


**ASSOCIATION OF SOCIETIES FOR GROWING AUSTRALIAN PLANTS**

ABN 56 654 053 676.

**THE AUSTRALIAN DAISY STUDY GROUP NEWSLETTER NO. 60**

 <p><i>Olearia frostii</i> x1</p> <p>A candidate for selection as the AD SG emblem Drawn by Gloria Thomlinson</p>	<b>CONTENTS</b>	
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**DEADLINE FOR NOVEMBER NEWSLETTER IS 1<sup>ST</sup> OCTOBER 2001**

## LEADER'S LETTER

Well the plan was good, but as yet (end of June) we still don't have our book with the publishers. It could happen in the next month or two if we are lucky. In the meantime we have been obliged to make a few other changes to the program. You will notice that the plant sale has been deferred until the 27<sup>th</sup> October, which is a trifle late for a plant sale, but we hope not too late. Perhaps we will still be able to combine it with a book launch. Another change is the end of year break-up which will now happen on Sunday 25<sup>th</sup> November instead of the fourth Tuesday. We expect to visit the gardens of Cheryl Southall and Gretna Weste. I hope these changes will not cause too much inconvenience to members.

As usual the 'May Meeting' was well attended, and we were particularly pleased by the number of country members who were able to come. It is always a pleasure to catch up with old friends and make acquaintance with some we knew only by a name in the newsletter. My thanks to all concerned for the success of the weekend, particularly Natalie Peate and Max and Regina McDowall.

Since then I have been home for only a short visit before taking off for a trip to the 'top-end' which was warm and wonderful, although as expected, not very productive in terms of finding daisies. The only successes were *Pterocaulon serrulatum* and *P. globuliflorus*. I was hoping to come across *Pleurocarpaea denticulata*, a slender herb to 80cm high with terminal pink flower-heads, but as it flowers from October to February and sets seed from November to March this was probably a faint hope.

Upon my arrival home I was very sad to hear that Julie Strudwick had passed away on 21<sup>st</sup> June. Julie was a prominent and talented member of the group and her skills with propagating and growing are well known. Many of us will have cause to remember her with fondness whenever we look around our gardens.

Regards,

**Joy**

## COMING EVENTS

SUBSCRIPTIONS are now DUE

Tue 17 <sup>th</sup> July	9.30am – 12.30pm	Book Committee Meeting	Maureen's
Tue 24 <sup>th</sup> July	10.00am – 3.00pm	General Meeting Small headed species ( <i>Angianthus</i> , <i>Gnephosis</i> etc.)	Judy's
Tue 21 <sup>st</sup> Aug	9.30am – 12.30pm	Book Committee Meeting	Maureen's
Tue 28 <sup>th</sup> Aug	10.00am – 3.00pm	General Meeting <i>Calotis</i> & <i>Millotia</i>	Jenny's
Tue 25 <sup>th</sup> Sep	10.00am – 3.00pm	General Meeting <i>Minuria</i> & <i>Kippistia</i>	Bev's
29 <sup>th</sup> Sep – 5 <sup>th</sup> Oct		ASGAP 21 <sup>st</sup> Biennial Conference	Canberra
Tue 23 <sup>rd</sup> Oct	10.00am – 3.00pm	General Meeting <i>Podolepis</i> & <i>Podotheca</i>	Joy's
Sat 27 <sup>th</sup> Oct	9.00am – 4.00pm	Plant Sale & Book Launch	Peg's
Sun 25 <sup>th</sup> Nov	10.30am – 3.00pm	Christmas breakup, garden visits	
Tue 22 <sup>nd</sup> Jan 2002	10.00am – 3.00pm	General Meeting	

## VALE JOHN EMMS

It is with considerable regret that we report the passing on March 14<sup>th</sup> of a very keen member John Emms of Loch, Vic. after a short illness. John has been extremely generous to the group in a number of ways, and we extend our sincere sympathy to his wife Pat and family.

## VALE JULIE STRUDWICK

by Ray Purches

Julie passed away on 21<sup>st</sup> June, aged 69 years. Born and raised in Sydney, Julie worked as a florist until the deaths of her brother, father and mother within a 2<sup>1</sup>/<sub>2</sub> year period. At that difficult time she moved to Melbourne where she worked at the Royal Australian Ornithologists Union (RAOU). She spent a happy time travelling to the 'top end' in her trusty blue Mazda station wagon, working on the bird atlas with RAOU and making some strong friendships.

By the 1980's Julie needed to escape the bustle of the city life and found a bush retreat at Upper Lurg in 1985. Her 60 acres with a long narrow ridge, precipitous slopes, difficult access, little water, seclusion and more rock than soil, was a great challenge that stretched and energised Julie. Her birding contacts led to other friendships with notable naturalists such as Arthur Hall, Chris Morris and Jill Rossiter. Chris' and Jill's superb Australian gardens caught her eye.

Julie began with log retaining walls utilising trees from the house site. With her astounding energy Julie had soon run out of logs, so the local mudstone rock was used to teach herself the art of dry stone-walling. Typically, she established the principles, used the proper lifting techniques, then got on with building hundreds of metres of beautiful stone retaining walls.

Julie of course found time for many other involvements. She joined the local fire brigade, being part of their emergency response system. She joined the Society for Growing Australian Plants at Wangaratta where she became president and organised a series of wonderfully successful Flower Shows. She joined SGAP Study Groups including the Boronia, and the Australian Daisy Study Groups.

Julie's garden in winter 2001 is about to explode into colour and movement with all the birds, spiders, mammals, insects, fungi, mosses, grasses and flowering plants that fascinated her for 16 glorious years. Her correas cascading over the stone walls, the pink racemes of *Hakea francisiana* against the sky, the deepest blue of *Halganea cyanea* on a rock wall next to *Hakea* 'Burrendong Beauty' connect her and therefore us all to an amazing network of gardeners and nature lovers.

Julie was my friend for nearly fifteen years. Over time it got better and better. Our May trips to Daisy Meetings were always like a pilgrimage to Mecca and our last trip was no exception. I treasure her inspiration, sense of humour and common sense.

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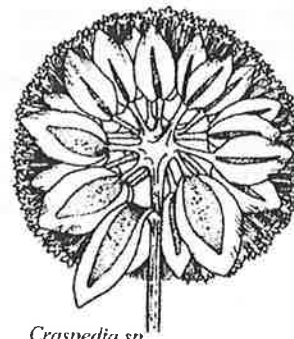
## DISTINGUISHING *CRASPEDIA* AND *PYCNOSORUS*

by Joy Greig

These two genera which were revised in 1992 by botanists at the National Herbarium of NSW prior to the publication of volume 3 of the Flora of NSW, edited by Gwen Harden.

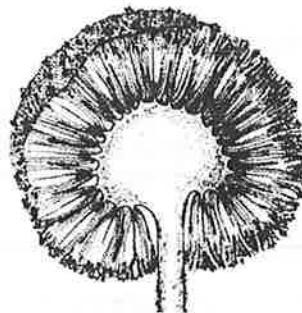
The genus *Craspedia* includes about 15 Australian species of which 13 are now described. Two are yet to be described and there are two or three other entities which are thought to represent natural hybrids.

They are annual or perennial herbs with mainly **basal rosettes** of entire, stem-clasping leaves which decrease in size up the stem. Spherical or hemispherical compound flower-heads occur at the tips of the stems consisting of 20-125 **stalked** partial heads on a general receptacle with a common involucre of bracts. The partial heads are each subtended by a herbaceous bract and 5-10 colourless involucral bracts. Each partial head has 4-12 tubular, bisexual florets on a common receptacle.



*Craspedia* sp

*Pycnosorus*, on the other hand, are tap-rooted annual or perennial herbs or subshrubs with mostly **cauline** leaves reducing in size up the stem. Spherical to ellipsoid compound flower-heads occur at the tips of the stems and consist of 40-200 **sessile** partial heads on a common receptacle, sometimes with a common involucre of mainly herbaceous bracts. The partial heads are subtended by a main bract and each have 3-8 tubular, bisexual, yellow florets which are themselves subtended by yellow scarious bracts or scales.



Flower-head of *Pycnosorus*

***Craspedia alba*** has brownish oblong basal leaves with a silvery covering of appressed hairs. The margins are entire and undulate and the upper leaves are decurrent. Florets are white and the heads occur on single scapes. It flowers in the summer in the Kosciusko region and is also known from Mt Bogong and Mt Cope in Vic.

***C. aurantia*** has spatulate leaves, mainly basal, with one main vein and glabrous or sparsely hairy surfaces. Florets are orange, the flower-heads being on single scapes. Flowering is in summer. It grows in grasslands in subalpine areas of NSW and Victoria and is thought to hybridise with *C. crocata*.

***C. canens*** is a grey-green glandular hairy herb with mainly basal, lanceolate to narrowly ovate or spatulate leaves. The florets are yellow, the flower-heads occurring on 1-5 scapes. It flowers in spring and summer in grasslands at low altitudes in NSW and Victoria.

***C. coolaminca*** is a silver-grey herb with linear to lanceolate, mainly basal leaves with long fine appressed hairs and woolly margins. The florets are yellow, the flower-heads occurring on single scapes. It flowers in summer in the Kosciusko region, the Victorian alps and in Tasmania.

***C. costiniana*** is a densely hairy herb with spatulate, mainly basal, pale green leaves. The florets are golden-yellow, the flower-heads occurring on single scapes 10-50cm high. It grows in drier sites on alpine or subalpine grasslands in the Kosciusko area and flowers in summer.

***C. crocata*** has linear-spathulate to spatulate green leaves, mainly basal, with one main vein, scattered glandular hairs and finely woolly margins (occasionally with multi-septate hairs). The leaves taper gradually at the base which is often purple in colour. The florets are deep orange, with the flower-heads on single scapes. It flowers in summer on grasslands in subalpine areas of ACT and NSW and at Falls Creek in Victoria. This species is thought to hybridise with *C. aurantia* and *C. jamesii*.

***C. haplorrhiza*** is an erect herb with basal and cauline, spatulate to oblanceolate leaves. Lamina have glandular and multiseptate hairs and the margins are woolly. Florets are golden-yellow, the flower-heads occurring on 1-many, yellowish to reddish scapes which are 7-15cm high. It flowers from early spring to early summer and grows in damp situations on heavy soils in Qld, NSW, Vic and SA. It is distinguishable from other *Craspedia* by its single tap-root.

***C. jamesii*** is a bright green herb with mainly basal, spatulate leaves and stem-clasping lanceolate upper leaves. The surfaces and margins are glabrous or evenly covered with multiseptate hairs. Florets are golden-yellow, the flower-heads occurring on single cream to crimson, hairy scapes. The species is widespread and flowers in summer in subalpine grassland in NSW and Victoria. It probably hybridises with *C. crocata* and *C. aurantia*.

***C. lamicola*** is a green herb with broad spatulate basal and cauline leaves, the bases broadly stem-clasping. Both leaf surfaces have long fine hairs and sparse multiseptate hairs, usually fringing the margins. Florets are golden-yellow on single reddish scapes which are woolly below the flower-head. It flowers in summer and grows in wet alpine sites in the Guthega-Kosciusko area.

***C. leucantha*** has bright green almost glabrous leaves except for a few hairs on the margins. The basal leaves are spatulate and cream to red at the base. Upper leaves are lanceolate. Florets are creamy-white and the heads often occur on multiple scapes. It flowers in summer in the Kosciusko region.

***C. maxgrayii*** is a white woolly herb with mainly basal leaves which are oblanceolate to narrow-spathulate. Florets are yellow, the flower-heads occurring on single scapes in summer in the Kosciusko area and on the Bogong High Plains.

***C. paludicola*** is a robust herb with dark green, narrow-oblanceolate, basal and cauline leaves with 1 to several prominent veins. The lamina are usually glabrous or have a few scattered woolly or septate hairs which may be denser on the margins and midvein. Florets are bright yellow and flower-heads occur on 1-3 scapes to 75cm high. It flowers in spring to summer and is common in lowland swampy areas in NSW, Vic., Tas., and SA and also at Lake Mountain and Mt Wellington.

***C. variabilis*** is an erect herb with narrow-spathulate basal and cauline leaves which are pale to olive green with glandular to multiseptate hairs and long fine hairs. Florets are golden-yellow and the flower-heads occur on 1-several, yellowish to reddish, hairy scapes to 50cm high. It is widespread in forest, woodland and grassland in Qld, NSW, Vic, SA, and WA but never in alpine areas. Flowering time is spring and summer. Several forms can be distinguished.

***Craspedia* sp.1** is a sparsely leaved herb with broadly spathulate basal leaves which taper to a distinct red tinged petiole. The leaf surfaces are slightly rough with sparse multiseptate hairs and often woolly hairs on the margins. Secondary veins are conspicuous. The florets are deep orange, the flower-heads occurring on 1-2 sparsely woolly, often red tinged, scapes. It flowers during summer and is endemic in Victoria in montane and subalpine woodland.

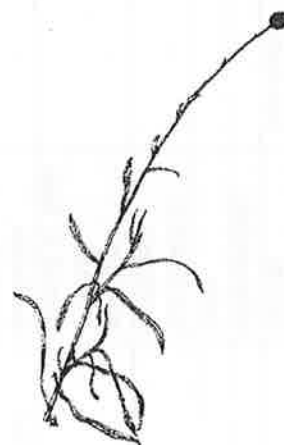
***Craspedia* sp.2** is a delicate herb with a basal tuft of erect, spathulate leaves and linear cauline leaves. Both surfaces are hoary with multicellular hairs. Petioles are reddish and narrow. The florets are pale yellow, the flower-heads occurring on 1-several, straw-coloured to reddish scapes. It flowers in late winter to spring and is endemic in drier grasslands of the volcanic plains in the vicinity of Derrinallum, Vic.

***Pycnosorus chrysanthes*** is an ascending or erect herb with white woolly stems, branching at the base. Cauline leaves are linear, olive-green to dark-brown above, usually paler below, woolly on the margins and with a main vein on the lower surface. Florets are golden-yellow. It flowers in early spring to summer and grows in moist areas in heavy soils in Qld, NSW, Vic, and SA.

***P. globosus*** is a silvery-white herb with linear basal and cauline leaves with prominent longitudinal veins and woolly hairs. Large compound heads of yellow florets are borne on several stems to 120cm high in spring and summer. It is found in heavy soil in moist situations in Qld, NSW, Vic, and SA.

***P. pleiocephalus*** is an ascending or erect herb with many stems to 40 cm high. Leaves are mainly cauline, oblong to oblanceolate, olive-brown to green with glandular hairs and septate hairs especially on the margins. The spherical compound head may be single or branched into smaller secondary spherical heads. The florets are lemon-yellow and flowering is generally spring and early summer. It grows in mallee on sandy soils in Qld, NSW, Vic, SA, and NT.

***P. thompsonianus*** is an ascending or erect herb branching at the base. Cauline leaves are linear and white to grey with woolly hairs. The compound heads of golden-yellow florets are borne on woody stems to 35cm high. It flowers in spring to early summer and occurs in heavy soils on flood plains in NSW and Qld.



*Pycnosorus thompsonianus* x<sup>1</sup>/<sub>4</sub>

#### References:

Everett J. & Doust A., Four new Australian species of *Craspedia* sens. strict. (Asteraceae: Gnaphalieae) *Telopea* Vol 5 (1): 3-38

Everett J. & Thompson J., New alpine and subalpine species in *Craspedia* sens. strict. (Asteraceae: Gnaphalieae) *Telopea* Vol 5 (1): 45-51

Flora of NSW Vol 3, Ed. Gwen Harden

Flora of Victoria Vol 4, Ed. NG Walsh & T.J. Entwistle

**Craspedia and Pycnosorus**

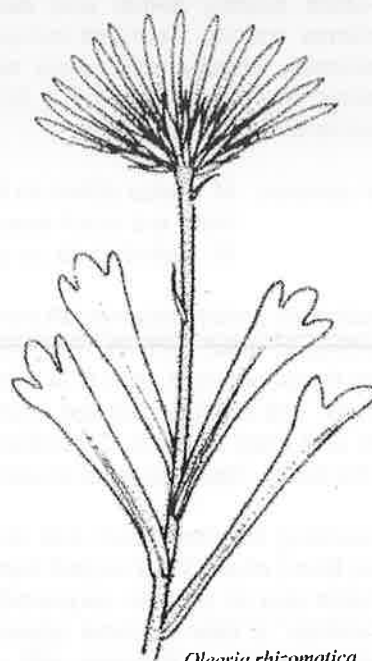
Species	Appearance	Basal leaves	Cauline leaves	Partial heads	Florets	Scapes	Taproot	Flowering time	Alpine	Subalpine	Lowland
<i>Craspedia leucantha</i>	green	spathulate	lanceolate	stalked	creamy-white	>1	-	summer	*	-	-
<i>C. alba</i>	brown	oblong	decurent	stalked	white	1	-	summer	*	-	-
<i>C. maxgreyii</i>	white	oblanceolate	-	stalked	yellow	1	-	summer	*	*	-
<i>C. coolaminca</i>	silver	linear	-	stalked	yellow	1	-	summer	*	-	-
<i>C. canens</i>	grey-green	lanceolate to spathulate	-	stalked	yellow	1-5	-	spring-summer	-	-	*
<i>C. crocata</i>	green, hairy	spathulate, 1 veined, tapered at base	-	stalked	orange	1	-	summer	-	*	-
<i>C. aurantia</i>	green, glabrous	spathulate, 1 veined	-	stalked	orange	1	-	summer	-	*	-
<i>C. paludicola</i>	dark green	oblanceolate	oblanceolate	stalked	bright yellow	1-3	-	spring-summer	-	*	*
<i>C. costiniana</i>	pale green, hairy	spathulate	-	stalked	golden-yellow	1	-	summer	*	*	-
<i>C. lamicola</i>	green, hairy margins	spathulate	spathulate	stalked	golden-yellow	1	-	summer	*	-	-
<i>C. jamesii</i>	bright green	spathulate, tapered at base	lanceolate, stem-clasping	stalked	golden-yellow	1	-	summer	-	*	-
<i>C. haplorrhiza</i>	pale green	spathulate to oblanceolate	spathulate to oblanceolate	stalked	golden-yellow	1 to many	*	spring, summer	-	-	*
<i>C. variabilis</i>	pale to olive-green	narrow spathulate	narrow spathulate	stalked	golden-yellow	1 to several	-	spring & summer	-	-	*
<i>C. sp. 1</i>	sparse leaves	spathulate secondary veins	-	stalked	deep orange	1-2	-	summer	-	*	-
<i>C. sp. 2</i>	delicate, hoary	spathulate	linear	stalked	pale yellow	1 to several	-	late winter, spring	-	-	*
<i>Pycnosorus pleiocephalus</i>	olive-brown to green, secondary heads	-	oblong to oblanceolate	sessile	lemon-yellow	several	*	spring, summer	-	-	*
<i>P. thompsonianus</i>	grey, woolly	-	linear	sessile	golden-yellow	many	*	spring, summer	-	-	*
<i>P. chrysanthes</i>	olive-green to dark brown	-	linear	sessile	golden-yellow	many	*	spring, summer	-	-	*
<i>P. globosus</i>	silvery-white	-	linear	sessile	golden-yellow	several	*	spring, summer	-	-	*

**SPECIES or FORMS NEW to MEMBERS****Olearia rhizomatica**

by Ros Cornish

The Wednesday Walkers of SGAP Canberra recently repeated a favourite walk to Booroomba Rocks in Namadgi National Park. We had not been there in March before and were not expecting to see many plants flowering as we were having a rather hot summer and most plants had finished flowering earlier than usual this year. Imagine our delight when we emerged on a stunning granite outcrop, with views back to Canberra, and found a daisy flowering that we had never seen before – lots of it. At a distance it didn't look like a daisy to me, perhaps because I wasn't expecting it, especially one so floriferous – it was more like a small *Prostanthera*. (You should know though that I am at that in between stage with wearing glasses. I need them for reading but not yet for walking!) The small bushes (about 30-40cm tall) were covered in flowers – mostly a pale blue but varying from nearly white to a definite blue. Close inspection showed small (about 5-10mm long), alternate, glabrous leaves with 3 distinct lobes. Discussion among the AD SG members in the group had us agreed that we were looking at an *Olearia*.

As a precaution for such finds I carry a photocopy from *Flora of NSW* of most of the descriptions of daisies found in the Southern Tablelands. Over lunch we pored over these and quickly concluded that we had found *O. rhizomatica*. The picture matched (always important!), the flowering time of December to March fitted and the location description was spot on – "Grows in *Eucalyptus pauciflora* woodland and alpine herbfields in sandy loam on rocky slopes over granite; in the Namadgi N.P. and Scabby Range." We were surrounded by *E. pauciflora* and were on granite.

*Olearia rhizomatica*

Elliot and Jones in *Encyclopaedia of Australian Plants Vol 7* comment "A rare and beautiful species from the Southern Tablelands where it grows in alpine herbfields and snow gum woodlands. Evidently rarely cultivated, it should adapt well to temperate regions if grown in freely draining acidic soils with a sunny or semi-shaded aspect. Tolerates snowfalls and heavy frosts. Plants have excellent potential for use in gardens, especially rockeries and in containers. Propagate from seed, or stem cuttings, and it may be worth trying root cuttings."

Once we had settled on a the name I recalled that I had seen this plant in the Australian National Botanic Gardens some years ago. It had been growing in a spreading mass near the *Callitris* section and had sprawled out onto the path looking very much like a plant which would have rhizomatous roots, as the books said. In contrast, the plants at Booroomba Rocks were quite upright and not spreading at all. We wondered whether that was because of the harsh conditions experienced in this area. On a previous trip we had failed to find *Asterolasia trymaloides* which, from earlier trips, we knew had been there. This trip we found small plants re-establishing in among the rocks. Perhaps *O. rhizomatica* was doing the same thing and hadn't reached its 'spreading' stage. A good reason to return and observe this delightful daisy. We will also be putting it on our propagation list for the Growing Friends (of the ANBG) when next we propagate daisies as it is one well suited to Canberra gardens.

**Description:**

***Olearia rhizomatica*** is a small shrub to 40cm high with crowded sessile, alternate leaves. The leaf blades are conduplicate (folded flat together lengthwise), keeled and narrow cuneate, 5-12 mm long and 1-4mm wide. The apex is truncate and three-lobed and the margins are entire and flat. The leaf surfaces are glabrous apart from a few basal marginal hairs. The flower-heads are terminal and solitary, 12-28mm in diameter on a peduncle to 45mm long. Ray florets (30-33) are blue, and disc florets (32-36) are yellow but tinged blue at the tips. Cypselas are silky with 30-36 pappus bristles and an outer row of short bristles. It grows in the Southern Tablelands of NSW.

**Reference:**

Flora of New South Wales, ed Gwen Harden, New South Wales University Press

**TWO REPRINTS from DR PHILIP SHORT**

by Judy Barker

Dr Short kindly sent ADSG two recent reprints of his work on daisies. Both appear in the November 2000 issue of *Australian Systematic Botany* 13, pp. 729–738 and 739–744. The reprints are available from Joy if any member wishes to borrow them. This is a brief report on the contents of the first article. A report on the second article (Two new species of *Asteridea* Lindl. (Asteraceae: Gnaphalieae) will appear in the next newsletter.

**Notes on *Myriocephalus* Benth. s. lat. (Asteraceae: Gnaphalieae)**

Two new species of *Myriocephalus* are described, *M. gascoynensis* and *M. walcottii*, both being annual herbs occurring in Western Australia.

***M. gascoynensis*** occurs around the Gascoyne River area in shrubland, open woodland and on the margins of saline depressions, growing in a variety of soils. It is a prostrate to erect herb to 17cm high, with grey-white cottony stems and sessile linear entire leaves, 10–60 x 0.3–2mm, mostly glabrous but sometimes cottony. Terminal compound heads are ovoid, 5–10mm across. The outer bracts are hyaline (translucent, usually colourless) with a green stereome and long hairs on midrib and bract margins. Cypselas are brown, 1.3–1.7 x 0.3–0.4mm, with scattered long straight twin hairs over the body. The pappus is one bristle.

Similar species: *M. nudus* differs in having no pappus, undulating leaf margins and the bracts of the general head are much less wide.

*M. walcottii* has no pappus, and the stems are greenish rather than grey-white.

***M. walcottii*** grows between Murchison River and Shark Bay in *Acacia* shrubland on red sand. It is an ascending to erect herb to 13cm high with greenish stems on which are some cottony hairs. Leaves are sessile linear entire, 4–25 x 0.3–1.5mm, glabrous or sparsely cottony. Terminal compound heads are ovoid, 4–10mm. The outer bracts are hyaline with a green stereome and sparse long hairs on the basal half of midrib and bract margins. Cypselas are brown, about 1.4 x 0.4mm, with scattered long straight twin hairs over the body. The pappus is absent.

In describing the characters and circumscription (botanical definition) of *Myriocephalus* s. str. (in the strict sense) Short *et al.* (1989) noted that species have 'narrowly ellipsoid cypselas with non-myxogenic, straight twin hairs and an annular carpopodium and that they either lack a pappus or possess a pappus of one or two bristles.' It later became apparent that some taxa have up to four bristles or bristle-like scales but nevertheless these features still serve to distinguish *Myriocephalus* s. str. from other members of Gnaphalieae with compound heads. It is observed that even so there is wide variation in the genus but this variation is accepted.

The following names are listed as belonging in *Myriocephalus* s. str.: *M. appendiculatus*, *M. gascoynensis*, *M. helichrysoides*, *M. nudus*, *M. occidentalis*, *M. pluriflorus*, *M. pygmaeus*, *M. rhizocephalus*, *M. rudallii* and *M. walcottii*.

The following names are excluded from *Myriocephalus*: *M. cotuloides* (= *Gnephosis brevifolia*), *M. gracilis* (= *Gilberta tenuifolia*), *M. guerinae*, *M. morrisonianus* (= *Helipterum craspedioides*), *M. stuartii* (= *Polycalymma stuartii*), *M. suffruticosus*, *M. villosissimus* (= *Gnephosis eriocephala*).

Dr Short has calculated pollen : ovule ratios and the number and size of anthers in *Myriocephalus* s. str., and summarised the results in a table. A key to species in the *Myriocephalus rhizocephalus* Group is also published.

## Reference:

Short, P. S., Wilson, K. E., and Nailon, J. (1989). Notes on the fruit anatomy of Australian members of the Inulae (Compositae). *Muelleria* 7, 57-79.



## POLLINATION, SELF-INCOMPATIBILITY AND HYBRIDIZATION

by Josphine Kenrick

(A transcript of the address given at the May Meeting by Dr. Kenrick from the school of Botany , University of Melbourne .)

### 1. Pollination

Pollination is strictly speaking, the deposition of pollen on the stigma surface by a vector. However, I am including a brief account of the whole complex series of processes leading to fertilization because they are relevant to the sections about self-incompatibility (the inability of a plant to produce seed from its own pollen) and hybridization (the process of mating distantly related organisms).

Pollen (the agent of sexual reproduction) is the 'package' which carries the sperm cells from pollen parent to the egg of the maternal parent plant. In Asteraceae a pollen grain is three-celled, and has a highly sculptured, spiny surface (the **exine**) made of hard material called **sporopollenin** (an alcohol related to suberin and cutin). Asteraceae pollen grains each have three furrows in the pollen wall and in each furrow is an aperture through which a pollen tube can emerge. In the exine there are spaces containing proteins, which were laid down by the pollen parent during pollen development. Below the exine there is a layer called the **intine**, which contains proteins originating from the pollen cytoplasm. Inside the pollen wall is dense cytoplasm and a large nucleus, the tube nucleus. Enclosed within the cytoplasm are two long, very dense, spindle-shaped sperm cells. At the time of its release, the pollen is in a very dehydrated state, making it suitably light for vector transport.

Pollen is usually highly adapted to the **vector**, whether it be a bird, furry animal, insect, wind or water. Pollen carried by living organisms is usually larger than wind-borne pollen and is often a source of food for the bird, insect or mammal. Hence the need for greater quantities of pollen where a vector is involved than in self-pollinating plants. Cross pollinating plants generally have higher pollen/ovule ratios than self-pollinating plants (see p.7 N/L No.59).

#### Pollen Hydration

When **viable** (living) daisy pollen grains land on the **stigma** (sometimes called the sticky tip) of a flower of the same species, they take up water immediately, and within 2 seconds the exine proteins begin to be released. Proteins from the intine take about a minute to start to be released. Other molecules are also exchanged between the stigma cells and the hydrating pollen. Given that all signals are satisfactory (ie. the pollen is compatible), the process of transporting sperm cells to the **embryo sac** (female tissue in the developing cypsela) begins.

#### Pollen tube growth

When the pollen grain and the stigma are compatible, a pollen tube will emerge from one of the apertures and will grow amongst the stigmatic hair cells (**papillae**) to the stigma surface where the tube tip penetrates the cuticle at the base of the papillae. Once past the cuticle and the stigma cells, the growing tube does a 90° turn and continues to elongate between the cells of the transmitting tissue towards the **ovary** (cypsela in daisies). Periodically, as the cytoplasm (including the two sperm cells and tube nucleus) moves down the pollen tube, the space vacated in the pollen tube is sealed off with plugs of a 1,3  $\beta$ -glucan called **callose** (the same material that forms a major part of the pollen tube walls). Pollen tubes in *Cosmos* and *Helianthus* reach the ovary within an hour of the pollen being deposited on the stigma.

#### Ovule entry

When a pollen tube reaches the ovary it grows over the internal surface of the ovary to the ovule (which will develop into the seed after fertilization) where it penetrates the external tissue and enters the embryo sac that contains the egg cell needing to be fertilized.

#### The embryo sac

The embryo sac (female tissue of the plant) is a complex structure containing at least 8 cells that have been formed by simple cell division of a single cell. This cell resulted from **female meiosis** which is a special reduction division which reduces the number of chromosomes to half the number (n) than in the normal cells of the plant (2n, one batch of chromosomes is derived from the male and one from the female parent). After the single cell has divided at least 7 times, one large cell, which took most of the cytoplasm from the last division, moves to near the centre of the embryo sac. This cell is the egg cell (n). Two other of the remaining 7 cells fuse to form the central cell (2n).

### Double fertilization

When the pollen tube enters the embryo sac it releases the sperm cells. One, the true sperm, enters to egg cell and releases its nucleus to combine its haploid number ( $n$ ) of chromosomes with the egg nucleus's haploid number ( $n$ ) of chromosomes to form a diploid ( $2n$ ) zygote that will divide and grow into the embryonic plant.

The other sperm cell enters the central cell, releases its nucleus to fuse with the two central cell nuclei to form the first cell of the **endosperm** (a  $3n$  tissue with one set of chromosomes from the pollen parent and two, probably identical, sets of chromosomes from the female parent). The endosperm is the food source that will support the growing embryo.

### Success of fertilization

For successful fertilization the pollen must firstly be viable, and secondly both parent plants must be compatible. In **self-fertile species** (plants in which **self pollination** can occur) pollen can fertilize ovules on the same plant, although the plant may, or may not produce as much seed from self-pollination as from **cross-pollination** (pollen from a genetically different plant of the same species). The level of seed set can be easily assessed by monitoring self- and cross-pollinations and calculating and comparing the resultant seed ratios, relative to the number of flowers pollinated by each method. Care should be taken to use pollen from several different plants (not members of the same clone) in cross-pollinations in case there is a self-incompatibility system operating.

**Out breeding** plants are always dependent on pollen vectors; however, many species have "fail-safe devices" which come in if cross-pollination has not occurred.

## 2. Self-incompatibility

Self-incompatibility (SI) is the inability of a plant to set seed when pollinated with viable pollen from its own flowers.

### Self-incompatibility systems

SI is often used in a narrower context to cover only the established systems where control clearly resides with one S-gene (or more) with multiple alleles. **Alleles** are variations of a gene that, for example, occupies the same position on each of a pair of chromosomes, but specify a slightly different product. That is, one allele ( $R$ ) might produce a red pigment in a flower and another allele ( $r$ ) might result in no colour. This could mean that a plant (having two sets of chromosomes) would either have  $RR$  and be red, or  $rr$  and be white, or  $Rr$  and be intermediate in colour if both alleles have an equal effect (are **co-dominant**). If plants carrying  $RR$  and  $Rr$  are both red then  $R$  is said to be **dominant**.

There are two types of genetically inherited SI systems, in which the **S-genes** have been identified. These are the **sporophytic** and the **gametophytic** systems. The S-genes and some of their alleles have been identified in tobacco and other members of the Solanaceae, in poppy, *Brassica* and grasses.

There are other means of preventing or reducing self-pollination such as :

- flower morphology
- timing of floral development
- having female flowers separated from male on the plant
- or even having male and female flowers on different plants!

### Gametophytic system

Involves the interaction between the products of a single S-allele of the pollen genotype and the 2 S-alleles of the style. This system's breeding pattern has been found in the Solanaceae, poppies, grasses, clovers, and a number of other genera.

A gametophytic system allows a wide range of crossing, because two plants are only incompatible if both S-alleles are identical. Two individual plants can produce seed if they share one allele, though only half the pollen can grow in the reciprocal pistil. Breeding experiments can be diagnostic of the system. In practice, the seed set is not greatly reduced because pollen deposition on a stigma is usually in excess of the amount needed for fertilization.

In a gametophytically controlled S-gene system the pollen tube arrest usually takes place in the style. *Papaver rhoeas* is an exception. This poppy has no style and the pollen tube arrest takes place on the stigma surface. Callose deposits often form within the pollen grains even before the pollen tubes emerge or certainly within the tube before it has grown a distance equal to the diameter of the pollen grain.

### Sporophytic system

In the sporophytic systems the interaction is between products of both parents' specified S-alleles. That is proteins deposited on the surface of the pollen grain which were produced by the pollen parent interact with pistil proteins. It means that no plants sharing even one S-allele can produce seed unless there is dominance within the system. This system is found in Brassicaceae.

Members of the Asteraceae which have been studied so far follow the same familial patterns (see diagram) as found in Brassicaceae and have a similar site of pollen tube arrest (ie at the stigma surface immediately after pollen hydration). Pollen tube arrest often results in the deposition of callose on the stigma cells as well as within the pollen and pollen tubes. Callose is an indication of, and the consequence of, self-incompatibility rather than being the cause of pollen tube arrest.

In *Cosmos* and *Helianthus* (sunflowers) there are three sites where incompatible pollen is arrested:

- with pollen from species outside the Asteraceae the foreign pollen does not even appear to hydrate.
- with pollen from within Asteraceae the foreign pollen hydrates but usually does not produce pollen tubes and callose is formed on cell walls adjacent to the pollen.
- with incompatible pollen, the pollen hydrates, the pollen tubes germinate and start to grow but curl round the papillae and can not penetrate the cuticle to enter the stylar transmitting tissue matrix.

### By-passing incompatibility

Incompatibility can sometimes be by-passed by:

- modifying background genes
- an allele for compatibility
- bud pollination
- surgical manipulations of the style such as removing the stigma surface and putting pollen on the cut surface of the style.
- injecting the pollen into the ovary.
- mixing incompatible pollen with dead compatible pollen (mentor effect).
- changing environmental temperature from the normal for the time of year.
- increasing carbon dioxide levels.

Diagram showing the breeding results when a family of full sibs are crossed. The family will fall into four groups of plants which are incompatible with the others within the group, incompatible with the parents and can only produce seed with members of one other group. This is a providing there are no dominance effects.

Parents  $S_1S_2$  X  $S_3S_4$

⊗ No seed set

⊗ Seed is set

Progeny

$S_1S_3$   
 $S_1S_4$   
 $S_2S_3$   
 $S_2S_4$

Progeny crosses

	$S_1S_3$	$S_1S_4$	$S_2S_3$	$S_2S_4$
$S_1S_3$	⊗	⊗	⊗	⊗
$S_1S_4$	⊗	⊗	⊗	⊗
$S_2S_3$	⊗	⊗	⊗	⊗
$S_2S_4$	⊗	⊗	⊗	⊗

### 3. HYBRIDIZATION

Hybrids are plants produced by mating plants of widely differing genetic composition. Some hybrids occur in nature and many other hybrids have been produced by the plant breeder. Hybridization can be a very useful tool by which variation can be introduced to cultivars or completely new cultivars are produced. However, hybridization means different things to different people.

**Intra-specific hybrids** result from crosses between in-bred lines (as used in some *Brassica* and corn crops) and between members of different ecotypes or populations of the same species. They often are particularly vigorous organisms in the first generation and are said to possess **hybrid vigor**. This hybrid vigor rarely persists into subsequent generations but may result in some interesting genetic recombinations in later generations.

**Inter-specific hybrids** are the result of crosses between members of different species. They are often difficult to produce and some crosses will only work one way. For example, A(cypsela) X B(pollen) may produce seed but when B is used as the cypsela parent no seed is set. The progeny usually show many characteristics that are intermediate in expression between those of their parents. Pollen produced by hybrid individuals is often found to be deformed or not viable.

When found in nature, inter-specific hybrids often occur in 'hybrid swarms' with both the parent species growing nearby. An example is *Acacia greyei* a hybrid between *A. brachybotrya* and *A. calamifolia* found in the Little Desert.

**Inter-generic hybrids** are the result of crossing between plants that are members of different genera. They are often the most interesting crosses but they are very, very rarely successful. Though, like inter-specific hybrids, they can occur in nature, for example *Celmesia gracilema* X *Olearia arborescens* found in New Zealand.

In order to produce a hybrid plant the 'foreign' pollen has to:

- hydrate
- germinate a pollen tube
- the pollen tube has to grow through the style
- the tube tip has to penetrate into the embryo sac to release sperm cells
- the sperm cells must combine one each with the egg and the central cells.

Normal cell division of both zygote and the endosperm must take place to develop the new plant. Unsatisfactory development of the endosperm is often a problem but embryo rescue may be possible by dissecting the embryo from the embryo sac. Considering the complex pathway leading to a fully developed plant it is not surprising that when parents of widely differing genetic makeup are cross-pollinated a mismatch can occur at any stage from pollination to the fully developed new plant.

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**GOOD ADVICE**

by Judy Barker

It is always worth listening to Gloria Thomlinson's advice. Here are two of her precepts which have been remarkably successful for me:

- Gloria suggested (NL 51, p. 33) that when she was planting at Shepparton she filled the holes with water and allowed it to drain away a couple of times before applying 'Wettasoil' solution. She also soaked the pots to be planted in the same solution. Finally she watered the plants in thoroughly. I have been following this advice over the long dry period Melbourne has endured through summer and most of autumn. So far not one plant has been lost, and all are looking healthy.
- On another occasion Gloria told me that she had spring-cleaned her basket of *Cassinia longifolia* by spraying with Preen laundry solution and then dunking the heads in water. She observed that 'the dirt just fell off them'. This statement came to mind when I was preparing for the arrival of a friend to stay for an unspecified time. Much cleaning and tidying went on. Amongst the less than perfect things my eye fell upon was a beautiful arrangement sent by Maureen. It had been sitting in the upstairs hall for some eighteen years and suddenly it looked dusty to the keen eye of the housewife. Out it went for a thorough spraying with a new bottle of Preen. True enough — runnels and streams of dirty liquid made their way to the concrete. It was too heavy and high to dunk in the trough, so I sprayed it with the fine nozzle from all sides and left it out to dry thoroughly. Even Maureen bestowed a few words of praise when she saw it at the May meeting. All the species benefited, not only the *Ixodia* and *P. globosa* but also the fern fronds, grasses, verticordias and Kangaroo Paws. The colours glow and sparkle again.

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**GRASSLAND EASEMENT SURVEY**

by Ros Cornish

**Williamsdale to Cooma - November 2000**

In early November 2000, John and I participated in a survey of the railway easement between Williamsdale and Cooma – a joint project between NSW National Parks and Wildlife Service (NPWS) and Friends of Grasslands (FOG). The aims of the survey were to:

- discover what grassland and grassy woodland sites may still exist along the easement
- identify threatened plant species and other species known to be uncommon and/or declining
- identify options for conservation of those sites
- add data to the NPWS Southern Directorate Grassy Ecosystems Database
- develop the plant identification and survey skills of FOG members
- analyse data and publish a report.

It is still early days but I thought the AD SG members would like to know about the survey and some of the preliminary findings. When the final report is available I hope to report again.

The survey took place over two Saturdays in November but we were only available for the first one. We met at the small township of Michelago, between Williamsdale and Cooma (about 55km south of Canberra), and were put into groups and briefed on what we had to do before having a practice on a designated piece of railway easement at Michelago. Each group had an experienced leader who was familiar with the local plants, a recorder and one or two "spotters" whose job it was to make sure that plants weren't overlooked. Thankfully, John and I were spotters. We are familiar with the native species but not the weeds so were happy to rely on our leader for identifying those. The recorder's job required concentration as we were using what is termed a "rapid assessment method" where all plants are recorded using the first four letters of the genus and the species name - for example, chry apic (*Chrysocephalum apiculatum*), ruti lept (*Rutidosia leptorhynchoides*). So, not only does the recorder need to know the names of the plants but also has to be able to spell them – the first four letters anyway. John and I spent a lot of time acting as go-betweens for our leader, Andrew, and the recorder, Ros (yes, another Ros – very confusing at some points during the day) as Andrew was charging ahead rattling off plant names while Ros got further behind as she tried to write legibly without tripping over. John and I became echoes – "lept squa, them aust, poa sieb, erod crin, etc".

The rapid assessment method (RAM) was developed by Rainer Rehwinkel from NSW National Parks and Wildlife Service. Quoting from our briefing material: "RAM involves a free transect through a site to cover each of the different micro-sites (hilltop, hill slope, aspect, soil type, watercourse, rocky outcrops) and to identify each plant. A frequency code is also recorded for each species." The form used is divided into sections so that exotics are listed separately from natives and herbaceous species are distinguished from woody species. So, the recorder has to have his/her wits about her. Rather than go into detail about the

method, I can provide contact details and a copy of a paper on the method if anyone wants it. Rainer (who was one of the group leaders in this survey) has surveyed about 700 sites in the south-east of NSW. Other professionals using the method bring the total of assessed sites to about 800 and this is proving a good database. Again quoting from our briefing material "The data held on the database enable the following to be extracted:"

- At how many sites is a particular species present?
- For a particular species, what is its geographical distribution or other site common features?
- When a species is recorded how abundant is it? Is it rare at some sites and abundant at others, or always rare?
- for any site what are the numbers and frequency of native species?
- for any site, what is the native/exotic mix? Are there particular weed problems?
- where are the sites and are they clustered?
- who manages the sites?
- what is the conservation action applied to or recommended for the site?
- at which sites is it likely to find particular fauna or flora species? Eg the database has been used to identify sites likely to have Golden Sun Moths and the Tarengo Leek Orchid. "

Getting back to our survey. The survey area was divided into sections about 1km long and we had to walk both sides of the railway line and record the plants in the width of the easement. A lot of preliminary work had been done by FOG and NSW NPWS in mapping and assigning the areas. This hard work was rewarded when a new population of the rare and endangered *Rutidosia leptorhynchoides* (Button Wrinklewort) was discovered close to Michelago. In fact, it was in our practice area so gave everyone an opportunity to familiarise themselves with it. I believe this is now the most southern population of the daisy known in NSW. Our group was lucky enough to find several more plants of it later in the day as one of our survey areas abutted the practice one. Unfortunately, the area surrounding the plants was heavily infested with weeds and the plants are in danger of being choked out.

We tackled 6 sites – that is, both sides of 3km of railway easement. We were lucky to have some areas within these that were rich in native species but overall the presence of weeds was depressing. Daisies that we saw flowering included *Leptorhynchos squamatus*, *L elongatus*, *Chrysocephalum apiculatum* (the small, silver-leafed form), *Vittadinia cuneata*, *V gracilis*, *V muelleri*, *Craspedia variabilis*, *Calotis lappulacea*, *Microseris lanceolata* and of course *R leptorhynchoides*. Some important non-daisy finds by others included *Swainsona sericea*, *S monticola*, *Lotus australis*, *Dodonaea procumbens*, *Diuris dendrobioides* and a *Prasophyllum* species (possibly a new species). Such finds kept spirits up amidst the dearth of weeds.

Our leader was rewarded for his patience with our group by seeing for the first time a plant which he had only read about. He was so excited that he flung himself to the ground, ripped off his lens cap and started taking photos while jabbering incoherently. We rushed over to him to see what the matter was and were relieved to find that he was not having a fit but was in raptures over a tiny plant called *Isoetopsis graminifolia* (Grass Cushion). There were quite a few of them which the rest of us had assumed was another grass, but in fact it is in the Asteraceae family. It is the only species in the world and is endemic to Australia where it is fairly widespread in NSW and is also in Queensland, Victoria, Tasmania, South Australia and Western Australia.

We were asked to record any birds and animals we saw within the sites and as luck would have it our leader, charging forth on a high from his earlier discovery, disturbed a large brown snake which was further startled by John and headed straight for me. I have this "thing" about snakes – I always seem to be in their way and they terrify me. I did my usual levitation trick as it slid underneath my feet and thankfully it was moving so fast I missed it when I returned to earth. The strange screaming noise that I heard at the same time that I levitated turned out to be me. The recorder gleefully added it to our form while glancing at me in a strange way. She obviously thought that she was close enough to me to be spoken to - not screamed at! Others in the survey found a new population of the Grassland Earless Dragon which caused some excitement.

## MEMBERS' REPORTS

**Matt Hurst** of Wagga Wagga, NSW wrote in March: 'Thank you for all that lovely seed. I am busy sowing it and shall pass on germination results as things appear. I am having slug problems and have to bait any punnet that has seedlings appear. I am testing to see if the potting mix I use is affecting germination of some species – so half the seed is sown on my usual mix and the rest on Yates seedling mix. All seed is covered lightly with vermiculite.

Results so far are:-

<i>Bracteantha bracteata</i> (Sandy Beach)	sown 17/02/01	germinated 23/02/01	good
<i>Brachyscome aculeata</i> (JI ex ACT, 8/98, 4°C)	25/02/01	1/03/01	good
<i>Brachyscome dentata</i> (96)	25/02/01	2/03/01	few
<i>Brachyscome dissectifolia</i> (4°C)	25/02/01	2/03/01	excellent
<i>Brachyscome melanocarpa</i> (MH, RT 3 months)	17/02/01	23/02/01	moderate
<i>Brachyscome nodosa</i> (St. G, 12/97, 4°C)	25/02/01	3/03/01	few
<i>Brachyscome readeri</i> (4/91, 4°C)	25/02/01	3/03/01	few
<i>Brachyscome rigidula</i> (96/97)	25/02/01	5/03/01	few
<i>Brachyscome stuartii</i> complex (Emmaville, 11/95)	25/02/01	2/03/01	100%
<i>Brachyscome</i> sp. Darling Downs (KS, 12/98, 4°C)	25/02/01	2/03/01	few
<i>Brachyscome tenuiscapa</i> var. <i>pubescens</i>	25/02/01	6/03/01	few
<i>Calocephalus citreus</i> (CJ, 95/96)	17/02/01	21/03/01	few
<i>Calocephalus sonderi</i> (Jerilderie, 3/93)	17/02/01	3/03/01	few
<i>Chrysocephalum baxteri</i> (JB, 11/99, 4°C)	17/02/91	3/03/01	fair
	25/02/01	18/03/01	starting
<i>Leucochrysum albicans</i> ssp. <i>albicans</i> SISP pre-treatment	25/02/01	3/03/01	good
<i>Microseris lanceolata</i> (Berry Jerry, 11/00)	25/02/01	4/03/01	1, then
		many on 20/03/01	after a storm.
<i>Minuria leptophylla</i> (Ganmain)	25/02/01	8/03/01	1
<i>Podolepis jaceoides</i> (Mates Gully)	25/02/01		none
<i>Senecio amygdalifolius</i> (KS, 11/99, RT)	17/02/01	25/02/01	2
<i>Rhodanthe charsleyae</i> (KS, 10/99, RT) SISP pre-treatment	25/02/01	1/03/01	few
<i>Rhodanthe citrina</i> (Bush Bay, JH 8/97) SISP pre-treatment	25/02/01	1/03/01	few
<i>Rhodanthe chlorocephala</i> ssp. <i>splendida</i> (WP019, 10/96, RT)	25/02/01	1/03/01	starting
<i>Rhodanthe corymbiflora</i> (JB, 11/99) SISP pre-treatment	25/02/01	1/03/01	few
<i>Rhodanthe humboldtiana</i> (MH, ex WP025)	25/02/01	1/03/01	excellent

I have a lot of *R. chlorocephala* ssp. ? and *R. humboldtiana* germinating in the garden after a storm on the 16/3. I think that the slightly cooler weather triggered germination, even though earlier storms had more rain in them. It is a shame that the frosts will take them before they flower.'

**Corinne Hampel** of Murray Bridge, SA reported on 26<sup>th</sup> March: 'After Christmas I got to the long promised mound which is a mix of subsoil, limestone rubble, clay loam, and mallee sand. Pretty awful except for the fact that it is well drained and with the clay holds moisture quite well. I planted, with my fingers crossed, between Christmas and New Year. As it turned out this was the beginning of a heat wave and we had many days of heat about 38°C.

I was delighted that I had no losses. I watered with drippers, about 4 litres at a time, every second day for a week, then gradually spread out the time to weekly, and now at the end of March, to fortnightly as the cooler weather has arrived. Things are very dry here and we have had little useful rain since the end of October. I am particularly delighted with *Brachyscome multifida*, a light mauve one from the Dandenongs. It is a tightly formed mound, flowers continuously in full sun and doesn't straggle like *Brachyscome* "Breakoday". I would be interested to know if this is the experience of other members.

I love *Bracteantha bracteata* "Sandy Beach". In pots, where it is in dappled shade, the plants became lanky. The plant on the mound, in full sun and in the heat, retained a mound shape and is quite compact. The flower colour against its particular shade of green leaves is pretty. I agree that it does not appear to set much seed. I have begun collecting some and have just put in some cuttings.

Other plants on the mound are *Pycnosorus globosus*, *Ammobium alatum* "Bikini", *Podolepis rugata*, *P. jaceoides*, *B. multifida* "Amethyst", *Rhodanthe anthemoides*, a form of *Chrysocephalum semipapposum*, *Calocephalus citreus*, *Bracteantha bracteata* "Pink surprise", *Leucochrysum albicans* ssp. *albicans* var. *albicans*, *Poa sieberiana*, and *Scaevola aemula*.

**Ray Purches** of Wangaratta, Vic writes on 5<sup>th</sup> April: 'I am trying to re-establish my love affair with *Olearia frostii* here at Wangaratta. I love that velvety compact grey-green look in the bush at Falls Creek and Mt Hotham and usually return with a few sprigs which strike fairly readily. My first plant took off. It was fantastic for four years with masses of large mauve-pink flowers each spring. It bounced back after a heavy prune each year, grew in gravel in full sun but then died. Since then I have been producing replacements and putting them in the perfect spot(s). It is fair to say that I am fast running out of perfect spots (and live plants). Surely it is one of nature's jokes that this daisy strikes so readily. Maybe beginner's luck is real.'

**Sylvia Oats** from Elizabeth East, SA reported in April: 'With great excitement and anticipation I prepared my pots and punnets tubs and trays, trying to make up for not doing any propagation last year. I went a little mad and planted all the daisy seed we had accumulated over the past few years. I had 26 different types of seed and I am pleased to say that 18 of them came up. The most surprising one was from Judy's garden seed, 1993. Not expecting much to happen, I put 12 pkts of seed into two trays but I had *Podolepis lessonii* 84 seedlings potted on, *Rhodanthe chlorocephala* ssp. *splendida* 26 seedlings potted on and from *Podolepis rugata* 1995 35 seedlings were potted up.

*Rhodanthe chlorocephala* from our own garden 2000 did extremely well (100% germination) and *Schoenia fillifolia* had that kind of germination too. *Schoenia* "Gabriele" and *Brachyscome iberidifolia* germinated well. I have over 300 seedlings of *B. iberidifolia* and still more to pot on.

*Rhodanthe anthemoides* (unbranched form) also germinated well (about 600 seedlings), but these plants only seem to last a season with our dreadful hot winds. *Pycnosorus globosus* yielded 60 potted seedlings, so the snails and slugs will be sure of a good feed.

I was very pleased to get *Ozothamnus diosmifolius* through (only a dozen or so). The shrub that the seed came from was a lovely pink form. It was growing so well and suddenly upped and died. *Waitzia suaveolens* has done very well too. I didn't expect them to come up and sowed them rather thickly, now I have to prick them out otherwise they will be too cramped. *Bracteantha bracteata* is wall to wall, thousands of them, so I am going to be very busy for a while.

Syd was very disappointed some *Rhodanthe polygalifolia* that he had 'suntanned' in 1999 and had successful germination from did not germinate this year at all, so I planted some that had spent the time in a paper bag in a locker with no pre-treatment, and was lucky enough to get 45 seedlings.

*Leucochrysum albicans* ssp. *albicans* var. *albicans* has come up but the seedlings are not as healthy in the garden as they were in Beaufort. I suppose it is this hot dry state. The last species is *Brachyscome* aff. *curvicarpa*. I have quite a few seedlings but they are very slow. That plant flourished throughout our hot summer, and is still flowering now. I seeds itself very well, so it is just as well some seeds never come up because we will never finish potting them up.

**APS- Bairnsdale Group** corresponded (per secretary Jean Merson) on the 3<sup>rd</sup> May: 'We purchased 16 packets of different daisy seed and I proceeded to divide each packet into 3 making 48 packets in all. Then 17 members took between 1 & 4 packets each to see if they could grow them on. They were handed out in October for results in March. We are now aware that our timing was out. Various potting mixes were used although sandy type mixes seemed to do best.

Six were non-productive (11 members were involved). They were *Bracteantha viscosa*, *Calocephalus lacteus*, *Chrysocephalum semipapposum*, *Ozothamnus scutellifolius*, *Podolepis neglecta*, and *Rhodanthe anthemoides* (branched). Three were very good (7 members) They were *Brachyscome melanocarpa*, *B. spathulata* and *Chrysocephalum apiculatum*. Seven were low to fair (16 members), these being *Chrysocephalum baxteri*, *Helichrysum elatum*, *Helichrysum scorpioides*, *Leptorhynchus squamatus*, *Leucophyta brownii*, *Podolepis jaceoides* and *Rhodanthe anthemoides* (unbranched). Some of these plants were sold at our auction in April while others will be sold at future meetings; funds going to the club. As a club we have stirred up a lot of interest in growing of plants from seed.'



**Jean** adds: 'Pushed on by this project I went through some old seed and found that I had 4 packets of daisy seed over 10 years old. I planted them in March. The two paper packets gave no germination at all, but the other two were sealed in foil and the results were great. Thompson and Morgan "Mixed Helichrysum" good till March 1991 gave about 50 plants, and West Australian Seeds "Helipterum roseum" which could have been up to 7 years older than the other packet, gave 24 plants in 7 days.'

**John and Julie Barrie** of Coonalpyn, SA, e-mailed their "daisy-patch report" on 11<sup>th</sup> May: '*Brachyscome* sp. from south of Tintinara growing on heavy dark swampy ground amongst *Gahnia*. Pink- purple flower-heads on slender stems with a basal rosette of leaves, possibly with affinities to *B. parvula*. Hope to be able to collect seed from two cutting struck plants soon. *Ozothamnus diosmifolius* occasionally come up as ferals in other pots, but this autumn we planted seed (scattered loosely over seed-raising mix in cell trays) in the same environment as the ferals appeared. We understood the viability of this species was low! Well. We have approx. 250 seedlings per 35mm square cell and 270 cells!!! Do your maths! As for field work, a good number of daisies were seen while chasing phebaliums. Of note, *Bracteantha adenophorum* ssp. *adenophorum* and *Argentopallium blandowskianum* in profusion following the Jan. 99 bushfire at Ngarkat CP.'

**Maureen Schaumann** of Mulgrave, Vic. has sent her germination results as follows:-

	sown	germinated	
<i>Angianthus</i> sp (Kimba Rubbish Dump)	9/03/01	14/03/01	good
<i>Ammobium craspedioides</i> (Mulgrave garden)	19/02/01	25/03/01	good
<i>Brachyscome</i> aff. <i>curvicarpa</i> (KS 4°C)	21/01/01	26/01/01	good
<i>Brachyscome ptychocarpa</i> (Mt Mittamatite PS 4151)	28/03/01	9/04/01	17
<i>Brachyscome procumbens</i> ('91)	28/03/01	9/04/01	7
<i>Brachyscome parvula</i> (Crayfish Bay 11/93)	28/03/01	9/04/01	15
<i>Brachyscome parvula</i> (Schnapper Point 1/94)	28/03/01	5/04/01	11
<i>Brachyscome</i> sp. (Darling Downs, PS)	28/03/01	13/04/01	dampened off
<i>Brachyscome</i> sp. (Darling Downs, Apr/May '95)	28/03/01	13/04/01	20
<i>Bracteantha viscosa</i>	21/01/01	02/01	many
<i>Bracteantha bracteata</i> (dwarf mixed)	23/03/01	31/03/01	many
<i>Calocephalus sonderi</i> ('92)	21/01/01	25/01/01	excellent
<i>Calocephalus citreus</i> (Grampians)	9/03/01	21/03/01	poor
<i>Leptorhynchus elongatus</i> (2/11/00)	28/03/01	9/04/01	4
<i>Leptorhynchus baileyi</i> (ES)	18/04/01	8/05/01	6+
<i>Microseris lanceolata</i> (Woodend)	1/03/01	16/03/01	good
<i>Microseris lanceolata</i> (Collingullie, NSW)	19/02/01	03/01	good
<i>Minuria cunninghamii</i>	28/03/01	4/04/01	good
<i>Olearia floribunda</i> (Temora)	19/02/01	12/03/01	12
<i>Ozothamnus diotophyllus</i>	28/03/01	9/04/01	good
<i>Podolepis jaceioides</i> (11/99)	28/03/01	20/04/01	good
<i>Podolepis jaceioides</i> (Trawola SF)	28/03/01	13/04/01	good
<i>Pycnosorus globosus</i> (Orange, NSW garden)	24/04/01	4/05/01	5+

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## SNIPPETS

- We are very fortunate to have talented botanical artists in our midst. John Armstrong has achieved international recognition by being invited to hang his work at the prestigious Hunt Foundation in Pittsburgh, Pennsylvania, USA. Congratulations John!
- Pam and David Shiells Wakiti Nurseries (formerly in Shepparton, Vic) has been relocated to Violet Town. The postal address is RMB 2000 Violet town 3669, and the phone no. 03 5798 1788.
- John Clark of Lover's Leap Nursery says a multitude of *Bracteantha bracteata* plants have self-sown in his nursery in all sizes and colours. He loves them for their perfume and the great show they make. He and his wife noticed that one white headed plant produced some heads with green disc centres as well as the yellow ones we are all used to seeing. They have taken cuttings from the flowering stems and will let us know what transpires.

- We celebrated in style at the May Meeting. It was the 20<sup>th</sup> anniversary of the formation of the group!!
- The National Institute of Agricultural Botany (NIAB) in Cambridge, England has requested seed of *Chrysocephalum apiculatum* from us. They have been unable to source it from anywhere in the UK and Roger Holland, Ornamental Plants Specialist, is delighted to receive it. We will let you know of any further developments.
- We have submitted material to Brian Walters for inclusion on the APS website as a webpage for the Australian Daisy Study Group. You will find it at <http://farrer.csu.edu.au/ASGAP/> in due course.

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## NEW MEMBERS

Welcome and happy daisy growing to the following new members:-

Paul Brennan: PO Box 144 Lennox Head, NSW 2478

Sarah Peel: C/- Yates Botanicals, PO Box 3198 Tuggerah, NSW 2259

## SUBSCRIPTIONS

Subscriptions for the coming financial year are \$10.00 per person for members within Australia and \$20.00 per year for overseas members. Cheques should be made payable to the 'Australian Daisy Study Group', and forwarded to Bev Courtney or Joy Greig (addresses on P1.) **FEES WERE DUE ON 30<sup>TH</sup> JUNE 2001.**

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## SEED DONORS

Thank you to the following members and friends who donated seed: Judy Barker, Matt Hurst, Christina Leiblich, Natalie Peate, Esmá Salkin, Maureen Schaumann, Mary Smith (Wongan Hills, WA). Special thanks to Ros Cornish who responded to the cry for more seed of *Calocephalus citreus*. Seed of *Schoenia cassiniana* has been purchased from Nindethana. ***Brachyscome multifida*, *Bracteantha subundulata*, and *Erodiophyllum elderi*** are still required.

## SEED LIST AMENDMENTS

### **Garden and Commercial Seed Bank**

#### **Additions**

*Calocephalus citreus*

*Leucochrysum albicans* ssp. *albicans* (11/00)

*Olearia astroloba*

*Ozothamnus diosmifolius* (11/00)

*Rhodanthe humboldtiana* (11/00)

*Schoenia cassiniana* (Nindethana)

#### **Deletions**

*Brachyscome tenuiscapa* var. *pubescens*

### **Provenance Seed Bank**

#### **Additions**

*Bracteantha viscosa* (Willans Hill Reserve, Wagga, 11/00; Pomigalana Reserve, Wagga, 11/00)

*Leucochrysum albicans* ssp. *albicans* var. *tricolor* (Blue Waterholes NSW, 1/00)

*Microseris lanceolata* (Collingullie NSW, 10/00),

*Minuria* sp. ? *leptophylla* (Ganmain NSW, 11/00)

*Olearia floribunda* (Temora NSW, 11/00)

*Rhodanthe polygalifolia* (Kimba SA, 9/00)

*Vittadinia gracilis* (WA); sp. (Coolamon NSW, 11/00)

#### **Deletions**

*Brachyscome cardiocarpa*-6/96; *xanthocarpa* – Streaky Bay 10/95

*Leptorhynchus baileyi*- Qld.

*Minuria cunninghamii*- WA, 7/97

*Olearia asterotricha*- Vic 95