

Science is not a finite body of knowledge—it is a debate in progress: Francis Bacon 1561-1626

Ultraviolet reflectance photography—in a gnat’s eye?

Flower colour. A flower has to advertise itself if it is to attract a pollinator, and it usually does this by the colour of its petals. Colour may be the most important attractant for insect pollinators, though fragrance, size, outline, surface texture, temperature and motion can all play a part.

Guides. Once the insect has been attracted to the flower, it may be directed to its centre by nectar guides (“pollen guides” or “honey guides”). These are usually a visual contrast – target patterns, or lines radiating from the centre.

In many orchids of course the labellum is specially modified as a colour-attractant for insects, and as a landing stage (*Aporostylis bifolia*). In some there may be a pattern of lines on the petals, leading towards the centre from all angles (*Thelymitra cyanea*). In others the petals may bear marks visible from the direction of approach (*Thelymitra nervosa*). In *Nematoceras*, the greatly elongated sepals and petals may act as guides.

What the bee sees. The white light humans see is composed of the colours of the rainbow: “Roy G. Biv” – from long wavelength Red, through Orange, Yellow, Green, Blue, Indigo, to short wavelength Violet. We have three colour-detecting pigments (rhodopsins) in the backs of our eyes—one each for red, blue and green. Below red the longer wavelengths start with infrared, and above violet, they start with ultraviolet, but we cannot see them.

Some snakes can see infra-red, useful in tracking warm-blooded mammals.

Butterflies have four rhodopsins, one each for red, blue and green, and an extra that lets them see ultraviolet as well. Some species (including the honey-bee) have three rhodopsins that let them see blue and green and ultraviolet—but they cannot see red. Some insects have only two—one for ultraviolet and

one for green.

Some flowers use ultraviolet to attract insects. Some floral surfaces reflect and some absorb ultraviolet, so flowers may show characteristic ultraviolet patterns to the insect. We cannot see what the bee sees, but we can make reflected ultraviolet light visible to ourselves by filtering out visible light and allowing reflected ultraviolet light to fall on a sensitive photographic film. Pollen guides may show under ultraviolet illumination. One of the best known flowers with a pollen guide giving a bullseye effect in ultraviolet is the black-eyed Susan, *Rudbeckia hirta*, whose centre contains compounds absorbing ultraviolet strongly. Black-eyed Susan flowers appear plain yellow to humans while appearing to have a very dark centre to insects. There may be differences in ultraviolet reflectance as a flower matures, to prevent competition on a raceme, or within a species.

Ultraviolet photography. It must be clearly stated that here I am trying to record the ultraviolet *reflected* by flowers. The light emitted by some substances illuminated under ultraviolet is called fluorescence, and is quite a different subject. Similarly, the “sunlight” filter commonly used to screen out unwanted ultraviolet in everyday photography is the opposite of that discussed here.

Ultraviolet-transmitting filters. An ultraviolet photographic filter, which *transmits* long-wavelength ultraviolet and *blocks* all of the visible wavelengths, must be placed over the camera lens so no visible light can reach the film. A range of filters has been available (e.g. the Kodak Wratten 18a, Hoya U-360).

Ultraviolet sources for photography. Longer wavelength ultraviolet is transmitted by regular optical glass photographic lenses, and is thus the most practical for use in ultraviolet photography. Middle ultraviolet is transmitted by expensive quartz (but not glass) photographic lenses. Short-wave ultraviolet

causes sunburn of the unprotected eyes or skin, so is best avoided.

Sunlight contains long and short and some middle wavelengths. The intensity of sunlight ultraviolet is too variable even in New Zealand for ultraviolet photography. For reliable control of ultraviolet “illumination”, other ultraviolet sources are usually used.

Ultraviolet fluorescent tubes are coated on the inside with a special phosphor that absorbs short wavelength and transmits long wavelengths. The glass contains a salt that absorbs almost all visible light and transmits the long-wave ultraviolet. Since these tubes appear black, they are referred to as black lights. They are the most readily available safe ultraviolet source, come in many standard fluorescent tube sizes and operate in standard fluorescent lighting fixtures equipped with standard starter coils and ballasts. These tubes are referred to as “low pressure” mercury vapour lamps. The variety of tube sizes allows flexibility in illuminating small areas or large areas.

High pressure mercury vapour lamps require high electric current and produce a higher output of long-wave ultraviolet. Some middle and short-wave ultraviolet is emitted, so they are not safe. Special transformers (ballasts) and a warm-up period of several minutes are required to start, and a cool-down period of several minutes is required before they can be restarted. They are useful for illuminating small areas with high ultraviolet brightness. Special high wattage lamps of this type are of particular use for small objects, ultraviolet photomicrography, and ultraviolet spectrography.

Arc lamps produce very intense ultraviolet radiation as well as a continuous spectrum from the ultraviolet through visible light and infrared by producing a spark across an air gap between two electrodes in close proximity. The best known of these types is the carbon arc, with two carbon electrodes that are consumed in the process (there must therefore be a mechanical means of moving them together to maintain the small gap). Cadmium

electrodes can be used to produce an extremely bright ultraviolet. The xenon arc contains electrodes in a high-pressure atmosphere of xenon gas. Although the xenon arc lamp emits long-wave ultraviolet, and its primary use is in visible light photography, it can be used for ultraviolet photography if the visible spectrum is filtered out.

The ultraviolet output from electronic flash units varies according to the kind of gas in their tubes and whether the tube and envelope are of quartz. Older krypton and argon units emit more blue and long-wave ultraviolet than those with xenon. The quartz tube and envelope also emit some shorter wavelengths of ultraviolet.

Although electronic flash units are an inefficient ultraviolet source, they are portable (so can be used in the field), and are the easiest to use for flower macrophotography, where the heat from black lights soon causes wilting.

Film. Colour films are designed to filter out the usually unwanted ultraviolet radiation. Monochrome films contain silver halide crystals suspended in a gelatin layer. The silver-halide crystals are sensitive to the blue and ultraviolet but their response to the ultraviolet is limited because of the absorption of some of the ultraviolet by the gelatin. Any black and white film can be used and colour film has no advantages. Images formed with ultraviolet tend to show low contrast, so a medium to high contrast film or development should be used.

Fuji RTP, a tungsten-balanced film, has been recommended, but is not sensitive enough for ultraviolet flash photography.

Focus. Lens focal lengths are defined for visible light. The focal length of the same lens is shorter when it is used to focus ultraviolet. Stopping down the aperture to obtain greater depth of field is useful if the flash is powerful enough. Test exposures are needed to find the best aperture size, flash distance and operating distance.

Exposure. There is at present no really reliable method for metering available ultraviolet radiation (ultraviolet flash units, and ultraviolet light meters are available but are prohibitively expensive). Test exposures are needed to find the best aperture, and once a reasonable estimate has been made, bracketing should ensure that a negative of appropriate density is obtained.

Ultraviolet photography in the field. Highly ultraviolet-reflective backgrounds are common in nature. Some flowers absorb ultraviolet, but to an animal with ultraviolet vision they will stand out from the rest of the plant, whose foliage (particularly hairs) often reflects ultraviolet. Ultraviolet reflectance photography in the field would be necessary to discover such contrasts.

Producing false colour images. A number of methods of false colour imaging for mimicking the visual system of a honeybee have been documented. The image can be compiled using photo-editing software by converting the green colours into red; the blue into green; and the ultraviolet into blue in the RG system. Before the availability of such software many photographers collaged their ultraviolet results with yellow and blue filtered shots, and thus closely approximated what the bee sees.

Methods

Of ultraviolet-transmitting filters for photography, only the B&W 403 UG1 UV pass filter proved possible to source from New Zealand. This absorbs visible light producing a purely ultraviolet image on the film.

To compare visible light shots I used two Marumi ND8 (1:8 neutral density) filters in place of the UV pass filter to reduce visible light transmission into the camera to 1/64, allowing about the same exposures as the ultraviolet-reflected shots of the same flower.

I used Kodak P3200 TMZ monochrome film, shot at ASA 25 but developed as if shot at ASA 1600 (ie 8 stops less than ASA 1600).

I used an Olympus OM-4 camera set to “manual”, shutter speed 30, and ASA 25, with an 80 mm macro lens and telescopic auto tube, and a T-28 single flash unit mounted on top of the camera. I set the object to be photographed at 18 cm from the filter, with a Kodak neutral grey card as background.

The negatives were scanned using the slide-copying attachment to an Epson Perfection 1240U scanner. The contrast and brightness were enhanced manually using Adobe Photoshop 4.0, to exactly the same degree for the light and ultraviolet images of each taxon.

Results

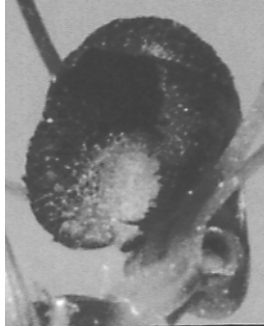
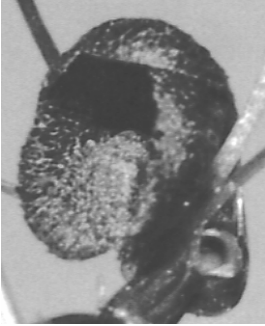
Satisfactory exposures were obtained with an aperture of f16 for the ultraviolet and f22 for the visible light shots. At these stopped-down apertures there was sufficient depth of field to overcome the differing focal lengths for ultraviolet and white light. The Kodak neutral grey card reflected ultraviolet similarly to visible light, so proved a suitable background for both.

The undescribed *Nematoceras* “Trotters” is a large, deeply coloured, fragrant orchid with affinity to *N. triloba*. I have photographed a pollinium-bearing fungus gnat on a leaf in a colony of this taxon, so it is likely to be insect-pollinated. The lateral sepals and petals reflected ultraviolet and visible light about equally, but the labellum showed differences: the fimbriated edges absorbed ultraviolet, and so appeared darker, in contrast to the central escutcheon which reflected ultraviolet more brightly than visible light; the result was an ultraviolet “pollen guide” in the form of a dark fimbriated rim around a pale central area (Figs 1, 2).

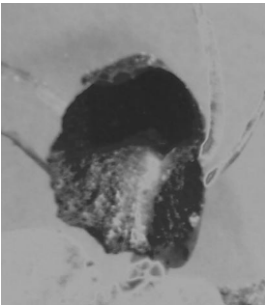
Figs 3 and 4 show *N. macrantha* (the pollinator, a small species of Diptera, possibly a *Culex*, according to GM Thomson); the leaves appear to absorb ultraviolet but otherwise there seem to be no differences. Figs 5 and 6 show *N. iridescens* - the leaves appear to absorb ultraviolet but otherwise there seem to be no differences. Fungus gnats have been observed pollinating *N. iridescens*.

Visible light ↓

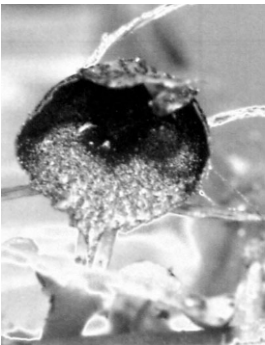
Ultraviolet ↓



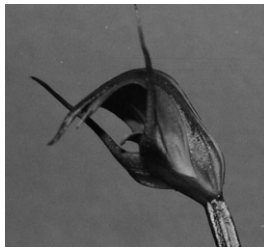
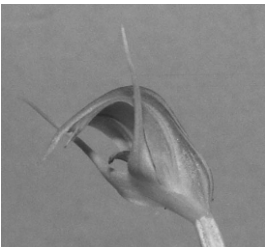
Figs 1, 2: *Nematoceras* "Trotters", the ultraviolet image of the labellum showing more clearly the dark fimbriated edge and a pale central "target", made especially more visible against dark, ultraviolet-absorbing leaves.



Figs 3, 4: *Nematoceras macrantha*, the leaves bright under visible light, but dark under ultraviolet.



Figs 5, 6: *N. iridescens*, the leaf dark under ultraviolet, but the flowers little different.



Figs 7, 8: *Pterostylis graminea* looks darker and less attractive under ultraviolet.



Fig. 9: The markings of the flower of *Pterostylis patens* appear with even greater contrast under ultraviolet.



Fig. 10: *Drymoanthus adversus* flowers appear dark (they absorb ultraviolet) but their columns and pollinia appear very bright from reflected ultraviolet.



While the flowers look the same, the leaves appear to be black under ultraviolet, but bright under visible light: perhaps the contrast between the bright labellar “bib” and the dark leaves works for the gnats’ ultraviolet “vision”. Shots of the “iridescent” dorsal sepal showed little difference between the reflected ultraviolet and visible images.

Figs 7 and 8 show shots of *Pterostylis graminea* under light and ultraviolet: there appears to be less ultraviolet reflection than light reflection.

Fig. 9 shows *Pterostylis patens* under ultraviolet.

Fig. 10 shows *Drymoanthus adversus*, photographed using reflected ultraviolet: note the dark flowers with the bright pollinia.

Discussion

The flowers and leaves of some New Zealand orchid taxa appear to reflect ultraviolet in patterns that could act as pollen guides to insects which can “see” ultraviolet.

Most NZ taxa are not insect-pollinated, and even for those that are, few pollinators have been identified. While we know many insects can “see”

reflected ultraviolet, no research has been carried out on the visual capabilities of any of the suggested pollinators of NZ orchids. Thus the significance of these observations is quite uncertain.

We do know fungus gnats have been observed pollinating Nematoceras species. As with most insects they can probably smell the fragrant flowers. I wonder if these insects will turn out to have the rhodopsin for seeing ultraviolet.

Let me surmise on the pollination of Nematoceras. Fungus gnats are attracted from afar by the fragrance, then use the tepals as coarse visible guides to the flowers, then the ultraviolet reflectance pattern of the throat as a light target - fringed by the dark fimbriated labellum edge, and contrasting with the darkness of the rest of the labellum and the leaves - to guide them inside. There the pollen is brightly lit by ultraviolet light entering the auricles. I think that is what the auricles are for, not for the insect to escape the flower (I have never seen a fungus gnat small enough). I think they are uv windows. Self-pollinators like *Corybas cheesemanii* don’t need them.

Drymoanthus adversus may attract insects with its ultraviolet-reflectant column and pollinia contrasting against the dark tepals. *Pterostylis patens* by the vividly contrasting stripes.

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No. 6 - epiphytic orchids

The epiphytic orchids form a discrete group of small genera. The species usually occur on tree stems or often high up in the canopy, being seen only in the branches of fallen trees or when their perch is removed by the wind in a storm. However, they can all occur on the ground in rocky places, especially where the scrub cover is very open or very short such as in coastal scrub or on ultramafic sites. Here they are often among a dense covering of ferns.

The genera can be readily recognised from the vegetative form but in *Earina* and to a lesser extent in *Drymoanthus* flowers are required. Recently *Bulbophyllum* has been split into two genera as *Adelopetalum tuberculatum* and *Ichthyostomum pygmaeum* but the plants are superficially so similar that they are retained in the same genus here.

- | | |
|---|------------------------|
| 1 Plants somewhat fleshy with a prominent bulbil at the base of the leaf | Bulbophyllum 2 |
| Plants stiff, leathery with long thick roots rather than bulbils | 3 |
| 2 Leaves without cilia | <i>B. tuberculatum</i> |
| Leaves with finely ciliate surface and margins | <i>B. pygmaeum</i> |
| 3 Plants small, tufted or with a short stem; leaves more or less ovate | Drymoanthus 4 |
| Plants large, with almost bamboo-like stems; leaves lanceolate to linear-lanceolate | 5 |
| 4 Leaves plain green; flowers purple spotted | <i>D. adversus</i> |
| Leaves spotted purple; flowers plain pale yellow | <i>D. flavus</i> |
| 5 Stems branched; flowers axillary | Winika |
| Stems unbranched; flowers terminal | Earina 6 |
| 6 Flowers heavily scented, summer to autumn flowering; leaf sheath cylindrical, splitting | <i>E. autumnalis</i> |
| Flowers scarcely scented, spring and summer flowering; leaf sheath flattened, not splitting | 7 |
| 7 Petals enclosing column; leaf veins inconspicuous | <i>E. mucronata</i> |
| Petals spreading widely; leaf deeply channelled, veins conspicuous | <i>E. aestivalis</i> |

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Acknowledgements

I am grateful to the Wellington Botanical Society for its Jubilee Award which I have used for the purchase of equipment and for travel. I am grateful to Michael MacConaill of Ottawa for explaining his techniques – much of the method I used is his.

References

<http://people.smu.edu/rmonagha/mf/uv.html> and http://msp.rmit.edu.au/Article_01/17.html have lists

of links to useful references on ultraviolet reflectance photography.

http://msp.rmit.edu.au/Article_01/index.html is a medically-oriented site with a wealth of information on ultraviolet reflectance photography, including the use of flash with digital cameras.

www.jpl.nasa.gov/technology/features/uv_bees.html discusses a new digital camera chip that is solely ultraviolet sensitive—so this research will soon be made much simpler.

RD Fitzgerald's genus Adelopetalum

In 1883 Augustus Hamilton found an epiphytic orchid near Petane, Hawke's Bay, and sent specimens to Colenso who described it as *Bulbophyllum tuberculatum* [*Trans.N.Z.I.* 1890; 22: 488], remarking it was "a species very distinct from our long known and common *B. pygmaeum*, Lindl.; apparently rare, though possibly confounded with that species. It is a much larger plant of similar appearance and habit."

In 1891 RD Fitzgerald found an epiphytic orchid near the Tweed River, New South Wales and described it as *Adelopetalum bracteatum* [*J. Bot.* 1891; 29: 152-3]. Almost at once FM Bailey reassigned it to *Bulbophyllum* [*Queensl. Dep. Agr. Bot. Bull.* 1891; IV:17]. Rupp noted "Bailey's treatment of this plant as a species of *Bulbophyllum* is generally endorsed. It is thought that Fitzgerald either had an anomalous apetalous form when creating his genus *Adelopetalum*, or else missed seeing the minute petals close up against the column" [*The orchids of New South Wales* 1943; p125].

Clements and Jones resurrected the genus *Adelopetalum* for *A. bracteatum* and 11 new combinations, among them *A. tuberculatum*, the only New Zealand species of the genus [*The Orchardian* 2002; 13 (11): 498-9]. They gave no explanation for the change, but wrote, "Detailed papers on (the *Bulbophyllinae*) are in preparation, but in light of the recent taxonomic activities of Polish workers, it has been decided to make the necessary nomenclatural transfers prior to the submission of these more detailed papers".

Fitzgerald's original description of *Adelopetalum* is reprinted here.

ADELOPETALUM, gen. nov. — Sepals nearly equal, the lateral ones connate with a projection of the column. Petals absent. Labellum thick, attached to the basal projection of the column. near the end, entire and contracted into a claw, but not articulate. Column short-winged and toothed at the top, and with a gland-like enlargement just below the tooth. Anthers terminal, capping the pollen-masses. Pollen-masses 2, globular, cohering, above a small rostellum, but not connected with it. Flowers reversed, numerous, terminal on filiform peduncle, which issues from below the pseudo-bulb. Small bracts at the bases of the pedicels, larger and leafy on the peduncle. Herbs with creeping rhizomes connecting one-leaved conical furrowed pseudo-bulbs.

Adelopetalum bracteatum, sp. n. — Rhizome creeping, forming a mass. Pseudo-bulbs globular or conical, with six or seven vertical ridges, much marked after the leaves fall off. Leaves solitary on the pseudo-bulbs, oblong, channelled along the centre, thick, contracted at the base, $\frac{3}{4}$ in. long by $\frac{1}{2}$ in. wide. Peduncles filiform, from $1\frac{1}{2}$ to 2 in, long, bearing 8-10 leafy bracts, irrespective of the bracts below the flowers, and about 12 flowers on short pedicels. Bracts on peduncle lanceolate, acute, transparent, colourless, 2 lines long, 1 line broad. Flowers reversed, without spur, yellow-striped, and blotched with red. Lateral sepals broadly lanceolate-acuminate, 3 lines long, united for 1 line. Dorsal sepal rather shorter. Labellum yellow, 1 line long, thick, hollowed above and thickened at the point, attached to the column, near the end and above the junction of the sepals, by a short claw. Column free for 1 line, adnate to the lateral sepals for 1 line. Wing of column having one tooth close to the anther, and below it a globular gland-like swelling (possibly abortive anthers). A small globular rostellum far back in the deeply sunk stigmatic chamber, below the overhanging pollinia. Pollen-masses 2, globular, cohering, not furrowed.



***Adelopetalum bracteatum* Fitzg.**

Drawing by Robert Lewis,
from Bedford RG. *A guide to native Australian orchids.*
Angus & Robertson, Sydney, 1969, p12. (as *Bulbophyllum bracteatum*).

1. *Thelymitra* “*tholinigra*”

Allan Ducker, Graham Marshall and your trusty Column were casting around for interesting orchids at the Kaitarakahi Reserve near Huia about a hundred years ago; actually 23 October 1994, when someone spotted some white *Thelymitra* with several flowers wide open (p15, figs 1, 2). The portrait gear flopped out and the poor things got flashed and videoed until lunch time. Then someone accidentally sat on one in bud. It had a sap perfume, so we were happy that it was our first *T. aff. longifolia* and the 3-D pairs of them got announced as such for at least two years. No expert in the audiences ever complained yet the domed, black, post anther lobe looked nothing like *T. aff. longifolia*'s! Now the Column finds his olfactory gear does detect *T. aff. longifolia* as a sweet musky smell when several flowers are open in hot sunlight, not that sap smell. *T. “tholinigra”* flowers he now finds, smell faintly of dung. The best 1994 spike had 3 flowers open and 5 still in bud, also quite uncharacteristic of *T. aff. longifolia* which opens them all at once. The doughty trio were none the wiser then and forgot about it; almost.

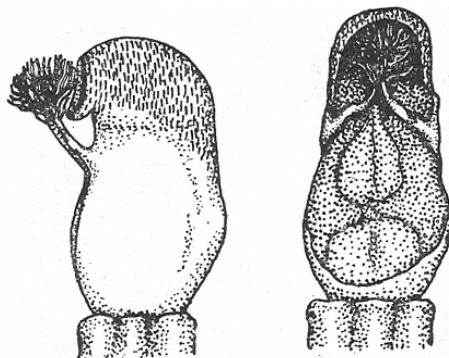
Who else found any? HB Matthews, Kaitaia Oct. 1920 (photo in AK), Dan Hatch, Waitakeres Nov. 1946, JB Irwin & OE Gibson, Kaikohe, Oct. 1949 and C Trevarthen East Cape & Lake Waikaremoana, Nov. 1949. HMR Rupp declared them to be the Australian *T. aristata* Lindl — it comes close to Nicholls' Plate 25 [1] but bears no resemblance to the modern interpretation of Lindley's species. Let us call the black domed one, *T. “tholinigra”*. Dan accepted (he had no option) Rupp's, identification and it was published as *T. aristata*, in 1946 [2]. Reading Dan's 1952 description [3], it became clear that the doughty 1994 trio had stumbled onto the same thing and decided wrongly that it was *T. aff. longifolia*. But it has to be a separate taxon.

On 12 Oct 02, the Column came across 2 specimens atop Rubbish Dump Hill near Cape Reinga and shared the find with the field party including Allan Ducker who has now videoed them at both sites. The more robust of the

specimens was measured, sniffed, photographed, videoed and examined with the X20 lens. Half as big again as the Waitakeres specimens but so rare as to be seen only once every 8 years.

Peter de Lange accepted a chiding from the Column in 2000 for not including, in his *NZ threatened and uncommon orchids* listing, [J76, p12] numerous of the unnamed orchids which the NZNOG have tagged and published in the Journal. Peter's response was, “Why not put descriptions and photos of them into AK Herbarium so that the Bot Soc's *NZ Threatened Plant Committee* can assess them for the conservation response?”

The Column — serves him right for opening his gate — is having a go at this, with Ewen Cameron's agreement. But there are some strange anomalies when taxa are examined in detail. For instance, four forms of *T. aff. longifolia* have come out of the exercise being, in Bruce Irwin's and the Column's terms, *T. “blue halo”* [J70 p33], *T. “deep cleft”* [J70 p31], *T. “orange fascia”* [J70 p31, J77 p21] and *T. “tired one”* [J62 p14, 25, both of the same flower, notice]. There are other possibilities but for less well known forms which can await more finds to prove they aren't isolated mutants. Now, looking again at the Kaitarakahi *T. “tholinigra”* transparencies, it was like a smack in the face with a board! They were well outside any *T. aff. longifolia* so the Column rang Dan and *tholinigra* was



The column of “*Thelymitra tholinigra*”- as *T. aristata*—from ED Hatch [5]

agreed upon, as a suitable tag. Compare Dan's drawing of the column from [3] with Fig. 2.

Below is a preview of the draft description for AK. What do you think?

***Thelymitra* "tholinigra"** a taxon close to *T. longifolia* but with a black, domed, post-anther lobe.

Rüpp [2] had confused Australia's *T. aristata* with HB Matthews's find at Kaitaia and Dan Hatch's in the Waitakeres.

Description *Plant* up to 430mm high. *Leaf* up to 300mm long, shallow-concave with 3 exterior ridges, and outer edges sts turned up at the outer ridges, stiff and leathery, dark olive with reddish margins. *Peduncle* darker than *T.* "darkie", purplish brown. *Lower bract* to 60mm, acute, purple, shading up to olive; *upper bract* to 43mm, acute, purple. *Pedicels* 2-3mm long completely sheathed by the *fertile bracts*, which are up to 23mm long, purplish brown, acute, often with the tip 1mm between the lateral sepals. *Ovary* 6mm long, ribbed, sheathed by the floral bract. *Flowers* 1-12, pale mauve, fragrant, (faint smell of dung to the writer, to attract flies?) to 38mm diameter, having five or more still in bud whilst three are open. This separates it from *T. aff. longifolia* in which the flowers all open at once. *Perianth segments* elliptic-acute up to 20mm long. *Sepals* outside, dark purplish brown with off white margins, pale mauve inside, most distinctive in bud. *Dorsal sepal* wider than the lateral sepals. *Petals* and *labellum* alike, slightly smaller than the sepals also paler mauve, inside and out. *Column* inclined slightly backwards, pale pink. *Midlobe* higher than the anther, cucullate, more or less emarginate, brownish black all over, finely tuberculate. *Lateral lobes* secondary, horizontal with short dense tufts of white or pink cilia with tiny tufts on each cilium. *Rostellum* like a jug spout with wings behind serrulate on top, leaning back, out of sight behind creamy pollinia in 2 paired segments which can also cover its own stigma as in Fig 2.

Similar species *T. longifolia* and *T. aff. longifolia* as noted above. But they have neither the domed post anther lobe lacking any yellow nor the long floral bracts encasing the pedicels and ovaries. Intermediate forms were

apparent at Rubbish Dump Hill indicating hybridisation.

Writer's notes This attractive orchid is rare

Flowering date	Specimen locations kms
23 Oct 94	Kaitarakihi Res.
12 Oct 02	Rubbish D. Hill
NZMS 260	Altitude above MSL
R11 518650	60m
N02 840501	160m

and cries out for efforts to avoid its extinction. Specimens should not be taken, to give it some chance of propagating.

T. "tholinigra" being perfumed to attract pollinators yet self pollinated is enigmatic. A. Ducker, G. Marshall and the writer lunched beside the colony photographed, only realising 8 years later that it was anything remarkable after close analyses of the many forms of *T. aff. longifolia*. The writer spotted two specimens, just opening their lower 3 flowers at Rubbish Dump Hill, Cape Reinga, on 12 Oct 02. The robust one of the two has been used to extend Dan's description.

Acknowledgements: The Column wishes to thank Dan Hatch, Brian Molloy and Allan Ducker for their comments.

References: 1. Nicholls W.H. *Orchids of Australia* (1969). 2. Rüpp HMR & Hatch, ED, *Proc Linn. Soc. NSW* 70, 1946. 3. Hatch, ED, *Trans. Roy.Soc. NZ* 79: t79-80, 1952.

2. Finding *Petalochilus minor*

The editor's adversarial sally into the *Petalochilus minor* debate in J84 certainly raised some cogent points but he drew a flawed conclusion so it could not go unanswered. The Column did make polite suggestions about drafts that the Editor kindly forwarded but could not dissuade him from his firm opinion. After some diligent research, more salient points have arisen and the Column contends that *Petalochilus minor* is valid as set out below but, in the interim, let us use Doug McCrae's *P.* "green column" for Hooker's lone type specimen with the fringed (glandular) midlobe to the labellum.

Hooker was including *all* the *Caladenia* he knew in the north, and which he may have encountered during his 3 months sojourn in 1841, in his abbreviated description [J84 p5]. But the petaloid labellum forms, *Petalochilus saccatus* and *P. calyciformis* would probably have been unknown to him. He no doubt lamented at having only two [1] of the “variations-within-the-species” for display on his type sheet but was doing the best he could with Edgerley’s inadequate collection. In Edgerley’s defence, to get both *P. alatus* and *P. “green column”* at the same time, he would have been collecting in a narrow window of time between 4 & 10 October for the latest *P. alatus* and the earliest *P. “green column”*. All the other several taxa flower later. So only Hooker’s description included the other “variations”. He must have learned them from somewhere and would not have just invented them, would he? Today we recognise the “variations” as separate taxa. One would have expected Hooker to notice that no one taxon in the north carried all the traits he described; and somehow he was not aware that *Caladenia alata* had been described by Robert Brown in his celebrated *Prodromus Florae Novae Hollandiae*, 3 decades earlier. Cheeseman, Rüpp, Hatch and Moore missed it too, many decades later. A curious omission. As our Editor noted, Hooker, with his undoubted expertise, was fallible; aren’t we all?

So Hooker’s descriptive characters for *C. minor*, in boldface type below, included all the northern *Petalochilus* taxa with showy labella, by association. There were

1. *Petalochilus* “green column” [J82 pp15,17] one specimen on the type sheet, & *P. “chloroleuca”* [J72 p27] both with **glandular margin** to a **subulate midlobe**, red barred but hardly pink,
2. *P. aff. chlorostylus* [J72 p27 Fig. 2, J83 p13 Fig.2 n.b.,16,17] **midlobe subulate & margin glandular**, red barred & red flecked but hardly pink,
3. *P. bartlettii* [J72 pp27,28] & *P. aff. bartlettii* [J78 pp20,26] **pink** and the only ones with **obtuse sepals**,
4. *P. aff. fuscatus* [J82 p17] & *P.*

“speckles” [J74 p18] **pink**, the only ones with **glabrous leaf** [2] and a **broad midlobe**,

5. *P. alatus*, 3 specimens on the type sheet; white but late flowerers are often **pink** [J77 p22; J82 p15] and the **labellum is broader than long** but the sepals are not obtuse, the leaf is not glabrous and the midlobe is neither subulate (awl-like) nor glandular with its solitary or totally missing callus.

ICBN rule 37.4 [J84 p3] bars only defining a holotype from an illustration where a specimen is present. Fitch’s drawing of *P. “green column”*, on the other hand, was part and parcel of Hooker’s description by his direct references to it. So the drawing is pertinent and is not barred by rule 37.4. Note that Hooker made no disclaimer about the drawing as he did for Fitch’s erroneous *Caladenia alata* in *Flora Tasmania*.

The question still remains, to what do we attach the name *P. minor*? As you can see, Hooker included parts of five to eight taxa in his description but only two of these were on his type sheet; one, *C. alata* had already been described by Robert Brown, so was illegitimate for *C. minor*. Even if NZ’s *C. alata* differs from the Australian one, which is doubtful, it is represented less in the description than the other on Hooker’s type sheet. So *P. “green column”* with the glandular, subulate midlobe, as referred to on Fitch’s drawing, is the only logical candidate for *Caladenia minor*. As such it was designated by Mark Clements in 1989 [1] now reassigned to *Petalochilus minor*. Publishing its designation formally, unless there is a serious error, ensures that *Petalochilus minor* is now the valid botanical classification for that fringed midlobe specimen on Hooker’s type sheet. How did our debating panel miss that important piece of information all this time? Don’t ask.

We still have the dilemma of differentiating among *P. minor*, *P. chlorostylus* and Bruce Irwin’s *P. aff. chlorostylus*. This is a job for David Jones, Mark Clements and Brian Molloy. The Column believes they are working on it and has agreed to send fresh specimens to Brian for analysis.

3. *N. triloba* complex

The turmoil Have you noticed the tedious procession of new tags for tiresome *Nematoceras triloba* agg.? Spare a thought for the poor unfortunate, hooked orchid addicts who are enduring everything from muddy knees to lying in frigid, sopping moss to bring you these gems of information. Why would they? Have you also noticed that your mental “type specimen” colonies, don’t quite match up to any that are published? Join the clan! The Editor noticed the same years ago and has been prodding likely NZNOG members ever since for info. on distribution of the different *N. triloba* taxa encountered. *Corybas trilobus*, as it once was, had long been uninspiring to the Column because they all seemed “the same only different” but a new light is dawning. Bruce Irwin, Graeme Jane, Mark Moorhouse, Gordon Sylvester, Brian Tyler and the Column have been egging each other into deeper and deeper water with this multifaceted aggregate until the Editor despairs of the plethora of different types continually being unveiled. Serves him right for setting us loose in the first place!

***Nematoceras triloba* sensu stricto.** Joseph Hooker originally described one taxon only, [1,2] as sent to him by William Colenso. Essentially, it grew in “damp woods”, had 2” sepals, 1” petals, dorsal sepal retuse (notched) at the front, peduncle shorter than the petiole, i.e. flower below or level with the leaf, perianth (labellum + dorsal sepal) $\frac{1}{3}$ ” long, labellum margins nearly entire (meaning not very ragged at the bib), leaf $\frac{3}{4}$ ” across and “deeply cordato-reniform” (notched at the base) but no mention of bracts, mode of pollination, perfume, latitude/altitude, colour or flowering time. Dr. Brian Molloy and his colleagues opined [J77 p5] that Colenso’s Kew specimen, “161 Acianthus 1847 Colenso East Coast N. Zealand” written in Hooker’s hand, should be the lectotype. That’s fair enough, isn’t it? A picture of it would be nice though. So if you can find a specimen of that description near the east coast of the North Island, please let us hear about it. Meanwhile, anything varying significantly from that description can happily be tagged as a separate taxon, can’t it?

The *Nematoceras triloba* report sheet That daunting self-explanatory insert in your Journal, is an update on the Editor’s original; everything an NZNOG investigator should know about his favourite *N. triloba* taxon. If you are keen to tell all about your latest find (s), here is your chance to deliver it (them) for recognition so that order can be gleaned from the turmoil. Photocopy as many report sheets as you need and fill in what you can, one sheet per taxon, the more traits the better but you can be excused for leaving out the pollinator or perhaps not drawing the centreline and column shape if you don’t have a good lens and if there were too few flowers to risk slicing one up. However that very centreline section, its angles, slopes, steps or glands, are usually consistent traits in a taxon and can be critical to identification. You may need an extra year to catch up on the extent of flowering time and other things you may not have noted first time around.

The suggested mode of tagging using *Nematoceras* “tri*****” is a succinct system for indexing our records alphabetically so keeping all the *triloba* aggregate together and allowing you enough letters to identify a place, trait or time as a personal reminder. Be wary of an odd solitary plant; it might be a sterile mutant. Even solitary colonies could be the same, spreading vegetatively but we would still like to know about the colonies. When you have filled in as much as you can, send your report sheets to the Editor for critical assessment. Add any photos, drawings or other information that you feel is pertinent. When we can see a consistent trend with two or more taxa over a sizeable area, it will be time to call in the taxonomists for DNA analysis and species naming. Get out there in that sopping moss and make your mark in the botanical texts of tomorrow! Good hunting.

The sheathing bract (SB) Watch out for that little SB below the leaf axil, (take a little torch plus a good lens!) The SB is low on the stem, it is delicate, often distinctive, often below the leaf mould, in the very place that one usually grabs a specimen and so wrecks the SB! Have a care. Maybe that grabbing action is why only Colenso, amongst our classical taxonomists, ever mentioned it. He prided himself on getting all the detail, as you will see in his

description [3,4] of *Corysanthes hypogaea* (now *Nematoceras hypogaea*) He wrote, "petiole -1½ inches long, . . . with a sheathing truncate bract at the base." just above the grab spot so Colenso's SB would have survived the grasping fingers. *N. "pygmy"* is another with the SB right at the leaf axil. All the *Corybas* alliance that the Column has checked have an SB, even on nonflowering plants which could make it a good and much needed alternative identifier; if the *N. triloba* agg. is ever to be properly understood. The SB is a short membranous tube on the rhizome from which the stem issues. SB tops vary from flared on a slight slope with a bract-like apiculus hooking back to the peduncle (*N. "trisept"*) to steeply sloping up from a sinus to a wavy edged green apiculus curving away from the peduncle (*N. acuminatus*) to a tin-jug type spout for an apiculus on Mark's "Mid Whangamoas".

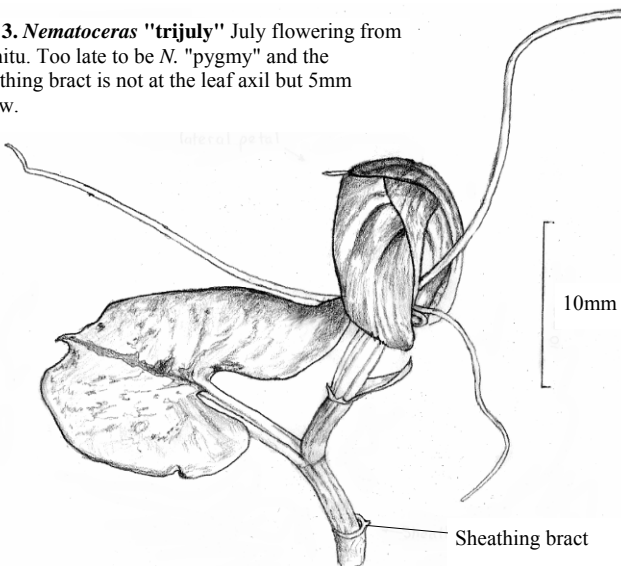
Nematoceras "trijuly" Tricia Aspin e-mailed the Column on 7 August about the July flowering *N. triloba* at Barry Lee's kauri bush at Awhitu. It was no doubt the same orchid as at Ian Dodd's trust bush at Wattle Bay [J82 p12]. Ian and Tricia had given the Column a sidelong glance, on 20 Nov 01, when he announced that it could not be the common *N. "pygmy"* because the SB was below the leaf axil. There is no harm in healthy scepticism is

there? Anyway, *N. "pygmy"* flowered in May-June and were finished by July this year. *N. "trijuly"* photo's from 8 Aug 02 show a spent, mud coloured last flower (we were too late!) with a lateral petal trapped between labellum and dorsal sepal (**Fig. 3**) so readers will have to make do with a drawing instead of a colour print. But there, down in the leaf mould after some delicate tweezer excavation, was a healthy SB, 5mm below the leaf axil. It has a flared rim sloping up at the back to a 0.2mm apiculus, akin to the secondary bract just below the front of the ovary. In situ, without a torch, it was so difficult to make out that tiny SB in the dark brown leaf mould but the flash caught it nicely. So *N. "trijuly"* it is bringing to six the number of *N. triloba* taxa so far found in ER9, Hunuas, Waitakeres and Awhitu peninsular. Have you any the same? Further south and at higher elevations, it could be expected to flower 4-6 weeks later.

References

1. Hooker JD. *Flora Novae Zelandiae Part 1*, London, 1853, p250
2. St George, I. *The Hookers on the New Zealand orchids*, NZNOG *Historical series* 1989 p31
3. Colenso, W. *Corysanthes hypogaea*, *TRNZ* 1884, 16:p336
4. St George I. *Colenso on orchids*, NZNOG *Historical series*, 1989, p21

Fig. 3. *Nematoceras "trijuly"* July flowering from Awhitu. Too late to be *N. "pygmy"* and the sheathing bract is not at the leaf axil but 5mm below.



Colour plates

Fig. 1 →
T. "tholinigra"
from Kaitarakihi
Reserve 23/10/94.
Note 3 flowers open,
5 still in bud, long
floral bracts.

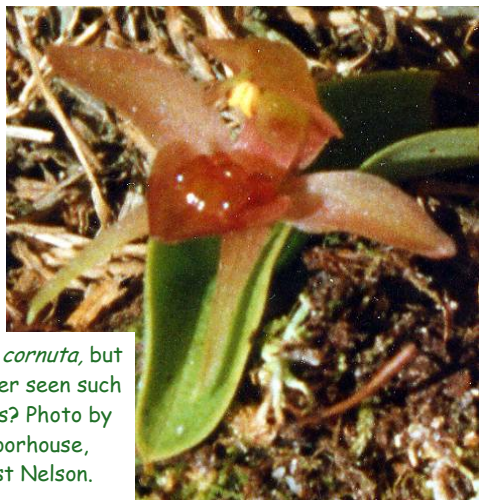
Fig. 2 →
Column of *T. "tholinigra"*,
no yellow fascia, no
cleft in the post-
anther lobe and tufts
of cilia on the
column arms.



↖↗ Pat Enright's big new *Nematocheras* aff. *triloba* (fl. 16 mm x 13) found in the Wairarapa 21 September. The labellum is widely flared (making it look flattened front-to-back), and fringed with teeth. The apiculus of the leaf is recessed, the tip of the dorsal smoothly rounded, and the auricles of the leaf curiously pointed.



↑ Eric Scanlen's *Thelymitra* "tholinigra" - see page 10 ↑



Chiloglottis cornuta, but have you ever seen such red flowers? Photo by Mark Moorhouse, northwest Nelson.

Seasons in the life of some Canadian orchids Part I - Spring and the *Cypripediums*

Marilyn H S Light conducts long term studies of native orchids in Canada including the Yellow Lady's-slipper pictured here. She chairs the Education Committee and the North American Regional Group of the Orchid Specialist Group, Species Survival Commission, International Conservation Union.

←Photographs by Michael MacConnail

Figure 1 - The Pink Lady's-slipper (*Cypripedium acaule*)

Figure 2 - The Yellow Lady's-slipper (*Cypripedium parviflorum* var. *pubescens*)

Figure 3 - Not all insect visitors are effective pollinators. Here we see a hoverfly (syrphid fly) that became stuck against the sticky pollen mass as it attempted to exit the pouch of a Yellow lady's-slipper flower. The flower has been opened to reveal the typical position of an insect as it passes between the stigma and the pouch on its way out of the flower.

A warm, sunny day in early May, finds shoots of several kinds of Lady's-slippers emerging after a long winter's rest. The rest, imposed through evolutionary selection for individuals best suited to life where the ground may be covered with snow for five to six months of the year, is a minimum of three month's exposure to near freezing temperatures. Dormant buds that formed during the previous autumn, burst into life once the soil has warmed to about 10°C. The shoots extend rapidly and within a week, the presence of flower buds can be discerned if one presses gently along the still cylindrical shoot. Soon, the leaves unfurl revealing an inflorescence. The two leaves and the single-flowered inflorescence of the Pink Lady's-slipper, *Cypripedium acaule*, arise at ground level (Fig. 1). For this reason, this orchid is

sometimes called the Stemless Lady's-slipper. Up to five oval, pointed leaves grace the taller stems of the Yellow Lady's-slipper, *Cypripedium parviflorum* var. *pubescens*, (Fig 2). In as little as two weeks, flower buds appear and open: one flower only for the Pink, one or two for the Yellow.

In recent years, spring has come early and swiftly to eastern Canada. Soil temperatures have risen more quickly than usual, prompting *Cypripediums*, especially those plants growing in open sun-drenched spots, to break dormancy and expand more quickly than what evolutionary selection has allowed for. Like tulips forced into unnatural early bloom, the flowers of these forced *Cypripediums* do not always form properly. The flowers may be crumpled or the anthers devoid of pollen. The many plants growing in cooler, semi-shaded spots seem less affected by an early warm spell. One cannot but wonder when they too might be challenged by the changing climate and what the result of that challenge will be.

The Pink Lady's-slipper and the Yellow Lady's-slipper inhabit very different environments. The Pink Lady's-slipper grows in acidic, often sandy soil or in a moss cap over granitic rock. It can also grow in the drier parts of sphagnum bogs. The flowers are visited by large queen bumblebees (*Bombus* spp.) They enter the bulbous lip through a large opening in the front and sometimes cut their way out of a flower using their powerful mandibles. The Yellow Lady's-slipper is found in limestone-rich woodlands and in fens. Pollinators of these showy fragrant flowers include a variety of small- to medium-

size bees attracted both by colour and scent. The flowers occasionally also attract the attention of a Ruby-Throated Hummingbird or a Tiger Swallowtail Butterfly which of course cannot enter the flowers but add to the enjoyment of a passerby. Bees that do enter the flowers leave without any reward because the Lady's-slipper flowers produce no nectar for their visitors. Insects may remove pollen as they squeeze past the anthers in their struggle to escape the flower but in order to do this, the insect must be thin enough through the thorax to squeeze past the anthers and thick enough to pick up pollen as it brushes past (Fig. 3). Also, the insect must be tall enough to deposit pollen on the stigma of a second flower as it climbs up the back of the lip toward the exit opening. Not all pollen removers are able to deposit pollen during a subsequent visit, only the ones that are just tall enough, thick enough, and strong enough to escape are successful.

Weather can affect insect movement and flower longevity. In the Yellow Lady's-slipper, flowers generally last about 8 to 10 days but we have found that flower life can be quite variable with flowers lasting up to 23 days under certain conditions. The cumulative minimum daily temperature is closely correlated with flower life. A series of cool nights during the blooming season will result in flowers lasting longer. Most flowers fade once 150 degrees Celsius have accumulated. We might presume that extended flower life would increase the opportunity for a plant to reproduce but close examination of pollinator behaviour, pollen germinability, and flower receptivity to pollination show that such assumptions are misleading. First of all, the pollinating bees fly only when the weather is perfect for them. In the case of the Yellow Lady's-slipper pollinators, most bee species will visit flowers only when it is sunny, the air temperature is 20°C or above, and there is a gentle breeze. Also, the bees fly mostly in the morning, from about 10 am to 1 pm, so there are further limitations on the conditions being appropriate for flight and flower visits.

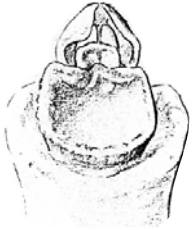
Experiments in the laboratory backed by experimental pollination of wild plants have revealed that the pollen of even fresh flowers is not always germinable. Pollen that does not germinate well in a petri dish does not sire many seeds when used in hand pollinations. Furthermore, flowers become unreceptive to pollination leading to fertilization and seed production after about 12 days or even less. Some plants will produce seeds only if their flowers are pollinated within a few days of opening. We might ask why these flowers can last so long if they cannot produce seeds under all conditions or at any age?

To answer this, we must examine the evolutionary selection process which led to what we have today. *Cypripediums* can be long-lived orchids and the Yellow Lady's-slippers are particularly long-lived. We know this because of some plants have been in continuous cultivation for more than 100 years. Long lived plants have numerous opportunities to produce seed throughout their lifetime. Even if one year or a series of years is unfavorable for seed production, eventually a season will be appropriate and seeds will be produced. Another point to consider is how these plants grow. They can form large colonies of hundreds of plants. Within a large colony in spring, we will find plants in different stages of growth and flowering. The flowering season can extend over 40 days. Large numbers of fragrant, showy blooms may be more effective in attracting pollinating bees to a colony when the weather is appropriate even if many of them are no longer fertile. Chance will determine which flowers are visited and in which order but even one visit of the correct-size bee to a flower with viable pollen followed by a visit to another flower still receptive to pollination leading to fertilization will result in some 5000 - 15000 seeds produced and this may be sufficient to maintain the population.

Each spring is a revelation, of new scenes, of new observations, and is a great opportunity for us to marvel at the complexity of evolutionary selection.

Nematoceras longipetala

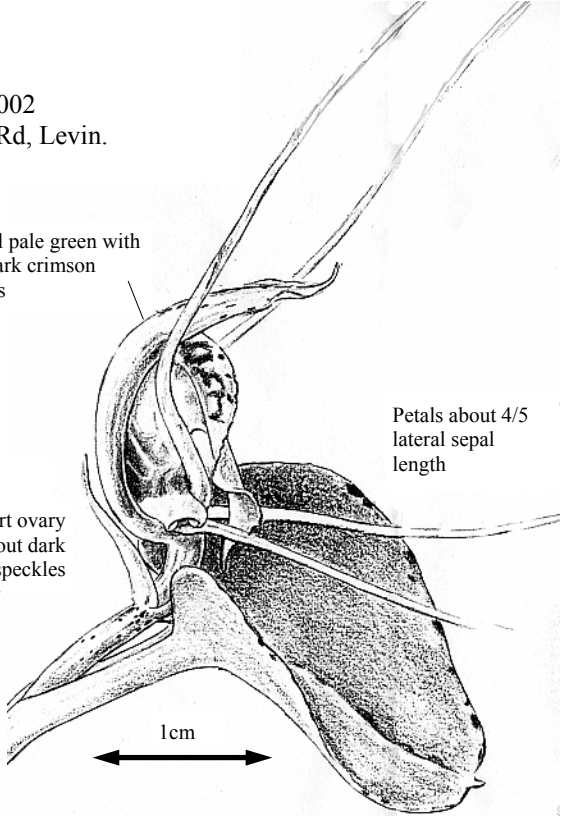
—drawings by Bruce Irwin.
From plants collected 2 August 2002
near the upper end of Gladstone Rd, Levin.



Column: pollinia
behind viscid disc,
behind stigma

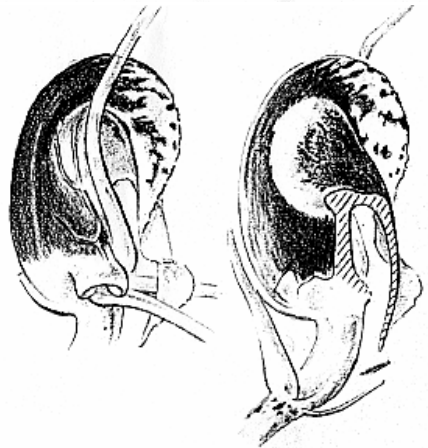
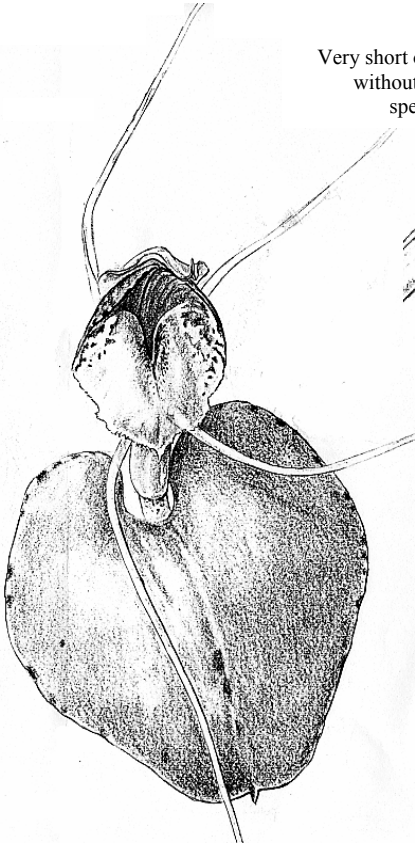
Dorsal pale green with
few dark crimson
streaks

Very short ovary
without dark
speckles



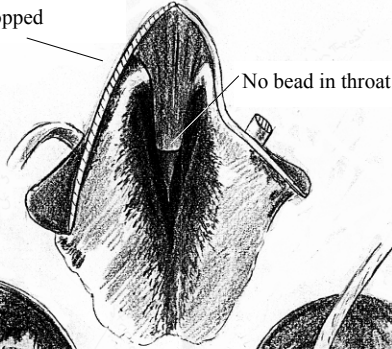
Petals about 4/5
lateral sepal
length

1cm



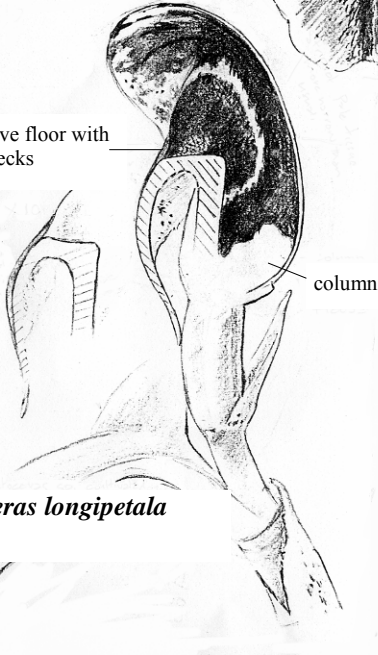
Upper lobes of labellum cropped

Entrance to interior very sharply defined. Floor more or less flat dark red but reflecting light



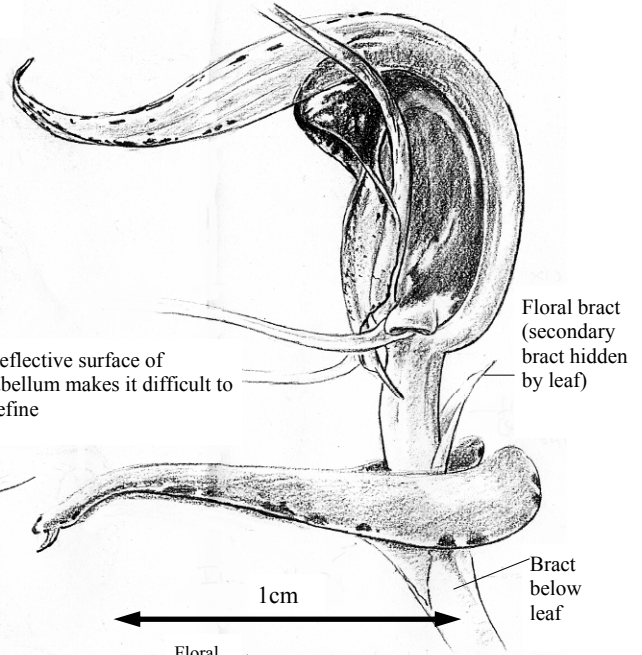
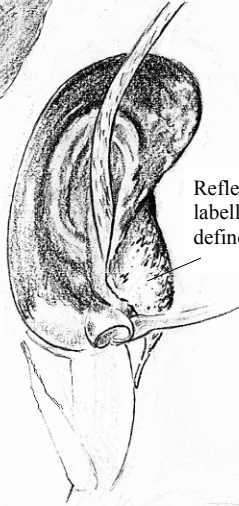
No bead in throat

Surface above floor with tiny clear flecks



column

Reflective surface of labellum makes it difficult to define



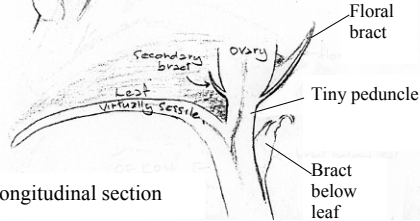
Floral bract (secondary bract hidden by leaf)

Bract below leaf

1cm

Nematoceras longipetala

Longitudinal section



—drawing by Bruce Irwin. Plants cultivated by Arnold Dench from plants collected at Lowe's Bush, Wairarapa Plains, by Pat Enright, Oct '99.

On the road to Whakahoro

By Bruce Irwin, Tauranga.

I went down to Ruapehu last week (the first week of October) to check on the hybrid *Corybas* colonies at Makatote Viaduct. It seems a poor flowering season there, numbers are well down on last year and all flowers we saw were good imitations of *N. iridescens* or *papa*.

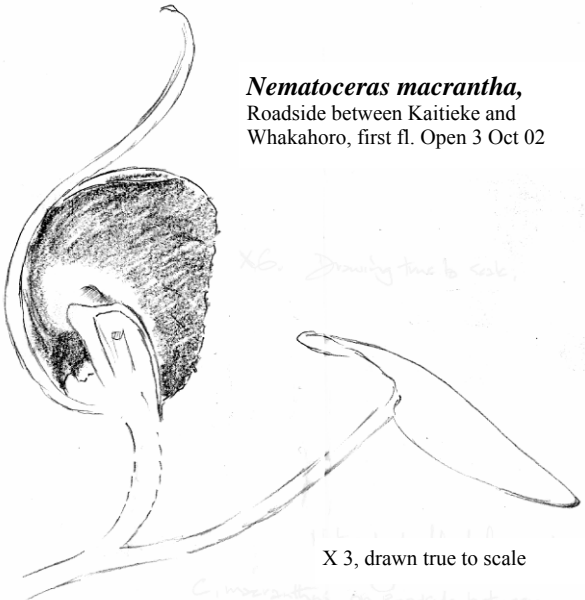
It was cold, windy and drizzly so we turned back at Makatote, to Raurimu, where we turned left to Kaitieke. Beyond Kaitieke a sealed road headed west to Whakahoro on the Wanganui River. The sealed road didn't reach Whakahoro of course. Shortly after we left the seal a sign indicated a winding road for the next 18 km. About 6 km further on a sign indicated a winding road for the next 12 km. I took that to mean "even more winding" – and it was. Several more such signs should have persuaded me to turn back. At one point the track – it was no longer a road – snaked along a ledge cut into a vertical papa cliff with no chance of passing for about ½ km. Heavy steel mesh supported on railway rails angled out from the cliff face to catch rubble falling from above. This had the effect of forcing cars to within a foot or two of the vertical drop. I admit that the view was most spectacular. It was also terrifying. About 3 km further on a gate across the road told us the "road" and a bridge were no longer maintained by the Council and

that you proceeded at your own risk.

There was a lodge close by, presumably for people too frightened to drive back over the road. I've been on some horrific roads in my time but none approached the road to Whakahoro.

We did find an interesting *Corybas*, fortunately back on a moderately tame part of the road. It was a colony of very small dark red buds more or less level with tiny leaves. We were lucky to find one flower fully open. It was a tiny but beautiful *N. macrantha*. Some years ago Eric Scanlen said he had heard of a tiny *C. macranthus* "somewhere west of Ruapehu". Presumably all plants and flowers in the colony will be as small.

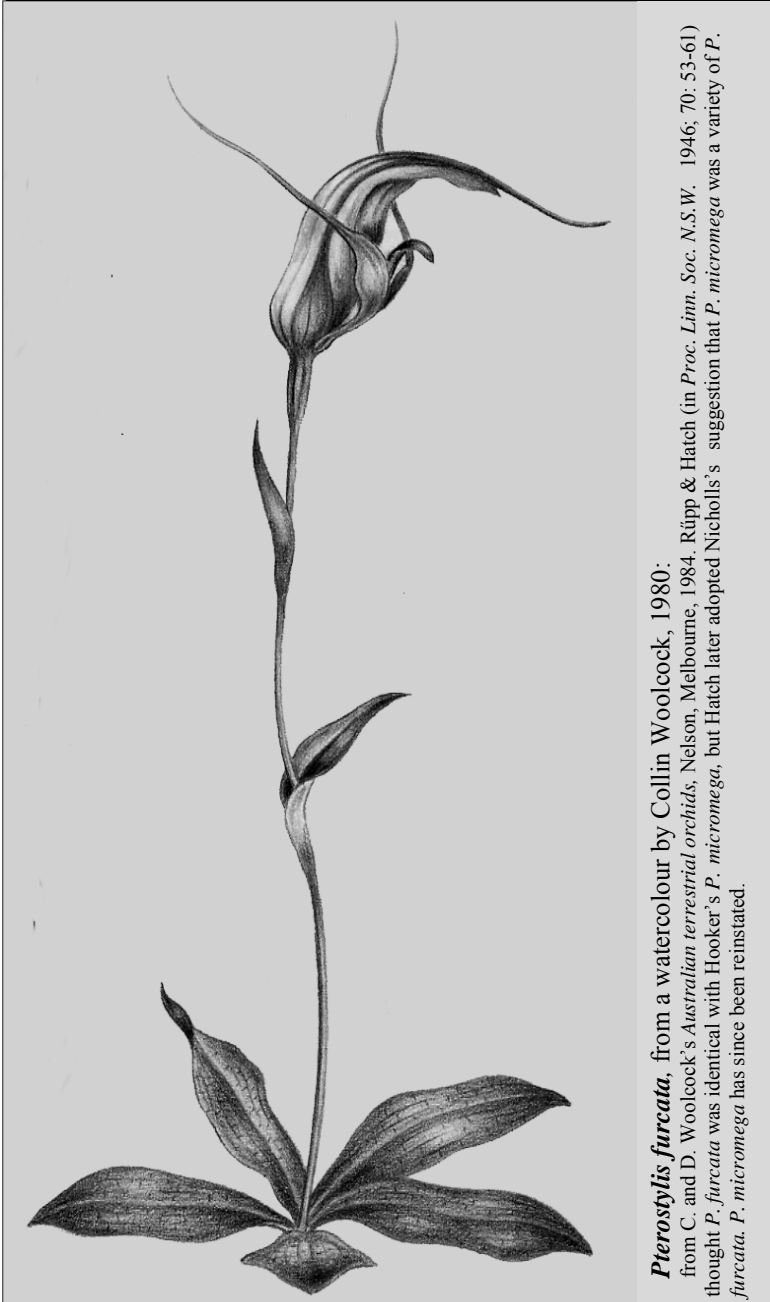
I once saw rather similar plants near Ohakune DoC Centre on Turoa Road, but they were surrounded by normal sized plants. There was a tight little bunch of perhaps 20 plants growing so close together that they looked as though they had sprung from a single large tuber. The Whakahoro plants were conventionally spaced. Those at Ohakune didn't appear the following year so were probably freaks.



***Nematoceras macrantha*,**
Roadside between Kaitieke and
Whakahoro, first fl. Open 3 Oct 02

X 3, drawn true to scale

close relations: orchids like ours



Pterostylis furcata, from a watercolour by Collin Woolcock, 1980: from C. and D. Woolcock's *Australian terrestrial orchids*, Nelson, Melbourne, 1984. Rupp & Hatch (in *Proc. Linn. Soc. N.S.W.* 1946; 70: 53-61) thought *P. furcata* was identical with Hooker's *P. micromega*, but Hatch later adopted Nicholls's suggestion that *P. micromega* was a variety of *P. furcata*. *P. micromega* has since been reinstated.

Nelson Nematoceras triloba trials

By Mark Moorhouse, Nelson

My interest in *Nematoceras* began with the reports of the Great Taranaki *Corybas* crawls of some years back which inspired me, then some savage prodding from the Column and encouragement from the Editor and others, to conduct a one man band effort (now of epic proportions) to try to establish what *Nematoceras triloba* varieties were to be found in Nelson and the surrounding districts.

Having seen quite a few colonies over the years, but virtually none in flower, it became a challenge to rat through all the old scraps of field notes to see what known sites I had visited in our region. It was profoundly confusing after visiting, in the flowering season, the first ten sites on my list before finding two colonies that appeared to be the same or even very similar. Oh well, I reasoned, if one waits out a few issues of the Journal, there they will all be, named or at least tagged with accompanying photos. Sadly not so. Although many good photos and drawings have been forthcoming from other interested parties, and although some have been tag named including 2 new Nelson taxa, they just weren't covering the ones I was familiar with.

Beginning in the Eastern Ranges behind Nelson and working South to the Nelson Lakes area the following season about 30 or 40 colonies were monitored and photographed. The idea was to establish as wide a data base as possible, to establish any common threads between colonies, and so be able to lump together those with common traits, but alas! alack!, the more colonies one studies, the more confusing and intermingled the features seem to become. (A problem that I'm sure Lucy Moore and more recent professional botanists have also faced.)

Perhaps inbreeding was causing much of

the variation in the small bush remnants isolated for probably 100 years? Perhaps some colonies in pristine bush, miles from man's influence, would yield the same plants that Hooker had named 150 or so years ago? Perhaps not, as you will see.

The following is typical of *triloba* forays made into various Nelson sites.

As it was now late November and the lowland colonies were done, I drove up to Flora, the subalpine carpark in the Mt Arthur Ranges in West Nelson. The carpark surrounds delivered a delicate, all green, flowering colony, but up the track to Mt Arthur Hut, on a limestone outcrop, were some colonies of unfamiliar looking *triloba* flowers with peach coloured labellum centres and coarse teeth on the bib. At snowline there also were other colonies of varying shades of green with purple infused in the dorsal sepals. Consistency? Oh dear no! Hmm, perhaps I needed to go further into the pristine yonder. As it was a beautiful day, only 10:30 am and a route was beckoning to some quite distinctive all green specimens I had discovered the Xmas before, I decided to press on. Of course this route just led over a couple of 5000 foot mountains through marble karst country and down into huge limestone potholes, but you all know that strong draw that orchids can have, especially something rare.

Having successfully negotiated Mt Arthur Ridge and Gordon's Pyramid, I descended from the tops into the alpine bush edge and immediately began finding colonies of *Nematoceras triloba*. This track descends through huge blocks of calcareous rock into a pothole area. At each turn in the track new colonies offered themselves and yes, you guessed it, new varieties of shape, colour, stance, labellum appendages, etc. By this time it was mid-afternoon, all the wonderful

panorama shots of the mountains from the top of Gordon's Pyramid were being systematically deleted from the digital camera to make room for more important new discoveries, and I had yet to reach my objective 2 kms on, and another 10 kms further back to the car via Flora valley.

On reaching the Tablelands, I checked out a non-flowering colony of round leafed *Nematoceras* I'd seen, some years back, at the rim of a nearby pothole. The colony was being gradually choked by grass, but they were in flower! and it was dead unusual. Blackish violet, inrolled lip with a more or less acute verandah-like dorsal sepal, neither *macranthus* nor *trilobus* but with aspects of both, more frantic deleting and culling of shots taken.

Now 4:30 pm, I anxiously decided to bolt for the prime objective. Carefully placing imaginary blinkers to prevent me from 'discovering' more new material, like colonies of *Pterostylis oliveri*, I made a beeline for the sphagnum patch where the unusually ball shaped green *triloba* with massive filaments grew, the ones that, as the Column would say, had lured me over the mountains like a siren on the Inchcape Rock.

On arrival, *they were still only in early bud!* Some new taxon perhaps? All the other *triloba* were happily in full flower, right to the snowline. Sadly another attraction nearby, a colony of huge leafed *N. rivularis*, had been partly washed away by flooding and the remainder badly trampled by unwitting trampers, one of those disappointing things that trackside sites suffer sometimes.

Oops, the sun is starting to set and it's 10 km to the carpark. A long, hard, beat to home and my hypothesis of consistency in the remote areas, left hanging in absolute tatters. Instead, at least two more new taxa to have to deal to after such a pleasant 23 km walk.

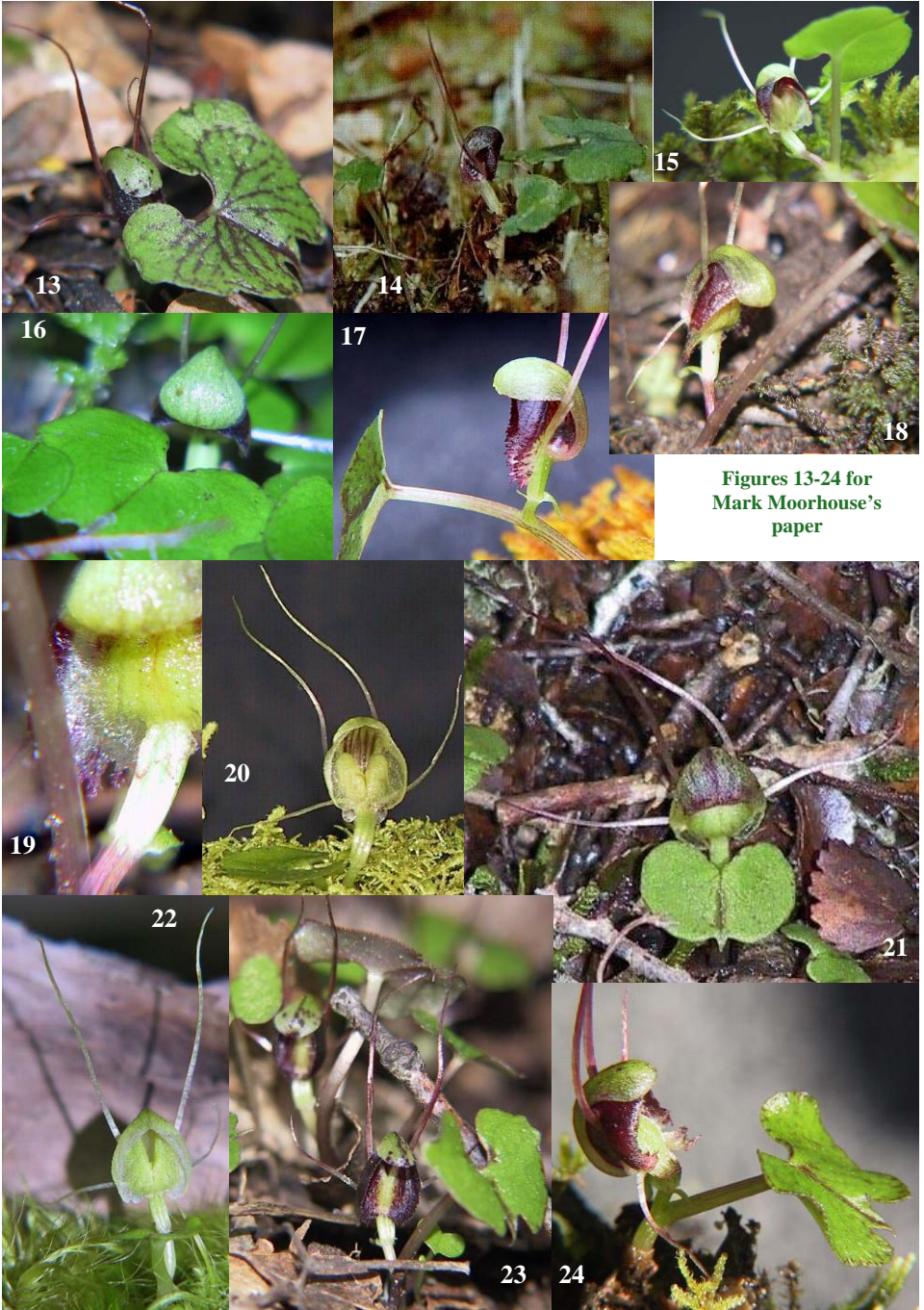
This season started early and at last some patterns are beginning to emerge. Slowly one feels happier lumping some of the

Key to plates 1-12, next page *Nematoceras* aff. *triloba* as under—

1. Eves Valley: *Nematoceras* aff *hypogaea* ex Moutere Hills. Sept fl. above litter and sheathing bract well below peduncle.
2. Hinetai: *Nematoceras* aff *hypogaea* Nr Tapawera. Sept fl above litter and lacks the two ragged lobes of *N. hypogaea*.
3. Mt Robert: *N. hypogaea* s.s. Note ragged lobes & sheathing bract position.
4. Maitai A: August fl *N. triloba* . Early taxa from E. Hills of Nelson.
5. Motueka Gorge: Early Sept fl. *N. triloba* Striped labellum bib, cucullate dorsal sepal, round leaf.
6. E. Hills type: Fl Sept to Nov. *N. triloba*. Lowland to snowline. Broad flat bib, shallow front to back, consistently nutant, cordate leaf.
7. Roding A: Late Aug to early Sept fl. *N. triloba* Striped labellum bib, cucullate dorsal sepal, round leaf.
8. Roding C: Oct fl very tiny *Nematoceras* akin to *hypogaea*? Sub-acute dorsal sits clear of labellum. Fringes almost entire. Sub-hastate leaf.
9. Tadmor Hill: *N. triloba* Rainbow labellum, long leaf apiculus, ragged bib.
10. Takaka Hill Top: *N. triloba* Fl late Sept. Di-morphic leaf, tiny and cordate on fl plants, larger & round on non-flowering plants.
11. Homestead Ck: Oct fl *Nematoceras* Nelson Lakes District. Note front bract.
12. Mid-Whangamoas: Large colony of very trilobate plants. Labellum blackish violet-red, *macranthus*-like.



Figures 1-12 for Mark Moorhouse's paper



Key to plates 13-24, last page

13. Roding D: Oct fl lowland *N. triloba* Akin to *hypogaea*? V. large leaf ornamented with purple. Fl narrow ovate from front. Rough papillose labellum.
14. Station Ck: Dark flowered *N. triloba* from Big Bush S.F.
15. Wairoa B: Late Sept fl *N. triloba* Rough labellum surface, fl usually below cordate leaf.
16. Wairoa round leaf: Fl mid Sept. Typical of E. Hills of Nelson. Apple green dorsal and notably nutant.
17. tri-wan flower: *N. triloba* taxa. Broad deeply fimbriated lower bib, all stems usually mauve-red, plants rarely flower, very long pedicels, leaf flushed mauve on underside
18. tri-wan side: *N. triloba* taxa. Broad deeply fimbriated lower bib, yellow green dorsal and bright yellow disc. Large fl.
19. tri-wan labellum detail: note retrorse hairs and extremely tattered lower fringe.
20. Mt Robert: Green *N. triloba* from Nelson Lakes. Labellum fringes virtually entire, cavernous notch, round leaf, forward pointing auricles. Fl very shallow front to back.
21. Montane green: Green *N. triloba* lowland to montane areas. Extremely hairy even outer labellum. Deep narrow cleft, dorsal notched & conical from front.
22. Gordon's Pyramid treeline: Common Green *N. triloba* from alpine areas. Purple flush on dorsal, round leaf, bulging disc area. Fringes finely denticulate. Cucullate dorsal.
23. Whangamoia top: *N. hypogaea* aff. Does not display ragged lobes & sheathing is 5mm below pedicel base.
24. Tophouse hypogaea: *N hypogaea* aff Note ragged lobes but sheathing bract is often 10 mm below pedicel.

colonies into groups and rephotographing many in finer detail in an attempt to examine things like column details and the 0.1mm retrorse hairs on the labella, also to carry out and photograph dissections. Currently about 80 sites with maybe 10 or so taxa are receiving attention. In about 5 years time, when enough material has been collated to know what I'm on about, the story will no doubt be quite different. Meantime I'll be bold and say that, here in Nelson there are likely 3 green taxa, also a cluster of colonies scattered through the Eastern hills of Nelson that very rarely flower but produce quite large flowers with broad bibs that are extremely tattered in appearance (tagged *N. "tri-wan"* after one site in the Wairoa Valley in Nelson), plus local versions of most of the tag-named taxa that have appeared in print (primarily in this journal). Anyone interested can contact Mark at memopob@yahoo.com.au. The writer is more than willing to share photos and info at no cost.

IWITAHİ 2002

Yes, there is a native orchid weekend at Iwitahi this year

Friday 6 to Sunday 8 December

Trevor Nicholls, 33 Hinekura Ave,
Taupo 2730, Ph 07-378 4813
Fax: 64-7-378 3222
email nicholls@reap.org.nz.

This will be Trevor's swansong; what excellent work he has done over the years at the Reserve: not only the organisation of the NOG weekends, but the extraordinarily dedicated work between times, the negotiations, the work with school kids, showing visitors around, working with Timberlands, Taupo Orchid Society, and all the others.

The orchids of the Ottawa District (1997)

I remarked in the last issue [J84 p8] on Joyce and Allan Reddoch's unique monograph on Ottawa's orchids. Their descriptions of species in it have the usual headings (as in our *Field guide*), but there is an extra: "Long-lived colonies".

They explain, "Under this heading we report our observations of colonies that we have monitored for from one to three decades".

One to three decades! even to make such observations is remarkable. To be able to report annual observations over such a long period is testimony to extraordinary enthusiasm and tenacity.

Here is the entry for the striped coral-root, *Corallorhiza striata*:

LONG-LIVED COLONY: In 1968, John Finder-Moss of Carleton University told us about a colony of *C. striata* that he had just discovered in the southern part of Gatineau Park [CCO 15486]; we have followed its progress since then.

The colony is spread over an area 25 m x 50 m in a maturing Eastern White Pine - Sugar Maple forest that is part of a larger Sugar Maple - Beech forest. Within the colony, the pines average 23 m in height, dbh 40-80 cm, and the maples, 19 m in height, average dbh 20 cm. Herbaceous plants at scattered locations on the mesic, sandy forest floor are Jack-in-the-pulpit (*Arisaema triphyllum*), Lady Fern (*Athyrium filix-femina*), Trout Lily (*Erythronium americanum*), Wild Lily-of-the-valley (*Maianthemum canadense*), Red Trillium (*Trillium erectum*), White Trillium (*T. grandiflorum*), White Baneberry (*Actaea pachypoda*), Red Baneberry (*A. rubra*), Wild Ginger (*Asarum canadense*), Blue

Cohosh (*Caulophyllum thalictroides*), Poison Ivy (*Rhus radicans*) and lettuce (*Lactuca* sp). There are a few plants of *Connus alternifolia* and a few saplings of Sugar Maple, Black Cherry and Basswood.

There were 60 stems of *C. striata* in 1968 and 155 in 1969. Since then, the number of stems/year has varied between 32 and zero (zero in four non-consecutive years), with an average of seven stems/year.

More detailed mapping in the past 11 years has revealed that most of the stems appearing during that time are confined to five nodes. Three of the nodes are about a metre in diameter and two others measure about 3 m x 7 m. We have found a total of only ten stems outside these nodes (and their positions may define additional nodes).

Within the nodes, stems emerge at intervals of one to five years. The most prolific rhizome has been producing stems for four consecutive years (1993 to 1996). The stems within a node tend to have a similar amount of greyish ruby colour from year to year, while the amount of the colour varies from node to node. From these observations, we infer that the stems at each node derive from a single rhizome system.

This colony is heavily attacked by weevils (*Srethobaris ovata* (LeConte) (Howden 1995)) that cause the stems to dry up soon after flowering; thus the colony rarely produces capsules. This observation leads us to conclude that since so little seed has been produced during the past three decades, the stems appearing during that time likely have come from long-lived rhizomes. Insect or slug activity occurs below ground as well; sheaths on one subterranean shoot examined already showed the holes that are seen on mature stems.

notes, letters, observations, comments

Dot Cooper wrote in response to Eric Scanlen's "Back issues" [J84], "The beginnings of the NZNOG certainly discovered some dedicated souls - I always said it was a 'disease', once hooked that was it!

"Can't remember anything about Mark Moorhouse's *S. lyallii*, I do remember how keen he was and that I had to translate pencilled notes on scraps of paper from him and others, sent to me from field areas. So maybe it got lost!

"In those days I had personally found so many different sizes in different habitats I could have called them all new species based on size alone. All were 'new' to us, we had very little to compare species with, and didn't really know what was the 'norm'. Which is really why I wrote the *Field guide*. But there were so many differences amongst them. I'm still not sure that means they are different species in some cases, certainly not on size alone, as I'm sure that growing conditions produce different results. The same species of *Thelymitra* 'starved' on a clay bank in NW Nelson at altitude, compared with one growing in a damp 'gully' in Upper Hutt, means a difference of some very dwarf forms only 3cm high to those with leaves 20-30cm high and stems 1-2cm thick.

"I still remember scores of 'odd' finds, many unreported I'm afraid, just put aside as an aberrant form - like *T. matthewsii* with its spiral leaf, I'm sure now that I found it in the Eastbourne hills - I put it down to weedkiller damage! Or another "Australian" species, *Thelymitra carnea* - without any cilia, in Cobb Valley. I only ever found it once because I never did get there again at the same time of year. A large cliff face full of flowering *Winika cunninghamii*. What is possibly a 4n form of *Earina utumnalis* - stems of 4-6ft with large leaves, hanging down over a creek in Eastbourne. Odd *Pterostylis* specimens that didn't fit with

anything I knew. (I did describe one as a new species, *P. cardiostigma*). Similarly with *Corybas* specimens - long, short, red, green, different leaves - a minefield of the unknown. *Caladenia* variants, *Chiloglottis*, *Aporostylis*, *Thelymitra*, *Orthoceras*, *Gastrodia*, *Den. cunninghamii*, *Earina* - did anything not vary?

"It started so simply - as we were always in the field with a geologist husband. Once I 'noticed' native orchids and found over 25 species around our hut in Cobb Valley, articles on them were useful for filling up our local Wellington Orchid Society newsletter which a group of us wrote, cut up, pasted, and printed on a printing press that should have been in a museum! But what fun we had and what friends we made. When I finally left for a stint in England and handed over to Ian St George I was delighted to leave NZNOG in his expert hands, and what a marvellous job he has done (helped by all you other keen souls of course). Don't tell anyone, but on the quiet, I think he said he'd do it for 5 years - that was 20 years ago!

"Thanks for reviving some wonderful memories!"

Gordon Sylvester wrote, "While reading an article about Colenso in our journal [J78:14] and later looking at Eric's index [J83:21] a place name intrigued me. Despite searching my resources I could not locate a site for this name. I then decided to look further afield for information on this, if only to get rid of Eric's question mark in the index. Accordingly I contacted a government dept, LINZ with a query, the response was as follows: there is no reference in the Geographic Place names to **Maungarei**, but in another part of the database not accessible to the public appeared the name as an alternative to Mt. Wellington in Auckland. The name appeared only on a caudastral map published in 1959

NZMS13 sheet 77 Otahuhu Survey District North Auckland Land District 1959 edition. My informant goes on to say it was possibly the original Maori name and it may be possible to search further if we consider it necessary to do so. I believe we need not go any further as we do know that Colenso was in Auckland during his explorations and also on his arrival in New Zealand.”

The *Australian* 17 August 2002 carried an advertisement for a **postdoctoral fellowship opportunity** – to study Australian orchid and mycorrhiza phylogenetic relationships. The main purpose is to contribute to a project aimed at determining evolutionary relationships among mycorrhizal fungi from different species and genera of the Pterostylidinae, and between these fungi and their orchid hosts. The fellowship is for 3 years at Black Mountain, Canberra, ACT, Australia. Contact Mark Clements (mark.clements@csiro.au) for further information.

Ed de Vogel & André Schuiteman wrote that a **second CD-ROM in the series Orchids of Southeast Asia**: “Flora Malesiana, Orchids of New Guinea Vol. II: Dendrobium and allied genera” was published on 25 July 2002. The publication of 4 more is planned before the end of 2005, covering all c.3000 New Guinea orchid species. In that period two more checklists are planned, on the Philippine and Vietnamese orchids. The price, EURO 59.00, is very moderate for a publication which would be in print some 1100 pages: 400 pages of text and 3000 illustrations.

Michael Pratt wrote (29 August), “I am writing to let you know that I've made a **website on native orchids** at <http://www.angelfire.com/nb/nzorchids/>. I decided that rather than having my orchid photos just fading in an album on the bookshelf, I may as well take advantage of technology and put them on the Internet for people to view. Things then progressed somewhat and I

ended up making a fairly detailed site as an introduction to our native orchids. It's kept me amused on these long winter evenings. At present it doesn't get much traffic as not many people know of its existence. I'm still tweaking some aspects of the site, so if you have any suggestions on how I could improve it, please let me know... I don't mind criticism.”

In its meeting of 4 Dec 02, the Trustees of the American Orchid Society (AOS) overwhelmingly confirmed their support for the joint efforts of AOS and Marie Selby Botanic Garden (MSBG) to co-sponsor the **second International Orchid Conservation Congress**, planned for 17 – 21 May 2004 at the facilities of Marie Selby Botanical Gardens, Sarasota, **Florida**. MSBG will handle the arrangements for hotels and local transportation, while the AOS will handle advance registration and much of the publicity. Speakers will be coordinated by both organizations, with AOS focus on scientists from more traditional sources such as the US and Europe, while MSBG will focus on participants from less developed nations, as well as obtaining grant monies for such participants.

The choice of MSBG as the site of this Conference should thrill all potential attendees. Beyond the sheer physical beauty of the Gardens, MSBG is situated in one of America's most lovely communities, with side attractions galore. MSBG is in the forefront of modern conservation biology, with active international contacts built up over a period of decades, as well as a highly respected scientific staff. The late spring dates will enable registrants to avoid the high seasonal hotel rates, while also having the opportunity to participate in a number of unique field trips to orchid habitats of the Southeast. The new headquarters and gardens of the AOS, the International Orchid Center, will also be the destination of one of the many interesting excursions. Registrants will want to take advantage of both pre- and post-event tours that will feature the wide diversity of Floridian and other southeastern habitats.

Work is proceeding apace to make this a worthy successor to the highly acclaimed IOCC in Perth. We look forward to your participation and support.

A list of **RD Fitzgerald's work** can be found at www.anbg.gov.au/library/fitzger.html.

Sandra Jones wrote (6 September), "I was rather alarmed to see the publication of a **request for orchid seeds** by a research group in the last NZNOG Journal. While I recognise that a seed atlas may be a useful research tool, I have two concerns: (1) issuing a blanket request for seeds in this manner may result in many more people collecting many more seeds than is necessary. This then becomes a conservation issue. (2) publishing this request for seeds without editorial comment about conservation issues, collecting rules & guidelines, particularly in relation to rare and endangered species, and the need to apply for collecting permits where appropriate. Perhaps it would be timely to publish an item in the next Journal on these issues?" *When I accepted the request for publication I assumed most readers would understand these issues, but it is good to have them spelled out. Please note this does not refer to the NZNOG Seedbank—Ed.*

Doug McCrae died on 29 October. In the years around 1990 he was almost singlehandedly responsible for the renaissance of interest in the orchids of the Far North, including the rediscoveries of *Thelymitra matthewsii* and *Calochilus herbaceus*. Sadly a long and debilitating illness prevented him realising the potential his early work seemed to promise.

The editor has recently received from NOSSA a full list of **RS Rogers's botanical papers**.

Oops! I am told Fig 4 in J84 p17 is *Nematoceras longipetalus*, not *N. "whiskers"*!

Threatened plant species of southern Africa. Janice S. Golding (ed.) 2002. Published by the Southern African Botanical Diversity Network (SABONET) in August 2002. This presents plant Red Data Lists for ten southern African countries - Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. About 4,100 plant and tree species for this vast region are classified here into various categories of extinction risk. Measures for coping with species losses need to be dealt with at social, economic and political levels. Until the notions of threatened plants and threatened ecosystems become firmly entrenched within developmental agendas, efforts at retaining species for economies and the benefit of future generations will yield little. To this end, the Southern African Plant Red Data Lists publication serves as both a technical and a political document - it offers a practical conservation dimension that can be integrated into more sustainable socio-economic agendas for the southern African region. Hardcover; 297 x 210mm; 237pp; ISBN 1-919795-64-2; Full-colour, with maps, charts and photographs. Angola and Mozambique sections also available in Portuguese. Full database on CD available on request. Up on the web after 01 November 2002. Copies are available free of charge from: The Project Coordinator, Southern African Botanical Diversity Network, c/o National Botanical Institute, Private Bag X101, Pretoria 0001, South Africa. Tel: (27) 12 8043200. Fax: (27) 12 8045979 E-mail: reddatalist@sabonet.org OR nrn@nbipre.nbi.ac.za The Southern African Plant Red Data Lists initiative was funded by the IUCN Regional Office for Southern Africa (IUCN-ROSA, Harare) with funding obtained via the United States Agency for International Development (USAID). Co-funding was obtained from the Global Environment Facility (GEF). The initiative was managed by South Africa's National Botanical Institute.

Australian Orchid Foundation books for sale

107 Roberts St, Essendon, VIC 3040, fax 61 3 9379 3570, all prices AUD, postage is extra

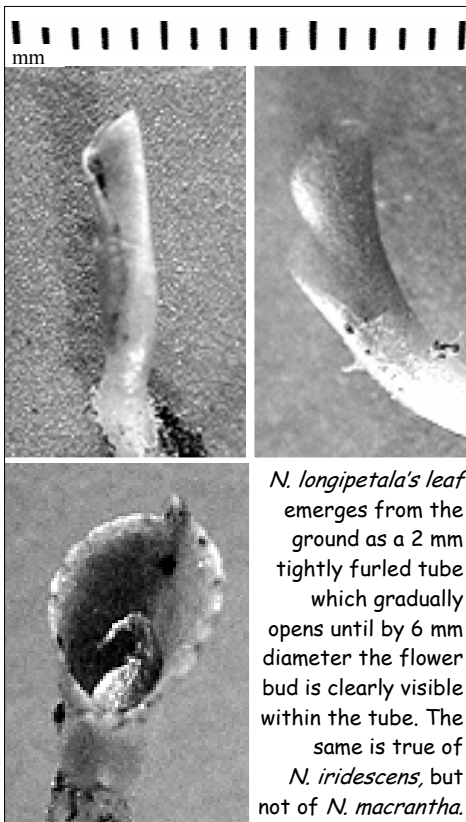
Australian orchid research	vol 1 (checklist)		\$19.50
“ “ “	vol 2 (108 new species)		\$19.50
“ “ “	vol 3 (Tasmanian species)		\$19.50
“ “ “	vol 4 (Pterostylis)		poa
Field guide to orchids of NSW & Vic (revised)	Tony Bishop		\$35
The orchids of Tasmania	David Jones et al		\$77.50
Orchids of SW Australia	Hoffman & Brown		\$57.50
Sarcochilus orchids of Australia	Walter Upton		\$27.50
Orchids of the Anglesea district	Foster		\$25
Australian indigenous orchids	vol 1	Alick Dockrill	\$72.50
“ “ “	vol 2	“ “	\$72.50
Orchids of the Solomon Is and Bougainville	Cribb & Whistler		\$60
Orchids of Samoa	“ “		\$50
Orchids of Vanuatu	“ “		\$45
Native orchids of New Caledonia	NC Orchid Society		\$32.50
Orchids of Sarawak	590pp	four authors	\$185
The orchids of Borneo	vols 1, 2, 3		\$77.50 each
The slipper orchids of Borneo		Phillip Cribb	\$20
Orchidaceae of German New Guinea		Schlechter	\$50
The orchids of Java	RBG, Kew	Jim Comber	\$98
Orchids of the Philippines		Jim Cootes	\$75
The orchids of Madagascar	“ “	Phillip Cribb et al	\$125
Orchids of Brazil		J&B McQueen	\$20
Native orchids of Ecuador	vol 1 208pp	Calaway Dodson	\$140
Native orchids of Ecuador	vol 2 420pp	“	\$175
Sanders list orchid hybrids	1976-80 \$70, 1981-85 \$85, 1986-90 \$95 1991-95 \$120, 1996-98 \$125		
Handbook orchid registration & nomenclature			\$17.50
Dendrobiums and their relatives	Lavarack et al		\$60
Revision Dendrobium sect Latourea and Spatulata			\$47
“ “ “	Oxyglossum (PNG highlands)		\$55
The genus Coelogyne	320pp	Dudley Clayton	\$145
The genus Paphiopedilum		Phillip Cribb	\$135
Dracula... annotated checklist... all species in colour			\$19.50
Paphiopedilum	“ “ “ “ “ “		\$18
Anguloa	“ “ “ “ “ “		\$21
Phragmipedium	“ “ “ “ “ “		\$9
The world of Catasetums		Arthur Holst	\$67.50
The genus Lycaste		Oakeley	\$13.50
Golden guide to orchids: species handbook	American Orch. Soc.		\$14.70
Revised handbook... orchid pests and diseases	“ “ “		\$17.50
Growing orchids	“ “ “		\$15

The European Orchid Conference and Show 12-16 March 2003. Royal Horticultural Society Halls, Westminster, London. This conference and show will have the theme "Orchids past present and future". This will be a once in a lifetime opportunity for all lovers of orchids. The conference show will fill the RHS's Horticultural Halls with displays by the best orchid societies from Europe and further afield. Royal Horticultural Society and British Orchid Council judging will take place. There will be traders from around the world offering the newest hybrids and the most unusual species. The two programmes of lectures will include leading edge science and the latest cultural and conservation information, as well as tales of trips to exotic places - orchid hunting of course. The social programme will include optional cultural and orchidaceous tours, some to places not normally open to the public. See http://orchid-society-gb.com/european_orchid_conference.htm for details of programme and venue.

Pat Enright's strange putative *Nematoceras* aff. *triloba* x *N. macrantha* hybrid, with the big wide labellum and the rounded dorsal sepal [J81 p43] was flowering again in Arnold Dench's Wellington pot on 4 October, proving last year was no fluke. Pat showed me several

other flowers from the same site on 6 October—*N. "Trotters"* was in full flower nearby (as was another *N. aff. triloba*), with *N. macrantha* in ripe bud. I have seen this taxon on the Putangirua pinnacles track in southern Wairarapa when both were in bloom. If it isn't a species itself, it must be a hybrid—it has the "trilobous" dorsal sepal, the "macranthous" leaf, with a labellum intermediate between.

Mark Moorhouse can tell which plants in some *Nematoceras* aff. *triloba* colonies will have a flower: they are the ones with the cordate leaves: the ones without flowers are round-leaved. *I agree—the leaves of aging plants become increasingly reniform, just as the leaves of N. acuminatus become more elongated isosceles triangular—Ed.*



N. longipetala's leaf emerges from the ground as a 2 mm tightly furled tube which gradually opens until by 6 mm diameter the flower bud is clearly visible within the tube. The same is true of *N. iridescens*, but not of *N. macrantha*.

OUT THEY GO!!

Field guide to the NZ orchids

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

the extensively updated and critically acclaimed 2001 edition, with line drawings and descriptions, is \$15 to members; and the

Nature guide to the NZ orchids

by Ian St George

with colour photographs and text, has been "re-remastered" by the publisher who has sent us his stock of this book, now also available at \$15 to members.

Order your copies now from 22 Orchard St, Wadestown, Wellington Email istge@rnzcgp.org.nz

Riley, John J. and David Banks. Orchids of Australia. Sydney: 2002. Quarto, dustwrapper, 320 pp., colour plates. AU\$120.00.

Describes 150 species from all parts of Australia and includes epiphytic as well as terrestrial species. Many of the species illustrated are well known and widespread while others are extremely rare and some only recently discovered and described. Each of 150 species is given two pages - one full page of colour illustrations with text and distribution map opposite. The illustrations are true botanical drawings, with the floral parts painstakingly dissected and faithfully reproduced in life-like colour.

http://www.andrewisles.com/currentlists/botorchid_1.htm.

A limited edition is available for AU\$385. They are individually signed and numbered 1-400 and come in a slip case. Each volume is individually boxed and each box has a metal plate engraved with the number.

A couple of interesting **websites**:
http://www.orchidsbooks.com/infolettres/Bandeau_Infolettre_Orchids.jpg,
and [orchids.angelco.htm](http://www.orchidsangelco.htm).

Australian orchid research Volume 4 will be entirely devoted to a revision of the genus *Pterostylis*. I had hoped it would be available before this issue went to press, but there have been delays, so a review will appear in our March Journal.

Graeme Jane accepted Graeme Atkins's invitation to look at the orchids in the bush block the latter looks after near **Te Araroa**; the former wrote (29 October), "I thought I would update you on the Te Araroa area. We headed that way over the weekend and spent the day on the Kakanui plateau. The approach is very steep - almost straight up the 200 m cliff, stepped all the way. The down route we took was rather of a slither. We covered only a small part of the area and didnt do a decent creek walk

(apparently Graeme had intended a slither down the "Waterfall creek" but we were too slow getting about).

"We recorded 22 orchid species (plus saw photos of *Danhatchia* to make the day total 23):

Acianthus sinclairii
Chiloglottis cornuta
Corunastylis nudum
Corybas cheesemani
Drymoanthus adversus
Earina autumnalis
Earina mucronata
Ichthyostomum pygmaeum
Microtis unifolia
Nematoceras macrantha
Nematoceras triloba
Orthoceras novaezeelandiae
Petalochilus bartlettii
Pterostylis alobula
Pterostylis banksii
Pterostylis trullifolia
Pterostylis "aff. montana"
Thelymitra carnea
Thelymitra intermedia
Thelymitra longifolia
Thelymitra pauciflora
Winika cunninghamii.

"Nothing special. The plateau area looks pretty good for clay type orchids but has recently been heavily 'ploughed' by pigs. According to Graeme animals shot were chock full of orchid tubers! Could be a quite a few more species there, so it warrants another trip or two at a different season. Pity I cant get back to catch more of the *Thelymitras*. The *Caladenia* was largely over - we saw only two open flowers. Both had no lateral calli. Could be others there too."

What do you think are **the most popular New Zealand native plants**? Would your selection include Icon plants (such as flax and cabbage tree) or do you have a special favourite that deserves greater recognition? Lets hear your views.

The Isaac Centre for Nature Conservation (based at Lincoln University) invites

everyone to contribute their suggestions as to what they feel are the most popular New Zealand native plants. This is the first of an annual countrywide survey to seek personal selections for the top ten favourite New Zealand native plants. These favourites could include a selection of trees, shrubs or wildflowers.

You are invited to select up to ten of your most favourite native plants and send your list to the address below. Please list your selection in order of preference and include either common names or scientific names. You may also like to comment on your personal selection and say why they are your favourites or why they should be in the top ten most popular native plants for New Zealand. There are some prizes to give away. After the closing date, the first three entries drawn from the nominations will be awarded prizes. Entries close on January 4th 2003.

The results and the winners of the prize draw will be made known in the March issue of the *New Zealand Gardener*. Please post or email your suggestions (with name and contact details) to: "The Top Ten New Zealand Native Plants", c/o The Isaac Centre for Nature Conservation, P.O. Box 84, Lincoln University, Canterbury. Or email: spelleri@lincoln.ac.nz. Don't forget to include your name and contact details.

The prize draws are vouchers for New Zealand native plants:

1. \$250 from Titoki Nursery, Palmers Rd., RD1, Brightwater, Nelson
2. \$150 from the Isaac Centre for Nature Conservation
3. \$100 from the Isaac Centre for Nature Conservation.

NOG Seedbank: a very sad NZNOG Seedbank organiser and curator (David Shaw) wrote (30 September), "Its getting time to think of seed. In the next issue can YOU PLEASE try and give them a bit of motivating as my requests don't seem to have worked". *This is a worthwhile cause, and I urge you to support it – Ed.*

Digital photography of the ultraviolet image. While the photographic recording of the reflected ultraviolet image (see editorial) yields higher quality, the immediacy of the electronic image has attractions when the image is invisible to the eye.

Prof. Robin Williams and Gigi Williams write that conventional *video* tubes are not sensitive to ultraviolet but many manufacturers supply ultraviolet sensitive tubes. Solid state charge coupled devices (CCDs) are also now available with sensitivity to ultraviolet.

All the CCDs used in consumer *still* digital cameras are sensitive to ultraviolet. Unfortunately the CCDs are also sensitive to infrared and the standard ultraviolet transmission filters have a significant window in the infrared. The recording of 'pure' reflected ultraviolet with a digital camera therefore requires the addition of an infrared absorbing filter ("hot filter") in addition to the ultraviolet-transmitting filter.

The auto-focus of digital cameras may not be accurate outside the visible spectrum. If the camera's autofocus will not function - as a result of either the wavelength shift or the low illumination levels - it may still be possible to switch to manual focussing.

The sensitivity of different CCDs varies so exposures will vary: the best ultraviolet source is electronic flash - but without any UV coating (that yellow coating on modern flashes is gold and is there to *reduce* ultraviolet output).

Rick DeFreez of California emailed; he has two digital cameras. The Fuji FinePix 6900Z and the Sony DSC-D770. Outdoor, full daylight photos with the 6900Z and the B&W 403 ultraviolet-transmitting filter are heavily weighted to the blue indicating good UV response. Those with the D770 and the 403 filter are heavily weighted to the red indicating poor UV response.

My wonderful Sony DSC-F707 is equally insensitive to ultraviolet, alas, and shots taken under ultraviolet illumination showed only a lot of infra-red—Ed.

Diuris fragrantissima - its conservation story so far

This article is reprinted from ANOS (Vic) Bulletin Vol. 35 No. 2 August 2002

by Helen Richard

Let's start by pretending we are pioneer settlers in this new land, and we have come to Port Phillip. Stretching to the north-west of Melbourne town are grasslands, and if you explore them in late spring you will find growing between the clumps of grass, these beautiful white to pale purple strongly perfumed flowers in such numbers that we call them "Snow in the Paddocks".

I guess they would have first been observed by Europeans about 150 years ago, but would have been known to aborigines for thousands of years and been in existence for millions of years. Well now, just 150 years on, there may or may not be any plants left in the wild.

Pre-european settlement, grasslands stretched across Victoria, covering about 10% of the state. They have now been reduced to 0.1 %, being prime targets for agriculture, remnant portions occurring along roadsides, railway lines, cemeteries and some on private land. Now *D. fragrantissima* had quite a limited distribution, occurring on the Keilor plains between Sydenham (about 20km north-west of Melbourne) south to Werribee (about 30km southwest of Melbourne) where it grew in grasslands dominated by Kangaroo Grass on heavy basalt soils. What hope did it have, occurring so close to Melbourne in areas which were ideal for industry and urban development as well as agriculture. Nicholls observed, in 1934, that the species was becoming rare and Willis, in 1951, believed that it was in dire peril of extinction. By 1970, only five populations remained, all along railway lines and, because of poor land management, only one site remained by 1980, near Sunshine (hence its common name - the Sunshine *Diuris*). At that time about 100 plants remained, but in the ensuing years the population declined, with 67 flowering plants in 1982, eleven in 1989 and only one in 1992. None appeared for several years, then one in 1997. Shortly after that an arsonist set fire to the reserve and three plants subsequently flowered in 1998 and 2000.

Just briefly, its taxonomy. It was originally called the White *Diuris* (*Diuris alba*) but that was recognised as a species which occurs in NSW and Queensland only. Dockrill described it as a variety of *Diuris punctata* in the *Victorian Naturalist* 81:137 (1964), naming it *Diuris punctata* var. *albo-violaceae*, referring to the colour of the flowers. In 1989, in *Australian*

Orchid Research Volume 1, *The Catalogue of Australian Orchidaceae*, Jones and Clements raised it to species status, naming it *Diuris fragrantissima* - an apt name because of its beautiful perfume. They noted that it differed from *D. punctata* in having a dwarf habit, stiff, erect flowers, white with purple markings and strong fragrance.

D. fragrantissima has the life cycle of atypical deciduous terrestrial, growing from a tuber which shoots in early autumn, has grass-like leaves, flowers in late spring and dries off in December. It propagates itself from seed, the plant making one replacement tuber only. It is pollinated by a small native bee through simple deception, the purplish colour of the flowers mimicking the native flowers with which it grows, and the bees may also be attracted by the strong fragrance of the flowers.

What has been done to conserve this species? In 1950, the Native Plants Preservation Society moved some plants and other native herbs into a reserve at Sydenham, but *D. fragrantissima* was only seen there for the following four to five years.

In the mid 1970's Mark Clements went to work at the National Botanic Gardens, Canberra, where he commenced work on the symbiotic germination of orchid seed (germinating orchid seed using its mycorrhizal fungus), work pioneered by Dr Jack Warcup in SA. He successfully grew *D. fragrantissima* from seed. We in ANOS Victorian Group became well involved with its cultivation through member Rick Datodi, a very enthusiastic and capable grower of terrestrial orchids who met Mark. Rick successfully grew on deflasked seedlings and also germinated seedlings around his parent plants. The tuber removal process was also applied successfully to *D. fragrantissima*. When Rick could no longer grow his terrestrials because of change of family circumstances, he passed his collection on to me, which I grew and propagated successfully for many years until the dreaded virus affected all of my *Diuris* plants and they had to be destroyed.

Sometime around the early 1980's, the young Cam Beardsell had just finished his studies at LaTrobe University where he had been involved in the rare and endangered plants program for which the university had

received a grant. He went to Canberra to see Mark's work in *D. fragrantissima*. Mark gave him a flask of seedlings which Cam brought straight back to Melbourne, and very excitedly planted them straight out into a reserve at Laverton North which appeared to be a suitable habitat. It was mid-summer and Cam went back frequently to water his precious seedlings, but they quickly died. (No surprise these days.) However, that was the first attempt to plant seedlings back into the wild.

Mark Clements' research work took a different direction, so he sent the *D. fragrantissima* fungus down to Dale Tonkinson at LaTrobe University where work on rare orchids was continuing. Dale successfully grew the *Diuris* from seed symbiotically. LaTrobe University continued to use the Laverton North grasslands as the site for reintroduction of *D. fragrantissima*, planting some adult plants plus seedlings grown at Canberra and LaTrobe.

As always happens, more changes. Dale Tonkinson left LaTrobe and funding for the rare and endangered species ended. Dale passed his collection of *D. fragrantissima* to the zoo for safe-keeping. The zoo??? I was to learn that they had great horticultural expertise, under the leadership of John Arnott, although no experience with terrestrial orchids. All of Dale's plants were in just two pots and thankfully, after a couple of years, on Christmas Day 1995 Colin Knight repotted what was almost the entire world's population of *Diuris fragrantissima* into about 100 pots. The zoo grew them on exceptionally well, but had the wisdom to distribute some of the plants around the following spring. About ten pots were shared amongst ANOS's better *Diuris* growers. They were subsequently flowered and seed produced. At this time, Peter McCauley, a new member from South Australia, was fascinated with *Diuris*, especially this endangered species, and he took some seed to Kevin Western in SA. Kevin had been doing tissue culture and growing orchids from seed, mainly epiphytes and European terrestrials, for about 20 years. He took up the challenge to germinate this endangered species and succeeded aseptically. His results were unbelievable - I have never seen such large seedlings in flask. Kevin has continued to grow them from seed and there are now hundreds or probably thousands in flask (or deflasked) and growing on very well.

Back to Sunshine - the last remaining natural population. It has been looked after by several authorities and groups in recent years. It has been fenced, and when that first happened, more orchids appeared outside the

fence than in it! It has been weeded and the site guarded during flowering time to prevent human damage. In 2000, several plants from the zoo were introduced, but it appears that they did not survive. The site is very small and surrounded by degraded areas and is badly affected by weeds and predators such as slugs and mice.

This species is listed as a Threatened Taxon under the Victorian Flora and Fauna Guarantee Act 1988 and Endangered under the Commonwealth Endangered Species Protection Act 1992. Under the Commonwealth Act, a Recovery Plan was prepared by the Department of Natural Resources and Environment, Victoria, for the years 1998-2002. The Recovery Plan has a short-term goal to increase plant numbers in the last remaining colony, to maintain and expand the species in cultivation and to establish new colonies at secure sites. The Recovery Program is overseen by the Threatened Orchid Recovery Team which has representatives from many organisations such as DNRE, Parks Victoria, Royal Botanic Gardens, Zoo and ANOS.

Many activities had been instigated by the Recovery Team. Work is undertaken at Sunshine to maintain the site, difficult as it is, which includes weed control, maintaining fencing and monitoring. A cultivation sub-committee has produced cultivation guidelines and guidelines for nurseries growing terrestrials for conservation use. Thanks to Kevin Western's successful flanking, hundreds of seedlings are growing on with plans to increase that to thousands. The genetic diversity in cultivated plants has been investigated by Liz James from the Royal Botanic Gardens. About two years ago, she checked the enzymes in 160 plants (almost the total population at the time) and followed that with DNA analysis. The results showed that there was good genetic diversity even though the plants were all seedlings from the one source. The Laverton North Grassland Reserve, about 40 hectares managed by Parks Victoria is the best site for a second population at this stage, where flowering plants were seen in 2000, from plantings in the 1980s, although none were seen between 1991 and 2000. Other potential sites are being looked at, and seed baiting trials will be commencing to find areas where the mycorrhizal fungus occurs naturally.

The conservation work continues, and with the various professional organisations and enthusiastic amateurs working together, it will succeed.

Reference: Backhouse, G., Webster, A. and Arnott, J. (2000). Recovery Plan for the Sunshine *Diuris fragrantissima* (Orchidaceae: Diuridinae) 1998-2002. Department of Natural Resources and Environment, Melbourne.

THE 2002 IUCN RED LIST OF THREATENED SPECIES

Release of the updated Red List of Threatened Species, the world's most authoritative source of information on the status of plants and animals.

Saiga antelope, wild Bactrian camel and Iberian lynx become Critically Endangered, two cactus species go Extinct, several Extinct species are rediscovered.

IUCN-The World Conservation Union, Gland, Switzerland 8 Oct 02. In the wake of the World Summit on Sustainable Development with the state of the environment fresh in the minds of the global community, IUCN releases its updated Red List of Threatened Species, one of the key tools used to determine the status of the Earth's biodiversity.

There are a number of significant changes to the List since the release of the last edition in September 2000. Over 400 new species assessments have been included, 124 of these entering one of the threatened categories: Critically Endangered (CR), Endangered (EN), or Vulnerable (VU). There have also been nearly 200 re-assessments of species already listed.

There are now 11,167 species threatened with extinction, an increase of 121 since 2000 with several new additions to the Red List and notable shifts in status.

"On the Red List, all species are treated with equal importance - the humble Bavarian pine vole stands alongside the African rhino. It provides the international benchmark to help guide effective biodiversity conservation, and IUCN calls on the international community to use it to advance efforts at all levels," says IUCN's Director General, Achim Steiner.

Previously assessed as Conservation Dependent, the Saiga (*Saiga tatarica*) is now Critically Endangered. This nomadic herding antelope generally inhabits the open dry steppe grasslands and semi-arid deserts of Central Asia. The species has undergone major population declines over the last decade as a result of poaching for meat and for export of horns that are used in traditional medicine. In 1993 the total population was estimated at over one million. By 2000 this had decreased to less than 200,000, and surveys for 2001-2002 indicate that less than 50,000 animals now remain in the wild.

Assessed as Endangered in 1996, the wild Bactrian camel (*Camelus bactrianus*) is now Critically Endangered. The species is the target of continued hunting, mainly through persecution because it competes with domestic camels and livestock for water and grazing, but also through sport hunting. The main stronghold for the species is China, where suitable habitat is being lost through legal and illegal mining. The effects of hybridization with domestic camels both in Mongolia and China and increased human competition and economic pressures within the habitat of the wild Bactrian camel, have also contributed to population declines.

Upgraded from Endangered to Critically Endangered, with its population dropping to less than half of the 1,200 individuals recorded in the early 1990s, the Iberian lynx (*Lynx pardinus*) is close to becoming the first wild cat species to go extinct for at least 2,000 years. The lynx occurs in Mediterranean woodland and maquis thicket, favouring dense scrub for shelter and open pasture for hunting rabbits. Habitat fragmentation by agricultural and industrial development has resulted in the population being confined to scattered groups in the southwestern quadrant of the Iberian Peninsula.

The Ethiopian water mouse (*Nilopegamys plumbeus*) enters the list as Critically Endangered. Only known from one specimen found near the source of the Little Abbai, a tributary of the Blue Nile in north western Ethiopia, its habitat may be overgrazed by livestock.

Classified as Vulnerable, the tiger tail seahorse (*Hippocampus comes*), is targeted by fishers supplying a substantial trade in seahorses for medicinal and aquarium uses. It is also accidentally caught as bycatch in other fisheries and suffers from habitat degradation. This species is among the most commonly traded seahorse, particularly for ornamental display, and populations have declined throughout its range.

Only recently redefined as separate species, the slender-billed vulture (*Gyps tenuirostris*) and Indian vulture (*G. indicus*) are classified as Critically Endangered because they have suffered extremely rapid population declines, particularly across the Indian subcontinent, as a result of disease, poisoning, pesticide use and changes in the processing of dead livestock.

In 2000, there were 5,611 plants assessed as threatened (1,014 CR, 1,266 EN, 3,331 VU). With the addition of Mexican and Brazilian cactus assessments, the figure is now 5,714 (1,046 CR, 1,291 EN, 3,377 VU) but there is much 'catching up' to do in plant assessments. With only approximately 4% of the world's described plants evaluated, the true percentage of threatened plant species is much higher. Most of the plant species listed are trees, since these have been relatively thoroughly assessed.

The total population of the artichoke cactus (*Obregonia denegrii*) of Mexico is estimated to have decreased by about 50% over the past 50 years to about 5,000 individuals, and it is added to the List as Vulnerable. This species is threatened by erosion (accelerated by livestock grazing) illegal commercial collecting and collecting by local people for medicinal purposes - the species is used to treat rheumatism.

Mammillaria glochidiata is one of two endemic Mexican cactus species declared Extinct in the Wild. This cactus was found in the Barranca Toliman, north of Zimapan in Hidalgo State in 1991. The small population estimated at 50 individuals was confined to a single location. By 1993 this had declined to about 15 individuals. During two later visits, one including an extensive search of the canyon in which it occurred, no plants were found.

There are now 811 species assessed as Extinct and Extinct in the Wild, with seven additions to these categories since 2000 including the sea mink (*Mustela macrodon*) which was last seen in 1860, the Réunion Island sheldgoose (*Mascarenachen kervazoi*) which became extinct around 1710, and two hippo species (*Hippopotamus lemerlei* and *H. madagascariensis*) that became extinct around 1500 AD.

Since 2000, two species previously assessed as Extinct have been rediscovered - the Lord Howe Island stick insect (*Dryococelus australis*) and the Bavarian pine vole (*Microtus bavaricus*).

The 2002 IUCN Red List of Threatened Species is the first of what will be an annual update of the Red List database which is housed on its own, searchable website www.redlist.org. The figures will change annually as new species assessments are included, currently-listed species are re-assessed, and species undergo taxonomic revisions.

There are no major changes to report in the distribution of threatened species or major threats since 2000. A major analysis of the Red List will be conducted approximately every four years with the next one due in 2004. As stated in 2000, Indonesia, India, Brazil and China are among the countries with the most threatened mammals and birds, while plant species are declining rapidly in South and Central America, Central and West Africa, and Southeast Asia.

Habitat loss and degradation affect 89% of all threatened birds, 83% of mammals, and 91% of threatened plants assessed. Habitats with the highest number of threatened mammals and birds are lowland and mountain tropical rainforest. Freshwater habitats are extremely vulnerable with many threatened fish, reptile, amphibian and invertebrate species.

*Links to the 2002 Red List will be found via www.iucn.org
or <http://www.iucn.org/themes/ssc/index.htm>*

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