Herbarium of NSW.: *Flora of New South Wales*, No. 48, Orchidaceae, 1969; p7.  
 1. Flower from the front. 2. Flower from the side. 3. Column and top of ovary from side. 4. Top of column from the side to show variation in the crest. 5. Column from the front; the anther is concealed behind the hair-tufts immediately above the rostellum. 6. Anther, rostellum and part of stigma; the hair-tufts removed. *a*, anther. *cr*, crest. *cw*, hair-tufts on column appendages. *o*, ovary. *r*, rostellum. *s*, stigma.




## Notes

 Rasmussen HN and Whigham DF (*American Journal of Botany* 1993; 80 [12]: 1374-8) wrote on "Seed ecology of dust seeds in situ: a new study technique and its application in terrestrial orchids". They noted that the study of seed ecology in minute seeds, such as those of orchids, is seriously impeded by the difficulty of handling them, and the near-

impossibility of tracing them in soil. They constructed seed packets of nylon plankton netting enclosed in labelled plastic photographic slide mounts, and planted these in the soil attached by nylon strings to a pole (see Figure). A year later they were easy to trace, and allowed the researchers to study the germination and seedling development of several species.



 Further to your editor's notes on insect pollination in *Thelymitra longifolia* (J53), I recently became aware of GM Thomson's comments (*TNZI* 1927; 57: 107) that

though there was general agreement that *T. longifolia* was self-fertilised, "When, however, I was in Stewart Island in January 1880, I found many lilac- and pink-flowered specimens,

which were very conspicuous, and in many of them the pollinia had been removed, showing that insects had visited them". Those pink *T. aff. longifolia* keep turning up, further and further south.



I was recently in southern China and bought a nice piece of Chinese brush painting and calligraphy depicting "che lan", fragrant ribbon-grass, their scented wild *Cymbidium*. The same plant was also painted in 1306 A.D. by Cheng Sze-shiao, along with his poem (Chinese artist/poets usually embellish their paintings with a few well-chosen words, whereas westerners tend to let the things speak for themselves) -

*Always bowing my head I have been  
asking the legendary king*

*Your identity and your journey.*

*Though no nostril has ever been  
tingled by a painting,*

*The fragrance of long ago is  
still hovering in the air.*

(S.C. Chen and T.Tang, quoted in Arditti J. *Fundamentals of orchid biology*. John Wiley & Sons, 1992.)



On 27 August I drove north from Kai Iwi, looping into native bush and wet roadsides, and eventually returning via Papaiti to Wanganui. Every wet bank carried *Corybas* "A" galore, and one or two had early buds of a later-flowering *Corybas*. Some good orchid territory there - I'll be back - Ed.



### Is *Corybas carsei* the same as *Corybas fordhamii*?

Dan Hatch wrote to say that if it is, then the valid name is *C. carsei* (1911) which predates *C. fordhamii* (1941).

Peter de Lange also wrote, "I have never been 'strangely silent' on this subject. The draft recovery plan for this species considers determining the exact relationship between *C. carsei* and *C. fordhamii* as top priority. Since April 1991 the only known population of *C. carsei* in New Zealand has been the subject of intensive monitoring and research into manipulating the wetland ecosystem, to try and reverse its decline - the results of this research were the subject of a paper at the Iwitahi Conference in December (see Clarkson *et al*, NZNOG Journal 1994; 52: 34-36). At that same conference I presented a paper co-authored by Brian Molloy, where we suggested that the term 'vagrant' be applied to indigenous orchids which as a result of some specific biological constraint have not successfully established in New Zealand. A 'boiled down' summary was reprinted in the last issue of the NZNOG Journal. Although the publication did not list *C. carsei* as a vagrant we did suggest this status at Iwitahi - and caused some active debate about systematics and research from some Landcare staff present. Since then Brian and I have elected to leave *C. carsei* out of the current vagrant list if only because there are some slight differences between our plant and the

Australian *C. fordhamii*, viz size, number of stripes on the labellum and the presence or absence of retrorse teeth within the labellum lip, all of which need wider consideration. David Jones has examined fresh material of our *C. carsei* and concluded that it is different from *C. fordhamii*. While I am not convinced of this, I do not profess to be an expert on orchids, and so I leave it to Brian, David Jones and Mark Clements to resolve. However both Brian and I are agreed that the ecology of the species - its sporadic and generally poor seed set, the timing of its discovery in the far north (and later in the Waikato) during periods of intense habitat disturbance - is similar to that of other orchid vagrants, e.g. *Thelymitra matthewsii*, *Caleana minor*, *Chiloglottis formicifera* and *Pterostylis nutans*, and strongly suggests that *C. carsei* is also a vagrant. If it is not then it has very recently diverged from an ancestral *C. fordhamii* migrant. In consideration of these uncertainties Brian and I share the view - *taihoa!* let's wait a while. Although I can fully understand the desire of some orchid group members to see a taxonomy published on our

Orchidaceae, this has been rushed all too often in the past - leaving numerous errors of nomenclatural standing for someone prepared to work through the mess to tidy up. We have a person prepared to do that - Brian Molloy - so why don't we allow him the time to complete a thorough revision of this family. Brian's perceived silence on subjects such as these belies the fact that he is making considerable progress on such tricky subjects as the relationship between our *C. carsei* and *C. fordhamii* as well as other problem species pairs such as *Pterostylis nana* and *P. puberula*. You simply cannot speed this process up - we have a lengthy legacy of problematic binomials showing what happens if you do! So in the interim my comment is - while the ecology and reproductive biology of *C. carsei* are consistent with those of other vagrant orchids, there are other factors acting on its decline which are not consistent (e.g. cricket predation, habitat loss). Dan Hatch and others may well be right, but until we know for certain, it is prudent to retain *C. carsei* as an endemic species in the New Zealand orchid flora".

## Orchid artist

### Norman Bruce Harvey (1931- )

"I very much regret that Mr Harvey has failed. His gouache pictures show great industry, but it is to no purpose that could not have been

better conveyed by photography. The tatters of a windblown branch or an insect-ravaged leaf might be an interesting exercise for the artist,

but their rendering does not constitute an adequate delineation of a species. In many instances, the specimens for drawing have been badly selected. So faithful has Mr Harvey been that the inadequacy is all too evident, and his understanding of the plants was insufficient to make good the deficiencies." [1]

The *Listener* review was not kind to Bruce Harvey's book *New Zealand botanical paintings*, published in 1969 [2]. The flap of the front cover had claimed that Harvey was

"New Zealand's leading exponent (of botanical painting), and with his published collection of forty gouache paintings he shows that he is entitled to a place in the front rank of the world's botanic artists."

Clearly this reviewer disagreed.

Bruce Harvey was born in Palmerston North and educated in Timaru. His first novel *Any old dollars, Mister?* was published in 1964 and a second *One magpie for sorrow* followed in 1968, winning an achievement award from the Literary Fund. By 1970 he was working full time in Auckland painting natural history subjects.

Harvey's *A portfolio of New Zealand birds* appeared in 1970 with his own commentary, published by Reed [3].

R.B. Gibson's review was titled "A lavish and pretentious tome". He began with some praise, "Book collectors and naturalists know Bruce Harvey for his delicate paintings of native plants and flowers", but he went on to slate the bird paintings, which, he wrote, "are frankly inaccurate".

Gibson reserved his harshest comments for the "verbal froth" and the mistakes -

"To enumerate further infelicities would be tedious. The text is a calamitous hotchpotch, marked by loose phrasing, sometimes self-

contradictory, and now sinking into sentimental verbiage, now into plain error" [4].

Tough criticisms indeed - the flower paintings slated for their faithfulness in depicting flawed specimens, the bird paintings slated for their unfaithfulness to scientific accuracy.

Among the gouaches in *Botanical paintings* is a depiction of the greenhood *Pterostylis banksii*. Scientifically accurate? Perhaps not - we can tell it is a greenhood, but not much more - it could as easily have been *Pterostylis* "Erua" or *P. graminea*.

I doubt if the paintings were ever meant to be scientific botanical illustrations, despite the publisher's claims. They are artworks, and faithfulness to one's subject, including its deficiencies, should certainly not be taken as a sign of poor quality in an artist. Paradoxically, such faithfulness may not of course result in the best science.

The *Pterostylis* painting is a pleasing thing, nicely composed, the flowers forming the points of an elegant triangle, base down, apex up, the turf from which they rise neatly suggesting an aesthetic debt to Albrecht Durer five hundred years earlier.

Some of Harvey's bird paintings now grace Air New Zealand planes named for native birds.

I think he was treated rather too savagely by the critics of the time - was a professional patch being threatened?

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*Pterostylis banksii*, gouache by Norman Bruce Harvey, from his  
*New Zealand botanical paintings*, 1969.

## Australian notes

### Comparative reproductive biology of two sun-orchids; the vulnerable *Thelymitra circumsepta* and the widespread *T. ixioides* [Orchidaceae].

Review of a paper by Sydes MA and Calder DM. (*Aust. J. Bot.* 1993; 41: 577-589).



The reproductive strategies of two *Thelymitras* similar to New Zealand species are reported. Our *T. aff. ixioides* is self-pollinating, and our *T. formosa* is similar to the Australian *T. circumsepta*. The differences between insect-pollinated and self-pollinating *Thelymitras* are delineated.

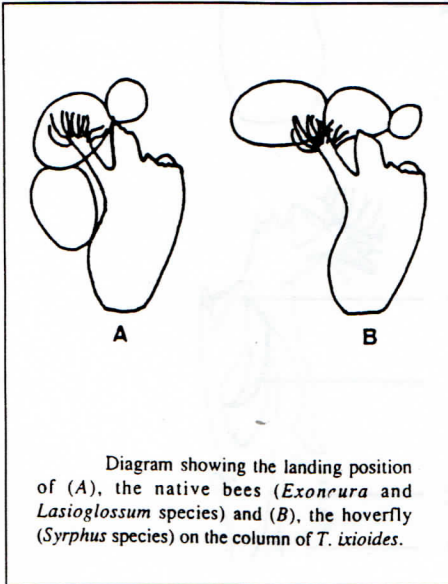


Diagram showing the landing position of (A), the native bees (*Exoneura* and *Lasioglossum* species) and (B), the hoverfly (*Syrphus* species) on the column of *T. ixioides*.

*T. circumsepta* is a vulnerable, localised, swampland species, flowering in December; *T. ixioides* is widespread in woodland-heath, more continuous in distribution, flowering October-

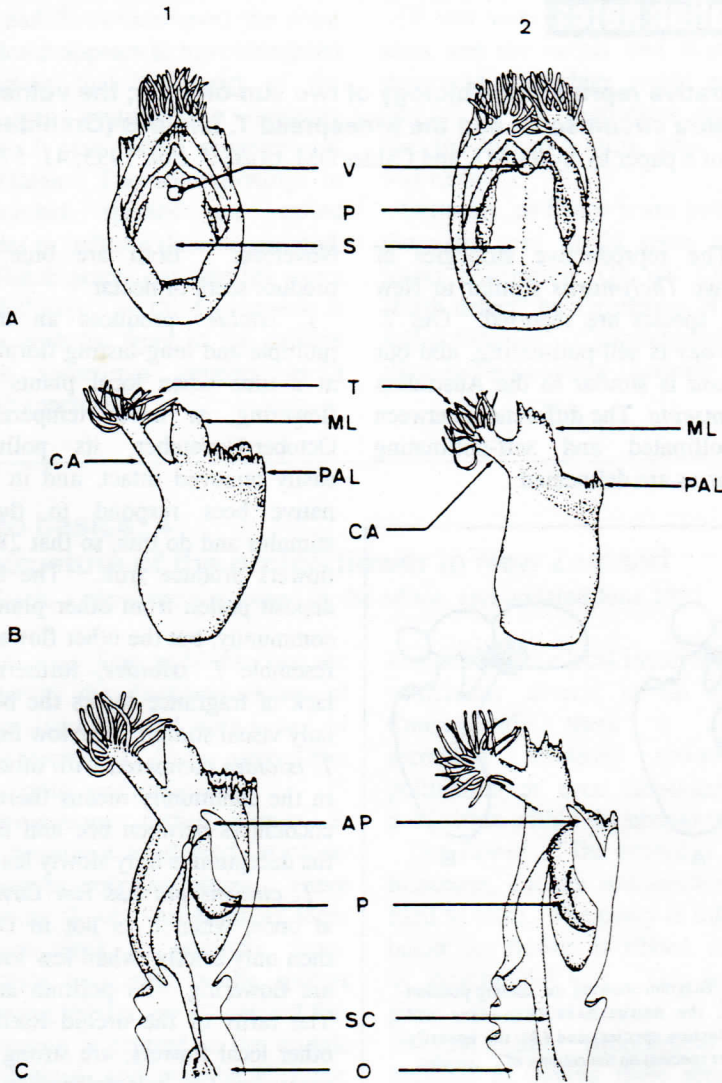
November. Both are blue; neither produce scent or nectar.

*T. ixioides* produces an attractive, multiple and long-lasting floral display, at a time when local plants are also flowering, at lower temperatures in October-November; its pollinia are easily removed intact, and in the wild native bees respond to the visual stimulus and do this, so that 28% of the flowers produce fruit. The bees also deposit pollen from other plants in the community, but the other flowers do not resemble *T. ixioides*; furthermore the lack of fragrance forces the bee to use only visual stimuli. The low numbers of *T. ixioides* compared with other flowers in the community means there are few encounters between bee and orchid, so the deception is only slowly learned.

*T. circumsepta* has few flowers open at once, when it is hot in December, then only briefly, when few local plants are flowering. Its pollinia are mealy. The rarity of the orchid itself, and of other local flowers, are strong selective pressures for self-pollination because insects are not attracted to the locality.

Self-pollination may confer advantages on the plant, in that offspring are genetically similar to the parents who have already adapted to the environment.





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Column structure of *Thelymitra ixioides* (1A–C) and *T. circumsepta* (2A–C). (A). Frontal view of the column. (B). Side view of the column. (C). Half flower with perianth removed. A=anther. AP=anther point, CA=column arms, ML=midlobe, O=ovary, P=pollinium, PAL=post anther lobe, S=stigma, SC=stylar canal, T=trichomes, V=viscidium.

	<i>Thelymitra ixcioides</i>	<i>Thelymitra circumsepta</i>
<b>Flowers</b>	Broad stigma hides pollinia which are easily removed intact (see Figure)	Stigma narrows at top to reveal pollinia which come into direct contact with stigmatic edge; pollinia not easily removed intact
<b>Floral display</b>	Mean 5.2 flowers/spike with 3.4 open at once; open 2.9 days; 83% of population open. Many other woodland species flower at same time.	7.5 fls/spike, 1.2 open at once; open 1 day; 16% of total population open at all. No other native plants flowering concurrently
<b>Floral community</b>		
<b>Rates of removal &amp; deposition of pollinia</b>	20-28% had pollinia removed; 49-64% had pollen deposited on stigma.	Never; never
<b>Flower to fruit conversion ratio</b>	28%	96%
<b>Insects</b>	Hoverflies did not pollinate; native bees did (see Figure).	One native bee visited but did not pollinate.
<b>Pollen collected from stigma</b>	Orchid pollen, but also pollen from many other species.	None
<b>Hand pollination experiments</b>	No difference in rates of fruiting among pollinations from same flower, same plant or different plants.	No differences

### Comment

These observations confirm much of what has been written of *Thelymitra* pollination. New information includes the different shapes of the stigmas between the insect-pollinated and the self-pollinating species. Also fascinating is the observation that insect-pollinated species flower at a time when other plants are flowering profusely – so that insects on the wing are in higher numbers. Perhaps our insect-pollinated *Thelymitra longifolia* flowers when the manuka is out? keep

an eye out for manuka, native bees and *T. longifolia* this season.

Bruce Irwin remarked, “I was interested to find that the authors backed up the thoughts I’ve developed over the years that insect-pollinated species have pollinia in compact units which do not crumble and spill over stigmas as do pollinia of self-pollinating species. I don’t think I’ve actually seen any explanation of the fact that in *Thelymitra* the pollinia are attached to the viscid disc and so are pulled out of



the anther case which is carried upward by continuing growth of the upper part of the column as the bud matures. In insect-pollinated plants the coherent pollinia are neatly stored behind the stigma whereas in self-pollinating forms the pollinia are pulled more onto the top of the stigma and because the pollen grains separate readily some spill onto the front of the stigma. So far so good, but populations of *T. aff. longifolia* near Whakatane which store their pollinia apparently well clear of the receptive part of the stigma, set seed very freely.

"I presume that the insects are not very efficient pollinators. I think the flowers are self-pollinated by pollen tubes growing through from the back of the stigma as in *Orthoceras*. At least these flowers give the insects a chance to cross pollinate, whereas *T. pauciflora* seems always to be self-pollinating before the bud opens.

"*Thelymitra* 'comet' (Bill Liddy's pink flower from the Kaweka Range) appears to behave much the same as the Whakatane *T. longifolia* but in my shadehouse they set no seed. Maybe this form will not accept its own pollen. I hope to check pollination in *T. 'Whakapapa'* next season.



Tony Slater reported (ANOS Victorian Group *Bulletin* 1995; March: 11-14) on the time when the **stigmatic surface** of the orchid flower is most receptive to pollination. The Australian Orchid Foundation had helped fund his research. Earlier research had shown that individual orchid stigmas all produce copious

secretion, though they may have different papillae. Slater confirmed these observations, and showed that the stigmatic papillae of *Dendrobium* and *Sarcochilus* were constructed of detached viable cells, *Diuris* and *Caladenia* had multicellular papillae, and *Microtis* and *Pterostylis* had unicellular papillae. The stigmas of all these orchids were wet with secretion throughout the period the flowers were open. They are therefore receptive throughout, though the optimum time for pollination is soon after the flower has opened.



Garry Guide wrote (NOSSA *Journal* 1995; 19: 17) on an 11 February field trip to swamps that supply Tookayerta Creek: "Despite the drought the springs here were still flowing. All through the sedges and t-tree were hundreds of the white, self-pollinating *Spiranthes*.... On the very edge of the track was a perfect pink and white *Spiranthes sinensis*, and directly opposite *Cryptostylis subulata* in full flower. It was fairly obvious that the pink *Spiranthes* were largely confined to the edges of the swamps and had mostly finished while the white ones were only in the middle of the swamp and were in full bloom. On both forms we observed red and black native bees working the flowers."



*Loc. cit.* Bob Bates reported *Pterostylis tasmanica* "from a few swamp areas in the south-east" of South Australia, extending its known range.



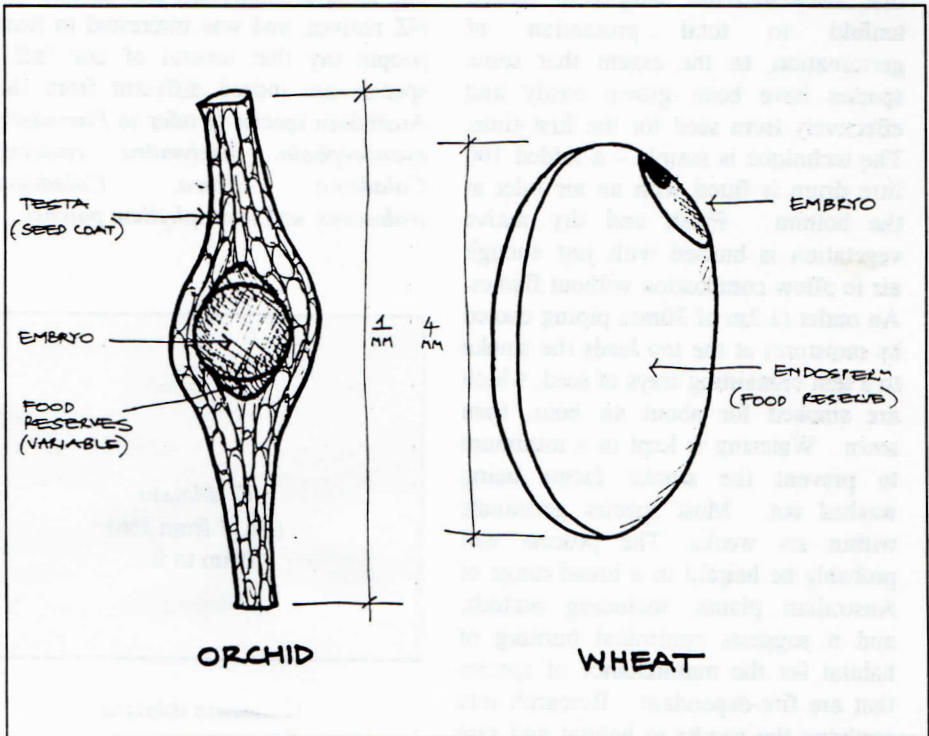
ANOS Victorian Group *Bulletin* April 1995 reported that the recently released *Flora of Victoria*, Volume 2, lists *Thelymitra cyanea* along with *T. venosa* and *T. pulchella* as one complex (*T. venosa* complex).



Helene Wild reported (ANOS Victorian Group *Bulletin* 1995; April: 2-4) a talk by Andrew Paget on orchid seeds. **Orchid seeds** are so tiny, and produced in such numbers, that they are often called "dust seed". Seeds are generally less than 1mm long and weigh from less than 0.5 to 14 micrograms. The embryo is tightly enclosed in a transparent seed coat

(testa) and lacks the food reserves (endosperm) of, e.g., wheat seed. Orchid seed has to get its food in other ways, and in nature it will only germinate if it comes into contact with a mycorrhizal fungus – in the soil, on the bark of trees, or elsewhere.

Few seeds make such contact in nature, so few of the many produced ever do germinate. In the laboratory the modern technician can provide an ideal artificial environment for orchid seed germination. Seed is stored cold – *Thelymitra* seed kept for five years at room temperature is no good, but after seven years in a domestic fridge 100% germinates.







The influence of **bush fires** on Australian orchid growth and flowering has been a recurring preoccupation over there. Some species only flower after a burn, and the current understanding is that burns need to be frequent, because otherwise the fire is too hot, destroying the underground tubers. The West Australian Native Orchid Study and Conservation Group newsletter of July 1995 carried an interesting press release from Kingsley Dixon and co-workers at Kings Park and Botanic Garden and the Botany Department at the University of Western Australia. Studies of 200 difficult-to-germinate species revealed that smoke-derived substances caused tenfold to total promotion of germination, to the extent that some species have been grown easily and effectively from seed for the first time. The technique is simple – a lidded 100 litre drum is fitted with an air inlet at the bottom. Fresh and dry native vegetation is burned with just enough air to allow combustion without flames. An outlet (1.2m of 30mm piping cooled by moisture) at the top leads the smoke to a tent containing trays of seed, which are smoked for about an hour, then sown. Watering is kept to a minimum to prevent the smoke factor being washed out. Most species germinate within six weeks. The process will probably be helpful in a broad range of Australian plants, including orchids, and it suggests controlled burning of habitat for the maintenance of species that are fire-dependant. Research into applying the results to habitat and rare

species continues – as well as attempts to refine the effective chemical factors.



Your editor had the good fortune to be attending a conference near Adelaide in early August, and was hosted on a field trip to **Belair Park** near the city by members of the Native Orchid Society of South Australia. It was early in the season, even for balmy Australia, but I saw *Acianthus caudatus* and *A. pusillus* in flower, as well as *Corybas dilatata*, and seven *Pterostylis* species – *Pp. cucullata*, *curta*, *longifolia*, *nana*, *nutans*, *robusta* and *sanguinea*. I spoke at an informal gathering of SA enthusiasts – including that mine of knowledge Bob Bates – on NZ natives, and was interested to hear people say that several of our “aff.” species are indeed different from the Australian species (I refer to *Pterostylis cycnocephala*, *Thelymitra ixioides*, *Caladenia carnea*, *Caladenia iridescens*, and *Prasophyllum patens*).



*Caladenia dilatata*  
*Corybas*



**A group of South Australian orchids, photographed in early August:** previous page *Corybas dilatata*; left and middle – *Pterostylis nutans*; right – *Pterostylis nana*.

## **A list of the New Zealand orchids**

The last major classification of the NZ orchids was that by Lucy Moore in *Flora of NZ* (1970) Vol II. What follows is a personal and nonprofessional list of what your editor believes to be the current status. Notes after each species refer to changes since 1970.

- Acianthus sinclairii* (in *Flora II* as *Acianthus fornicatus* var. *sinclairii*)
- Acianthus 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 var. *exigua*. See Hatch E.D. and McCrae D. *NZNOG Newsletter* 1989. 32:5-6)
- Caladenia carnea* (in *Flora II* as *C. carnea* var. *bartlettii*. See Jones D. *Native orchids of Australia*. Reed, Frenchs Forest, 1988. p95-96)
- Caladenia catenata* (this is now regarded as *R. Brown's C. alba*, and is said not to be present in NZ)
- Caladenia* aff. *iridescens* (in *Flora II* as *C. carnea* var. *minor* forma *callinger*. See Hatch E.D. *NZNOG Newsletter* 1985. 16: 1. But should it be *C. callinger*? see also McCrae D. *NZNOG Newsletter* 1988. 25: 11)
- Caladenia minor* (in *Flora II* as *C. carnea* var. *minor*)
- 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)
- Caladenia* "green column" (undescribed; a white form may be a further undescribed species)
- Caleana minor* (occasional Australian visitor, not a *Paracaleana*)
- Calochilus herbaceus* (occasional Australian visitor, in *Flora II* as *C. campestris*. See McCrae D. *NZNOG Newsletter* 1987. 24: 9)
- Calochilus paludosus*
- Calochilus robertsonii*
- Chiloglottis cornuta*
- Chiloglottis formicifera* (occasional Australian visitor, probably extinct in New Zealand)
- Chiloglottis valida* (occasional Australian visitor, not in *Flora II*; has been included by mistake in *C. gunnii*, but 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. Probably identical with *C. fordhamii*)
- Corybas cheesemani* (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 seven 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* as well as by Irwin's tagname *C. "Waiouru"*; others include *C. "Kaimai"*, *C. "Kerikeri"*, *C. "whiskers"*, *C. "rest area"*, *C. "A"* and *C. "Mt Messenger"*; [Irwin J.B. *NZNOG Newsletter* 1989. 32: 1-4. *NZNOG Journal* 1993. 47: 7-9. *NZNOG Journal* 1995. 55: 22-24]. The original *Acianthus [Corybas] rivularis* is probably *C. "Kerikeri"*)
- 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* (see St George IM. *NZNOG Newsletter* 1988; 28: 10-13).
- Cryptostylis subulata* (Australian visitor, now well established in Northland; 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 flavus* (see Molloy & St George. *NZJBot* 1994; 32: 415-421)
- Earina aestivalis* (reinstated; though many still think it is just a form of *Earina mucronata*; 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 *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 graminea*
- Pterostylis* aff. *graminea* (undescribed)
- Pterostylis humilis*
- Pterostylis irsoniana*
- Pterostylis* “linearis” (treated by Hatch in 1949 as a variety of *P. furcata*, and in *Flora II* under *P. montana* – now considered to be a valid species)
- Pterostylis micromega* (has been confused with *P. furcata*, but now regarded as distinct)
- Pterostylis montana*
- Pterostylis* aff. *montana* (probably several undescribed species, but for details of one of the species currently tagged “aff montana”, see St George I.M. *NZNOG Newsletter* 1988. 25: 12)
- Pterostylis nutans* (occasional Australian visitor recently seen at Waihaha near Taupo)
- Pterostylis oliveri*
- Pterostylis patens* (was included in *P. banksii*, now regarded as distinct)
- Pterostylis puberula* (some of the various forms of *P. nana* are occasional Australian visitors, and *P. puberula* was included in *P. nana* – but is regarded by some as distinct)
- 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 tasmanica* (in *Flora II* as *P. barbata*; has also been confused with *P. plumosa*. See Molloy B. *NZNOG Journal* 51: 14-16)
- Pterostylis tristis* (in *Flora II* as *P. mutica*. See Molloy B. *Proc. 2nd Int. Orch. Conf.* 1985. p2)
- Pterostylis trullifolia*
- Pterostylis venosa*
- Pterostylis* “Catlins” (undescribed; illustrated in St George I.M. *Wild orchids in the far south of NZ*)
- Pterostylis* “Erusa” (undescribed; see Irwin J.B. *NZNOG Journal* 1993; 45: 15-17)
- Spiranthes sinensis*
- Spiranthes* “Motutangi” (undescribed)
- Thelymitra aemula* (see Molloy B.P.J. and Hatch E.D. *NZNOG Journal* 1990. 35: 20-24)
- Thelymitra carnea*
- Thelymitra cyanea* (was confused – e.g. in *Flora II* – with the Australian *T. venosa*)
- Thelymitra decora*
- Thelymitra dentata* (a sterile hybrid *T. pauciflora* x *pulchella*)
- Thelymitra formosa*
- Thelymitra hatchii*
- Thelymitra intermedia* (regarded as identical with *Thelymitra pauciflora*, a name which however contains many forms – see below)
- Thelymitra* aff. *ixioides* (regarded as identical with the Australian *T. ixioides*, but the NZ species is self-pollinating, and the Australian insect-pollinated)
- Thelymitra longifolia*
- Thelymitra* aff. *longifolia* (undescribed species, appears to be insect-pollinated)
- Thelymitra malvina* (not listed in *Flora II*. See Clements M.A. *Australian orchid research* 1991. 1: 141)
- Thelymitra matthewsii*

*Thelymitra pauciflora* (perhaps several species including those tagged as *T.* "Ahipara", *T.* "darkie", *T.* "rough leaf" and *T.* "pseudopauciflora". Clements appears to regard NZ forms of this highly variable species as "*T. colensoi*")


*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* "Whakapapa" (undescribed – see *NZNOG Journal* 1995; 54: 7-8)

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

 The drawing labelled *Caleana minor* (*J56* p10) actually included, at lower right, a drawing of the flower of *Caleana major* for comparison. The flower of *C. minor* is upper right; the whole plant illustrated at left is also *C. minor*.

David Jones and Mark Clements will be in Christchurch in early December conferring with Brian Molloy on progress with their checklist of the New Zealand orchids, to be published soon. Brian reports that he is hopeful that the publication will contain a colour section. The papers read at Brian's farewell conference at Lincoln in September will be published in a special edition of the *Journal of the Royal Society*, including Brian's own paper on *Thelymitra*.

## Go Back to Basics at Twitahi 8993

### STOP PRESS

#### *Pterostylis nutans* in NZ again

In 1991 Cathy Jones and Bruce Irwin were botanising near Waihaha west of Taupo. It was a wet day and the track was greasy. Bruce slipped coming downhill - his feet shot out from under him, and he cracked the back of his head on the ground. In his dazed state he thought he saw strange rosettes of an

unusual *Pterostylis*. As his head cleared he *knew* he was looking at strange rosettes of an unusual *Pterostylis*. At least that is how Bruce tells it.

Those of us who know him realise of course that he has a keen eye for anything new. The list of his



discoveries tells a tale of a keen observer, always on the alert. Readers of this *Journal* will be aware of his discoveries of different species within the *Corybas rivularis* complex. If Bruce thought this was something new, then certainly it was.

A year later the colony had almost doubled to 24 plants [5]. At that stage no flower had been seen, and although Bruce had suspected that this was *Pterostylis nutans* (in fact he had carried in some Australian plants for comparison), he was yet uncertain. In 1994 he, Brian Molloy and I visited the spot in December, and found one unidentifiable dead flowerhead - too late, alas!

I had seen *Pterostylis nutans* flowering in South Australia in early August. We returned to Waihaha in mid-October in 1995. It was a dreadful day - a southerly bringing sulphurous whiffs of nearby Ruapehu on its icy breath. John Dodunski, Margaret Menzies and Bob Talbot braved the conditions too.

We were well rewarded. In 1995 there are 26 plants in a colony 40 x 120cm. Two had flower stems - one was dried up and unfertilised, the other a delightful fresh nodding greenhood. Indubitably *Pterostylis nutans*.

*Pterostylis nutans* is an Australian orchid that is a classic example of what de Lange and Molloy [1] call vagrant species in New Zealand. That is to say it is "part of an ongoing process of immigrant orchids arriving at different

times, barely establishing a foothold, and disappearing". *Pterostylis nutans*, like *Chiloglottis valida* and *Chiloglottis formicifera*, is insect-pollinated in Australia, but its specific pollinator is not present in New Zealand, so it fails to establish beyond its point of landfall.

Thomas Cheeseman received a specimen from HB Matthews who found it on the "crest of a ridge leading to Pukemiro Hill, near Kaitaia"; Cheeseman thought it was new, and dedicated it in 1914 to its discoverer by calling it *Pterostylis matthewsii* [2]. Matthews's photograph shows a group of five plants. HMR Rupp recognised that it was the Australian *Pterostylis nutans* and said so in 1932 [3].

Dan Hatch has related the second discovery of *Pterostylis nutans* in New Zealand [4]. Lucy Cranwell found it by a gunpost at Castor Bay on Auckland's North Shore in 1942, on "heavy pipeclay, bared in parts by the military stationed there".

Now in 1991-1995 we have the third confirmed sighting of this vagrant visitor.

#### References.

1. de Lange P and Molloy BPI. Vagrancy within New Zealand threatened orchids. *NZNOG Journal* 1995; 56: 13-15.
2. Cheeseman TF. New species of flowering-plants. *Trans. NZI* 1914; 47: 46.
3. Rupp HMR. Australian and New Zealand orchids. *Victorian Naturalist* 1932; 49: 151-2.
4. Hatch ED. *Pterostylis nutans* - the case of the wandering gunpost. *NZNOG Newsletter* 1986; 19: 4.
5. Irwin JB. Notes. *NZNOG Journal* 1992; 42: 5.