



BULLETIN

OF THE

WESTERN AUSTRALIAN NATIVE ORCHID
STUDY AND CONSERVATION GROUP
(INC)

June 1998

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VICE PRESIDENT	Ian Greeve	
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COMMITTEE	Don Manners	
	Joan Greeve	
	Joani Eaton	
	John Eaton	
FIELD TRIP COORDINATOR	Stuart Harris	
LIBRARIAN	Bill Burton	
EDITOR	Noel Clarke	
AUDITOR	Ross Wilton	

OBJECTIVES OF THE GROUP

- a) To promote interest in and preserve Western Australian indigenous orchids.
- b) To learn the best means of cultivation and do all things possible for the conservation of native orchids in their environment.
- c) To learn their habitats and keep records.
- d) To have field days and learn to recognise the different genera and species.
- e) To hold meetings for the exchange of knowledge and furthering of interest in Western Australian orchids.
- f) To affiliate with kindred organisations.
- g) To make rules of the Group's domestic affairs.
- h) To do all such other lawful things as are incidental to or conducive to the attainment of the above objectives.

Note: The opinions expressed by contributors to this Bulletin are not specifically endorsed by this group.

POSTAL ADDRESS OF GROUP: PO Box 323
Vic Park 6979

NEXT COMMITTEE MEETING

Wednesday, 17 June 98 at 7.00 p.m.

NEXT GENERAL MEETING

Wednesday, 17 June 98 at 8.00 p.m.

MEETING VENUE CHANGE

Please note that the May and June meetings will be held at the Laboratory, Kings Park, near the glass houses.

GUEST SPEAKER

Kingsley Dixon "Botanic Garden Display".

ANNUAL GROUP MEMBERSHIP FEES

The Groups financial year commences on 1 February, so all membership fees are now due.

The Group membership fees are as follows:

Single Membership \$20.00 pa.

Family Membership \$20.00 pa.

The digit after your name on the address label is the year for which you are financial and is updated to the last meeting. If you have paid since then please make the allowance.

RED DOT ON YOUR BULLETIN

Do you have a red dot on your Bulletin? This means you are now an unfinancial member and as such you cannot vote at meetings.

FORTHCOMING MEETINGS

June 17	General Meeting
July 15	General Meeting
August 19	General Meeting
September 16	General Meeting
October 21	General Meeting
November 18	General Meeting

BULLETIN CONTRIBUTIONS

Contributions are needed for every edition of the Bulletin. Articles should be sent to Noel Clarke. The article submission deadline for the next issue is 1 July 1998.

SUPPER COST

Each month our supper is generously donated by group members (per list on the back of the Bulletin), while the group supplies the tea, coffee, sugar and milk. To recoup some of the cost of these supplies, a modest fee of 50 cents applies. This can be left on the supper table and will be collected by the Treasurer at the end of the evening.

Also please rinse out your cups when you have finished with them.

NAME BADGES

Group name badges can be ordered from the Treasurer. The cost is \$8.50 each.

PRIVATE FIELD TRIPS by Noel Clarke

I propose to visit the Esperance region twice this year to locate orchids I haven't photographed yet. Anyone wanting to accompany me will be welcome. The trips are programmed for 20th Aug & 18th Sep and will be for about 5 days each.

THE BIBBULMUN TRACK and ORCHIDS by Bill Jackson 24 May.

Most members will be aware that a long distance walk track is being constructed between Kalamunda and Albany, to be completed in August 1998. The track is primarily promoted and viewed as a means for walkers to enjoy an experience by walking through our conservation estate.

For the orchid enthusiast the track has another important use. It provides access, not previously available, to locations of interest. A slight drawback – you have to walk!

In our South Coast area this access opens up a variety of orchid habitats, flats, coastal areas and rocks.

We persuaded the Greeve and French families to accompany us on the first use of a part of the still to be opened section of the Bibbulmun Track, which led to a granite outcrop. Only 3km according to the unofficial line drawn on my map - easy 40-minute walk I assured the group. After an hour of walking the group stopped! While they had afternoon tea, Chris and myself walked for a further 20 minutes. Still no rock! Reluctantly we started back on the approx. 6km walk back to the vehicles. So much for unofficial lines on maps!

Having studied the map more closely and taken advice from 'others', Gloria and self tried again from the other end of the track. Success this time! Magnificent views from the top of the granite, with an abundance of *Eriochilus pulchellus*, and evidence of other species to come later in the year.

An overnight shelter is situated at the base of the rock, also a toilet and rainwater tank. A location well worth the 6km walk each way.

This is only one of several rocks now accessible via the Bibbulmun Track.

Currently (late April) flowering round Walpole – *Praecoxanthus aphyllus*; *Leporella fimbriata*; *Prasophyllum* aff *parvifolium*; *Eriochilus dilatatus* ssp *dilatatus*, *magnus* and *multiflorus*; *Pterostylis vittata*; *Pt* aff *nana* rosettes.

WANOSCG GENERAL MEETING 20 MAY 1998

Meeting commenced at 8.00 pm.

ATTENDANCE

30 members and 2 visitors as per register.

NEW MEMBERS

Ms Margaret Cashman Bailes.

Visitors Bernadette Smith & Roger Bussell were welcomed.

Chairman Noel Clarke instructed that unfinancial members are not allowed to vote.

MINUTES

It was moved John Eaton/Gary Brockman that the minutes of the General Meeting of 15th April be accepted. Carried.

BUSINESS ARISING

Bill Jackson has volunteered to go through the slides donated by Sid Gibbings.

CORRESPONDENCE

As per correspondence list.

TREASURER'S REPORT

Treasurer's Report circulated. No queries raised.

FIELD TRIPS

1. Noel Clarke visited Corrigin area 6 May for *Genoplesium nigricans*, but they were mostly finished.
2. Andrew Brown will be visiting Corrigin area Saturday 30 May for underground orchid. Meet at 11 am, 10km west of Corrigin.
3. June 7 to Watheroo as in Bulletin. Schedule will be tight.
4. Eva & Don Smith reported visit to Walpole, *Leporella fimbriata*, *Pt. Vittata*, *Eriochilus dilatatus* and *pulchellus* as well as leaves and buds of other types.

PLANT TABLE

S. Harris – *C. drummondii*

W. Burton – *Pt. Nana* (hairy stemmed), *Pt. rogersii*, *sanguinea* & *aspera*, and *Eriochilus pulchellus*.

GENERAL BUSINESS

1. Meeting was invited to see Treasurer if new or for renewed name badge.
2. Club has purchased computer for use by Secretary.
3. Eddy Wajon brought to notice two notices of intention to clear land at Jurien Bay (6 ha) and Lancelin (900 ha), and requested Club to obtain documents to ascertain if Club wishes to make representation. Secretary to attend.
4. The advertised speaker was unable to attend but Mike Lloyd from Kings Park gave an informative talk on smoke stimulated germination. He was presented with a Club badge in appreciation.

Two raffle prizes were provided by Kate Ward and were won by Joan Greeve and Don Manners.

The supper was provided by Donna Wajon.

The meeting closed at 9.15 pm.

FIELD TRIP REPORT – 30 May 1998

It is a good feeling to arrive for a field trip and know you are 'wanted'. Being the last to arrive. One automatically inherits 'the mantle of greatness' and is smilingly told that 'it's your job to write up the report for the Newsletter'.

In this instance this proved to be a pleasant task, for how often does one get to report on a trip arranged to look for the rare underground orchid, *Rhizanthella gardneri*, and better still to report on a very successful outing.

Although arranged at short notice, approximately 25 members and visitors journeyed to a site near Corrigin where Andrew Brown has been monitoring *R. gardneri* for over ten years. Following a briefing by Andrew on the habitat and flowering characteristics of the plant, it was a case of 'lets go and see what we can find'. After a short period on site, Tony Lock uttered the words, 'I have found one', and was soon surrounded by a number of interested onlookers. Close inspection revealed another two plants nearby. The flower heads were very carefully exposed and the bracts opened up, as if one was looking at time lapse photography, to reveal the full glory of the flower. Another two plants were found and many photographs taken to record the finds, before the flowers were covered for protection.

The group then journeyed to a site near Babakin to have lunch and further exploration. It was not long before *Caladenia drummondii* was found; other finds included *Pterostylis scabra*, not quite in flower, and *Eriochilus* in seed. It was then time for the serious business of scratching to find *R. gardneri*. Stuart Harris was successful and photographs were again the order of the day, before the flowers were covered.

No further orchids were found and members left to return home following experiences that none would ever forget.

Thankyou Andrew for sharing your time and knowledge with us; you will certainly not lack volunteers when next arranging visits to look for *R. gardneri*.

Ross Wilton.

SEEDER/CLONAL CONCEPTS IN WESTERN AUSTRALIAN ORCHIDS (CONTINUED)

Mycorrhizal Specificity

There is evidence showing that fungal types specifically associate with genera of Western Australian orchids (Ramsay *et al.* 1986, 1987). For example in sterile culture on potato dextrose agar all *Caladenia* species examined use a mucoid, slow growing, cream coloured fungus whereas *Pterostylis* species require a fast growing fluffy, white endophyte for in vitro seed germination and seedling growth.




Mycorrhizal infection patterns in the whole plant (i.e. root, collar, stem, rhizome, etc) may be associated with particular fungal types (Fig. 4). Using hyphal anastomosis an analysis of fungal types associated with the genus *Pterostylis* show that distribution of fungal types may be linked to particular habitat types (Fig. 5) (Ramsay *et al.* 1987). For example anastomosis group (AG) 8 is only recorded for hot, arid habitats, AG3 semi-arid sites (e.g. exposed rock habitats) and AG4 is only associated with *Pterostylis* which grow in introduced pine plantations (Fig. 5). Conversely, vicarious fungal groups such as AG2 isolates associate with

Pterostylis species across a range of habitats. Sympatric species of *Pterostylis* have also been found to use different AG's. For closely cohabiting orchid species the use of different endophytes may minimise competition for the same nutrient resource. There is also an indication (K. Dixon, unpublished) that seedlings may use different AG's to the parent plant and thus provide a potential means to minimise seedling-parent plant competition for nutrients. The abundance and vitality of the endophyte in the adult plant may also directly influence the vigour and survival of the parent plant. Death of adult orchid plants may be connected to decline or death of the endophyte. Tuber based storage for many terrestrial orchids would be sufficient to sustain

plant growth for at least 2-1 growing seasons in the absence of new nutrient uptake. Thus by resorting to stored nutrients adult terrestrial orchids may bridge environmental periods unfavourable to endophyte activity.

In addition to fungal endophytes it has now also been demonstrated that endophytic bacteria resembling

fluorescent *Pseudomonads* are associated with adult orchid plants. These bacteria have been shown in laboratory trials to enhance orchid seed germination and growth (Wilkinson *et al.* 1989). The specificity and role that these bacteria play in orchid growth and development in natural habitat is not clear.

Type	Location	Number of isolates	Culture	Response ²	Group ³	
	collar	3	81	good	good	3
	stem (vertical)	2	17	good	good	1
	roots	11	52	difficult	poor	1,3,4,5,8
	stem / rhizome (horizontal)	2	2	moderate	slow	1,4
	collar / root	3	10	good	good	1,2

¹ Numbers for genera and species do not represent all taxa of Western Australian orchids

² Symbiotic germination on oatmeal based media

³ Based on fungal cultural/hyphal characteristics groups of Ramsay *et al.* 1986

Fig. 4. Endophyte type, ease of isolation, symbiotic efficacy and infection type and location in plant (arrows) for a selection of south west Western Australian terrestrial orchids.

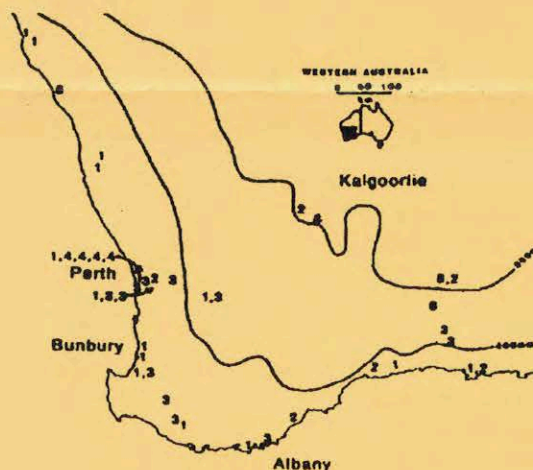


Fig. 5. Distribution of anastomosis groups in *Pterostylis* species from the south west of Western Australia (Ramsay *et al.* 1987).

Niche Exploitation and Vegetative Reproduction

Once site selection has occurred then it is implied that near to the parent plant conditions, including fungal component, are suitable and capable of sustaining orchid growth. Thus terrestrial orchids once established at a new site may begin exploitation of that niche. By repeated seasonal cycles of symbiotic growth terrestrial orchids may be able to increase symbiont presence and abundance in the soil over other soil fungi and hence the mycorrhizal inoculum potential of the site. The role of this localised increase in the inoculum potential has on the ability of the orchid to exploit a niche for increasing its population size is unknown. Many terrestrial species have the potential to promote seedling development around the parent plant and thus increase the ability of the species to exploit microsites. This method of 'self-seeding' has been used for many years as a non-laboratory means for seed propagation of terrestrial and epiphytic species. Recent studies (K. Dixon, unpublished) has shown that it is the presence of suitable fungal inoculum rather than a living parent orchid plant that is the key to success of self-seeding. In the natural habitat *Caladenia* and non-clonal *Pterostylis* will cluster various aged seedlings around the parent plant. In *P. vittata*, seedlings remain juvenile around a flowering parent plant for many years or may die without flowering. This suggests that there may be direct competition effects or some other method of control of the development of offspring by the parent plant.

Seeder/Clonal Habits in

Western Australian Orchids

Seventy eight species of Western Australian terrestrial orchids are 'seeder species' relying exclusively on seed for reproduction (Table 2). Of these, 17 species have enhanced production of seedlings around the parent

plant. Sixty four species have both clonal and seeder capacity, producing vegetatively derived plants

either adjacent (proximal) to or at some distance (distal) from the parent plant.

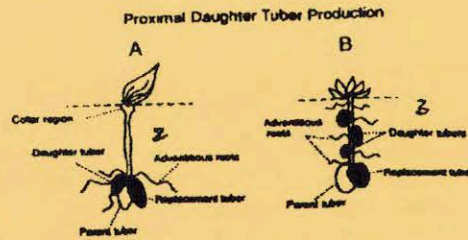


Fig. 6. Proximal daughter tuber production for a typical *Caladenia* (A) and *Pterostylis* (B) species.

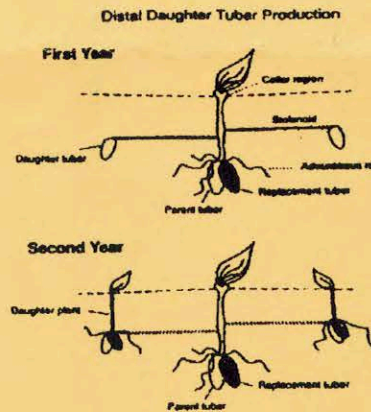


Fig. 7. Distal daughter tuber production in the first and second year showing the placement of daughter tubers at the end of horizontal stolonoids at distance from the parent plant.

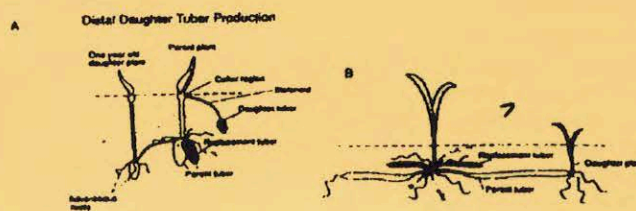


Fig. 8. Two methods of daughter tuber production in (A) *Caladenia menziesii* where stolonoids can be produced from the collar region or from the base of the shoot (dotted), and (B) *Dieris longifolia* where the daughter plants are produced at the distal end of parent tubers.

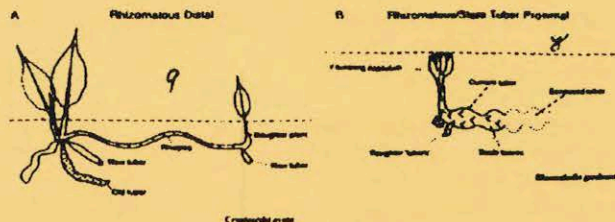


Fig. 9. Production of daughter plants at the end of non-storage rhizome extensions in (A) *Cryptostylis ovata* and proximal production of daughter plants on shortened rhizome/stem tuber extensions in (B), *Rhizanthella gardneri*.

Proximal clonal reproduction occurs when supplementary (daughter) new tubers are formed adjacent to the parent plant and in addition to the replacement tuber (Fig. 6A). All orchid species have the morphological capacity to develop proximal daughter tubers but only 19 species do so regularly under natural conditions. Removal of the replacement tuber is common horticultural practise used to encourage the development of one or more daughter tubers. A second method of proximal daughter production involves the development of 'adventitious' daughter tubers along the underground stem of some *Pterostylis* species (Fig. 6B). Both methods of proximal vegetative reproduction result in intense clustering of daughter plants around the parent plant.

Distal daughter tuber production occurs when daughter tubers (rarely replacement tubers) are produced on more or less horizontal stolonoids (outgrowths of an auxiliary underground bud) or root tubers (2-10) 25 cm from the parent plant (Fig. 7). Stolonoids are produced either along the underground stem or leaf-tuber connection, from the base of the leaf (for collar infected *Caladenia* species) or from the point of attachment of the parent tuber to the shoot (Fig. 8A). Daughter plants can also be produced distally at the end of the specialised root tubers formed in *Diuris longifolia*, *D. corymbosa* and several undescribed taxa allied to *D. longifolia* (Fig. 8B). Depending on the species these methods of distal tuber production result in between 1-3(5) daughter plants per year with each daughter plant positioned around the parent plant. The number of daughter tubers produced is often a function of the favourableness of the growing season and whether the habitat was burnt the previous summer. Stem (rhizome) or swollen stem (stem tuber) extensions have also been used as a means for reproduction of daughter tubers. Distal rhizome extensions are known for *Cryptostylis ovata* and *Nervilla holochila* (Fig. 9A). The number of rhizome extensions produced annually varies from one up to four per parent plant and extension lengths vary from less than one centimetre to more than 20 cm. Proximal rhizome extenuation occurs in *Gastrodia sesamoides* and the Western Australian underground orchid, *Rhizanthella gardneri* (Fig. 9B). As a result, clusters of 1-3 daughter plants are produced annually around the parent plant. For *Rhizanthella gardneri* the parent rhizome extends in a sympodial-like fashion each year. Daughter tubers are produced only after flowering and follow senescence of the parent plant.

Table 2. Known reproductive modes for Western Australian terrestrial orchids. Number of species in brackets. Some species may operate in more than one category.

Seed Only	Clonal	
	Proximal	Distal
<i>Caladenia</i> (32)	<i>Caladenia</i> (10)	<i>Caladenia</i> (4) <i>Acianthus</i> (2)
<i>Calochilus</i> (2)	<i>Calochilus</i> (1)	<i>Corybas</i> (3) <i>Cryptostylis</i> (1) <i>Diuris</i> (1)
<i>Diuris</i> (1)	<i>Cryptostylis</i> (1)	
<i>Drakea</i> (4)	<i>Diuris</i> (5)	
<i>Elythranthera</i> (1)	<i>Elythranthera</i> (1)	<i>Epiblema</i> (1)
<i>Eriochilus</i> (2)		
<i>Habania</i> (2)		<i>Leporella</i> (1) <i>Lyperanthus</i> (3) <i>Microtis</i> (5)
<i>Microtis</i> (3)		
<i>Paracaleana</i> (2)		<i>Nervilla</i> (1) <i>Prasophyllum</i> (10) <i>Pterostylis</i> (4) <i>Rhizanthella</i> (1) <i>Spiculaea</i> (1) <i>Thelymitra</i> (7)
<i>Prasophyllum</i> (6)		
<i>Pterostylis</i> (12)	<i>Pterostylis</i> (1)	
<i>Thelymitra</i> (11)		
78 spp	19 spp	45 spp

Conclusion

Western Australian orchids have developed many methods for establishment and exploitation of niches in the natural habitat. These methods plus derivation of characters which provide tolerance to summer drought have promoted speciation and enabled the Orchidaceae to penetrate habitats at the ecological limit of herbaceous plant growth in Western Australia. Successful habitat penetration by Western Australian orchids has no doubt been facilitated by the retention of microsporous seed habit (except *Rhizanthella gardneri* which has fleshy seed 'capsules' and large seeds with distinctive spiral thickenings). However rarely do orchids recruit seedlings representing more than a fraction of a percent of the 3-5,000 seeds produced per capsule per annum. Whether this low rate of natural seedling recruitment is a reflection of inappropriate symbiont, competition with non-orchid species or simply that only 'fit' genotypes survive the rigours of establishment in the natural habitat are areas for future research.

	SUPPER ROSTER	RAFFLE ROSTER
MAY		
JUNE	Nancy Clarke	G & V Brockman
JULY	Del Haywood	Noel Clarke
AUGUST		Ross Fox
SEPTEMBER		Don Manners
OCTOBER		Bill Jackson
NOVEMBER		Ross & Eva Smith

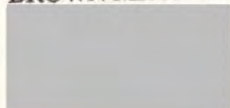
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FORTHCOMING FIELD TRIPS