



Newsletter No 50

NSW GROUP ACTIVITIES:

Sunday 7 June 1998

****** note change in Venue:**

9.30 First Venue: Home of Betty & Eric Rymer
48 Annangrove Rd. Kenthurst

Phone: 9654 1831

Subject: Post mortem Autumn Plant Sale.

1 pm Second Venue: Home of Ian & Tamara Cox
5 Ivy Place, Kenthurst

Subject: Garden visit.

Sunday 2 August 1998

Venue: Bruce Wallace, 9 Naylor Pl Ingleburn

Subject: Examine & discuss Bruce's propagation set-up.
Garden visit and plant identification using keys
Visit local reserve and examine populations of
G. mucronulata & others.

Thurs. - Sun 10-13 September

Mt Penang Garden Spectacular.
Set up Wednesday 9th

Oct 31-Nov 3

Safari to North-eastern Victoria.
see Victorian Group Activities for details

VICTORIAN GROUP ACTIVITIES

At the inaugural meeting held on the 4th April, 20 people attended Phillip & Alexis Vaughan's beautiful garden at Pomonal, following a tour of the garden, a relaxed discussion was held over a delicious barbeque. Neil Marriott was voted as the convenor of the Victorian Group and it was decided that we will meet four times a year for the time being. After lunch we travelled to the Black Range to wander the Marriott's property where the following agenda for 1998 was planned.

July 25th 11 a.m.

Venue: Don and Jean Weybury,
Lot 6 Hastings Road Greendale

Phone: 0353 68 7337

Subject: Tour of garden, BYO lunch etc. hot soup provided!
After lunch we will explore O'Brien's Crossing, Lerderderg Gorge where we expect to see some beautiful plants of *G. alpina*.

Sat Oct. 31st - Tues Nov 3 (Melbourne Cup Weekend)
Joint camp-out and Grevillea crawl with Sydney group.

Venue: Meet 10 a.m.

McDonald's carpark southside of Albury. Please note there is also a McDonald's in North Albury.

Subject: Expect to see loads of grevilleas including 2 possible new species. BYO camping gear, food etc.

Phone: Neil Marriott (0353 562404) or Peter Olde (02 9543 2242) for more details if required.

S.E. QLD GROUP ACTIVITIES

All meetings commence at 9.30 am unless otherwise notified. Further information and road directions contact Merv Hodge on (07) 5546 3322.

Sunday 31st May 1998

Venue: Home of Merv & Olwyn Hodge
81-89 Loganview Rd, Logan reserve 4133

Phone: (07) 5546 3322

Subject: Rejuvenating an old garden

Sunday 26th July 1998

Venue: Home of John & Ruth Sparrow
Newspaper Hill Rd (between Eumundi & Kenilworth see previous newsletter for directions)

Phone: (07) 5447 9130

Subject: Propagation of grevilleas by cuttings

Sunday 27th September 1998

Venue: Home of Paul & Esme O' Sullivan,
Obum Obum Rd, Kalbar 4309

Phone: (07) 5463 7339

Subject: Paul will talk on the establishment of his grevillea garden

Sunday 25th October 1998

Venue: Home of Heather Knowles, "Newerah",
Lot 2 Ebenezer Road, Rosewood 4340

Phone: (07) 5464 1333

Subject: Grafting workshop

ACTIVITY REPORTS

Autumn Plant Sale Report

by P. Olde

The inaugural Autumn plant & art sale of the Grevillea Study Group at Mt Annan Botanic Garden on April 18-19 was a major success for such a small active membership. The ambience of the venue was excellent and offered considerable opportunity for activity apart from the plant sale. The event drew over 2000 people who purchased over 6000 plants, generating income of c.\$30,000, for which the Study Group will see a profit of c. \$4000. The weather was perfect on both days and the opening by Don Burke was well received by all in attendance. Don stayed on for about 3 hours and seemed to thoroughly enjoy himself and the company of other enthusiasts. He was so loaded down with plants when he left he couldn't carry them all. Don was an early pioneer in the popularisation of Grevillea hybrids, including the most successful marketing of Grevillea 'Mason's Hybrid' at the time under the name Grevillea 'Ned Kelly'. He gave an open-air talk entitled 'The best grevilleas and how to grow them'. Following the talk, Don invited a number of experts to the podium, including Neil Marriott, Philip Vaughan, Ray Brown and Merv Hodge and asked the crowd for questions. Almost unbelievably the first question was about a lemon tree!!!

The organisers were particularly pleased with the good spirit of the participants and both the quality of the plants and their price was outstanding. Especially welcome were the interstate visitors, Phillip Vaughan from Mt Cassell Nursery, Victoria and Merv Hodge from Loganview Nursery near Brisbane. In addition, two nurserymen, Paul Carmen and Peter Ollerenshaw, from Canberra were in attendance and brought excellent plants. Several local nurseries were also present and provided the main bulk of plants, which were of very high quality. One measure of this was the number

of grafted plants on sale and the degree of willingness by purchasers to spend the extra money on these value-added plants. It is clear that Sydney buyers now perceive this product as a worthwhile investment

Two wine companies who indicated their willingness to mount a wine-tasting both pulled out at the last minute, Drayton's wines during the week previously and Kirkham Estate Wines phoned during the opening to indicate they could not make it. Very nice of them. As well the company invited to demonstrate native foods pulled out a few weeks earlier, effectively preventing me from obtaining the services of anyone else. These disappointments notwithstanding, everyone else pulled their weight mightily, especially the SGAP groups who were the main supporters of the event, as you might have expected. It was wonderful to see Eunice Hogue, from Sutherland Group, win the raffle.

The staff at Mt Annan Botanic Garden were a terrific help and this help extended down all the way from the top to the bottom. Special mention must be made of Mark Savio, Peter Cuneo, Glenn Fensom and most especially Allen Powell. Apart from personal help given, the gardens provided staff to set up, clean up, maintain security and assist in parking. They also provided benches for setting the plants on. The whole day would not have been as successful without their co-operation. Thanks also are due to the members of the Grevillea Study Group and their friends, partners and family who have so selflessly of their time and work.

There is much pressure to have the event again next year and I think it would be worthwhile to build on the good will so apparent at our first sale. April 17-18, 1999 seems like a good date.

Tasmanian Grevillea Study Group Outing

by Jeanette Closs

Grevillea enthusiasts were welcomed to the home of Ian and Doris Picken for a pleasant and informative day on Saturday 14 February to discuss and observe these lovely flowers and plants in a rather special environment.

The Picken's home is in the hills behind Lachlan in the Derwent Valley, so we enjoyed the drive to the Lachlan Hall where Ian met us and guided us up through the hills to their home, which has superb views down into the surrounding valleys. They have developed a lovely garden in very difficult conditions. The area in the past was probably clear felled and bulldozed resulting in top soil loss, compaction and damage in general to the soil profile. The block faces east with a 12 degree slope and is approximately 325m above sea level. They experience heavy frosts, frequent high winds and occasional light snow.

New plants have to be caged against the many small marsupials, and rabbits were a problem until the dog grew up! Ian is growing over 40 different Grevilleas as well as many other Australian plants and he has successfully

flowered *Grevillea* 'Robyn Gordon' and *G.* 'Ned Kelly' for three seasons and *G.* 'Superb' for one season.

After exploring this interesting garden and admiring the view and house that Ian is building, we enjoyed lunch together and then looked at the many specimens of Grevilleas that members brought from their own gardens and hopefully we clarified the identification of some of them with the help of the three volumes of "The Grevillea Book".

A warm welcome is extended to any members from other Regions who have a very good knowledge of Grevilleas e.g. Neil Marriott, Peter Olde, Dave Mason or Ray Brown to come to Tasmania for a holiday and set aside a day or two to meet our small group and to help us to improve our knowledge. Needless to say, any member of the Grevillea Study Group would be welcomed when they visit our island.

Can anyone give me information re *Grevillea* 'Goldrush' please? Jeanette Closs, 176 Summerleas Road, Kingston 7050

FIELD TRIP REPORTS

Brief Notes on Some Aspects of a Trip to Gibb River Road and elsewhere, Spring '97

H & D. Saunders

Grevillea eriostachya

486 km NW of Alice Springs on Tanami Track. Plants 3-4 m high; inflorescences 24 cm long in bunches of 10-12 per peduncle.

Grevillea sp. aff. wickhamii

Piccaninny Creek (not Gorge), 15 km from Walardi Camp (Purnululu National Park) on road to Picaninny Creek. Most plants had multiple racemes of red flowers 15-16 cm long (similar to conflorescences of *G. byrnesii* and quite different to those of *G. wickhamii* seen elsewhere); some flowers on some plants were pink with dark ash-coloured markings.

At Mt Elizabeth Station we met Robin Maher. Her husband owns and flies a hire helicopter. In her album was an excellent photo of a branch and flower of *G. adenotricha* that she had collected from a plateau north or north west of Manning Gorge on Mothers Day. Robin could not pinpoint the exact location which was on a plateau above the gorge not in the gorge where visitors go. Her husband, the pilot, would know exactly where they went. Robin also directed us to some small plants of *G. mysodes* near the last gate into the Station - 28 km from the turn-off on Gibb River Road. The plants were only 50 cm high but carried many ripe seeds.

I notice that this species is also recorded as occurring at Bloomfield Springs, N.T. which is hundreds of km away.

G. cunninghamii

- i. 4 km N of Kalumburu.
Easy to find but you need a permit to enter the Aboriginal reserve. You are supposed to get it before you arrive. but you can get one at Kalumburu but you might have to wait a bit of a wait.
- ii. near Morgan River, on Theda Station 15° 48'S 126° 30'E (approx 70 km S of Kalumburu in sand amongst eroded sandstone outcrops in open shrubland.



G. cunninghamii (photo P. Olde)
The Grevillea Book Vol 2.

G. latifolia

- i. near Morgan River, Theda Station, same location as above. Growing in fine sand amongst long grass along lower drainage line (poorly drained in wet).
- ii. later we found that the stand along the Gibb River Road on Pentecost Station had been recently burnt out. Peter Olde found this species at King Edward River on one of the back roads around the camp in 1992.

G. microcarpa

- i. near King Edward River crossing on Mitchell Plateau Road.
- ii. Theda Station in open amongst granite rocks near Morgan River, 15° 48'S 126° 29'E. You need to get permission from the Station before entering the property.

G. pungens

- i. 124 km from Roper Bar Caravan Park on road to Boorooloola (2.5 km S of Little Towns River) growing in sand which was inclined to be somewhat swampy. Young bushes regrowing after fire, mainly single stems waist-high, some branching. No flowers or seed.
- ii. 130.5 km from Bar Caravan Park (5.5 km S of Towns River). Thick on both sides of road, growing in silty sand. Some in flower (orange). Arched branches up to 1 m long were intertwined. 11 immature flower spikes on on branch.
- iii. 12 km S of Towns River. In deep, fine sand. Plants to 2 m tall with stems up to 2 cm thick with numerous branches. Acres of plants nearly continuously touching on western side of road; plants in full flower with some ripe seeds. Fabulous orange flowers exactly as in Olde and Marriott Vol 3.:121 93B. We noticed a species of *callitris* was common at the three locations.

G. benthamiana

Fergusson River Crossing on Stuart Highway.

We've been coming this way over several decades of intermittent travel and must report a serious decline in this population which was once prolific with hundreds of plants in flower. Now there are only a few miserable plants scattered amongst the grass. We might be wrong but it appears to have resulted from too much burning. Don't think this population will be with us much longer.

A final, non-grevillea highlight to our trip. At 11.5 km past Watsonville windmill on road to Irvinebank, Qld (3.5 km east of the Irvinebank pub) we saw on the uphill side of the road on the bank of a small cutting a prostrate plant covered in small mauve-pink pom pom flowers. It was a beautiful plant of *Acacia purpureapetala*.

The SE Queensland Group of the Grevillea Study Group has kindly donated a FAX/Answering machine to the Grevillea Study Group. Newsletter articles, change of address etc. can now be sent by FAX to Christine Guthrie on (02) 9579 4093.

TAXONOMY

Review & commentary of *G. celata* W. Molyneux

P. Olde

Description: See the *Grevillea* Book Vol.2:91 where treated as *G. sp. aff. chrysophaea*.

Key: 1: 213, 20* Some relevant revised morphometric measurements from the study are: Shrub height to 1.8 m. Leaves 15-58 mm long, 4-18 mm wide, shortly petiolate (petioles 0.5-1.5 mm long). Conflorescence: up to 3-branched without a common peduncle (sic!); bracts 1.8-2.5 mm long. Flowers: pedicels 4-9 mm long; torus 1.7-2.2 mm across; nectary: 1.3-2.5 mm long; perianth 3-8 mm wide; tepal-limbs (often only the dorsal ones) variably horned with a short villous appendage (sometimes scarcely apparent); pistil 18-25 mm long.

In examining the paper published in *Muelleria* 8(3) by Bill Molyneux (See Newsletter 48), I found myself somewhat unconvinced by some of the arguments being advanced in support of specific recognition for *G. celata*. The distinction from *G. alpina* has been clearly shown on a number of characters that show unambiguous discontinuity. However, the separation from *G. chrysophaea* is less convincing.

THE PROTOLOGUE:

The protologue, for which there is unfortunately no translation provided, asserts that *G. celata* differs from *G. alpina* and *G. chrysophaea* in its root-suckering habit (*surculus radicibus*), its conflorescences showing a greater degree of branching (*conflorescentiis magis ramosis*), the shape, size and posture of the nectary (*forma amplitudine stato[sic] nectarii*), and in its often longer pistils (*pistillis [sic] saepe longioribus*).

Root-suckering habit. There is an assertion that *G. celata* is always root-suckering and that this is a diagnostic character state. Yet the discussion under both **FLOWER COLOUR**, where we see the existence of a single plant bearing flowers with lemon perianths, and **REPRODUCTION** suggests that it is not always so. The mere fact that regeneration also occurs from seed indicates that root-suckering habit in juveniles is unlikely to be readily discernible. Furthermore, the statement that *G. alpina* does not root-sucker (Table 1) is definitely incorrect. I have personally examined two root-suckering populations of *G. alpina* (at Myrhee and near Chiltern State Forest), neither of which involves hybridisation or intergradation with *G. lanigera*, as the author suggests. A third population of the Type form of *G. alpina* has recently been found (N. Marriott pers. comm.) at Pomonal (on Pomonal Rd). I have no knowledge of root-suckering in *G. chrysophaea*. However, given that sometimes even *G. celata* does not observably sucker, then separation on this character is clearly dubious. In any event, numerous species have both single-stemmed and root-suckering populations (e.g. *G. alpina*, *G. sericea*, *G. oleoides*, *G. obtusiflora*, *G. linearifolia sens. str.* among many others). Root-suckering habit really only provides a valid basis for separation at specific rank when reproductive and therefore genetic isolation is also involved (i.e. there is no seed set and the population relies solely on non-sexual modes of regeneration.)

Conflorescence branching. The table of comparative features (Table 1) states that the conflorescences of *G. celata* vary from simple to three-branched; *G. alpina* and *G. chrysophaea* vary from simple to 2-branched.

In other words only when we have a three-branched conflorescence can we be sure that we have *G. celata*. One wonders how common this is. The author's taxonomic description of *G. celata* states that the 3-branched conflorescences do not have a common peduncle. However, a branched conflorescence must have a common primary peduncle. A conflorescence with three separate peduncles is really three simple (or unit) conflorescences. If this is the case, then we have no discontinuity at all because all the conflorescences of *G. celata* are simple.

The nectary. In the taxonomic description, Molyneux states or implies that *Grevillea celata* has a conspicuous, angularly ascending, arcuate-rectangular to oblong (?4 sides) nectary 1.3-2.5 mm long. (The word 'long' for which the word 'high' is substituted in Table 1 is very confusing here). In terms of posture, shape and height, there is a clear discontinuity with *G. alpina* which has a patent, tongue-like nectary. The nectary of *G. chrysophaea* is given in Table 1 as pulvinus-like or broadly V-shaped, rising 0.5-1.3 mm high. There may be a difference from *G. celata* in nectary shape here but generally there is very little difference in shape between an arcuate nectary and a broadly V-shaped nectary. While most specimens of *G. chrysophaea* usually have a less conspicuous nectary (mostly 1 mm high), Molyneux records that some measure up to 1.3 mm high, the same as the lower measurement for *G. celata*. Up until I had read this paper I had assumed that nectary height was the key to the distinction between *G. chrysophaea* and *G. celata*. Disappointingly there is clear overlap or abutment on the nectary height and the necessary discontinuity is not present, even though the highest nectary of *G. celata* clearly exceeds that of *G. chrysophaea*. It would be very interesting to know how many specimens of both species measured at 1.3 mm high and whether indeed this was a common overlap or rare. There should have been some discussion on this most important point in the paper.

Pistil length. According to Table 1, pistil length of *G. celata* is given as mostly 18-20 mm with an occasional measurement to 25 mm. *G. alpina* is given as 10-20.5 mm. *G. chrysophaea* is given as 15-22 mm. So, if we have a plant with pistils 18-20 mm long, the most common measurement of *G. celata*, what have we got? We could have all three. There is clear overlap with both comparative species and to include this character in the protologue is pointless and misleading.

OTHER MEASURES OF DIFFERENCE FROM TABLE 1.

Floral bracts: Table 1 clearly shows a difference in bract width and degree of persistency between *G. celata* (1.2-1.4 mm wide, caducous when buds c. 3 mm long) and *G. alpina* (0.3-0.8 mm wide, persistent to late bud). There is no difference for *G. chrysophaea*.

Leaf venation: Molyneux states that *G. celata* has brochididromous (sic) venation. It thus clearly differs from *G. alpina* which has no visible secondary venation. Again, there is no discontinuity with *G. chrysophaea*.

Flower colour: *G. celata* which has mostly red with yellow, white or pink bi-coloured flowers differs noticeably from

TAXONOMY (cont.)

G. chrysophaea which for the most part has uniformly yellow or golden flowers, sometimes with greenish patches. *G. alpina* has a similar colour range to *G. celata* and is therefore not distinguishable. However, flower colour is indicative rather than conclusive evidence of species separation. One might compare red and white-flowered populations of *G. banksii*. They are clearly different but it doesn't mean much taxonomically.

Perianth beard: The hairs of the beard inside the perianth on the dorsal tepal are stated to be less dense than on the ventral tepals for both *G. alpina* and *G. chrysophaea*, whereas the hair density is the same on both tepals of *G. celata*. If this character is readily observable and consistent, then this is one of the strongest characters offered by the author. It is a pity it was not included in the protologue.

Summary: The separation of *Grevillea celata* from *G. alpina* is clearly made on a number of good characters in this paper. A further point of separation not mentioned by the author lies in the leaf orientation of *G. alpina* which is very often retrorse, whereas in *G. celata* the leaves are always spreading to ascending, never retrorse. However, there was no doubt about the distinction from *G. alpina* even before the paper was written because McGillivray (1995) had already included it in *G. chrysophaea*. The real question that this paper had to address was how *G. celata* differs from *G. chrysophaea*.

I was disappointed that the paper did not revise the whole of *G. chrysophaea* where there is considerable population-based variation apart from the Nowa Nowa group.

Although the author may have undertaken a broad study of *G. chrysophaea*, this paper provides little evidence of it, apart from some measurements in Table 1 that more or less agree with McGillivray's. A detailed analysis of variation in *G. chrysophaea* is really essential to our understanding of the variation considered so significant in this population. And at the end of the day, what have we got? A difference in generative habit, flower colour, perianth beard density and perhaps, nectary height. The degree of overlap and the lack of a strong, defining discontinuous character state suggests that perhaps subspecies might have been a more appropriate rank for *G. celata*.

The other major worry with this species is its extreme variability over such a relatively small distribution and population, which is strongly suggestive of a hybrid swarm. The concept of the species arising from relatively recent hybridisation is an interesting one. What is meant by "relatively recent"? One is also drawn to the question of what a species is and how many ways it can arise. This paper does not address this question. However, if we can accept a species that has arisen from recent hybridisation, what then of *G. gaudichaudii* R. Brown ex Gaudichaud which was first collected in 1818-19 and is still extant, or numerous other hybrid swarms yet to be described. My own experience with *G. celata* in the field left me with the distinct impression, through its extreme variability, of a hybrid swarm centring around *G. chrysophaea* and *G. alpina*. Only botanical consensus and further scientific analysis over time can determine this. In the meantime, *G. celata* should be accepted as a species in need of further study.

The Grevillea Park, Bulli

Opening Dates for 1998

19th, 20th July
26th, 27th July
19th, 20th September
26th, 27th September

The park is open from 10am to 4pm on the above dates.

Volunteers from the Grevillea Park Society Inc, Illawarra SGAP (particularly Mrs Evelyn van Ede), and members of local garden clubs help staff the Park on the day.

Special Openings for Groups:

Special openings for tours from groups (such as bus tours by Garden Clubs) can be arranged.

Location

The park is located at the rear of the Bulli Showground, Pacific Highway, Bulli. (Turn at the Woonona-Bulli Sports Club, just south of Slacky Creek). Bulli is one of the northern suburbs of Wollongong, and is just a 1 hour drive south of Sydney. The Park is a short walk north of Bulli railway station (check the timetables).

Cold Loving Plants Needed

by Pat Halligan, USA

I just received my first issue of the Grevillea Study Group Newsletter, and I found it full of interesting material. I am writing to let you know my needs, and in the hope that some of the members in the Study Group might take an interest and collect seeds from plants that might have potential in the Pacific Northwest.

I am carrying on a project to identify, obtain and test bird pollinated plants for the Northwest. Presently, I am limited to South African species. South Africans have recognised the potential of their plants in temperate climates, and as a result, I have been able to obtain seed collected from their coldest mountains. I can see similar potential in the genus Grevillea, if the right species are collected from the right areas.

The characteristics of plants likely to be successful here are:

- cold tolerance to -15 degrees C
- tolerates frozen soil
- grows well in wet, acid soil
- takes cool, humid summers without disease problems.

To me it appears that there are two factors to look for in locating the best areas to collect plants with hardiness potential in the Northwest: winter cold, and summer humidity. The eastern drainage of the Snowy mountains and nearby seaward ranges above 1,000 m in elevation appear to fulfil these requirements. Any plant collected there from a moist situation on acid soil is a good candidate. Species which grow in this area include the following: *Grevillea baueri*, *G. asperula*, *G. laurifolia*, *G. diminuta*, *G. miqueliana* and *G. victoriae*.

If anyone can help please contact me - PO Box 489, Freeland, WA 98249 USA

PROPAGATION

TISSUE CULTURE OF GREVILLEA SPECIES AT MOUNT ANNAN BOTANIC GARDEN

Catherine A. Offord & Joanne L. Tyler, Mount Annan Botanic Garden, Mount Annan NSW 2567.

Introduction

Mount Annan Botanic Garden is the Australian native plant garden of the Royal Botanic Garden Sydney. It was established in the mid 1980s and is rapidly amassing a significant collection of Australian plants, particularly taxa from the arid, temperate, subtropical and montane tropical regions.

The Horticultural Research Section was established in 1989 and as the name implies, its function is to further Australian horticulture, particularly in the area of conservation. The research facilities include tissue culture and seed germination laboratories and propagation glasshouses.

One of the most extensive plant collections at Mount Annan is *Grevillea*, a taxonomically complex genus subject to much recent reclassification. There are upwards of 340 species of *Grevillea*, and a large number of subspecies, forms and cultivars (Olde and Marriott, 1994) many of which are horticulturally desirable and widely grown. Unfortunately there is also a significant number of rare or threatened *Grevillea* taxa (164) representing approximately 3.5% of all Australian threatened flora (Briggs & Leigh, 1996).

With help from the *Grevillea* Study Group a truly significant collection of *Grevillea*s has been amassed at Mount Annan Botanic Garden. Of the 283 taxa held, 44 taxa are considered threatened. This captive collection has given us both an opportunity to display the diversity and to research the biology and conservation of the genus. Because of the extreme rarity of some of the species, we have concentrated much effort on researching ex situ conservation of endangered *Grevillea* spp. through micropropagation.

Micropropagation Techniques

*Grevillea*s have proven to be a relatively easy group of plants to tissue culture and all of the species we have in culture (see Table 1), have been initiated and established using the same technique that was established for Waratah (Offord et al. 1990, Offord et al. 1992, Offord & Cambell 1992).



G. bachtrachioides
(80% actual size)

Table 1. *Grevillea* species successfully propagated in vitro at Mount Annan Botanic Garden

Species	Endangerment category (national listing)	State of origin
<i>G. batrachioides</i>	Endangered	WA
<i>G. banksii</i>	Endangered	Qld
<i>G. caleyi</i>	Endangered	NSW
<i>G. christinae</i>	Endangered	WA
<i>G. dryandroides</i> subsp. <i>hirsuta</i>	Endangered	WA
<i>G. flexuosa</i>	Endangered	WA
<i>G. infundibularis</i>	Poorly known	WA
<i>G. kennedyana</i>	Vulnerable	NSW/Qld
<i>G. leucoclada</i>	Vulnerable	WA
<i>G. montis-cole</i> subsp. <i>brevistyla</i>	Vulnerable	Vic
<i>G. olivacea</i>	Rare	WA
<i>G. robusta</i>		NSW/Qld
<i>G. scapigera</i>	Endangered	WA
<i>G. shiressii</i>	Vulnerable	NSW
<i>G. ssp. aff. curviloba</i>	Poorly known	WA
<i>G. trachytheca</i>	Rare	WA
<i>G. scabra</i>	Poorly known	WA

Most *Grevillea* species grow well on MS nutrient medium (Murashige and Skoog, 1962), agar (10gms/l), with the addition of BA (Benzyl adenine) at concentrations between 1.0 -1.5 μM .

Although this medium is considered to have a high nutrient content, we have found no advantage in using half strength MS or other media with a lower nutrient content.

Cultures are incubated at $25 \pm 2^\circ\text{C}$ under a light intensity of 50-100 $\mu\text{mol m}^{-2}\text{s}^{-1}$, with a photoperiod of 16h/8h (day/night), for a period of six weeks. At this time, a multiplication rate of two to six times can be expected for most species, although there is some variation according to species.

Once we have a plant established in tissue culture we bulk up the number to reinforce our potted collection or use the material for research purposes, such as DNA fingerprinting or nutritional experiments. One clone of *Grevillea scapigera*, an extremely rare species from Western Australia has performed so well in culture that it has been used in many of our in vitro experiments, including phosphorus tolerance and the development of proteoid roots in a sterile environment. Species that are not being used for research purposes are stored using a reduced temperature and light system (10°C and $10 \mu\text{mol m}^{-2}\text{s}^{-1}$).

PROPAGATION (cont)

Cultures are held in these conditions for many months, sometimes over two years, before regeneration. The medium used is little different to that used for other cultures (MS, BA 0.5 μ M), and we allow the cultures to grow at 25°C for two weeks before being put into cool storage.

This system of storage obviates the need for regular subculturing, cutting labour and consumable costs, and the chance of genetic variations being perpetuated. Table 2 demonstrates some of the species that have been stored under these conditions.

Table 2. Proteaceae species that can be regenerated after low temperature storage conditions for periods of greater than nineteen months.

Species	Period stored (months)
<i>Grevillea flexuosa</i>	30
<i>G. infundibularis</i>	29
<i>G. kennedyana</i>	19
<i>G. phanerophlebia</i>	29
<i>G. scapigera</i>	19
<i>G. shiressii</i>	31
<i>Hakea Dactyloides</i>	19
<i>H. salicifolia</i>	19
<i>Isopogon axillaris</i>	26
<i>Telopea speciosissima</i>	31

Exflasking

Explants can be rooted *in vitro* using IBA (indolebutyric acid) 5-10 μ M in the medium, although in some cases plantlets can have poor vascular connection between the roots and the shoot and may become necrotic after exflasking.

We have developed a "direct rooting" technique using microcuttings dipped in IBA powder (3 g IBA/kg powder), in a similar manner to vegetative cuttings. With either method it is essential to place exflasked cultures in high humidity environment until roots are established, humidity should then be gradually reduced allowing plants to harden off. We use a fogging tent at the early stages and move plants on to a mist system after initial establishment.

Plants should not be moved to normal humidity until shoot growth recommences.

Problems

Initiation of plant material into the tissue culture environment is always a difficult process, and as plant material from the wild has a high natural microbial presence it is essential to only use healthy actively growing shoots.

Growing plants in a protected environment, such as a glasshouse for several weeks prior to initiation, decreases contamination considerably at this stage and is the recommended method. Alternatively, if clonal material is not required, seeds can be readily sterilised in 1% bleach - the length of time depends on the species.

Hyperhydricity (vitrification) is a problem in some *Grevillea* species, where the explants become brittle and have a water soaked or glassy appearance. It is common in new explants and may be overcome with subsequent subculturing, although some species take up to 12 months to outgrow this problem.

We have also had success using vented lids which reduce the relative humidity of the jar. The addition of a low concentration of some amounts of IBA (0.1-0.2 μ m) to the medium can also help.

Other tissue culture research

At Mount Annan Botanic Garden we are becoming increasingly involved in the endangered species "recovery process", a multilateral approach to plant conservation involving landholders, the NSW National Parks and Wildlife Service and the Royal Botanic Gardens, working together to conserve plant species *in situ* and *ex situ*.

Tissue culture is an appropriate *ex situ* conservation technique for some species.

In recent times we have embarked on a number of projects in which tissue culture may play some role, most notably *ex situ* conservation of the endangered *Wollemia nobilis*. We are also researching the development of the Flannel Flower (*Actinotus helianthi*) for horticulture (Offord & Tyler, 1996), as this is a species heavily exploited by bush-harvesters. Tissue culture techniques developed at Mount Annan are now being used to propagate this species for the commercial market.

As a young botanic garden our role is continually developing, however it is certain that micropropagation of threatened species will be a valid technique in insuring against species loss if it is seen as part of an overall strategy.

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PROPAGATION

The Seed Bank

by Judy Smith

A big thank you to Heather Clarke from Hunter Region Botanic Gardens and Pip Gibian for donations of seed.

There are not vast amounts of seed, so the first people to respond will receive seeds. To obtain free seed please send a self-addressed envelope with a 70 cent stamp to Judy Smith, 15 Cromdale Street, Mortdale 2223.

G. acrobotrya

G. asplenifolia
G. banksii red - grey leaf form
G. beadleana
G. bedgoodiana
G. bipinnatifida
G. cv. "Cascade"
G. dielsiana
G. endlicherana
G. fililoba

G. flexuosa
G. hodgei (syn. *whiteana*)
G. johnsonii
G. juniperina (red upright)
G. longistyla
G. macleayana
G. masonii
G. nana ssp. nana

G. petrophiloides
G. planerophlebia
G. rivularis
G. sericea (pale pink)
G. thelemanniana
G. trifida (divaricate leaf form)
G. triloba
G. venusta

A Note from the Treasurer

Please ensure all cheques are made payable to Grevillea Study Group, not Peter Olde.

Thanks

A Note from the Editor

Apologies for any inconvenience caused by early publication of this newsletter. A change to the NSW Group's June Meeting needed to be publicised prior to the meeting.

CUTTING EXCHANGE

Cutting material is available to financial members only from Dave Mason, Box 94 Coraki 2471.

Hundreds of species available!

Please contact me, I may have the plant you require. The cost is \$6.50, payable with order, which covers the cost of packing and return via Express Post.

OFFICE BEARERS

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Cuttings Exchange: Dave Mason, Box 94, Coraki, 2471. (02) 6683 2583

FINANCIAL REPORT

Income		MAY 1998	Expenditure	
Subscriptions	\$475.00		Newsletter Publishing	200.00
Donations	30.00		Postage	114.20
Illawarra Grevillea Park	150.00		Stationery	24.50
Autumn Plant Sale	2,973.00			
	<u>\$3,638.00</u>			<u>\$338.70</u>
Balance on Hand	16.5.19.98			
				\$3,866.88

If a cross appears in the box, your subscription of \$5.00 is due. Please send to the Treasurer, Christine Guthrie, PO Box 275, Penshurst 2222. Please make all cheques payable to the Grevillea Study Group.

1997

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