The Victorian Naturalist

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COMPILED BY K. N. BELL

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FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9th February, 8.00 p.m.
Mr. Max Dean. "Aboriginal Rock Paintings."

Monday, 16th March, 8.00 p.m.
Mr. Max Campbell. "Venomous Animals in Australia."

Monday, 13th April, 8.00 p.m.
Prof. Roger Short. "Chimps and Gorillas in the Wild."

New Members

Metropolitan:

Ms. Wendy Bicknell, 51 Erskine Street, Middle Park, 3206.

Mr. Bohdan Durnota, 363 Mascoma Street, Strathmore Heights, 3041.

FNCV EXCURSIONS

Saturday, 7th-Monday, 9th March. Victorian Field Naturalists Clubs Association combined weekend will be held at Inverloch this year and leaders will include Mr. and Mrs. Brewster and Mr. and Mrs. Love (Geology). There will be an excursion Saturday afternoon and an evening meeting. On Sunday there will be a full day outing with an evening get-together and Monday, a morning excursion before departing for home after lunch. A coach has been chartered for the weekend which will leave Flinders Street outside Gas and Fuel Building at 8.45 a.m. Bring a picnic lunch. Cost for accommodation R.O. and coach for the three days approximately $95. Exact cost may vary according to numbers. Please book with excursion secretary as soon as possible sending a $25 deposit. The Saturday afternoon excursion will leave from the Inverloch Motel, Bass Highway at 1 p.m.

Sunday, 5th April, Yarra Glen. Fossils. Leader: Mr. Graeme Love. Bus leaves Batman Avenue at 9.30 a.m., fare $12. Bring a picnic lunch.

Sunday, 3rd May. Lysterfield Park. Details in next Naturalist.

GROUP MEETINGS

All FNCV members and visitors are invited to attend any Group Meetings.

Day Group – Third Thursday

Thursday, 19th February. St. James Old Cathedral, Flagstaff Gardens and Meat Market Craft Centre. Meet at Flagstaff Garden Station Exit at 11.30 a.m. Leader: Dan McInnes 211 2427.

Thursday, 19th March. Ferntree Gully National Park. Train leaves Flinders Street Station at 10.20 a.m. Leader: Marg. Wilson 836 3521.

Wednesday, 15th April (note change of day). Planetarium. Museum of Victoria. Meet at Swanston Street entrance at 11.30 a.m. Session begins at 2.00 p.m. Leader: Andy Blackburn 379 8960.

At the National Herbarium, Birdwood Avenue, South Yarra at 8.00 p.m.

Botany Group – Second Thursday

Thursday, 12th February. "Port Phillip Bay: Yesterday, Today and Tomorrow." Mr. Bram Dawson.

Thursday, 12th March. "Some Wildflowers of Kakadu National Park." Miss Betty Terrell.

Thursday, 9th April. "Western Australia – Darling Range and Northern Sand Plains." Mrs. Hilary Weatherhead.

Geology Group – First Wednesday

Wednesday, 4th February. "Further Developments in the Voyager Saga. Planets." Dr. A. Prentice.

Wednesday, 4th March. To be announced.

Wednesday, 1st April. "The Geological Time Scale – How did we get it?" Mr. Neil Archibald.

Mammal Survey Group – First Tuesday

Tuesday, 3rd February. "Pigmy Possums". Mr. Simon Ward.

Tuesday 3rd March. To be announced.

Tuesday, 7th April. To be announced.

Microscopical Group – Third Wednesday

Wednesday, 18th February. "Rotifers" (including a film by the late Mr. Paul Genery) Mr. Dan McInnes.

Wednesday, 18th March. "Objectives and Eyepieces." Mr. John Dawes.

Wednesday, 15th April. "Parasitic Wasps." Mr. Urwin Bates.

(Continued on inside back cover)

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Cover Illustration: River Red Gum *(E. camaldulensis)* (see page 14) *Photo:* H. T. Reeves

President's Note

Your Council is very much aware that of our 670 elected Members and 172 subscribers (paid up at October last) only 100-150 attend General Meetings, Group Meetings or Excursions. Now this is, of course, the normal state of affairs in a Club like ours, where the majority contribute a great deal, often at some sacrifice, by maintaining their membership. We certainly could not continue to publish 6 issues per year of the *Victorian Naturalist* without this support.

This means, however, that being away from the action, so to speak, the majority will be unfamiliar with many aspects of the Club. One that comes to mind is our base of operations – where we house our possessions and where we meet, and I am elaborating a little on this theme as my message in this issue.

Since March 1948 we have had our General and Council Meetings at the National Herbarium, Birdwood Avenue, South Yarra, and the majority of Group meetings are held here also. Here is our legally Registered Office, in a partioned-off and secured part of the main hall of this building, which is controlled by the Director General, Department of Conservation, Forests and Lands. Our library is housed here, along with our files and archives, and other memorabilia, lecture aids and other such items as the collection of Amy Fuller wildflower paintings, and the Neil Douglas painting awarded to the Club as the Victorian Conservation Prize by the Conservation Council of Victoria in 1980.

We use the remainder of the hall for our General Meetings (other organizations also have use of this portion) and auxiliary rooms for our Council meetings. We cannot afford an executive officer in full or part-time attendance, but the Librarian and Secretary for example make regular visits to process correspondence, accession library material, etc.

Our amiable association with the Officers of the Herbarium has continued for nearly forty years, and has been acknowledged to the extent that we have been consulted about the proposed extensions funded by the Bicentenary Authority.

We have not always been in the Herbarium. The inaugural meeting of the Club was held in the Melbourne Town Hall in May 1880, with the subsequent meetings in the Temperance Hall, Russell Street, until June 1881. An extremely long association with the Royal Society then began when its Victoria Street Hall became our home until May 1945. For the next three years we met in the Public Library until our move into the Herbarium in 1948. Further research might reveal some interesting stories as to why we changed headquarters from time to time.

Of course much Club work is done at other venues. The Editorial Committee, for example, meets elsewhere to prepare copy for the Naturalist, and between advertised meetings work goes on in members' homes and by phone to keep the Club functioning as smoothly as possible.

Our office and library is not open on a regular basis during the day, but anyone who can attend a General or Group meeting is welcome to look around our present home.

Jack Douglas,
President

Delma nasuta (Lacertilia: Pygopodidae), An Addition to the Herpetofauna of New South Wales and Victoria, with a Note on Rapid Colour Change in this Species

By G. M. Shea*

Recent collections of reptiles in the south-west of New South Wales demonstrate the presence of a distinctive herpetofaunal element associated with mallee-*Triodia* habitats (Shea and Wells, 1985; Sadlier, 1985). This paper records another member of this faunal assemblage in New South Wales and Victoria.

Five species of *Delma* have previously been recorded from New South Wales and Victoria: *D. australis, D. impar, D. inornata, D. plebeia* and *D. tincta* (Kluge, 1974). During fieldwork in south-western New South Wales in October-November 1984, several *Delma* specimens were collected that agreed with the diagnosis of *D. nasuta* Kluge and with South Australian material of this species, althouth they could not be clearly differentiated from *D. inornata* using the key to the genus provided by Cogger (1983). Morley and Morley (1985) experienced similar difficulties in differentiating *D. inornata* and *D. nasuta*. Subsequent examination of all *D. inornata* material in the Australian Museum and Queensland Museum reveal-

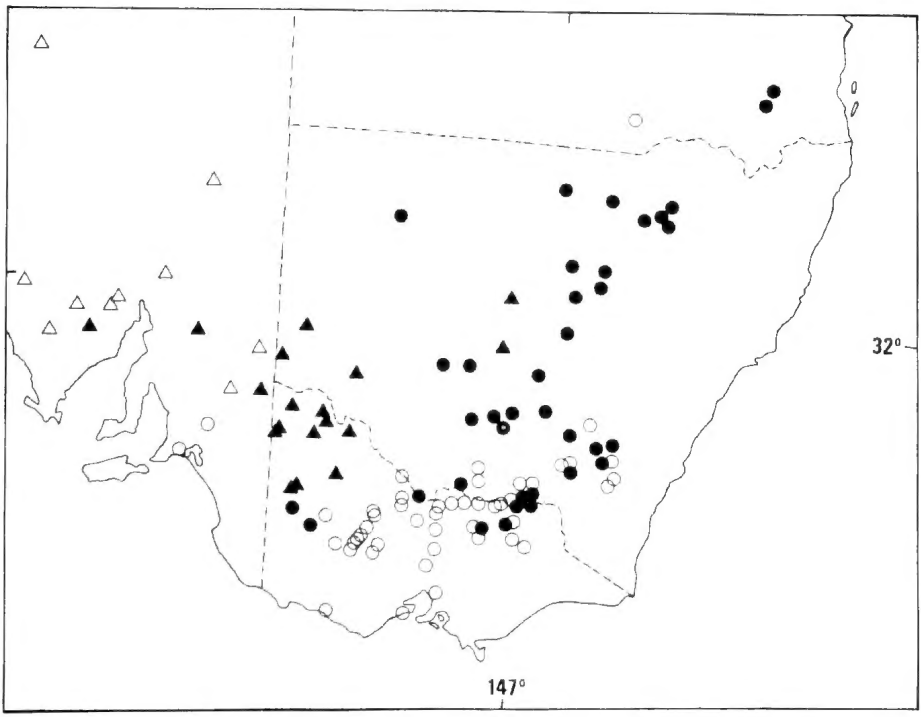

Fig. 1. Distribution of *D. inornata* (circles) and *D. nasuta* (triangles) in south-eastern Australia. Closed symbols are specimens examined; open symbols are literature records from Kluge (1974), Menkhorst and Gilmore (1979), Jenkins and Bartell (1980), Thompson (1980), Annable (1983) and Morley and Morley (1985).

*Dept. of Veterinary Anatomy, University of Sydney, N.S.W., 2006.

ed several additional N.S.W. and two Victorian *D. nasuta* specimens, including two of the paratypes of *D. inornata* Kluge (Australian Museum R17982, R27922), and extended the known range of *D. nasuta* eastwards to Round Hill Fauna Reserve (Fig. 1). Mr. A. J. Coventry kindly checked identifications and provided data for *D. nasuta* material in the Museum of Victoria, which included a further six paratypes of *D. inornata* (MV R10810-11), D8746, D13945, D15453-54) and confirmed the presence of *D. nasuta* in Victoria.

D. nasuta from the southern part of the range lack the dark ventral pigmentation of northern populations, and superficially resemble *D. inornata* in colouration. The two species may however be readily differentiated on scalation (Table 1; Fig. 2), althouth two of the diagnostic characters used by Kluge (1974), number of loreal and ventral scales, are of little practical use in identification. *D. nasuta* in N.S.W. and Victoria lack the dark edging to dorsal and lateral scales often seen in *D. inornata* (Fig. 63 in Kluge, 1974; Fig. 485 in Cogger, 1983), and frequently possess a light speckled appearance to the lower temporal region, due to light centres and darker rostral or caudal margins to individual temporal scales (Fig. 71 in Kluge, 1974; Fig. 3). There may additionally be some difference in ventral colouration in life. *D. inornata* has been recorded as having a

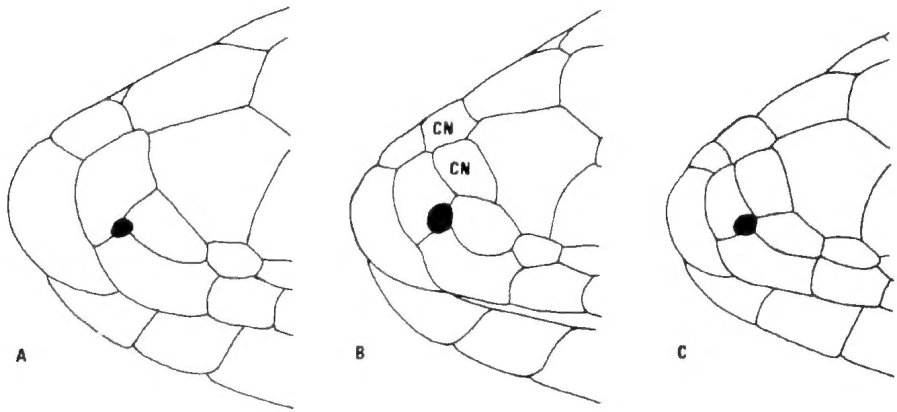

Fig. 2. Laterodorsal view of snouts of A: *Delma inornata* with single pair of nasals (AM R59308), B: *D. inornata* with two pairs of nasals (AM R55618; CN = caudal nasals), C: *D. nasuta* (AM R115906).

Table 1. Scalation characters differentiating *D. inornata* and *D. nasuta*.

	D. inornata	*D. nasuta*
Caudal nasal scales*	Usually present, broadly separated from nostril, less commonly absent (Fig. 2a,b).	Present, in contact or barely separated from nostril (Fig. 2c).
Gular scales**	12-16, mode 15, $\bar{x}$ 14.3, SD 1.01, n 61.	15-19, mode 18, $\bar{x}$ 17.4, SD 1.01, n 19.
Nuchal scales**	12-16, mode 13, $\bar{x}$ 13.3, SD 0.75, n 62.	15-18, mode 17, $\bar{x}$ 16.2, SD 1.01, n 19.

* posterior nasal scales of Kluge (1974).
***sensu* Kluge (1974).

lemon-yellow throat and flesh coloured body venter in life (Cogger, 1983; Jenkins and Bartell, 1980; notes accompanying Australian Museum R37482-83, R55617-18) while the six southern *D. nasuta* for which I have noted ventral colouration had body venter yellow and throat white (yellow body venter also recorded for AM R97914).

Kluge (1974) noted that 10% of the *D. inornata* he examined had only a single pair of nasal scales, with no evidence of any geographic trends in variation. However, in the material examined here, loss of caudal nasal scales was not uniformly distributed. Overall, 23% of individuals examined lacked caudal nasals. Loss was most frequent in the area between 29° and 32°S and east of 147°E (71%, n 14) and between "Yandembah" and Hillston (100%, n 3). In the remainder of the range, the frequency of loss was only 7% (n 45).

Re-identification of *D. inornata* and *D. nasuta* records simplifies the known habitat preferences of these species. South-eastern records of *D. nasuta* agree with western populations (Kluge, 1974) in being restricted to *Triodia,* while *D. inornata* inhabits grasslands (Menkhorst and Gilmore, 1979; Jenkins and Bartell, 1980; Annable, 1983; field notes accompanying AM R55616-18, R55620, R80577, R110626-27, R113384).

Colour change has not previously been reported in pygopodids. The six *D. nasuta* examined in life (AM R114366, R115906, R116019-20, R120847, R121052) all showed an ability to rapidly change the intensity of the yellow ventral colouration. When first handled, all had dull or bright lemon-yellow venters. Immediately following ecdysis, AM R116020 retained a bright yellow venter. Within 20 seconds of slough segments being removed, the venter became pure white, and regained its yellow colouration one day later. Placing individuals with dull yellow venters on moistened tissue paper or spraying them with a fine mist resulted in a change over

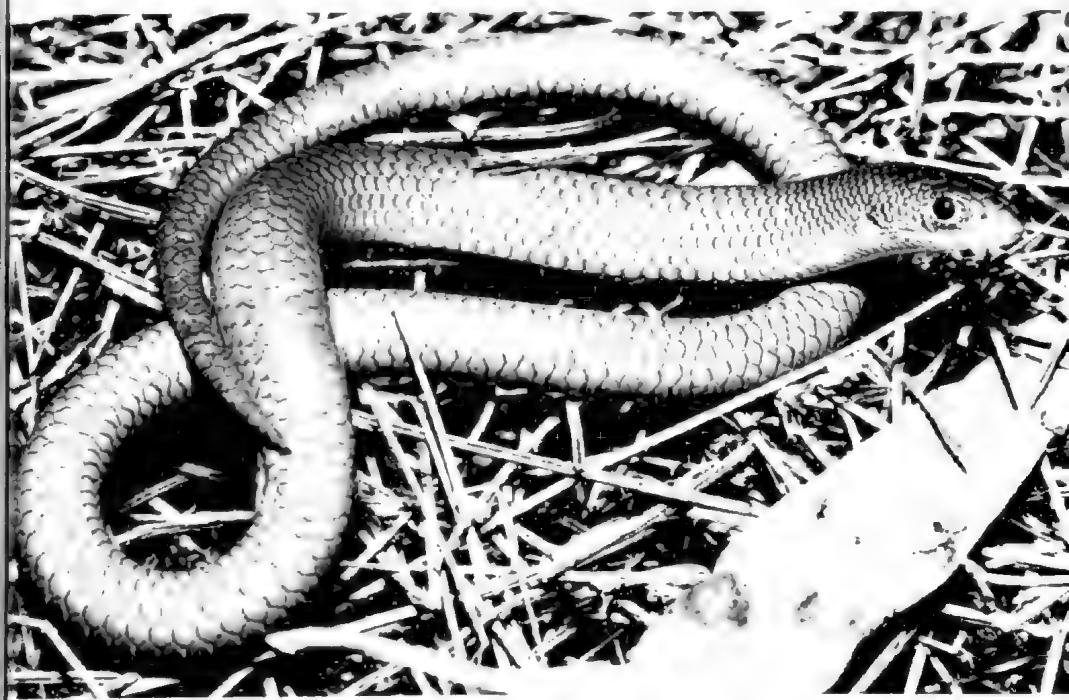

Fig. 3. Delma nasuta from 14km N Coombah Roadhouse, N.S.W.

5-10 minutes to a bright lemon-yellow venter, which returned to dull lemon-yellow within 30 seconds if the animal was disturbed. Mild cooling (5 minutes refrigeration) or heating (10 minutes under 100W incandescent globe at 20 centimetres) did not induce any change in ventral colouration.

SPECIMENS EXAMINED (All specimens prior to AM R37482, QM J28999 and MV D33336 also examined by Kluge, 1974).

Delma inornata (n 72)
AM: R679-82, R952, Cootamundra, N.S.W.; R973, "Yandembah", 20mi W Hillston, N.S.W.; R6988, Gerogery, N.S.W.; R10118, R10126, Barmedman, N.S.W.; R10497-98, Hillston, N.S.W.; R11763, Quantong, Vic.; R12584, Marmor, Qld.; R13428, Bringagee, N.S.W.; R13890, Finley, N.S.W.; R15451, Pericoota, via Moama, N.S.W.; R15495, "Merah", N.S.W.; R15946, R111637-41, Holbrook, N.S.W.; R15977-80, Vic.; R17163, Yanco, N.S.W.; R17656, Lake Narran, N.S.W.; R20587, Moombooldool, N.S.W.; R20729, Wymah, N.S.W.; R27986, Albury, N.S.W.; R30278, Bellata, N.S.W.; R30329, Riverina district, N.S.W.; R37482-83, 21mi S Condobolin, N.S.W.; R37485, 14mi W Gilgandra, N.S.W.; R39507, "Klondyke", N.S.W.; R42721, Nhill, Vic.; R55616, 5.5mi W Bowning, near Hume Highway, N.S.W.; R55617-18, 2.7mi N Gocup, N.S.W.; R55619, 30mi N Narrabri, N.S.W.; R55620, 11mi S Yass on Wee Jasper Road, N.S.W.; R59308, 5.7mi E Nevertire on Mitchell Highway, N.S.W.; R64188, R70111, 15mi W Gilgandra, N.S.W.; R64932-34, Galarganbone (?Gulargambone), N.S.W.; R69726, "Myallvale", N.S.W.; R80577-78, "Murmungee", near Beechworth, Vic.; R80580, "Hattah, Vic." (probably in error); R92527, 19mi E Walgett, N.S.W.; R95269, Moura Creek, 50km N Warren on Carinda Road, N.S.W.; R95413-14, Benalong, N.S.W.; R102856, Old Gunnedah Road, Narrabri, N.S.W.; R110626-27, Blakney Creek, near Yass, N.S.W.; R112443, Yenda, 15km NE Griffith, N.S.W.; R113384, NW side Oakey, Qld. QM: J14753, near Pittsworth, Qld.; J28999, J34157, J45498-99, Oakey, Qld.; J32262, Lurg Firetower Hill, Vic.; J37821-23, Grid Reference 347662, Deniliquin 1:250 000 topographic map, N.S.W..

Delma nasuta (n 26)
AM: R17982, Nymagee, N.S.W.; R27922, R41088, R90491-95, R112224, Round Hill Fauna Reserve, N.S.W.; R80575, R80579, Hattah, Vic.; R97914, "Tarawi", N.S.W.; R98347-48, 62mi S Broken Hill on Silver City Highway, N.S.W.; R105536-38, 23km ENE Kimba, S.A.; R114366, 6.4km S Top Hut HS on "Old Arumpo" Road, N.S.W.; R115231, 4km S Double Tanks, "Top Hut", N.S.W.; R115906-08, Pandappa Hill, S.A.; R116019-20, 14km, N Coombah Roadhouse on Silver City Highway, N.S.W.; R120847, 166km N Wentworth on Silver City Highway, N.S.W.; R121052, 5.9km S Top Hut HS on "Old Arumpo" Road, N.S.W.

OTHER RECORDS FROM MUSEUM OF VICTORIA
Delma nasuta (n 33)
R10810-11, Woomelang, Vic.; R10833, R11137-38, Mallee, Vic.; D8746, Hattah, Vic.; D13945, Annuello, Vic.; D15453-54, Renmark, S.A.; D33336-37, 11.3km NE Millewa South Bore, Vic.; D38851, Rockhole Bore, Vic.; D40171, D47829, D47892, Millewa South Bore, Vic.; D52433, 2.9km NNW Chinaman Well, Vic.; D52757, Ross's Springs, 13km S Tutye, Vic.; D53565, Nowingi, Vic.; D54566-67, D54639, D55218-19, D55308, 2.75km NNW Chinaman Well, Vic.; D54585, 3.5km SSE Chinaman Well, Vic.; D54586, 10km SSE Chinaman Well, Vic.; D54811-12, 0.9km N Chinaman Well, Vic.; D54983, 0.6km NE Chinaman Well, Vic.; D54984, 1.7km NNW Chinaman Well, Vic.; D55042, 2.8km NE Chinaman Well, Vic.; D55533, 1km N Chinaman Well, Vic.; D58470, 30km WNW Kiamil, Vic.

ACKNOWLEDGEMENTS

I thank B. Coulson, M. Peterson, R. Sadlier and R. Wells for their help in fieldwork. G. Swan kindly allowed be to examine one of the live *D. nasuta,* and A. Greer and J. Covacevich allowed be access to the Australian Museum and Queensland Museum collections respectively. J. Coventry generously offered records from the Museum of Victoria collection. A. Bauer, H. Cogger, B. Farrow, A. Greer and R. Sadlier offered helpful suggestions on the manuscript.

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Influx of the Grey-headed Flying-fox *Pteropus poliocephalus* (Chiroptera: Pteropodidae) to the Melbourne area, Victoria, in 1986

BY HELEN I. ASTON*

Introduction

Menkhorst and Dixon (1985) have summarised and mapped the pre-1983 known occurrences of the Grey-headed Flying-fox *Pteropus poliocephalus* in Victoria. They detailed the abnormally large autumn influxes of 1981 and 1982, in which years the number of *P. poliocephalus* in daytime camps in the Royal Botanic Gardens, Melbourne, peaked at about 100 and 800 individuals respectively.

The present paper details the influx of this species to the Melbourne metropolitan area in 1986, when the daytime camp established in the Royal Botanic Gardens was the largest ever recorded for the area, peaking at about 1000 individuals and extending in time well before and after the usual autumn months of prior visitations. Brief comments on known occurrences of the species in Melbourne since 1982 are also made.

The Royal Botanic Gardens camp

1. Numbers and duration

In 1983 no flying-foxes were reported anywhere in Melbourne but in 1984 a daytime camp of about 150 individuals was established throughout autumn in the Fern Gully in the Royal Botanic Gardens (37° 49′ S.; 144° 58′ E.). Their arrival commenced about the end of March, 10 or 12 first being reported present on 1 April. Numbers built up to a peak in early June, with P. Menkhorst counting 130 and estimating a total of about 150 on 9 June. Numbers then declined, the last sighting, of 8 individuals, being by W. Schulz on 9 July.

In autumn-winter of 1985 flying-foxes were absent but in 1986 the largest known influx for the Melbourne metropolitan area occurred and extended for the longest duration yet recorded. The daytime camp for this influx was again in the Fern Gully of the Royal Botanic Gardens. K. Allen and D. Churchill first noticed about 12 *Pteropus* present on 22 December 1985. Numbers remained small until mid January 1986 when a steep rise commenced and continued at least into February (Fig. 1). No counts were made between 2 February and 7 May 1986 but general observations indicated that the peak of approximately 1000 individuals was held from at least late March to mid April. A decline in numbers (observations by K. Allen) had occurred apparently 3 or 4 weeks before 12 May when a count of 925 flying-foxes was obtained during a branch-by-branch count through the gully. Numbers dropped steeply in the last half of May and less steeply but steadily throughout June to mid September. The last individuals to desert the camp left on 20 or 21 September. However, 10 to 15 remained until early December, when they were joined by new arrivals. Counts of 18 to 20 and of 39 were made on 1 and 12 December respectively. This increase in numbers could be the commencement of an influx for 1987 and raises the possibility that a permanent camp of *P. poliocephalus* may become established in the Royal Botanic Gardens.

First arrivals in 1981, 1982 and 1984 were in late March, early March and late March respectively. Last departures for the same years were mid July (with most gone by late June), early June and early

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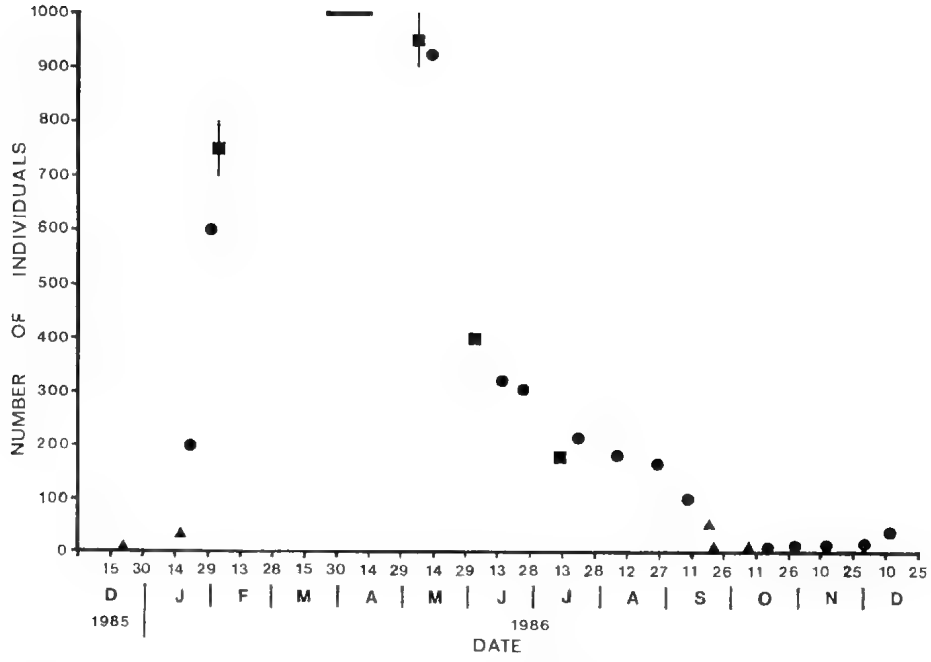

Fig. 1. Numbers of *Pteropus poliocephalus* at the Royal Botanic Gardens camp during 1986. ● = counts by H. Aston; ■ = midpoints of estimates by P. Menkhorst (range shown by vertical line); ▲ = estimates by others; ——— = peak estimated by K. Allen.

July respectively. The period of the 1986 influx from late December 1985 to late September 1986, with a few individuals remaining until at least mid December, was therefore quite abnormally extended. The year 1986 is the first for which *P. poliocephalus* has been recorded in the Royal Botanic Gardens throughout every month.

2. Camp site

The Fern Gully is approximately 140 metres long and 55 metres wide. During the peak of 1986 influx *P. poliocephalus* camped in groups dispersed throughout most of the gully but chiefly in the northern two-thirds of it. The camp occupied an area of about 4,500 square metres, with an average density of c. 0.22 individuals per square metre.

The camp first established in the northern end of the gully, expanding southwards along its full length as numbers increased and contracting back to the extreme northern end as numbers declined. On 12 May 1986, when the highest count of 925 was made shortly after the peak, dispersal was still throughout most of the gully with the flying-foxes in 29 groups of from 1 to 99 (mostly 4-58) individuals per group. By 16 June, with numbers decreased to 325, the flying-foxes were concentrated in only four trees at the extreme northern end of the gully and by 25 June all (c. 305) had concentrated further into only two of these trees. The same two trees remained the major camp trees from then until 20 or 21 September, with several palms also occasionally being used by a few individuals. One of these palms was adopted as the sole camp site by the 20 or less *P. poliocephalus* which

remained after 20 or 21 September.

Large trees of Moreton Bay Fig *Ficus macrophylla,* Elm *Ulmus* spp., Plane *Platanus* sp., White Poplar *Populus alba,* Lilly-pilly *Acmena smithii* and River She-oak *Casuarina cunninghamiana* and also tall palms were heavily utilised either throughout or for a notable portion of the camp period. Both evergreen and deciduous trees were used, the latter during all stages from heavily-foliaged to leafless.

3. Effect of weather

Contraction of the camp as numbers declined was presumably due to the gregariousness of the species but the selection of the final site of four, then two, trees at the north end of the gully appeared to be influenced by weather. *Pteropus poliocephalus* normally inhabits warmer locations than Melbourne and, when it does visit this area, departs soon after the coldest period from June to August has begun. Individuals remaining throughout winter during the 1986 influx therefore could be expected to seek warmth and the trees at the north end of the gully were well-placed to receive any sunshine available.

Table 1 gives the numbers of *Pteropus* present in the final northern camp site and the minimum and maximum temperatures for eight days on which counts were made during June to August 1986. On 16 June, with the temperature nearly 17°C, approximately 72% of the 325 individuals were in the leafless or near-leafless sections of three deciduous trees, mostly in sunny positions. The remainder were generally in shade in an adjacent, heavily-foliaged, Moreton Bay Fig. Nine days later, on 25 June, following colder weather (maximum temperature 11°-12°C over the previous five days), the camp had contracted to only one of the deciduous trees, a White Poplar, and the fig tree. The number of flying-foxes had not decreased markedly and more individuals had moved to the fig, only c. 51% remaining in the poplar. As winter progressed, numbers in the poplar dropped further, ranging from about 33%-44% on fairly calm, mild, and more or less sunny days. However, on 14 and 25 July the poplar was completely deserted and all individuals camped in the fig. The 14 July was extremely windy with whole trees in motion and the 25 July was cold (maximum temperature 8°C) with rain and sleet. The dense foliage of the fig was obviously sought for shelter in adverse weather whereas the bare branches of the poplar were utilised for warmth in sunnier, milder weather.

Date	Number of *P. poliocephalus* present		Per cent present	Tempertaure (deg. C.)	
	Fig	Poplar	in Poplar	Min.	Max.
1986					
16 June	90	235*	72%	6.9	16.8
25 June	150	155	51%	6.0	13.6
14 July	all	nil	0%	4.4	15.0
21 July	112	88	44%	8.8	14.9
25 July	all	nil	0%	2.5	8.2
8 August	114	70	38%	3.5	16.6
22 August	about 2/3 of total	about 1/3 of total	c.33%	9.7	21.0
27 August	103	65	39%	7.5	17.7

Table 1. Numbers of *Pteropus poliocephalus* present in an evergreen Moreton Bay Fig and a leafless White Poplar, together with minimum and maximum temperatures, on eight occasions during June to August, 1986. (* = three leafless trees used, thereafter one only.)

Other Melbourne occurrences

1. Night dispersal

There were no reports of *Pteropus* in the Melbourne metropolitan area in 1983 and 1985 but, coinciding with the daytime camps in the Royal Botanic Gardens, there were reports in 1984 and 1986 of night flying and feeding in suburban Melbourne. No other camps were reported and the night dispersals presumably originated from the Gardens camp.

Between mid March and 6 May 1984, occasional sightings of from 1 to 12 flying foxes were reported from Northcote, North Fitzroy and Kew, all locations being less than 8 kilometres in north to north-easterly directions from the Royal Botanic Gardens.

In 1986, fourteen night sightings of from 1 to 20+ individuals extended from 26 January to 4 July. Reports were from Albert Park, East Melbourne, North Fitzroy, Richmond, Kew, Hawthorn and Canterbury. All locations were within 2 to 10 kilometres of the Royal Botanic Gardens and all except Albert Park, south-west of the Gardens, were in north to easterly directions from them.

The 1984 and 1986 records are consistent with the findings of Menkhorst and Dixon (1985), who reported that 78% of foraging records came from within a 10 kilometres radius of the Royal Botanic Gardens and that directions of dispersal were wide, although concentrated in the eastern and south-eastern suburbs.

2. Feeding

Flying-foxes were reported at night feeding on Moreton Bay Figs, cultivated figs, apricots and apples. Individuals apparently return regularly to the same food source each night over a period of several weeks if the food source persists. For example, Ms Kramer reported 3 to 5 regularly present each night from 5 February to mid March 1986 feeding on cultivated figs and apricots at a house in Holden Street North Fitzroy, and Pauline Duncan reported 20+ individuals feeding in a Moreton Bay Fig in Richmond on 20 January, 21 January and 11 February 1986.

Audrey Wain made regular observations of flying-foxes feeding in a large Moreton Bay Fig in Burke Road, Hawthorn, between 26 January and 9 February 1986. They would arrive between 21:25 and 21:30 hours eastern summer time and mostly depart about 03:00. On the nights of 29 and 30 January at least 20 individuals were present, flying in from the direction of the Royal Botanic Gardens, i.e. from the west to south-west. By 5 and 6 February the number had decreased to a maximum of 10 to 12 and the arrival was more from the north-west to north. Only a few individuals appeared on the next three nights and none visited the fig after 9 February, probably because of depletion of food supply.

On 5 February 1986, at about 21:00 hours eastern summer time on a hot evening (maximum day temperature 26°C), Kathy Preece observed flying-foxes streaming out of the Royal Botanic Gardens. Many flew to the adjacent Yarra River and drank by skimming the surface with their mouth open.

Victoria outside Melbourne

There have been few reports of *P. poliocephalus* in Victoria for 1983 to 1986 inclusive apart from scattered East Gippsland sightings of small numbers. The regular autumn camp site at Dowell Creek, near Mallacoota Inlet, East Gippsland (Menkhorst and Dixon, 1985) has not been checked but it is probably still in use. The most interesting record is of one individual electrocuted on power lines on the outskirts of Cobden (38° 20′ S.; 143° 04 E.) on 30 January 1986. It is unusual for this species to extend so far west, especially in summer.

Acknowledgements

I particularly thank Peter Menkhorst, Arthur Rylah Institute of Environmental Research, Department of Conservation, Forests and Lands, for making sundry records including his own counts at the Royal Botanic Gardens available to me, and for commenting on this manuscript. Ken Allen, Michael Burston, Warren Worboys and Colin Pratt, Royal Botanic Gardens, have also been particularly helpful in observations within the Gardens during 1986 and Bill Schulz made regular Gardens counts in 1984. To them and to others whose records have been incorporated in this account, I am most grateful.

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Nature Notes

A Boobook *(Ninox novaeseelandiae)* preying on an Eastern Rosella *(Platycercus eximius).*

BY M. J. LEWIS*

On the 13 May 1986 at the Australian National University, Canberra, I was walking across from the Zoology Department to the Hancock Library at 1930 hours when I heard the distress calls of a Rosella. As I turned to approach the area from where the calls had originated an Eastern Rosella *(Platycercus eximius)* flew straight towards me about 40cm above the ground, with a Boobook Owl *(Ninox novaeseelandiae)* in pursuit about 2 metres behind. The Rosella landed on a footpath about 10 metres away and the owl in a nearby tree. My presence obviously disturbed the owl's pursuit.

I approached to within about 1 metre of the exhausted female Rosella and observed that its back was devoid of feathers and bloody, obviously having already been attacked by the owl and having escaped. After a few moments the Rosella flew off, low above the ground, with the owl again in pursuit.

Boobooks primarily feed on insects and occasionally small marsupials and rodents but have also been known to prey on birds up to the size of small parrots (Schodde and Mason 1980, Vestjens 1973). As Schodde et. al. (1980) note this is probably not a common event but with insect activity becoming low, as would be the case in Canberra during this period of the year, birds may form an important source of protein.

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Notes from the National Herbarium of Victoria – 2

Review of recent studies in *Eucalyptus* – the species.

BY S. J. FORBES*

The search for a natural classification scheme for eucalypts has accelerated the resolution of specific and subspecific problems in Victoria. Recent investigations of eucalypts have resulted in the discovery or redefinition of many Victorian taxa. Brooker (1983) and Costermans (1981) both provide as excellent guides to published taxa. The list below draws attention to new names and taxa recognised in Victoria since the publication of Willis (1972), and indicates some presently unresolved problems.

Investigations of individual taxa throughout their range have provided the basis for the resolution of many problem taxa (see below, for example, *Eucalyptus willisii* Humphries, Ladiges and Brooker). Numerical techniques have assisted subsequent definition of taxa and emphasized the value of seedling and juvenile leaf characters.

Amateur eucalyptologists may still make significant contributions to resolving problem taxa through systematic observation, recording and collecting. Accurate identification of eucalypts may depend on characters not obvious from a pressed specimen such as leaf colour, flower colour, bark and habit (see Brooker 1983). Eucalypt collectors should be prepared to provide detailed notes, properly pressed duplicate specimens and preferably, a photograph.

Notes should include:

Collector's name, collection number and date of collection.

Locality – sufficiently accurate to allow population to be relocated.

* *National Herbarium of Victoria, Department Conservation Forests and Lands, Birdwood Avenue, South Yarra, 3141.*

Eucalyptus obliqua L'Herit. (Messmate), the first species described under *Eucalyptus*. A widely distributed tree in cooler, southern parts of eastern Australia. Photo: H.T. Reeves, courtesy library of National Herbarium of Victoria.

Habitat – associated species (especially eucalypts), geology and soil, aspect and slope.

Habit – height, form, branching.

Bark – type, persistance, colour.

Juvenile & adult leaves – texture, colour, note whether upper and lower leaf surfaces are the same or differing colours, i.e. concolorous or discolorous.).

Flower colour

Collections should be from a single mature tree and surrounding juveniles. (A population sample may include a number of separate collections from a single population.)

A collection should include:

Bark

Leaves – juvenile and adult (selection of conspecific juveniles can present problems).

Buds (and flowers if possible).

Fruits

Seed (store surplus mature fruits in paper bags for seed).

If seedling or juvenile leaves are absent, accurate identification may depend on growing seed from fruits collected with specimens. Seed collections, accompanied by voucher specimens, are also required for the Royal Botanic Gardens seed exchange program.

Notes on collection and preservation of specimens are available from the National Herbarium of Victoria.

The following list of new taxa and unresolved problems in Victorian eucalypts is arranged according to the informal classification of Pryor and Johnson (1971). Only subgenera, sections and series or subseries have been used. These levels of classification serve adequately to bring related eucalypts together to assist discussion. Recent modifications to Pryor and Johnson's classification are conveniently disregarded for this purpose.

Eucalyptus regnans F. Muell. (Mountain Ash), the tallest flowering plant in the world. Restricted to wet sites below 1,100 metres in eastern Victoria and Tasmania. Photo: H.I. Reeves, courtesy library of National Herbarium of Victoria.

New names and taxa recognised in Victoria since the publication of Willis (1972).

Subgenus MONOCALYPTUS
Section Renantheria

Subseries Capitellatinae

E. alpina Lindley (Grampians Gum)

E. baxteri (Benth.) Maiden & Blakely (Brown Stringybark) Grampians populations include two undescribed species previously referred to *E. alpina*. An inland (e.g. Big Desert and adjacent areas in South Australia) form of *E. baxteri* is also presently undescribed (see Marginson 1984).

Subseries Eugenioideinae

E. globoidea Blakely (White Stringybark)

Stunted coastal stringybarks in East Gippsland may be referable to *E. globoidea* from the concolorous adult leaves, and sessile buds. The closely related *E. eugenioides* Sieber ex Spreng. (Thin-leaved Stringybark) occurs in southern NSW and may possibly be expected in East Gippsland. The pedicellate buds and narrow juvenile leaves of *E. eugenioides* contrast with the sessile buds and broad

juvenile leaves with long petioles of *E. globoidea*.

Subseries Strictinae
E. stricta Sieber ex Spreng. (Mountain Mallee)

The occurence of *E. stricta* in Victoria is based on two collections from Mt Wellington. No contemporary record exists despite repeated attempts to relocate the species. *E. kybeanensis* Maiden & Cambage is an abundant mallee about the summit of Mt Wellington.

The first collection was by W.H. Green, s.n. 28.xii.1916, University of Melbourne, who undertook some studies on the analysis of eucalypt oil with P.R.H. St John, Royal Botanic Gardens, Melbourne (see Morris 1944). The later collection was by a forester, W. Briggs, s.n. iii.1924. Both collections have been determined in 1959 by L.A.S. Johnson and are in bud only. The labels are handwritten by J.H. Willis and J.W. Audas respectively.

Subseries Pauciflorinae
E. pauciflora Sieber ex Spreng. ssp. *pauciflora* (White Sallee)
E. pauciflora ssp. *niphophila* (Maiden & Blakely) L. Johnson & B. Blaxell (Snow Gum).

All Victorian *E. pauciflora* occurrences are referable to these subspecies. Supposed Victorian records of *E. pauciflora* ssp. *debeuzevillei* (Maiden) L. Johnson & D. Blaxell should be referred to *E. pauciflora* ssp. *niphophila*.

Subseries Amygdalininae (see Ladiges *et al.* 1983)
E. radiata Sieber ex DC. ssp. *radiata* (Narrow-leaved Peppermint)
E. radiata ssp. *robertsonii* (Blakely) L. Johnson & D. Blaxell

Two subspecies of *E. radiata* are presently recognised in Victoria. Variation in juvenile leaves indicate the presence of at least one other taxon in Victoria.

E. willisii Humphries, Ladiges & Brooker ssp. *willisii* (Shining Peppermint).

E. willisii ssp. *falciformis* Newnham, Ladiges & Whiffin.

Mainland populations previously referred to *E. nitida* Hook.f. (Smithton Peppermint) are clearly distinct from Tasmanian and Bass Strait Island populations. Ladiges et al. (1983) refer the mainland populations to *E. willisii*. The Grampians population, with conspicuously falcate juvenile leaves and larger, obconical fruits (0.6-0.7 x 0.5-0.6 cm), is referred to *E. willisii* ssp. *falciformis* by Newnham et al. 1986.

Subgenus SYMPHYOMYRTUS
Section Dumaria

Series Dumosae
E. cyanophylla Brooker (Blue-leaved Mallee)

Previously (and incorrectly) referred to the glossy green-leaved *E. pileata* Blakely (Western Australian Capped Mallee) in Victoria. The blue-grey leaves and winter-spring flowering of *E.cyanophylla* contrast with the grey-green leaves and late summer-autumn flowering of *E. dumosa* A. Cunn. ex Schauer (Dumosa Mallee) (Brooker 1977).

Series Incrassatae
E. incrassata Labill. (Ridge-fruited Mallee)

Victorian material incorrectly referred to *E. incrassata* Labill. var. *angulosa* Benth. is typical *E. incrassata*.

Section Exsertaria

Subseries Tereticorninae
E. blakelyi Maiden (Blakely's Red Gum)
E. camaldulensis Dehng. (River Red Gum)
E. dealbata A. Cunn. ex Schauer var. *dealbata* (Tumble-down Red Gum)
E. dwyeri Maiden & Blakely (Dwyer's Red Gum)
E. tereticornis Smith (Forest Red Gum)

Problems exist in the delimitation of members of the Red Gum group, especially in north-east Victoria. Some Victorian collections have been referred to *E. dealbata* (around Tallangata) and to *E. dwyeri* (Warby Range). The presence of intermediate populations makes identification difficult. The slope of the disc (on

Eucalyptus camaldulensis Dehnh. (River Red Gum), the most widely distributed eucalypt. The species exhibits considerable morphological variability through its range. Photo: H.T. Reeves, courtesy library of National Herbarium of Victoria.

the fruits), operculum shape (on the buds), juvenile leaves and habit are diagnostic. *E. dealbata* var. *dealbata* is characterised by glaucous leaves, buds and branchlets. *E. dwyeri* is typically a mallee with characteristic narrow juvenile leaves contrasting with the characteristic broad juvenile leaves of *E. blakelyi*.

Section Maidenaria (see Ladiges et al. 1984)

Subseries Ovatinae

E. brookeriana A.M. Gray (Brooker's Gum)

E. camphora R.T. Baker (Mountain Swamp Gum)

E. ovata Labill. (Swamp Gum)

E. yarraensis Maiden & Cambage (Yarra Gum)

Identification of members of the Swamp Gum group may be difficult. Simmons (1986) provides an excellent discussion of the last three species. *E. brookeriana* is typically characterised by clearly crenulate juvenile leaves. Upright habit and forest habitat are also often characteristic.

Subseries Manniferinae

E. aromaphloia Pryor & Willis (Scentbark)

Three groups within *E. aromaphloia* are differentiated in Victoria on the basis of seedling morphology by Chappill, Ladiges & Boland (1986). *E. aromaphloia sensu stricto* is characterised by seedlings with round stems and ovate, glaucous juvenile leaves that are sessile or subsessile for many leaf nodes. *E. aromaphloia sensu stricto* occurs from the Mt William Range east to the Brisbane Range. A second group occurs from the Grampians west of the Mt William range and in the Little Desert, and is characterised by round stems and linear non-glaucous juvenile leaves that are sessile for many nodes. The third group occurs in eastern Victoria and is characterised by seedlings with often square stems and broad-lanceolate, non-glaucous juvenile leaves that are distinctly petiolate by the 11th node.

Subseries Bridgesiana

E. angophorides R.T. Baker (Apple-topped Box)

E. bridgesiana R.T. Baker ssp. *bridgesiana* (Apple box)

The green juvenile leaves, discolorous adult leaves and upright habit of *E. angophoroides* contrast with the glaucous juveniles, concolorous adult leaves and crooked habit of *E. bridgesiana*.

There are also clear distinctions in the phyllotaxy (leaf arrangement) of the juvenile leaves (Chappill pers. comm.).

Subseries Globulinae

E. globulus Labill. spp. *globulus* (Southern Blue Gum)

E. globulus ssp. *bicostata* (Maiden Blakely & Simm.) Kirkpatr. (Eurabbie)

E. globulus spp. *maidenii* (F. Muell.) Kirkpatr. (Maiden's Gum)

E. globulus spp. *pseudoglobulus* (Naudin

ex Maiden) Kirkpatr. (Victorian Eurabbie).

The status of the Victorian Blue Gum is still unresolved.

Kirkpatrick (1974) reduced the species to subspecific rank based on the difficulty of accurately delimiting the species.

E. cypellocarpa L. Johnson (Mountain Grey Gum)

E. goniocalyx F. Muell. ex Miq. (Long-leaved Box)

E. nortonii (Blakely) L. Johnson (Long-leaved box)

The glaucous buds, fruits, leaves and branchlets of *E. nortonii* contrast with the non-glaucous *E. goniocalyx*. *E. nortonii* generally prefers more extreme rocky sites.

The so called phantom hybrids of *E. cypellocarpa* x *E. goniocalyx* at Anglesea and the Grampians described in Parsons & Kirkpatrick (1972) will be accorded specific status (Watson et al. in prep.). The new species is closely related to *E. cypellocarpa*.

Subseries Viminalinae

E. viminalis Labill. ssp. *viminalis*

E. viminalis var. *racemosa* F. Muell. ex Maiden

E. viminalis ssp. *cygnetensis* C.D. Boomsma

E. viminalis var. *racemosa* F. Muell. ex Maiden should at least be raised to subspecific rank and may be sufficiently distinct from *E. viminalis* to justify specific status as *E. pryoriana* L. Johnson. The unpublished combination, *E. viminalis*-ssp. *pryoriana* is used by Costermans (1981) for this taxon. Persistant fibrous bark, flowers commonly in (3-) 7's, compact habit and coastal distribution on sand are characteristic. *E. viminalis* ssp. *cygnetensis* is a western form with persistant bark and flowers in 7's. In the absence of juvenile leaves, *E. viminalis* ssp. *cygnetensis* is difficult to distinguish from *E. aromophloia*.

Eucalyptus viminalis Labill. (Manna Gum), also exhibits considerable morphological variability. A widely distributed tree in a variety of habitats in South eastern Australia. Photo: R. Lee, courtesy library of National Herbarium of Victoria.

Subseries Cordatinae
E. cephalocarpa Blakely (Mealy Stringybark)
E. cinerea F. Muell. ex Benth. (Argyle Apple)

Costermans (1981) notes three forms presently referred to *E. cephalocarpa* and *E. cinerea* in Victoria and refers to the unpublished combinations foreshadowed in Pryor and Johnson (1971), of *E. cinerea* ssp. *cinerea* and *E. cinerea* ssp. *cephalocarpa*
E. saxatilis Kirkpatrick & Brooker (Suggan Buggan Mallee)

Willis (1972) referred to this then undescribed species in a footnote to *E. glaucescens*. The campanulate fruit with a flared rim is characteristic.

Section Adnataria

Subseries Polyanthemae
E. bauereana Schauer (Fuzzy Box)
E. polyanthemos Schauer (Red Box)

The thin, green leaves of the crown and conical fruits of *E. bauereana*, contrast with the thick, glaucous and typically blue leaves of *E. polyanthemos*. In some locations these species are difficult to distinguish.

Subseries Melliodorinae
E. leucoxylon F. Muell. ssp. *leucoxylon* (Yellow Gum)
E. leucoxylon ssp. *megalocarpa* Boland (Large-fruited Yellow Gum)
E. leucoxylon ssp. *pruinosa* (F. Muell. ex Miq.) Boland (Inland Blue Gum)
E. leucoxylon ssp. *megalocarpa* (syn. *E. leucoxylon* var. *erythrostema* F. Muell. ex Miq.) and *E. leucoxylon* ssp. *pruinosa* (syn. *E. leucoxylon* var. *pruinosa* F. Muell.) are currently recognised in Victoria.
E. sideroxylon A. Cunn. ex Woolls ssp. *sideroxylon* (Red Ironbark)
E. sideroxylon ssp. *tricarpa* L. Johnson.

The broad juveniles, flowers in 3's and large fruits of *E. sideroxylon* ssp. *tricarpa* contrast with the typical subspecies.

ACKNOWLEDGEMENTS

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A CLOTHES-PEG VARIETY OF THE ORB-WEB SPIDER *Araneus transmarinus*

BY NOEL SCHLEIGER*

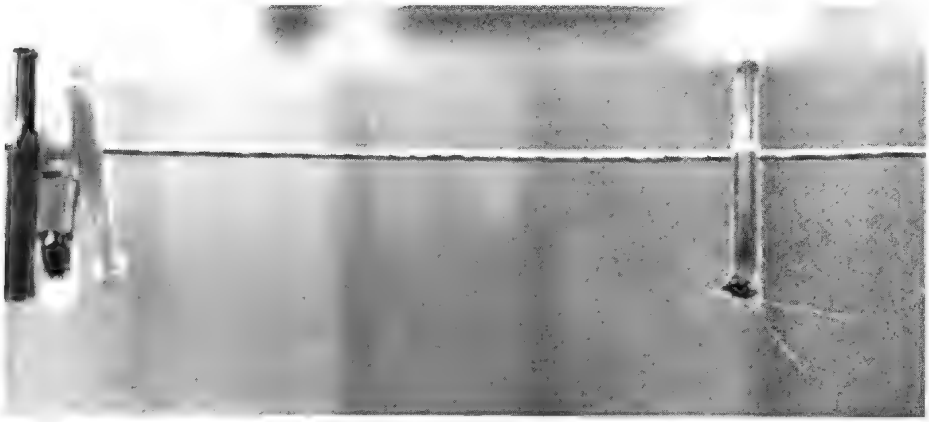

Figure 1.
Female (left) and male (right) shelter on separate clothes pegs on a makeshift clothesline facing southerly, 3 Jacqueline Court, Point Lonsdale, late April, 1968. Each has an access line to the orb-web below.

In March 1986, on looking through the kitchen window of 3 Jacqueline Court, Point Lonsdale, a well-nourished brown spider was seen sheltering in the scoop of the leg of a broken plastic clothes peg on a makeshift rope clothes line (Fig. 1). Between the line and the back fence and parallel to the line of vision was a large ovally symmetrical orb web strung on bridging threads running from the pegs downward to the fence and to the shrubbery below (Figs. 2, 3). The ingenuity of this spider to use the scoop in a broken peg to shelter from the weather and hide from its prey took my interest. Main (1980, 1984), Child (1968), Mascord (1983), gave illustrations and descriptions of orb-weaving spiders referring to them as garden spiders up to 24mm long with coarsely hairy body and legs and strong abdominal shoulder humps. The male and female spiders described in Figs. 4-6 are not as hairy as *Eriophora biapicata* figured by Walker (1982:12). The abdomen of *Eriophora* is more triangular and pointed

Figure 2.
The orb web was illuminated by spraying with a water jet siphon used for watering indoor plants. There are 24 radials and 19 to 21 links on the outer annulus. The lack of links at the centre allows less wind resistance - wind has distorted spaces between the links in the lower part of the orb. The lower part of the orb is anchored to "bottle brush" and shrubs.

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Figure 3.
Note the bridging threads between the orb and the clothesline. The peg on the right shelters the male *Araneus*.

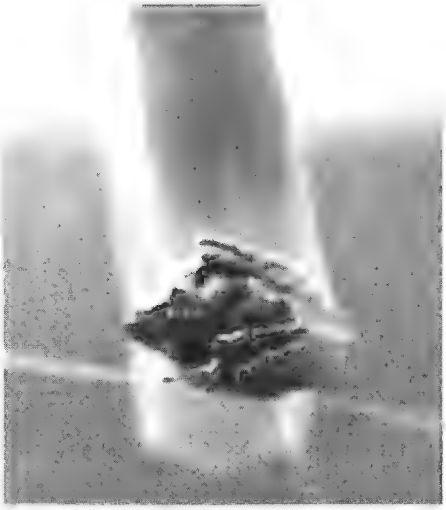

Figure 4.
Close-up view of the right peg showing the male in its resting position. Linking threads to the bridging thread and to other pegs behind it.

Figure 5.
A close up view of left peg (with one leg broken) to house female individual. Note how the third right tarsus is in contact with the thread to detect movement due to change of weight on web or wind movement. A similar habit is seen in Curling leaf spider *Phonognatha graeffei*.

than in *Araneus*. Mascord (1983:86) remarked on the value of the *Araneus* species keeping down insect pests. He described the female as ranging from 20-25mm in length whilst the male is smaller 15-17mm which is in accord with Figs. 4 and 5. Main (1984:191-2) describes the structure and web construction of *Araneus* as well as the method by which it disposes of the prey caught in the web.

This female *Araneus* took up its residence in the peg leg in early March and was still in residence in mid-May. A male arrived about mid-April and disappeared after about 2 weeks of co-habitation (Figs. 1 and 4).

Figure 6.
A strong wind and wet weather form of web of *Araneus transmarinus.* View looking south. Web plane is east-west. Note fewer radials, wider-spaced links and smaller diameter of web.
Top: Wide view to show bridging ties. Bottom: Close up view to show radials and concentric links.

In windy or wet weather, the web spun is much smaller with fewer radials (say 12 to 16), with only about 14 concentric and wider-spaced links per segment (see Fig. 6). In fine, calm weather the web is larger, say 25 to 30 radials, with over 20 links per segment, and the spacing is much closer. In all cases the plane of the web is in the direction of the wind.

One can thus forecast the weather in the early morning at Point Lonsdale by noting the Orb webs. The direction of the plane of the webs gives the wind direction. If the wind is strong with rain the orb web will be small, coarsely-textured with fewer radials and concentric links. On the other hand a large oval orb-web with closely spaced radials and links means a fine, calm day.

In late summer and autumn the curling leaf spider *Phonognatha graffei* also behaves similarly. In nasty weather it will angle its curled leaf in the wind and not spin its orb fan. It will strengthen its

bridging ties between bushes. These bridging ties will be both parallel and perpendicular to the wind direction.

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REPORT OF SPRINGTIME GET-TOGETHER OF VICTORIAN FIELD NATURALISTS CLUBS ASSOCIATION AT BALLARAT OCTOBER 4th and 5th 1986

The weather forecast was for cool sunny weather on Saturday, October 4th, but the rain descended continuously. A party of hardy, cheerful, but very wet Friends of Clarkesdale Bird Observers Reserve at Linton were waiting patiently for us beside the sodden roadside in front of the Ranger's Cottage. Twenty seven dry Field Naturalists, who had driven out from the Old Ballarat Village Inn after lunch, descended and within minutes were also wet through, but thoroughly warm from the exertion of tramping through soggy grassland and open stringy-bark forest of the Reserve, which has been so beautifully planted with acacias (at present in full flower), hakeas and grevilleas. We crossed the flooded Springdalla Creek by foot-bridge and later along a narrow concrete wall of a road ford. In spite of the rain we identified six orchids in flower within 100 yards of the bus; there were large colonies of Nodding Greenhoods *(Pterostylis nutans),* two species of *Diuris,* the Leopard Orchid *(D. maculata)* and Golden Moths *(D. pedunculata),* the Spider Orchid *(Caladenia dilatata),* the Tall Greenhood *(Pterostylis longifolia),* as well as a closed pink sun orchid *(Thelymitra sp.)* and many leaves of Helmet-orchids *(Corybas sp.).*

Further into the forest there were brilliant magenta crops of *Tetratheca ciliata,* deep violet masses of *Hardenbergia violacea,* the Ivy-leaved Violet *(Viola hederacea),* Blue Squills *(Chamaescilla corymbosa),* Yellow Stars *(Hypoxis glabella)* and patches of scarlet Running Postman *(Kennedia prostrata),* also mats of the beautiful pale pink Peach Heath *(Lissanthe strigosa)* and clumps of pinky-white Beard Heath *(Leucopogon virgatus).* All these were common flowers, but blooming so beautifully in the rain. The only native wattles that we encountered in the Reserve were Blackwood *(Acacia melanoxylon)* and Hedge Wattle *(A. paradoxa).* The most spectacular of the planted acacias was the N.S.W. Fringed Wattle *(A. fimbriata),* a golden mass of about one metre tall.

The eucalypts were mainly Messmates *(Eucalyptus obliqua)* and some fine old Candlebarks *(E. rubida).*

From a lakeside bird-hide we observed a Black Swan with cygnets, Crested Grebes, a Coot and one Black Cormorant. Other birds seen and heard in the Reserve were a Kookaburra, a White-throated Tree Creeper, a Restless Flycatcher, a Grey Thrush and a Rufous Whistler and we heard the cry of the Fan-tailed Cuckoo. Along the route we had observed flocks of Corellas, Galahs, Straw-necked and White Ibis, Ravens and Magpies. But in spite of sheets of water lying in the paddocks, water birds were rare.

That evening, the post-dinner meeting had to be curtailed as our one course meal in the restaurant claimed two hours. However, approximately 40 people attended the evening meeting in the Conference Hall of the Inn and a Roll Call disclosed that members from the following clubs were present: Ballarat, Creswick, Stawell, Benalla, Melbourne, Mornington and Mt. Martha (with 9 members) and Ringwood.

Mr. Phil Day, the retiring Head of the Geology at Ballarat College of Advanced Education, then gave a most interesting illustrated lecture on the Basalt Plains of Western Victoria and the evidence of successive lava flows at the Devil's Kitchen,

which was the venue for our excursion the following day, October 5th.

He said that the area at Pigoreet was a picturesque little area which had been intensely settled in the gold mining era and that there would be an interesting display of garden escapes as well as native plants. He warned that the Woady Yallock Creek, which had formed the ravine, would be in flood and would be difficult to cross. He then showed us photos of the steeply tilled and folded bedrock of sandstone, slates and phyllites (which felt smooth to the touch) which had been covered by several volcanic lava flows, some as recent as 5000 years ago. He explained how the lava sets solid at 1000°C and breaks into columns, which were visible as "organ pipes" along the cliffs and some of which had been undercut by the Creek. We also saw the entrance to tunnels made by the miners to reach the alluvial gold deposits below the creek.

Commenting on the wildlife of the area, Mr. Day noted that two years earlier, rabbits had been in plague proportions, but Myxomatosis had broken out and their numbers had decreased. Three members of the Creswick Field Naturalists Club were present at the lecture, who had seen during one of their excursions to the Devil's Kitchen some years previously a strange black panther-size animal walking nonchalantly along the top of the cliff, it had a long black tail and walked like a cat; it was observed through binoculars throughout, but there was no explanation of its presence. Mr. Day recalled finding a lair in the Victoria Ranges of the Grampians which smelled of cat, had enormous scats and spoor with pads some three inches across, he said that it was thought that feral cats had evolved to gigantic proportions because of the available food supply. Unfortunately, no such excitement occurred during our visit, although we watched expectantly.

The weather was gloriously sunny and as we journeyed by bus, we were followed by a convoy of nine private cars and Albert Perry, President of the V.F.N.C.A., gave an excellent commentary of the history of gold mining in the area. We stopped at a roadside bush monument erected to the memory of Ulrich Burke, a Bank Manager who was murdered there by bushrangers in 1864. Later we stopped on the road beside bare green fields which once supported Brownstown, a town of 25 to 30 000 people with hotels, shops, etc., supplying the miners who were seeking surface gold, mostly in gravels washed down from Watsons Hill. The tiny Scarsdale school was said to have had some 380 pupils attending in those days.

Along the Woady Yallock Creek in the Devil's Kitchen area we found many bushes of the Lemon Bottle-brush *(Callistemon pallidus)* Wirilda *(Acacia retinodes)* and the Shrubby Violet-bush *(Hymenathera dentata var. angustifolia),* as well as magnificent red flowering *Correa* (said by the Ballarat F.N.C.V. to be *C. glabra).* We also observed a pair of very dark coloured Peregrine falcons nesting on a small ledge in a broken "organ pipe", the hen bird was sitting on a nest and the male was seen to alight beside her carrying something in his beak.

A large iron "billy" was boiled and after lunch thanks and farewells were made before we left per bus south to Cape Clear. (Cape Clear has nothing to do with the coast or the ordinary meaning of a Cape but was said to have been the call of an old Irish bullocky meaning "Keep clear"). We then proceeded to Geelong and back to Melbourne.

Dr. Elizabeth K. Turner

Subscription Now Due

Membership subscriptions are due at the beginning of the year. If you haven't yet renewed please think of it. Prompt payment is a great help to the Club and ensures you will continue to receive the Victorian Naturalist.

FIELD NATURALISTS CLUB OF VICTORIA

Reports of Recent Activities

General Meeting
Monday, 10th November

Silence was observed by the meeting in remembrance of Miss Cecily Allen and Miss McClaren who had both recently died.

The President then introduced the speaker for the evening, our Secretary, Mr. Michael Howes who spoke on "Everything You Wanted to Know about Woodlice but were Afraid to Ask!"

Woodlice, or slaters, are Crustaceans belonging to the large (with over 900 species described) and ancient order, Isopoda.

A lot of superstition and folklore has surrounded woodlice; they are supposed to be either lucky or unlucky, to poison food and to be a remedy when swallowed for various ailments. Many colourful names have been given to them, including "Butcher Boys", "Pill Bugs", "Sow Bugs", "Cud-worms", "Cheese Lice", "Coffin Cutters", etc.

The speaker went on to describe in detail the anatomy and reproduction of woodlice and also to tell something of their ecology.

The common introduced woodlouse, *Porticellio scaber,* was introduced to Australia prior to 1840. They range in colour from dark-grey through to pink or purple, the purple colouring apparently being caused by a virus.

Mr. Howes finished by describing some of the techniques he used to catch woodlice. His talk was illustrated with slides of many native and introduced species he had caught and photographed.

Nature Notes

- A report of the November M.S.G.. excursion to the Big Desert, wildflowers were plentiful due to recent rain and the trapping results included 5 Little Pigmy Possums and a Silky Desert Mouse; A pair of Peregrine Falcons nesting in Dromana Quarry. Mr. Tom Sault.
- A report of the Red Beard Orchid from Wantirna. Mr. Doug Weston.
- There is a lot of Boneseed flowering at the moment on the Mornington Peninsula. Mr. Karl Kleinecke.
- A brief report of the recent and very successful Warby Ranges Campout on which numerous species of orchids were seen. Mr. William Ashburner.
- Small parasitic wasps, hatched from a cupmoth larva. Mr. Urwin Bates.
- Regarding Emperor Gum Moths: One spent all day on a Kangaroo Paw in his garden. Mr. Doug Weston. There do not seem to be as many around as there used to be . Dr. Jack Douglas. Still lots east of Melbourne. Mr. Karl Kleinecke. When camping, six or more are often found under the bonnet of his car – perhaps they are seeking water. Mr. Tom Sault.

General Meeting
Monday, 8th December

This being the occasion of the presentation of the Australian Natural History Medallion, the president introduced the president of the Royal Society of Victoria, Dr. Terry O'Brien, to make the award to the winner, Mr. Graham Pizzey.

Dr. O'Brien spoke of the importance of the work done by people like Mr. Pizzey in educating the public and interesting them in and giving them an appreciation of environmental issues and went on to detail some of Mr. Pizzey's achievements. (A biography of Mr. Graham Pizzey appears in the last issue of The Vic. Nat.).

After accepting the Medallion, Mr. Pizzey went on to give the address for the evening, entitled "A Tale of Two Worlds – A Naturalists View of Reality." in which he reflected on the growing gap between those who appreciate Natural History and those who don't.

He considers that there are too many people today who remain outside the thrall of Natural History; people who are too selfish, too interested in money and possessions and who have too little compassion for others or the natural world. For them a different time scale is important. They are only interested in instant gratification and have no thought for the long term consequences of their actions.

Because of such attitudes we are today faced with many enormous environmental problems such as the clearing of our forests, the spread of soil salinity and diseases such as dieback and the urbanization of Barrier Reef Islands.

Mr. Pizzey believes that only by developing a "land ethic" whereby we regard ourselves as belonging to the land rather than the land as a commodity belonging to us, will we come to love and respect the land rather than abuse it.

Although he considers that these ideas may sound very idealistic, Mr. Pizzey believes that there is at present a powerful force for change, as so many people now believe that something must be done to stop the destruction of the environment.

Exhibits

- Under microscopes: *Euglena* collected as green scum on sandbanks, a walking jellyfish *Cnidonema haswellii* and several species of hydroids and bryozoans. Mr. Dan McInnes.
- Two species of parasitic wasps, one lot emerged from the body of a Cabbage White Butterfly larva and the other from a Cup Moth larva. Mr. Urwin Bates.
- Lerps on leaves of *Eucalyptus botryoides*. Mr. Tom Sault.
- Bag Moth cocoons on *Prostanthera* stems. Mrs. Hilary Weatherhead.

Nature Notes

- Regarding Lerps: Lerps seem to attack trees more severely when they are already under stress. Mr. William Ashburner.

Richard Loyn believes that Bellbirds cultivate Lerps. Dr. Jack Douglas.

Lerps do infest stressed redgums - the mobilization of nutrients in the plant seems to be a factor. Bellbirds drive off other lerp-feeders and often just remove the carbohydrate covering, leaving the insect. Lerps are therefore more frequent when Bellbirds are present. Mr. Graham Pizzey.

Suburban trees may be particularly badly infested with lerps due to the lack of lerp-feeders such as Pardalottes. Mr. Doug Weston.

Noisy Miners do the same as Bellbirds. Mr. Bill Middleton.

- A pair of Willy Wagtails have nested in the same nest twice this season at Blackburn Lake. Miss Gwenneth Taylor.
- A Red-whiskered Bulbul seen at Yarraville over a period of 1½ weeks. Mr. Norm Plever.

C. M. Shankly.

Macedon and Pyrete Ranges Bibliographies

The Macedon Range Conservation Society has published a valuable research document entitled "Annotated Bibliographies to the Flora, Fauna and Landscape of the Macedon and Pyrete Ranges".

The 18 page document, compiled by Ian Lunt, includes 95 reports, articles, books and submissions which relate to the natural environment of the two ranges.

All articles are arranged in categories (e.g. flora, mammals, planning, etc.) to enable easy reference. A select list of recent and comprehensive reports, which provide the most useful information on the biology of the ranges, is also included.

The annotated bibliographies will prove invaluable to everyone with an interest in the flora, fauna and landscape of the Macedon and Pyrete Ranges and surrounds. Copies are available for $3.00 (to cover production and mailing costs), from the Macedon Range Conservation Society, P.O. Box 51, Macedon, 3440.

Special Note for Authors Using Wordprocessors

Many wordprocessing and microcomputer floppy disks can now be transcribed directly to our printer's typesetting equipment, saving the effort and cost of rekeying.

Authors of papers which have been typed on a wordprocessor should tell the editor (at the time the paper is first submitted), what type of machine and wordprocessing software was used. Note that printed copy must still be submitted.

Queries can be directed to Russell Thomson, 17 Powlett St., Heidelberg. 344 5704 (B.H.).

(Continued from inside front cover)

GROUP EXCURSIONS

All FNCV members and visitors are invited to attend any Group Excursions.

Botany Group

Saturday, 28th February. Cement Creek, Warburton. Ferns and Mosses. Leader: Mr. Arthur Thies.

Saturday, 28th March. Grantville. Remnant Fern Gully and Mangrove Foreshore. Leader: S. Rennick.

Saturday, 25th April. Doongalla Forest Reserve. Leader: C. Falkingham.

Geology Group

To be announced.

Mammal Survey Group

Saturday, 14th-Sunday 15th February. M.M.B.W. Farm, Werribee.

Saturday, 7th-Monday 9th March, Strathbogie Ranges.

Friday 17th-Tuesday 21st April. East Gippsland.

INSTRUCTIONS TO AUTHORS

The Victorian Naturalist invites contributions of original papers relating to Australian natural history, particularly of Victoria. All papers are assessed by an independent referee before publication.

Short contributions of natural history observations are also invited for use as "Naturalist Notes". These contributions may be edited, or excerpts published, at the Editors' discretion. Such notes are not normally refereed, and may be submitted more informally.

All contributions are to be written in concise, simple English.

For cost reasons, authors of original papers submitted for publication are requested to conform with the following guidelines. Any author who has difficulty in complying with these guidelines, or has queries concerning manuscripts, should consult the Editors before submitting a manuscript

Submission of Manuscripts

Manuscripts should be sent to The Editorial Committee, Victorian Naturalist, F.N.C.V., C/- The National Herbarium of Victoria, Birdwood Ave., South Yarra, 3141.

Two typewritten copies of the manuscript should be submitted. Authors are advised to retain a further copy.

Format

Text should be fully revised, typed double spaced on one side of the paper only, with a wide margin, pages numbered consecutively, and should conform in style to recent issues of the *Victorian Nat.*

Author's name and address or institution should appear beneath the title. Underline only those words to be italicised in the text i.e. genus and species names, and titles of periodicals and books. All measurements should be expressed in the metric system (SI units).

References should be cited in the text as Brown (1981) or (Brown, 1981). Footnotes must be avoided. Acknowledgements should be grouped at the end of the paper before References.

References should be listed alphabetically by author's surname at the end of the paper. All references should be cited in the text. Abbreviations of titles of periodicals should conform with those in *A World List of Scientific Periodicals* (4th ed., Butterworth). Refer to recent issues of the *Victorian Nat.* for the formatting of references.

Tables and Figures

Tables should only be used for essential data needed to show important points in the text. They should be numbered consecutively, referred to in order in the text, and designed to fit within the print area of 115 x 180 mm. Each table must have an explanatory caption.

Figures may be in the form of drawings or photographs. They should be identified on the back with the author's name and the figure number. The top should be indicated and the magnification by scale where appropriate. Compass directions must be indicated where necessary. All figures should be referred to in the text and numbered consecutively (Fig. 1, Fig. 2 etc.).

Figures should be carefully prepared and should be submitted ready for publication. Each should have a short caption. Maximum size is 115 x 180 mm; single column width is 55 mm. Figures are preferably submitted at actual size. Lettering on Figures should be done by the author; care is needed to ensure that all letters are legible after reduction.

Line drawings should be made in black ink.

Photographs should only be used where essential due to the high cost of printing plates. They should preferably be unmounted, glossy black & white prints, showing good detail and moderate contrast

Proof and Reprints

Galley proofs will be sent to the author, who should correct and return them as soon as possible. Only the minimum of corrections should be made.

Multiple copies of articles can be prepared for the author only at the time of printing. These will be in the form of print run-ons and priced as follows for each multiple of 50 copies:

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Orders for these 'reprints' must be made at the time authors return their corrected proofs to the editor.

Taxonomic Papers

Papers describing new taxa will not be accepted for publication unless the primary type material is deposited in a recognised public museum or herbarium.

It is suggested that in other more general papers where taxonomy is discussed, voucher material be lodged in a public collection, and the repository details cited in the text.

Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria

Established 1880

Registered Office: FNCV, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

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His Excellency, The Rev Dr John Davis McCaughey, The Governor of Victoria.

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MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

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GENERAL MEETINGS

Monday, 13th April, 8.00 p.m.
Mr. Robin Youl. "The Government's role in tree growing".

Monday, 11th May, 8.00 p.m.
Annual General Meeting and Presidential Address.

Monday, 15th June, 8.00 p.m.
Dr. Bill Birch. "Crystals".

New Members

Metropolitan:

S. Manser, 24 Geades Crescent, Hoppers Crossing, 3030.
Dr. Geoff Lacey, 5/9 Wattle Avenue, Glenhuntly, 3163.
Mrs. Cherry Wilcox, 1-7 201 Spring Street, Melbourne, 3000
Mr. Andrē Cleghorn and Mrs. Hilde Cleghorn, 18 Mundy Street, Mentone, 3194.
Mr. Geoff Carr, 13 Lawson Street, East Hawthorn, 3123.
Ms. Sarah Bedggood, 116 James St., Rosanna, 3084.

Country:

Dr. Roger S. Briggs, P.O. Box 402, Myrtleford, 3737.
Mr. Rod Barker and Mrs. I. Barker, Bunyip House, c/o P.O. Healesville, 3777.
Mrs, J. A. Forbes, Tankerton, French Island, 3921. (Joint with Dr. Forbes, a current member)

FNCV EXCURSIONS

Sunday, 3rd May, Lysterfield Park. The coach will leave from Batman Avenue at 9.30 a.m.. Fare $10, bring a picnic lunch.

Sunday, 31st May. Fungi excursion to be led by Dr. J. H. Willis. Note date. This will be a week earlier than the date given in the calendar of events to avoid the holiday weekend, The destination will be decided later according to weather conditions. Fare $12, bring a picnic lunch.

Friday, 16th – Sunday, 18th October. Waranga Basin, Rushworth will be the venue for the Victorian Field Naturalists Club's Association Spring get-together. Accomodation has been booked in the holiday camp with meals. This will be in bunks with pillow and mattress, but it will be necessary to take pillowslips, sleeping bags or blankets and linen and towels. The camp has a dining room and a large lounge. The facilities are within the building and most members should have a lower bunk. There is a camping ground with a few on-site vans for those who prefer to camp and the area is within easy reach of Rushworth Forest which is noted for its wildflowers. Benalla F.N.C. will host the weekend. Based on 20 members, the cost with meals should be about $100. Please book as soon as possible.

GROUP MEETINGS

All FNCV members and visitors are invited to attend any Group Meetings.

Day Group – Third Thursday

Wednesday, 15th April (note change of day). Planetarium, Museum of Victoria. Meet at Swanston Street entrance at 11.30 a.m.. Session begins at 2.00 p.m.. Leader: Andy Blackburn 379 8960.

Thursday, 21st May. Caulfield Park and Caulfield Racecourse Museum. Meet at the corner of Hawthorn and Balaclava Roads at 11.30 a.m. Leader: Dan McInnes 211 2427.

Thursday, 18th June. Burnley Gardens. Meet at the entrance of the gardens at 11.30 a.m. Leader: Joan Miller 836 2681.

At the National Herbarium, Birdwood Avenue, South Yarra at 8.00 p.m.

Botany Group – Second Thursday

Thursday, 9th April. "Western Australia – Darling Range and Northern Sand Plains." Mrs. Hilary Weatherhead.

Thursday, 14th May. "The Impact of Introduced Weeds on the Native Flora." Mr. Geoff Carr.

Thursday, 11th June. Members' Night.

(Continued on inside back cover)

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Cover Illustration: Habit of *Melaleuca ericifolia* (see page 42) *Photo:* D. Albrecht.

Diet Analysis of the Western Grey Kangaroo (*Macropus fuliginosus*) in Wyperfeld National Park by Microscopic Faecal Analysis

By P. Belcham*, J. Kiely*, J. MacKenzie*, S. Vaartjes*, A. L. Pennell*†, and T. P. O'Brien*.

Abstract

Diet analyses were carried out by microscopic examination of faecal pellets on samples collected in the six major habitats of Wyperfeld National Park during August 1983, in order to ascertain the selective and/or preferential feeding habits of the Western Grey Kangaroo (*Macropus fuliginosus*). It was found that the majority of the diet consisted of monocotyledons, although actual percentages and species eaten changed between habitats.

Introduction

Diet analyses of herbivorous mammals, such as sheep and kangaroos, have been recorded at many different locations. For example Storr (1961), Griffiths *et al.* (1974), Ellis *et al.* (1977) used microscopic analyses of faeces, and Taylor (1983) used analysis of gut content, to ascertain the diet of herbivorous mammals. This study, based at Wyperfeld National Park (NW Victoria) in August 1983, investigated the feeding habits of the Western Grey Kangaroo (*Macropus fuliginosus*), using microscopic analyses of faeces.

Western Grey Kangaroos are found in a wide area, from south-western Australia through the south into western Victoria, where its range overlaps with the Eastern Grey Kangaroo (*M. giganteus*).

Western Greys are predominantly nocturnal or crepuscular (twilight) in habit (Russell 1974). They spend much of the middle part of the day lying under trees and shrubs in highly organised social groups (Caughley 1964). They are sedentary, rarely moving more than a few miles in search of food, even in drought conditions (Russell 1974). Their home range (i.e., the area over which they travel in pursuit of routine activities), is therefore very small in comparison with Red Kangaroos (*Megaleia rufa*) which often travel extensively (Russell 1974).

Previous studies (Low *et al.* 1981; Russell 1974; Griffiths *et al.* 1974) have shown that kangaroos much prefer grasses to other feed; Eastern Greys often eat approximately 89% grass in their diet.

Kangaroos have a higher proportion of monocotyledons in their diet than dicotyledons, although monocotyledons have a lower nitrogen content (Brown and Main 1967; Griffiths *et al.* 1974; Taylor 1980). Griffiths *et al.* (1974) suggest that kangaroos are capable of using the soluble carbohydrates present in grasses as their energy source, thereby avoiding the need to deaminate proteins for this purpose, and so retaining more nitrogen.

Morgan (1986) has classified Wyperfeld National Park into the following six habitats: Lakebeds; *Callitris* Woodlands; River Red Gum Woodlands (*Eucalyptus camaldulensis*); Black Box Woodlands (*Eucalyptus largiflorens*); Mallee and Heath; and Sand-Dune Herbfields. This study used this habitat classification to investigate the distribution and diet of the Western Grey Kangaroo in Wyperfeld National Park during August 1983.

Materials and Methods

Using binoculars and rangefinders, two transects (after Morgan 1986) were covered in order to calculate the distribution and

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density of the Western Grey Kangaroo. Between them, these transects covered all six of Morgan's major habitats. A minimum of six subsamples of fresh and old kangaroo pellets were gathered from each habitat. Plant specimens were collected from each habitat; some were pressed for later identification using the Wyperfeld herbarium based at the Botany Department of Monash University, while others were stored as fresh samples at 4°C for later analysis.

Cuticular Preparations

Fresh material from selected, identified plant specimens was cut into small pieces and cleared, usually overnight, in 4% sodium hypochlorite solution. The cuticles were then rinsed well to remove bleach and stained in crystal violet or gentian violet for approximately 30 seconds and mounted in Karo syrup on microscope slides (R. Waters, Zoology Department, Monash University, *pers. comm.*; Ellis *et al.* 1977). Both adaxial and abaxial surface preparations were made and distinguishing features were photographed for reference at x100, x400 and x600.

Faecal Preparations

The six or more subsamples collected from each habitat were pooled, and one faecal analysis per habitat was carried out, using the following method. Kangaroo pellets were soaked in warm water, ground, using a pestle and mortar, and then cleared in 4% sodium hypochlorite for an average of 2-4 hours at 50°C, or for longer times (up to several days) if necessary. The residue was rinsed thoroughly with water, stained and mounted as for the cuticular preparations. These slides were then scanned under x100 magnification using a 500μm x 500μm grid. Epidermal segments, lying over grid intersection points, were classified and recorded using epidermal cell shape, hairs and silica bodies as identification aids. Where possible classification was made at the species level but mostly only broad distinctions between the narrow elongated cells of monocotyledons and the tabular irregularly-shaped cells of dicotyledons were made (Esau 1977; Ellis *et al.* 1977).

Results

a) Transects

The distribution and densities of the Western Grey Kangaroo during August 1983 were greatest in the two most exposed habitats, i.e., Sand-Dune Herbfields and Lakebeds (Table 1). Morgan, (1986) using a similar method over several years in this same area, showed that this is not a constant situation. His data for 1981 are reproduced also in Table 1.

b) Species Lists

Species lists from each habitat except the Mallee and Heath habitat are included in Table 2

c) Cuticle Reference Preparations

Plant species found in faecal pellets collected from the different habitats and the proportions of monocotyledons and dicotyledons are summarised in Table 3. Various pellet samples showed some cuticle fragments which appeared to be different from any of the reference cuticles e.g. *Callitris* Woodland pellets contained

Table 1. The distribution and densities of the Western Grey Kangaroo (*Macropus fuliginosus*) in six habitats of Wyperfeld National Park (after Morgan 1986) in 1981 & 1983.

Habitat	D. G. Morgan 1981 Individuals/hectare	August 1983 Individuals/hectare
Sand-Dune Herbfields	0.4 ± 0.1	0.4 ± 0.2
Lakebeds	0.7 ± 0.2	0.3 ± 0.1
River Red Gum Woodlands	0.9 ± 0.2	0.3 ± 0.1
Black Box Woodlands	0.7 ± 0.2	0.3 ± 0.1
Callitris Woodlands	0.8 ± 0.4	0.1 ± 0.1
Mallee and Heath	0.07 ± 0.04	0.02 ± 0.02

Table 2. The plant species recorded in each habitat. No list was available for Mallee-heath. P = species present. D = species locally dominant. Di = Dicotyledon M = Monocotyledon

Species		*Callitris* Woodlands	Sand-Dune Herbfields	Black Box Woodlands	River Red Gum Woodlands	Lakebeds
Acacia spp.	(Di)	P				
Actinobole uliginosum	(Di)	P	P	P	P	
Ajuga australis	(Di)		P			
Anagallis arvensis	(Di)	P				
Arctotheca calendula	(Di)	P	P			
Brachycome cardiocarpa	(Di)	P				
Brachycome perpusilla	(Di)					P
Brassica tournefortii	(Di)	D	D	D	D	P
Bromus diandrus	(M)	P				
Bromus rubens	(M)	D	P	P		P
Calandrinia eremaea	(Di)	P		P		
Callitris preissii	(M)	P				
Calotis hispidula	(Di)	P				
Capsella bursa-pastoris	(Di)				P	
Carex bichenoviana	(M)				P	
Centaurea melitensis	(Di)					P
Cynoglossum spp.	(Di)	P				
Danthonia spp.	(M)	P		P		
Daucus glochidiatus	(M)	D	P	D	P	P
Enchylaena tomentosa	(Di)			P		
Erodium cicutarium	(Di)	P		P		P
Erodium crinitum	(Di)	P			P	
Eucalyptus incrassata	(Di)	P				
Gnaphalium involucratum	(Di)				P	
Haloragis heterophylla	(Di)	P				
Harmsiodoxa blennodioides	(Di)	P		P		
Helipterum pygmaeum	(Di)	P			P	
Hibbertia virgata	(Di)	P				
Hordeum leporinum	(M)	P	P	D	D	D
Hypochaeris glabra	(Di)	D	P	P	P	P
Isoetopsis graminifolia	(Di)	P		P		
Leptospermum coriaceum	(Di)	P				
Marrubium vulgare	(Di)			P		D
Medicago polymorpha	(Di)		P	D	D	D
Millotia macrocarpa	(Di)	P				
Myriocephalus stuartii	(Di)	P	P	P		
Onopordum acaulon	(Di)		P	P		
Pelargonium australe	(Di)					P
Pentaschistis airoides	(M)	P	P	P		
Plantago varia	(Di)	P		P	P	
Podolepis capillaris	(Di)	P				
Schismus barbatus	(M)	P		P	P	
Senecio glossanthus	(Di)	P		P		
Senecio lautus	(Di)					P
Senecio vulgaris	(Di)					P
Silene longicaulis	(Di)		P	P		
Sisymbrium orientale	(Di)					P
Sonchus oleraceus	(Di)	P				
Stellaria media	(Di)			P		
Stipa spp.	(M)		P		P	P
Trifolium spp.	(Di)	P	P			
Trifolium tomentosum	(Di)	P		P		
Vulpia bromoides	(M)	P	P			
Vulpia myuros	(M)	P		P		

Table 3. Summary of Results of Faeces Analysis. Confidence limits are ± 1 standard deviation. It is assumed that the observed number of either monocotyledons or dicotyledons has a binomial distribution and this variance $\delta^2 = npq$. Strictly this assumption requires that grid points be randomly distributed, but the assumption should be approximately valid since the grid spacing is large compared with the average size of cuticle particles.

Sample No.	Habitat Type	Fresh or old dung	Number of grid points intersecting cuticle	Monocotyledons %	Dicotyledons or *Callitris* %	Notes
1	Lakebed	Fresh	136 ± 4	61 ± 4	39 ± 4	Species identified were the grasses *Bromus rubens, Stipa spp. Hordeum leporinum* and the dicotyledons *Medicago, Erodium, Daucus, Sisymbrium.*
2	Sand-Dune Herbfields	Fresh	100	92 ± 3	8 ± 4	*Vulpia* was most prominent amongst the grasses. The dicotyledons *Trifolium spp.* and *Silene longicaulis* were identified.
3	,,	,,	100	83 ± 4	17 ± 4	
4	,,	,,	100	87 ± 3	13 ± 3	
5	,,	,,	100	90 ± 3	10 ± 4	
6	*Callitris* Woodlands	Fresh	100	65 ± 4	35 ± 4	*Vulpia* was the major grass component in all samples.
7	,,	,,	120	67 ± 4	33 ± 4	*Trifolium* constituted over 80% of the dicotyledons present in samples 6 and 7 but was absent from sample 8. Other species identified were *Danthonia, Schismus, Triodia, Pentaschistis, Brassica* and *Callitris.*
8	,,	Old	100	83 ± 4	17 ± 4	In sample 8, cuticles were degraded and hard to identify.
9	Mallee & Heath	Fresh	100	92 ± 3	8 ± 3	In sample 9, *Triodia* constituted over 60% of the grass component. *Callitris* was the major non-grass component.
10	,,	Old	—	—		In sample 10, cuticles were badly degraded no *Triodia* was identified but *Callitris* and a sclerophyllous dicotyledon similar to *Eucalyptus* were present.
11	Black Box Woodlands	Fresh	100	85 ± 3	15 ± 3	*Vulpia* was the most dominant grass consumed. Also identified were *Hordeum, Pentaschistis,* and the dicots *Oxalis, Medicago, Trifolium* and *Brassica.*
12	,,	,,	100	90 ± 3	10 ± 3	
13	River Red Gum Woodlands	Old	100	83 ± 4	17 ± 4	Species identified were *Bromus, Hordeum, Pentaschistis, Oxalis* and *Trifolium* and *Brachycome.* Bark fibres from River Red Gums may have been present.
14	,,	Fresh	100	55 ± 4	45 ± 4	

a grass of reasonably frequent occurrence with distinctive red staining bodies between the ends of adjoining cells.

Discussion

Previous studies (Low *et al.* 1981, Morgan 1986) have found that kangaroos move to open places during drought for food, but return to sheltered woodlands when there is plentiful food. This study found differences between the habitats in the grass species consumed by Western Grey Kangaroos. *Vulpia* spp. was the predominant grass found in pellets from Sand-Dune Herbfields, *Callitris* and Black Box Woodlands, but was not recorded as part of the Lakebed flora. Similarly, *Bromus rubens* was identified in Lakebed pellets but not in *Callitris* Woodlands, although it was recorded as abundant in the latter area.

The Mallee faecal samples showed a diet consisting of a high proportion of *Triodia irritans*, even though more palatable plants grew nearby. Griffiths and Barker (1966) suggest that *Triodia irritans*, which has a higher nitrogen content than many monocotyledons, is eaten in order to supplement the water and nitrogen content of the diet of Red and Grey Kangaroos, especially during periods of drought. R. Waters (*pers. comm.*) found that Swamp Wallabies (*Wallabia bicolor*) ate bark at the end of the summer when food was scarce, but at Wyperfeld, the Western Grey Kangaroos were observed eating bark from River Red Gums during August 1983 when food was plentiful and traces of bark fibres were present in River Red Gum faecal pellets. It would be interesting to study the effect of differing seasons on the selective diet of the Western Grey Kangaroo and the varying impacts grazing animals have on such a boom or bust ecological succession environment.

The plant species identified in the pellets coincided for the most part with those growing in the habitat from which the pellet was collected. Thus, this study confirms the observations of Morgan (1986) that the Western Grey Kangaroo has a small home range, and is therefore a localised feeder.

On the basis of cuticle area, grasses constituted the major dietary component in all habitat types with values ranging from over 90% in the Sand-Dune Herbfield habitat to approximately 66% in Lakebed and *Callitris* Woodlands. This could indicate that Sand-Dune Herbfield kangaroos are consuming significantly greater proportions of grasses than in the Lakebed or *Callitris* Woodlands; or could be a sampling error, as pellets collected from one area may have come only from one animal.

There are reservations about the accuracy of the results obtained because of the limited sampling and the techniques used in the microscopic analyses of faeces. Ideally, the required diagnostic features of cuticle used in the analysis of faecal samples are as follows:

i) Cuticle must be preserved during digestion and subsequent clearing.
ii) Features should be relatively constant over the surface of the cuticle.
iii) Features should occur at high frequency so that they occur on most suitable cuticle pieces.
iv) Distinctive variations between species should be observed. Several potentially useful diagnostic features of cuticles e.g. orientation and shape of cells; trichome structures (i.e. micro and macrohairs, stellate and clothing trichomes and papillae); silica bodies; costal and intercostal zones; anticlinal cell walls and stomata have been discussed (Metcalfe 1960; Metcalfe and Chalk 1950) and were used to identify plant species in this study.

Slater and Jones (1971) found that the cuticle of different plant species, and even genera, are often extremely similar and pointed out that with time, in sodium hypochlorite, certain cuticles are destroyed, or so changed as to be unrecognisable. This was especially so in dicotyledonous plants when the silica content is lower. R.

Waters (*pers. comm.*) working on the diet of wallabies in a high rainfall area of South Gippsland, found that the time required to clear sclerophyllous particles e.g. Eucalyptus leaves, was too long for the preservation of less resistant *Trifolium* spp. Waters suggests that up to three different clearing times may be necessary for each sample in order to determine accurately the different species found in faeces, and Slater and Jones (1971) found legumes ingested by cattle and detectable in oesophageal fistulas could not be detected in the faeces. More easily identifiable species will tend to be overestimated in the diet (e.g. *Triodia irritans*), and featureless species will tend to be overlooked. Griffiths *et al.* (1974) showed that estimates comparing stomach contents and faeces were in fairly good agreement but that the sclerophyllous species tended to over estimated using faeces. This difference might be real, if lower intestinal tract digestion in fact takes place, although Dawson and Ellis (1979) showed there were consistent differences between gut and faecal estimates for some plant categories. In particular, grasses were estimated to be lower in the faeces than in the guts and plants with stellate trichomes e.g. *Senecio glossanthus* and *Pelargonium australe* were always overestimated, suggesting that the principal factor affecting the difference between gut and faecal estimates was the character of the plant itself and not the type of digestion it had undergone. However, in semi-arid environments (similar to the one of this study) Ealey and Main (1967), Stewart (1967), Field (1968), Sparks and Malachek (1968), Storr (1968), Bailey *et al.* (1971) and Griffiths *et al.* (1974) have considered faecal analysis to be reasonably reliable because of the robust nature of the sclerophyllous plants containing either silica hairs or bodies of various shapes or which are lignified. Even a relatively mushy plant like *Portulacca oleracea* grown in an arid climate is robust enough to retain identifiable characteristics for faecal analysis.

The quantitative method used (point sampling using random points or, as in this study, using a widely spaced grid) provides a means of estimating relative cuticle areas in the preparation. It was used in preference to other methods, such as presence or absence of cuticle type in a microscope field (Sparks and Malachek (1968); R. Waters *pers. comm.*) or classification of 400 particles as either monocotyledons or dicotyledons (Griffith *et al.* 1974), because it was easier to standardise between different workers. In a population study it would be best to pool data derived from single pellets from a number of different animals of different age and sex over a period of time. Pellets dropped from animals with diurnal feeding patterns should be sampled at various times throughout the day. The study of single pellets can at best give information about diet over one or two hours only, depending on gut passage rates.

Allowing for these reservations, the methods used in this study have been widely used. Taylor (1983) found large kangaroos to be almost exclusive grazers with a high proportion (78% to 98%) of low-fibre grass in the diet and a variable dicotyledon component depending on the seasonal conditions and vegetation. This study confirmed these observations and, although there were more dicotyledon species in each habitat (Table 2), higher numbers of monocotyledon species were subsequently identified in the faeces (Table 3). *Brassica* was abundant in all habitat types except possibly the Mallee, but it was not identified as a significant component of the kangaroos' diet. This is probably due to selective grazing by kangaroos, or could be due to poor preservation or poor recognition of the cuticle. Sanson (1982) shows that dental morphology of kangaroos is adapted to grass eating, their many cusps being continually replaced and allowing them to cope with the high fibre content found in some grasses which supports the view that kangaroos do graze selectively for grasses.

Conclusions

Western Grey Kangaroos (*Macropus fuliginosus*) at Wyperfeld National Park during August 1983 appeared to prefer open rather than sheltered habitats.

The results from the microscopic examination of faecal pellets must be treated with caution. However, it appears certain that Western Grey Kangaroos selectively graze monocotyledon rather than dicotyledon species. The actual species grazed differ according to habitat.

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The Diet of the Red Fox *(Vulpes vulpes)* in the Eldorado Hills of North-East Victoria.

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Abstract

During the summer and autumn of 1983 and 1984, 26 fox stomachs and 14 samples of scat and den litter from the Eldorado Hills (north-east Victoria) were examined and their contents identified and quantified. Mammals were the most common prey, with rabbit *(Oryctolagus cuniculus)* predominating. Native mammals appeared rarely; one, the common dunnart *(Sminthopsis murina),* had not previously been reported in this area.

Foxes frequently ate insects, the number consumed reflected differences in weather conditions for the two years.

This study appears to support the view of the fox as an opportunistic predator and scavenger.

Introduction

Studies of the diet of the red fox *(Vulpes vulpes)* in Australia and overseas have tended to indicate the animal to be primarily an opportunistic scavenger and predator, (McIntosh, 1963; Hockman and Chapman, 1982), but there is still much debate on the economic significance of fox predation in agricultural areas, and its contribution to the decline in numbers of the smaller indigenous mammals and birds.

Research into the feeding habits of foxes in Australia has mainly been confined to the analysis of stomach contents or scats. Sheep *(Ovis aries)* and rabbit *(Oryctolagus cuniculus),* and sometimes house mouse *(Mus musculus),* constitute the major food items of the fox in the Canberra district. (McIntosh, 1963), New South Wales (Martenz, 1970, Croft and Hone, 1978) and Victoria (Coman, 1973). A survey carried out in the Kinchega National Park, where no domestic stock were available, still showed rabbit as the main food item, except in autumn when insects competed for this role (Ryan and Croft, 1974).

The main objective of this study was to determine and attempt to evaluate the major components of the fox's diet in an area of north-east Victoria.

Area Surveyed

The area in which the survey took place is situated in north-east Victoria between the Ovens Valley and the Pilot Range. A rectangular area of 10 × 5 km was defined on the Survey Corps map of Wangaratta, the grid reference of its south-west corner being 448517.

Most of this area is unreserved Crown Land, with its margins adjoining pastoral farmland to the south and west. Annual rainfall averages 700 mm, with winter being the wettest season. Less elevated parts are very frost-prone in winter. The hills are granitic and rise to 400 m above sea level on either side of Reedy Creek, which, except in extremely dry summers, is a permanent creek. The soil is coarse and sandy, very shallow, and gives rise to the dry, open forest which is characteristic of the region.

By coincidence, the seasons in which the foxes were sampled were very different. The autumn of 1983 followed a period of drought, while the spring and summer of 1984 were much wetter.

Methods of Collection

Foxes were collected by two methods. A small number were shot during visits to the area; others were made available by farmers and skin hunters of personal acquaintance.

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The area was divided into eight units, each of which was visited at dawn and dusk to ensure diurnal differences between food items did not affect the results. In fact, most of the 26 foxes were killed at night, with few being observed in the morning. Scat and den litter was collected during these visits, and dried and stored in paper bags prior to examination. During the months of August to December few foxes were observed and none collected.

The entire alimentary canal was removed from each fox and tied at the base of the oesophagus, below the pyloric sphincter, at the anus and caecum. The stomach and intestines could then be separated and their contents weighed and stored in 10% formalin for later sorting.

Analysis of Gut Content

The contents of each part of the gut were sorted and identified, visually where possible. Bird remains were identified by examination of feathers. Mammal remains were generally identified by their hair colour and structure of bones and claws and, in some cases, by the presence of organs such as feet and ears. Where these methods proved difficult Brunner and Coman's (1974) technique for identification of mammalian hair was employed.

Scats were treated in a similar manner, but no attempt was made to estimate percentage volume occurrence.

Methods and Treatment of Data

Occurrence of each specific food item was listed separately for each technique, and the percentage occurrence was

Table 1
Occurrence of food items in 26 fox alimentary tracts from North-East Victoria.

FOOD ITEM	WEIGHT	OCCURRENCE			
		Total No.	Mean %	1983 %	1984 %
Animal					
Oryctolagus cuniculus	42.5	13	25	26.9	23.1
Mus musculus	2.7	3	5.7	3.8	7.6
Trichosurus vulpecula	0.8	1	1.9	3.8	—
Ovis aries	0.4	1	1.9	—	3.8
Gallus gallus	0.2	1	1.9	3.8	—
Unidentified bird	0.4	2	3.8	3.8	3.8
Annelid	0.01	1	1.9	—	3.8
Gryllidae sp.	0.4	2	3.8	7.6	—
Magicicada sp.	3.9	6	11.8	3.8	19.8
Coleoptera sp.	0.4	4	7.75	—	15.4
Odonata sp.	0.4	2	3.8	—	7.6
Larvae	0.1	1	1.9	—	3.8
Eggs	0.5	1	1.9	—	3.8
Other insects	0.5	7	13.45	7.6	19.2
Arachnid		1	1.9	3.8	—
Unidentifiable	28.0				
Plant					
Grass	3.0	13	25	38.5	11.5
Berries	2.0	2	3.8	—	7.7
Eucalyptus leaves	0.25	3	5.75	—	11.5
Seeds	0.9	1	1.9	3.8	—
Seed pods	0.3	1	1.9	3.8	—
Unidentifiable	12.34				

calculated from the ratio of the number of times a specific food item was found to the total number of separate occurrences for all food items, or stomachs. Clearly the number of occurrences is insufficient information in itself, as it gives no indication of how great a proportion of the entire gut contents each item takes up, therefore, some method of estimating the amount of each food item present is required.

Two other methods, both of which have limitations, have been used by various workers to assess importance of prey species in a predator's diet, percentage volume (Coman, 1973; Croft and Hone, 1978), and percentage weight (Ryan and Croft, 1974). In each case the specific food item is expressed as a percentage of the total volume of weight of food present. With the food in various stages of digestion it is often difficult to accurately separate food items from one another, and from digestive juices. Any method, therefore requires fairly gross estimation, but is nevertheless essential if a true representation of the fox's total diet is to be given.

Results and Discussion

The sample of 26 foxes and 14 collections of scat and den litter (Tables 1 and 2) was considered too small for statistical purposes, but these results show that the fox's diet is omnivorous and covers a wide variety of food types, which are eaten when available.

By weight, mammals made up the greatest proportion in the diet in both years. Insects figured more prominently in the wetter year (1984), but the percentage occurrence of these indicated a greater importance in the diet than did the percentage volume. Of the vegetation ingested, some was presumably taken in incidentally with other food items, but it is apparent that berries, for example, are deliberately eaten when available. Reptiles, birds and fish appear to play little part in the diet of foxes in this area.

Of the vertebrates, the rabbit predominates, both by percentage weight and percentage occurrence. The presence of some native mammals suggests that these will be taken when available, their comparative rareness and elusiveness making them less likely to be caught than more easily obtainable prey. The sheep sample contained an amount of wool, and was probably taken in as carrion.

Large numbers of cicadas in the stomachs reflect the annual fluctuations in the populations of these insects, which again supports the view of the fox as an opportunistic feeder. A variety of other insects was found in the food

Table 2
Occurrence of food items in 14 samples of fox scat and den litter from North-East Victoria.

FOOD ITEM	OCCURRENCE			
	Total No.	Mean %	1983 %	1984 %
Oryctolagus cuniculus	10	35.7	35.7	35.7
Trichosurus vulpecula	3	10.7	14.3	7.1
Sminthopsis murina	3	10.7	14.3	7.1
Vulpes vulpes	3	10.7	21.4	—
Pseudocheirus peregrinus	1	3.55	7.1	—
Scincidae sp.	1	3.55	7.1	—
Magicicada sp.	1	3.55	7.1	—
Coleoptera sp.	2	7.1	7.1	7.1
Orthoptera sp.	1	3.55	7.1	—
Other insects	3	10.7	7.1	14.3
Seeds	3	10.7	14.3	7.1
Other vegetation	6	21.45	18.6	14.3

samples, but they were mainly from the orders Coleoptera and Orthoptera.

The ability of the fox to utilise such a wide variety of food types must be the basic factor in the establishment of sizeable fox populations in the different environments Australia offers. The results of this survey tend to be very much in line with similar studies carried out in other parts of the country, i.e. the fox is an opportunistic predator and scavenger.

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Notes from the National Herbarium of Victoria – 3
A poorly known *Melaleuca* in Victoria

BY DAVID ALBRECHT*

Willis (1973) was apparently the first author to recognise two distinct forms of *Melaleuca ericifolia* Smith (Swamp Paperbark) in Victoria. He noted that a form in East Gippsland differed from the typical widespread form in bark type, leaf arrangement and inflorescence characteristics. He suggested that the East Gippsland form was either undescribed or was perhaps referable to *M. ternifolia* F. Muell. ex Miq., however the features that characterised that species were uncertain as the original description of *M. ternifolia* is inadequate and type material had not been examined.

Subsequent authors viz. Beauglehole (1980) and Costermans (1981) elected to refer this entity to *M.sp. aff. ericifolia,* the later author presenting a brief description, distribution map and illustration of a fruiting specimen.

* National Herbarium of Victoria, Department of Conservation, Forests and Lands, Birdwood Avenue, South Yarra, 3141.

Willis' suggestion that this entity may be undescribed was vindicated when in 1984 it was formally named *M. parvistaminea* N.Byrnes in the first of three papers revising *Melaleuca* in northern and eastern Australia (Byrnes 1984, 1985, 1986). In Byrnes (1986), he clarifies the status of *M. ternifolia,* considering it to be a narrow-leaved form of *M. ericifolia* and therefore reducing that name to a synonym of *M. ericifolia..*

Although the primary aim of this article is to publicise and encourage the use of the name *M. parvistaminea,* the concluding section also provides tabulated information on the morphological distinctions between *M. parvistaminea* and *M. ericifolia,* extracted largely from Byrnes (1984, 1986) (see Table 1). In addition, the habitat range of *M. parvistaminea* is briefly mentioned and compared with that of *M. ericifolia,* and a contemporary map provided of the known distribution of *M. parvistaminea*

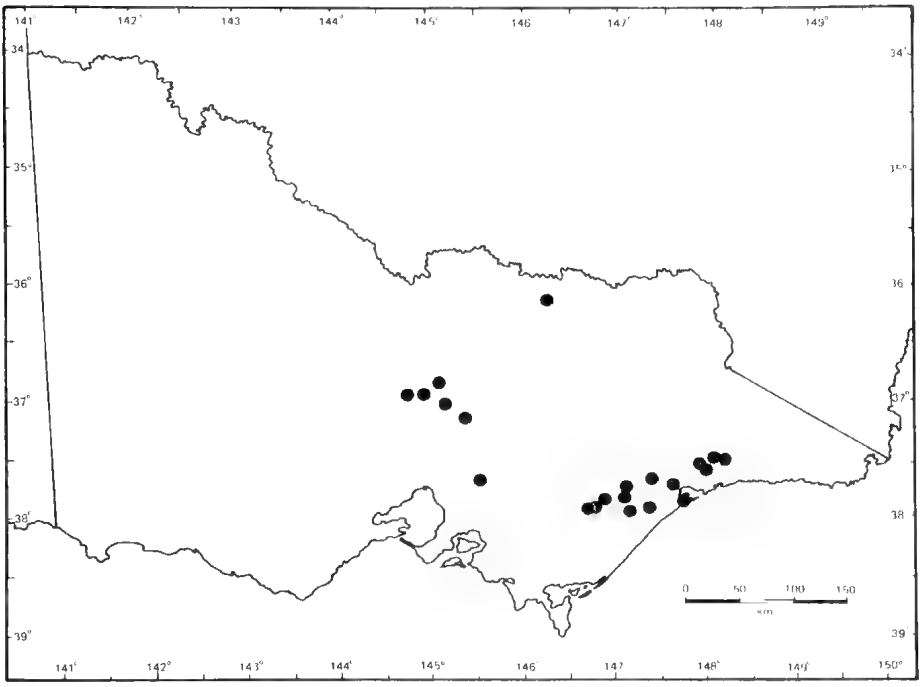

Fig. 1. Distribution of Melaleuca parvistaminea in Victoria from herbarium specimens at MEL.

in Victoria as indicated by herbarium specimens at MEL (see Fig. 1). It is reasonable to expect that additional populations of *M. parvistaminea* will be located and hence eliminate the evident disjunctions in its distribution as currently understood. Herbarium collections from such localities would be most welcome.

M. ericifolia favours river floodplains, lake margins and low-lying near coastal swamps (Bird, 1962). Permanently moist soils are a unifying feature of such sites and prolonged but not permanent flooding of fresh or brackish water is also a common site characteristic (Bird 1962, Parsons 1966). *M. ericifolia* thickets typically develop on relatively fertile heavy soils, however it has been found to grow on a range of soils including sandy clay, clay loam, poorly drained sands, poorly drained coastal mudflats, humic gley, peaty sands and amorphous peats (Parsons 1966, Gullan 1978, Gullan *et al. 1985).*

Fig. 2. Habit of *Melaleuca ericifolia*

Fig. 3. Habit of *Melaleuca parvistaminea*

A. C. Beauglehole (pers. Comm.) has observed *M. parvistaminea* growing intermingled with *M. ericifolia* at two localities in the Lake Victoria-Sperm Whale Head area and experienced no difficulty differentiating the two species. Both species also grow within close proximity at Healesville where *M. parvistaminea* is colonising areas disturbed by earthworks. This colonising ability appears to be a characteristic feature of *M. parvistaminea.* With better recognition of *M. parvistaminea* the two species may be found to grow sympatrically in aditional localities. Many of the sites from which *M. parvistaminea* has been recorded however are quite distinct from typical *M. ericifolia* habitat. They are relatively infertile , moist sites with skeletal or shallow soils, such as moist rocky slopes or rocky creek beds and banks. The remaining collections have been made from non-rocky sites such as the silty margins of Lake Glenmaggie and poorly drained sandy loams at Providence Ponds.

Table 1. Principal characters distinguishing *Melaleuca ericifolia* and *M. parvistaminea*

	M. ericifolia	*M. parvistaminea*
Habit	Shrub or small tree to c. 9 m high, suckering and forming dense thickets under natural conditions with the leaf canopy often continuous. (see Fig. 2)	Shrub 2-3 (–4) m high, non-suckering, but often forming thickets. Obconic-shaped with canopy as broad as or broader than high. (see Fig. 3)
Bark	Papery (see Fig. 4)	Rough, non-papery (see Fig. 5)
Leaves	7–15(–18) mm long. Oil glands obscure.	4–11 mm long. Oil glands visible as tubercles in fresh material or as black dots in dry material.
Stamens	Bundles greater than 5 mm long. Each bundle composed of a claw to 2 mm long with 7–13 filaments attached to its margin.	Bundles less than 4 mm long. Each bundle composed of a claw to 0.5 mm long with 3–7 filaments attached to its margin.
Inflorescence	Comparatively short and broad (usually greater than 10 mm wide at anthesis).	Comparatively long and narrow (usually less than 10 mm wide at anthesis).

Fig. 4. Bark of *Melaleuca ericifolia*

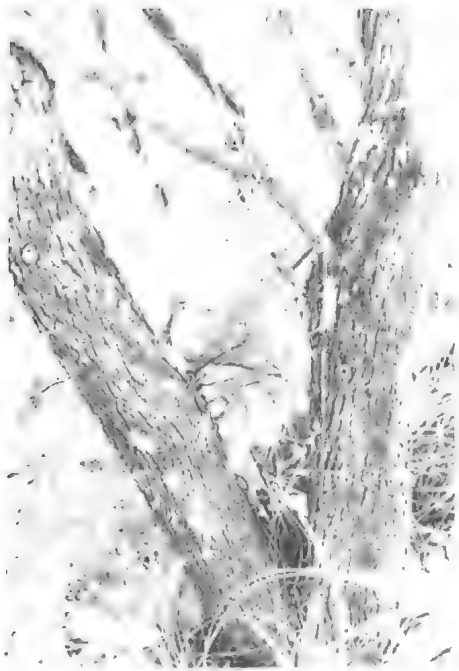

Fig. 5. Bark of *Melaleuca parvistaminea*

There is obviously still much to be understood about the ecology of M. parvistaminea and additional field studies with particular attention to habitat features would be a worthwhile avenue of further research.

Acknowledgements

The author is grateful to Mr. A. C. Beauglehole for his willingness to discuss field observations relating to *M. parvistaminea* and to Mr. Stephen Forbes (National Herbarium of Victoria) for valuable comments on the manuscript.

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Additional Field Notes and Observations of *Thesium australe* R. Brown (Santalaceae)

By W. R. Archer*

Introduction

Observations of six colonies of *Thesium australe* situated between First Emu Plain and Rocky Plain in N.E. Gippsland (Archer 1984), suggested that they were in a state of rapid decline due to grazing pressures and land management practices. As this decline has occurred in other regions resulting in local extinction of the species, concern was held for the continued survival of *T. australe* in Australia.

In December 1983 only 19 plants had survived from the original 4520 *Thesium* plants recorded in December 1981 and reduced to 140 plants by March 1983. From this resource fifteen plants widely spaced within the community were selected, marked with a stake and numbered to enable individual identification and permit further study of growth and development characteristics, hopefully to reveal management practices which may reverse the downward trend of *Thesium australe*.

Observations

Thesium plants tend to be spindly with only a few wiry stems radiating from a central rootstock; these stems seldom develop lateral branches. The length of the dominant stem of each plant was measured on the 21st December 1983 to the closest 5mm. Thirty three days later on the 23rd January 1984 they were re-measured (Table 1).

The average growth rate for the period was 45mm or 31%. However, the growth variation was considerably varying from zero to 85mm, possibly reflecting the type, health, and vigour of the host plant to which the parasitic *Thesium* was attached. Growing conditions had been ideal with good rainfall and general weather conditions producing optimum results, which may not occur in poorer seasons.

Grazing in the area from December 1983 to late January 1984 was unusually light; cattle had not as yet been brought to the area and wild horses were not evident in concentrated numbers. Rabbits were scarce due to a myxomatosis outbreak in February 1982 and of those remaining most were infected, and were soon to disappear. Insect attack was not evident on any plant examined.

Table 1. Growth rates of *Thesium australe*. Length of dominant stem in mm.

Plant	Size 21/12/83	Size 23/1/84	Growth (mm)	% Growth
1	150	215	65	43
2	150	220	70	47
3	120	140	20	17
4	210	295	85	40
5	220	265	45	20
6	170	240	70	41
7	100	120	20	20
8	110	160	50	45
9	130	160	30	23
10	90	90	0	0
11	190	250	60	32
12	110	130	20	18
13	160	230	70	44
14	150	210	60	40
15	130	140	10	8

The unexpectedly high growth rate of the *Thesium* by January 1984 was impressive, but more surprising was the large numbers of seedlings to 20mm in height that had appeared at all colony sites but had not been evident a month previously. This sudden appearance in January, and the known site history (Archer 1984) supports previous observations on the general timing of the germination of *Thesium* seeds, for the area was burnt in the Autumn/Winter period of 1980 but seedlings were not evident that

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December. However, new *Thesium* plants were mature when next visited in December 1981, indicating that germination followed by considerable development had occurred during this period.

The appearance of large seedling numbers following the fire of 1980, and the drought of 1983, may also indicate that exposure to heat can be a stimulus to *Thesium* germination, and that land use and weather conditions in the following summer may be critical to their survival.

A seedling count was made of each colony in January 1984, (Table 2.) but it was very approximate as the *Thesium* plants were very small and many were still developing, making them difficult to sight, particularly amongst taller vegetation. Comparison with mature *Thesium* plants in May 1985, sixteen months later, indicates the initial seedling counts were underestimated or further germination had taken place. In the latter case, the germination would have occurred before the end of January, as warmer summer weather and drying conditions make germination in the *Thesium* habitat improbable after this period.

Table 2.
Thesium australe seedling count January 1984.

Colony A	1000 plants
Colony A1	3 plants
Colony B	100 plants
Colony C	200 plants
Colony D	300 plants
Colony E	300 plants
Total	1903 plants

What is of note from the seedling count is the very high germination in Colony A. Here the vegetation is more sparse than other colonies, and more exposed to the heat of summer, which may with the effect of lower competition; have stimulated germination, and/or favoured seedling establishment than the other colonies. Also seed from the 1981/82 colony must have lain dormant during the drought year of 1982/83, for no plants were recorded from the colony that year.

Many visits have been made to the *Thesium* sites since the first in the summer of 1979/80 but none in winter, this deficiency was remedied on the 23rd August 1984, when snow and ice was still patchy on the road and herbfields. The fifteen marked *Thesium* plants initially used to establish growth rates were located; in each case the stems and foliage had died back to the rootstock at ground level but no plant had actually died, and all, even at this time were beginning to reshoot from the base. A specimen collected has been lodged with the Botany Department, La Trobe University, Bundoora, Victoria.

The colonies were again visited in late December 1984, although no statistics were taken *Thesium australe* was well represented in all colonies, indicating many seedlings from January 1984 had since matured and survived the winter. However by the following May all *Thesium* plants had disappeared from Colonies A and A1.

Colonies A and A1 occupy an open position exposed to hot northerly winds and grow in shallow soils over granite, as compared with Colonies B to E which grow in deeper soils and more sheltered situations. Due to an abnormally hot, dry summer after January 1985 and the conditions prevailing in Colonies A and A1, the normally moist habitat would have dried rapidly and is thought to be the main factor contributing to plant loss. Grazing from cattle would have also reduced *Thesium* plant numbers, but probably no more than the previous year from which reasonable numbers had survived. It would therefore imply that adequate moisture levels in *Thesium* habitats play a critical part in their survival.

Table 3.
Thesium australe count May 1985.

Colony A	Nil
Colony A1	Nil
Colony B	140
Colony C	320
Colony D	248
Colony E	566
Total	1274

Odd plants and small *Thesium* groups have been sighted outside the original colony boudaries, which may have initially been overlooked, but more likely spread by the movement of animals. The largest group is 30 plants 9 metres to the north east of Colony E.

The situation regarding other known colonies of *Thesium australe* in N.E. Gippsland to May 1985 is as follows.

1. Gillingal Station, private property west of Butchers Ridge:
   500 to 1000 plants March 1980. Current status unknown.
2. First Emu Plain, west of Wulgulmerang:
   100 to 500 plants in February 1980. May below 100 plants.
3. Six colonies subject of this paper:
   4520 plants December 1981. May 1985, 1274 plants.
4. Rocky Plain, west of Wulgulmerang:
   Colony 1. 100 plants February 1980. May 1985, 10 plants.
   Colony 2. 12 plants February 1982. May 1985, nil.
   Colony 3. 100 plants May 1985. Newly discovered colony.

All other *Thesium australe* colonies predate 1971, and have not been recorded since.

Discussion

It should be emphasised that rabbits have played little part in the recent demise of *Thesium australe*, due to the myxomatosis outbreak in the area which has been most effective. Had they been present in their normal numbers I have no doubt the May 1985 survival rate of the *Thesium* would have been much lower.

Grasshoppers and other insects which were so destructive to the remnant *Thesium* population in 1983 (Archer 1984), have, like the rabbits, played little or no part since. Specimens of plants collected from Colonies B, C, D and E, have been examined under a microscope for insect attack. Most plants showed no sign of insect damage and only a few suffered minor effects. This result supports the hypothesis that *Thesium australe* is not at risk from this source unless other herbaceous vegetation is severely depleted through heavy grazing, and/or drought conditions.

Cattle numbers in the area have been reasonably consistent with the exception of the 1983 drought period, when stock numbers were increased considerably and were brought to the area four to eight weeks earlier than usual. It was this pressure that instigated the sharp decline of *Thesium* in all recorded colonies, and from which they have yet to recover. Even with lower stock numbers, *Thesium* growing in areas which are favoured by cattle are unable to cope, as is evidenced by the fate of the two *Thesium* colonies which have failed to recover on Rocky Plains. This is despite seedling germination which assisted them as it had the other colonies. Colonies A to E however, are situated in an area that is commonly by-passed by cattle and consequently grazing is reduced.

Conclusions

Thesium australe being a perennial herb, has adapted to the freezing temperatures of the Wulgulmerang area of N.E. Gippsland by dying back to its rootstock during winter, and in the warmer weather growing rapidly to overtake the growth of most surrounding vegetation, enabling it rest against or on top of them. With present day land use, this adaption has placed *Thesium australe* at great risk from grazing animals, and would be a significant factor to its demise.

The seed of *Thesium australe* can remain dormant for at least twelve months, and may be stimulated to mass germination when subjected to heat in the form of fires or hot summers. Germination appears to take place in the December/January period when the days are mild and generally interspersed with light rain or drizzle. The effects of sub-zero temperatures on the seed is not known, other than, it does not stimulate germination of its own accord.

Recommendations

Due to the rarity and limited distribution of *Thesium australe*, combined with its tenuous existence under current conditions, seed should be collected from known colonies to act as a survival safe-guard, and for propagation study under controlled conditions where the effects of heat can clearly be ascertained in relation to germination, to then enable field trials in other areas where longer term management programmes are possible.

Acknowledgements

My thanks to Dr. R.F. Parsons and N.H. Scarlett of La Trobe University, for checking the draft of this paper and for their helpful comments.

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Naturalists Review

'Flora of Australia' By Stephen Forbes* Volume 46 (Iridaceae to Dioscoreaceae)

Australian Government Publishing Service, Canberra (1986)
Bureau of Flora and Fauna, Canberra
(Griffin Press, Netley, S. Aust.)
25.5 x 18 cm, 247 pp., 5 col. plates, 51 fig., 248 distribution maps
Price $30.00 (Case bound)
$26.00 (Paper)

The only previous review of the 'Flora of Australia' in the Victorian Naturalist was Dr Jim Willis' review of Volume 1 (Introduction). The reader is referred to Dr Willis' review for a synopsis of the history, scope and format of the 'Flora of Australia' project. As Dr Willis notes, the last, complete guide to the Australian flora, Bentham's *Flora Australiensis*, published between 1863 and 1878, includes only about half of the presently known vascular flora. Nevertheless Bentham's *Flora* is still the most useful single guide to many parts of Australia.

The volume numbers of the 'Flora of Australia' are arranged according to Cronquist's arrangement of flowering plant families in the 1981 edition of 'An Integrated System of Classification of Flowering Plants'. Volume numbers therefore represent the volume's position in this arrangement rather than the order of issue. Volume 46 (Iridaceae to Dioscoreaceae) is the seventh volume of the 'Flora of Australia' to be published. Previously published volumes are numbers 1, 4, 8, 22, 25 and 29.

Victorian botanists will find the treatments of Iridaceae (Iris family) Agavaceae (Agave family), Xamthorrhoeaceae (Grass tree family) and Smilacaceae (Smilax family) in volume 46 especially relevant.

David Cooke's account of the Iridaceae, prepared at the National Herbarium of Victoria, has been used in manuscript form here for some years. The account is an impressive achievement in treating a family composed largely of naturalised taxa (26 native, 53 naturalised species), often of obscure origin and poorly represented in herbaria.

Agavaceae is only represented in Victoria by *Agave americana* L., a widespread garden escape – although the 'Flora' overlooks Victorian occurrences. Other Agavaceae may also be considered naturalised (Geoff Carr, pers. comm.). The adoption of *Aloe vera* (L.) Burman.f., in preference to *A. barbadensis* Miller is of interest, however the reference quoted to justify *A. vera* is rather unclear.

The segregation of Smilacaceae and Xanthorrhoeaceae from Liliaceae *sensu lato* (in the broad

*National Herbarium of Victoria, Department of Conservation, Forests & Lands, Birdwood, Avenue, South Yarra, 3141.

sense as in Dr Willis' 'Handbook') may be unfamiliar. Victorian representatives of Smilacaceae are *Smilax, Eustrephus, Ripogonum* (for which no Victorian specimen is cited) and *Geitonoplesium* and are readily distinguished from the Liliaceae by their climbing habit.

Victorian representatives of Xanthorrhoeaceae are *Lomandra, Calectasia,* and *Xanthorrhoea.* Unfortunately the key to families of Australian plants in volume 1 of the 'Flora' relies on a tall woody spike in the only lead to Xanthorrhoeaceae which prevents *Calectasia* and *Lomandra,* from being keyed out. The family is distinguished from the Liliaceae by a short, thick, hard or elongated woody stem and perianth segments which are scarious or calyx-like. Xanthorrhoeaceae appears less distinct than segregate families of Liliaceae such as Dasypogonaceae (including *Lomandra*), Calectasiaceae, Xanthorrhoeaceae (*sensu stricto*) and Phormiaceae (including *Dianella* and *Stypandra*) as defined by Dahlgren, Clifford and Yeo (1985).

However, a system had to be chosen for the 'Flora' and Cronquist's is quite suitable, if sometimes rather cryptic

David Bedford's treatment of *Xanthorrhoea* illustrates the importance of adequate herbarium specimens and detailed accompanying field notes. Significant characters include scape, spike and trunk length and leaf shape, which are rarely apparent from a herbarium specimen! The addition of *X. semiplana* F.Muell. to the Victorian flora is anticipated, however probable collections of this species (Short 1221, Beauglehole 38320) are inadequate for positive identification. Parkes and Menkhorst for Walsh 1490, collected since publication is the first adequate herbarium specimen vouchering the occurrence of *X. semiplana* in Victoria. The introductory notes and illustrations which accompany the key are invaluable.

The treatment of *Lomandra* by Dr Alma Lee, Dr Terry Macfarlane and Joy Everett also illustrates the necessity for adequate herbarium specimens. The key to *Lomandra* is largely dependant on examination of male and female inflorescences which necessitates thorough examination of populations in the field. Identification is made more difficult by the occurrence of intermediate forms of some Victorian *Lomandra* species. For example *L. collina* and *L. nana* have intermediate forms which are not considered in the text although such specimens have been annotated by Dr Lee in the National Herbarium of Victoria. Dr Lee observes that 'The group . . . continues to pose problems of classification'. Observation of herbarium specimens suggest that the characters separating the sub-species of *L. micrantha* (Endl.) Ewart are not satisfactory. For example *L. micrantha* ssp. *teretifolia* Everett is distinguished in the key by terete leaves. Although this distinction is adequate for Western Australian specimens, Victorian specimens, including that of Willis cited by Everett in the Flora may also have flat leaves. In such circumstances it seems strange that *L. micrantha* var. *sororia* (F.Muell. ex Benth.) H. Williamson is relegated to synonymy under *L. micrantha* ssp. *tuberculata* Everett. Unfortunately the one line Latin type descriptions provided by Ms Everett are completely inadequate to define the new sub-species.

It is a pity that the 'Flora of Australia' allows such inadequate descriptions for new taxa. By contrast, Dr Lee's, Dr Macfarlane's and Mr Bedford's new taxa and combinations are provided with a useful, albeit short, description or justification.

Despite these problems the 'Flora of Australia' remains an essential reference to amateur and professional botanists and each volume represents an impressive achievement. Purchase of volumes at publication is strongly recommended - the cost of purchasing more than one volume at a time is rather less attractive.

*The 'Flora' is available through the Club's Book Sales Officer.

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OBITUARY

Cecily Margaret Eyres Allen

Cecily Allen died in the first week of November 1986.

The following extracts are taken from the Oration by Rev. Andrew St. John at Holy Trinity Church, Kew, on November 5.

"Cecily Allen was born in Melbourne, the youngest of the five children of Thomas and Alice Allen, of whom Roger and Dorothea survive her. Cecily grew up in Hawthorn, was schooled at Tintern then in Glenferrie Road. After 1960 Cecily took up secretarial work first at the old Bank of Victoria but then at Melbourne University with which great institution she had a long and happy association. She will be especially remembered as secretary to Wilfred Frederick, Professor of Education.

As her commitments to home and work became less so she was able to pursue more fully her extraordinarily broad range of interests. She was a naturalist and a bird-watcher and bush walker – she loved the world around her; she loved Australia. Cecily was no 'dabbler' in these interests – rather she was whole hearted in all that she did. This is reflected for instance in her close involvement with various organizations including the Bird Observer's Club, The Field Naturalist's Club of Victoria, the Melbourne Women's Walking Club (the latter of which she was nominee on the Conservation Council of Victoria.) She served as secretary of several of those organizations. She was secretary of the Natural History Medallion Committee of the F.N.C.V.. Cecily took to her retirement with admirable relish – no sitting back in the presentation arm chair for her – rather she was up and off in the pursuit of that which she enjoyed most – the great outdoors – so much so that she was out of Melbourne for long periods of time – some of the family and her friends perhaps wondered why she kept up her flat in Pakington Street, Kew. It was not unfitting that she died returning from an overland trip to Western Australia."

Cecily Allen was elected a member of the F.N.C.V. in 1975, and quickly became involved in the Club's affairs. She was an active member of the Botany Group, and a keen excursionist. Her major contribution to the Club was as Secretary to the General Committee of the Australian Natural History Medallion, a task which she carried out with great efficiency during the last seven years. The Club has now received the very generous bequest of part of Cecily's personal library, seventy seven books in all, which will make a very valuable addition to our library.

FIELD NATURALISTS CLUB OF VICTORIA

Report by Council

The members of the Council submit herewith balance sheet as at 31 December 1986, and statement of income and expenditure for the year ended on that date, and report as follows:-

1. The names of the members of the Executive Council in office at the date of this report are as follows:-

   Dr. J. Douglas
   Mr. G. Love
   Mr. M. Howes
   Miss Y. Gray
   Mrs. S. Houghton
   Miss M. Allender
   Mrs. H. Stanford
   Miss H. Bartoszewicz
   Mrs. C. Ashburner
   Mr. S. Forbes
   Mr R. Faragher

2. The principal activities and objects of the Club are to stimulate interest in natural history and to preserve and protect Australian Fauna and Flora. No significant change in the nature of those activities occurred during that period.
3. The net Surplus of the Club for the year ended 31 December 1986 was $2403 in the General Account. In addition surpluses were earned in the following Funds -

   Building Fund $1,301, Publications Fund $7,665
   Excursion Fund $4,292, Special Funds $609

4. The following transfers to and from Funds have been made during the year ended 31 December 1986 -

   From Income & Expenditure Account to Club Improvement Account $1,655

5. The Club has issued no shares or debentures during the year.
6. The review of operations for the year:-
   The Club's groups met regularly throughout the year. The Botany, Day, Geology and Mammal Survey Groups arranged day trips and extended excursions. The Australian Natural History Medallion waas administered and awarded to Mr. Graham Pizzey.
7. No significant changes in the state of affairs of the Club occurred during the financial year ended 31 December 1986.
8. No matters or circumstances have arisen since the end of the financial year which significantly affected or may significantly affect the operations of the Club, the results of those operations, or the state of affairs of the Club in financial years subsequent to the financial year ended 31 December 1986.
9. The likely developments in the operations of the Club and the expected results of those operations in financial years subsequent to the financial year ended 31 December 1986 are unlikely to have any significant effect on the financial results in future years.
10. At the date of this report there exists no charge on the assets of the Club which has arisen since the end of the financial year and secures the liabilities of any other person and no contingent liability has arisen since the end of the financial year.
11. No member of the Council has an interest in a contract or proposed contract with the Club, being an interest the nature of which would have been declared by the member of the Council in accordance with Section 228(1) of the Code.
12. Information on Members of the Council:-

    Jack Douglas President
    Occupation - Geologist
    Council Member since - 1986

    Graeme Love Vice President
    Occupation - Public Servant
    Council Member since - 1985

    Michael Howes - Secretary
    Occupation - Laboratory Technician
    Council Member since - 1986

    Yvonne Gray - Treasurer
    Occupation - Accountant
    Council Member since - 1986

    Sheila Houghton - Member of Council
    Occupation - Librarian
    Council Member since - 1981

    Marie Allender - Member of Council
    Occupation - Retired
    Council Member since - 1956

    Helen Stanford - Member of Council
    Occupation - Homemaker
    Council Member since - 1983

    Helen Bartoszewicz - Member of Council
    Occupation - Technical Assistant
    Council Member since - 1986

    Christine Ashburner - Member of Council
    Occupation - Technician
    Council Member since - 1983

    Stephen Forbes - Member of Council
    Occupation - Botanist
    Council Member since - 1986

    Richard Faragher - Member of Council
    Occupation - Teacher
    Council Member since - 1987

13. Since the end of the previous financial year no member of the Council has received or become entitled to receive any benefit by reason of a contract made by the Club with him or with a firm of which he is a member or with a company in which he has substantial financial interest.

SIGNED at MELBOURNE this 23rd day of February 1987 in accordance with a resolution of the Council.

J. Douglas President
Y. Gray Treasurer

FIELD NATURALISTS CLUB OF VICTORIA
STATEMENT OF INCOME & EXPENDITURE — YEAR ENDED 31 DECEMBER 1986

INCOME

	1986 $	1985 $
Subscriptions Received		
Arrears	—	48
Current	14,122	13,193
Supporting	404	424
	14,526	13,665
Sales of "Victorian Naturalist"	364	817
Advertisements	35	—
	399	817
Interest Received		
Library Fund	15	15
Bank Account	227	233
Commonwealth Bonds	1,475	1,475
Bonds — M Wright Legacy	767	767
Bonds — C M Walker Legacy	148	147
National Mutual Deposit	771	—
Life Membership Fund	78	78
Natural History Medallion Fund		323
	3,481	3,038
Sundry Income	797	145
Profit on Book Sales	1,655	1,812
	2,452	1,957
Deficit for year	—	132
	20,858	19,609

EXPENDITURE

	1986 $	1985 $
Victorian Naturalist		
Printing, Illustrating & Despatch	14,853	14,077
Less Grants		
Treasury	(3,013)	(1,000)
	11,840	13,077
Working Expenses		
Postage & Telephone	486	281
Printing & Stationery	547	639
Bookkeeping & Typing	1,000	1,123
Rent - Herbarium	825	811
Affiliation Fees, Subscriptions & Donations	292	275
Auditor's Remuneration (Note 1)	220	200
Insurance	307	238
General Expenses	737	407
Natural History Medallion Expenses	38	245
Kinglake Expenses - rates	420	361
	4,872	4,580
Nature Show (Profit)	154	(18)
Author's Reprints	(30)	—
Subject Index (Profit)	(36)	158
Club Improvement Account - Transfer of Profit on Book Sales	1,655	1,812
Surplus for year	2,403	
	4,146	1,952
	20,858	19,609

NOTES

1. Auditor's Remuneration of $220 relates to auditing services only. No other benefits were received by the Auditors in respect of their services to the Club.
2. No Emoluments were paid by the Club to any member of the Council.
3. Basis of Accounting. The accounts have been prepared under the historical cost convention and have not been adjusted to take into account the current cost of specific assets.

FIELD NATURALISTS CLUB OF VICTORIA
BALANCE SHEET AS AT 31 DECEMBER, 1986

LIABILITIES

	1986 $	1985 $
Current Liabilities		
Subscriptions paid in advance	1,746	1,855
Sundry Creditors	2,363	3,378
M A Ingram Trust Grant in Hand	154	154
Treasury Grants in Hand	1,916	4,879
	6,179	10,266
Special Funds & Accounts		
Building Fund	12,309	11,008
Publication Fund	71,272	63,607
Excursion Fund	22,378	18,086
Marie Allender Excursion Fund	6,000	6,000
Library Fund	100	100
Club Improvement Account	12,763	11,108
Estate M Wright Legacy	5,217	5,217
Estate C M Walker Legacy	1,466	1,466
Estate I F Knox Legacy	200	200
Estate E Bennett	535	500
Estate I Hanks	204	204
Wilfred C Woolard Fund	1,024	955
D E McInnes Fund	1,074	1,004
V H & B E Miller Fund	473	446
N A Wakefield Memorial Fund	90	90

ASSETS

	1986 $	1985 $
Current Assets		
Cash at Bank	5,051	6,731
Australian Savings Bonds at cost	10,000	10,000
Sundry Debtors	—	725
Stocks on Hand at cost –		
Badges & Sundries	95	95
Books for Sale	953	1,406
Victorian Naturalist Subject Index	785	785
	16,884	19,742
Fixed Assets at cost		
Library Furniture & Equipment	9,829	9,834
Land Cosstick Reserve, Maryborough	213	213
– Harold C Frahm, Kinglake	—	—
	10,042	10,047
Investment of Funds at cost		
Australian Savings Bonds	8,300	8,300
Esanda Ltd Debentures	8,800	8,300
ANZ Savings Bank – Deposit	10,268	7,498
Statewide Building Society – Deposit	603	430
	27,971	24,528

Cedric Ralph Gift Account	150	150
P Matches Memorial Fund	500	500
Kinglake Project Fund	657	484
Natural History Medallion Fund	2,893	2,658
Life Membership Fund	520	520
	139,825	124,303
Surplus Account		
Balance at 1/1/1985	12,449	12,581
Surplus/(Deficit) for year	2,403	(132)
	14,852	12,449
	160,856	147,018

Building Fund		
Australian Savings Bonds at cost	3,100	3,100
Esanda Ltd Debentures at cost	8,500	6,600
Cash at Bank	709	1,308
	12,309	11,008
Publications Fund		
Australian Savings Bonds at cost	45,380	45,380
Esanda Ltd - Debentures at cost	9,500	5,000
Telecom – Bonds at cost	3,500	1,500
Book Stocks at cost	6,675	6,907
Sundry Debtors	–	1,322
Cash at Bank	6,217	3,498
	71,272	63,607
Excursion Fund		
Australian Savings Bonds at cost	1,000	1,000
Nat Mutual Perm Bldg Society – Deposit	9,321	8,349
Cash at Bank	18,067	8,707
Sundry Debtors		30
Less Sundry Creditors	(6,010)	—
	22,378	18,086
	160,856	147,018

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

	1986	1985
	$	$
Balance of Fund at 31 December 1985	11,008	9,668
Interest on Investments and Bank Account	1,301	1,340
Balance of Fund at 31 December 1986	12,309	11,008

PUBLICATIONS FUND

Balance of Fund at 31 December 1986	63,607	56,141
Interest in Investments and Bank Account	7,549	7,211
Sundry	43	—
Surplus for the year from –		
Fossil Book	73	220
Ferns of Victoria and Tasmania	—	35
Balance of Fund at 31 December 1986	71,272	63,607

CLUB IMPROVEMENT ACCOUNT

Balance of Account at 31 December 1985	11,108	9,296
Book Sales Account Profit	1,655	1,812
Balance of Account at 31 December 1986	12,763	11,108

EXCURSION FUND

Balance of Fund at 31 December 1985	18,086	13,590
Interest on Investments and Bank Account	2,234	1,911
Donation	60	—
Surplus on Tours	1,998	2,585
Balance of Fund at 31 December 1986	22,378	18,086

AUDITOR'S REPORT TO THE MEMBERS OF FIELD NATURALISTS CLUB OF VICTORIA

We report that we have audited the accounts of the FIELD NATURALISTS CLUB OF VICTORIA in accordance with Australian Auditing Standards.

In our opinion:-

(a) The accompanying accounts, being the Balance Sheet, Statement of Income and Expenditure and Notes to Accounts, together with the Statement by Members of the Council, are properly drawn up in accordance with the provisions of the Companies (Victoria) Code 1981 and so as to give a true and fair view of:-
  (i) the state of affairs of the company at 31 December 1986 and of the results of the company for the year ended on that date; and
  (ii) the other matters required by Section 269 of that Code to be dealt with in the accounts;
  and are in accordance with Australian Accounting Standards and applicable approved accounting standards.

(b) The accounting records and other records, and the registers required by that Code to be kept by the company have been properly kept in accordance with the provisions of that Code.

DANBY BLAND PROVAN & CO.
Chartered Accountants

R. M. BLAND
Partner

MELBOURNE
February 1987

FIELD NATURALISTS CLUB OF VICTORIA STATEMENT BY MEMBERS OF COUNCIL

In the opinion of the members of the Council:-

1. (a) The accompanying Income & Expenditure Account is drawn up so as to give a true and fair view of the results of the company for the financial year ended 31 December 1986.
   (b) The accompanying Balance Sheet is drawn up so as to give a true and fair view of the state of affairs of the company as at the end of that financial year.
   (c) At the date of this statement, there are reasonable grounds to believe that the company will be able to pay its debts as and when they fall due.

2. The accompanying Accounts have been made out in accordance with Australian Accounting Standards and applicable approved accounting standards.

This statement is made in accordance with a resolution of the Members of Council.
SIGNED at MELBOURNE this 23rd day of FEBRUARY 1987.

J. Douglas, President
Y. Gray, Treasurer

NOMINATIONS OF FNCV COUNCIL MEMBERS AND OFFICE BEARERS

FNCV Annual General Meeting will be held on Monday May 11th, 1987 and nominations are required for Council Members and other office bearers. Council consists of the President, Vice President, Immediate Past President and ten other members. The following offices are open for nomination: President, Vice President, Secretary, Assistant Secretary, Treasurer, Assistant Treasurer, Editor, Assistant Editor, Librarian, Assistant Librarian, Excursion Secretary, Programme Secretary, Conservation Co-ordinator, Club Reporter.

With the exception of the President, Vice President and Immediate Past President, office bearers are not automatically members of Council, though the Secretary and Treasurer are required to attend Council meetings, which are held on the last Monday of the month at the Herbarium. If you nominate a person for a particular office, and that person is willing to be a member of Council, an additional nomination to this effect is required. Council is the governing body of your Club. Think now of the people you would like to form this body, and ask them if they will accept nomination.

Nominations, endorsed by two members of the Club should be received by the Hon. Secretary by May 8th, 1987.

The Club is entitled to two representatives on the Conservation Council of Victoria. We also require an Information Officer (at General Meetings) and a Display Co-ordinator. If you would like to undertake these jobs, or know of members who would, please let the Secretary know.

Michael D. Howes,
Hon. Secretary,
February 2nd, 1987.

Bequests to the Field Naturalists Club of Victoria

The Club is conscious of the extent to which its development and influence depend upon the assistance of benefactors. Donors may prefer to make their gifts during their lifetime or by their Wills. In either case the President and other officers will always be happy to discuss the nature and conditions of benefactions to ensure that they will be made in accordance with the overall needs of the Club.

Very often a gift expressed in general terms is more advantageous than one restricted to certain purposes.

At the same time the Club will always try to ensure that any special intention of a benefactor in relation to a gift is fully observed and carried into effect.

Should donors prefer to make their gifts by Will, the following form of bequest may prove of assistance:

"I give and bequeath to the Field Naturalists Club of Victoria the sum of ..... dollars to be paid free from all duties and to be applied for the purposes of the Club in such manner as the Council of the Club may determine and I direct that the receipt of the President or Treasurer shall be sufficient discharge for my Trustee(s)".

THE VICTORIAN NATURALIST – BACK ISSUES

Complete volumes are available form Volume 63 up to the present. Back numbers start from volume 11 but some issues are missing. Prices are those given below plus postage.

Vols. up to 75	–	40 cents minimum per part
76 to 91	–	50 cents minimum per part
92	–	75 cents per part
93 to 95	–	$1.20 per part
96 to 99	–	$1.75 per part
100	–	$2.20 per part
101 to 102	–	$2.50 per part
103	–	$3.00 per part

Volumes up to Vol. 91 contain 12 parts per volume, Vol. 92 has 11 parts and volumes onwards from 93 have 6 parts.

All enquiries to D. E. McInnes, Victorian Naturalist Sales Officer, c/- National Herbarium, Birdwood Avenue, South Yarra.

Australian Natural History Medallion

Council appointed Mrs. Tess Kloot to fill the vacancy left by Cecily Allen's death, as Secretary to the General Committee of the Australian Natural History Medallion. Unfortunately, ill-health has forced Tess regretfully to resign from the position. Mrs. Shiela Houghton has now been appointed, and any correspondence relating to the Medallion should be addressed to her, c/- F.N.C.V. National Herbarium, Birdwood Avenue, South Yarra, 3141.

LATE FEE

The increasing costs of reminder notices - postage, stationery, and the numbers of late renewers have resulted in the need for a late fee to recoup some of these costs, which are substantial.

Therefore, in 1987 a Late Fee of $2.00 shall be imposed on members who do not renew their subscriptions by the end of March, 1987.

Council draws members' attention to the following points:

- Subscriptions cover the calendar year from January to December.
- Persons joining the Club in the second half of the year may pay a six month or an eighteen month subscription. Anyone paying a full year subscription in the second half of the year will be regarded as having paid for the current year and will receive back issues of that volume of *The Victorian Naturalist.*
- Subscriptions do **not** run from mid year to mid year.
- Members who fail to renew their subscriptions by 15 May will automatically be removed from the mailing list.
- Prompt payment greatly facilitates the Club's operations.

M. D. HOWES
Hon. Secretary

(Continued from inside front cover)

Geology Group – First Wednesday

Wednesday, 1st April. "The Geological Time Scale – How did we get it?" Mr. Neil Archibald.

Wednesday, 6th May. "Chernobyl." Mr. Graeme Love.

Wednesday, 3rd June. Some aspect of Palaeobotany (title to be confirmed) Dr. Jack Douglas.

Mammal Survey Group – First Tuesday

Tuesday, 7th April. "Fauna of the North-west Study Area." Mr. Andrew Bennett.

Tuesday, 5th May. To be announced.

Tuesday, 2nd June. Members' Night.

Microscopical Group – Third Wednesday

Wednesday, 15th April. "Parasitic Wasps". Mr. Urwin Bates.

Wednesday, 20th May. "Castlemaine Lake Pondlife". Dr. E. Peters.

Wednesday, 17th June. "The Diatom Experts". Mr. Bob Graham.

GROUP EXCURSIONS

All FNCV members and visitors are invited to attend any Group Excursions.

Botany Group

Saturday, 25th April. Doongalla Forest Reserve. Leader: C. Falkingham.

Saturday, 23rd May. Fungi.

Saturday, 27th June. Royal Botanic Gardens.

Geology Group

Sunday, 5th April. (Combined excursion) Yarra Glen. Leader: Mr. Graeme Love.

Mammal Survey Group

Friday, 17th - Tuesday, 21st April. East Gippsland.

Saturday, 6th – Monday, 8th June. Upper Lerderderg Gorge.

FIELD NATURALISTS CLUB OF VICTORIA

Reports of Recent Activities

General Meeting
Monday, 9th February

The Speaker for the evening was Mr. Max Dean who spoke on the topic of "Aboriginal Rock Paintings." He has for many years been part of a team recording the rock paintings in sandstone caves of the Cape York area. The paintings in this area have been dated from carbon remains at up to 12,000 years old.

Some of the images have been formed by chiselling with a stone whilst others are painted using natural pigments such as ochre and charcoal. Some showed only an outline, others had internal details filled in.

Mr. Dean showed slides of many of the paintings and explained the significance of various animals to the Aboriginals. Emus, kangaroos, White Ibis and bandicoots all appeared in the paintings, as did many handprints and spirit figures.

The paintings were apparently an activity in which all members of the tribe, not just specialized artists, could participate. In some areas huge murals had been developed over the years, one having up to 11 overlying layers.

Exhibits

- Under microscopes: Polyzoan skeletons from Bay of Fundy, East Canada collected by Mary Doery; A species of *Myriophyllum* (Water Milfoil) with clumps of the blue-green alga *Rivularia ; Brachionus* rotifers from Caulfield Racecourse Lake; A ciliate, *Vorticella* and a colonial ciliate, *Opercularia;* an aquatic caterpillar, *Nymphula* which breathes underwater with the aid of thread-like gills. Mr. Dan McInnes.
- Under microscopes: Stained sections of the plants *Griselina littoralis* and *Tilia cordata* made by Mr. C. Nance. Mr. Urwin Bates.
- The Mountain Devil or Honey Flower found in the Blue Mountains. Alice Walker.

Nature Notes

A parade of Fairy Penguins was observed at The Twelve Apostles. Dr. Jack Douglas.

C. M. Ashburner

Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria

Established 1880

Registered Office: FNCV, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron

His Excellency, The Rev Dr John Davis McCaughey, The Governor of Victoria.

Key Office-Bearers 1985-1986

President: Dr JACK DOUGLAS, 42 Sunhill Rd., Mt. Waverley, 3149 (277 4804 A.H.)

Vice President: Mr G. LOVE, P.O. Box 2018, St. Kilda West, 3182.

Secretary: Mr M. D. HOWES, c/o R.M.I.T. Dept. of Applied Biology, G.P.O. Box 2476V, Melbourne, 3001. (386 2980).

Hon. Treasurer: Ms YVONNE GRAY, 46 Albany Cres., Surrey Hills, 3127 (890 1488 A.H.)

Subscription-Secretary: Mr N. STANFORD, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

Editorial Material: The Editorial Committee, Victorian Naturalist, FNCV, c/- National Herbarium, Birdwood Ave., South Yarra, 3141.

Librarian: Mrs SHEILA HOUGHTON, FNCV, National Herbarium, Birdwood Avenue, South Yarra, 3141 (551 2708 A.H.)

Excursion Secretary: Miss MARIE ALLENDER, 19 Hawthorn Avenue, Caulfield, 3161 (527 2749)

Club Reporter: Miss CHRISTINE SHANKLY, 50 Glyndon Road, Camberwell, 3124 (836 7187 A.H.)

Conservation Co-ordinator: Mr BOB GRAHAM, 147 Broadway, Reservoir, 3073.

Sales Officer (Books): Mrs H. STANFORD, 100 Middlesex Road, Surrey Hills, 3127 (830 1505)

Sales Officer (Victorian Naturalist only): Mr D. E. McINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

Group Secretaries

Botany: Miss MARGARET POTTER, 1/249 Highfield Road, Burwood, 3125 (29 2779).

Day Group: Mr D. E. McINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

Geology: Miss HELEN BARTOSZEWICZ, 16 Euroa Avenue, Nth. Sunshine, 3020 (311 5106 A.H.)

Mammal Survey: Mr JULIAN GRUSOVIN, 17 Sutherland Street, Chadstone, 3148. (211 4997)

Microscopical: Mrs ELSIE GRAHAM, 147 Broadway, Reservoir, 3073 (469 2509)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1987

Metropolitan Members (03 area code)	$25.00
Joint Metropolitan Members	$27.00
Country/Interstate/Retired Members	$23.00
Joint Country/Interstate/Retired Members	$25.00
Student (full-time)	$18.00
Junior (under 18; no Victorian Naturalist)	$5.00
Subscription to Victorian Naturalist	$23.00
Overseas Subscription to Victorian Naturalist	$30.00
Affiliated Clubs	$25.00
Subscriber Clubs	$23.00
Individual Journals	$3.50
Late Fee (Renewing Members), after end of March	$2.00

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The Victorian Naturalist

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GENERAL MEETINGS

Monday, 15th June, 8.00 p.m.
Dr. Bill Birch. "Crystals."
Monday, 13th July, 8.00 p.m.
Mr. John Coventry. "Prohibited Imports and Exports — Reptiles."
Monday, 10th August, 8.00 p.m.
Dr. Robin Hirst. "Where on Earth are We?" (Astronomy)

New Members

Metropolitan:

Mrs. Shirley O'Neill, 77 Orrong Road, Elsternwick, 3185.
Ms. Ruth Dann, 6/3 Burwood Avenue, East Hawthorn, 3123.
Mrs. Joan Marks, 3 Warida Avenue, East Malvern, 3145.
Ann McGregor, 103 Mitchell Street, Brunswick, 3056.
Dr. Helen Steward, 106 Gatehouse Street, Parkville, 3052.
Gillian Earl, 12 Anderson Street, South Melbourne, 3205.
Katrina Geering, c/o Botany Department, Monash University, Clayton, 3168.
Miss Beverley McBean, P.O. Box 172, Malvern, 3144.
Mr. Jolyon C. Scott, 78 Nepean Highway, Mentone, 3194.
Miss Beryl Vera Fookes, 28 Pine Street, East Brighton, 3187.
Miss Beverley L. Vonarx, 1/1 Lithgow Street, Burwood, 3125.

Country:

Ms. Jenny Bolwell, c/o Post Office, Falls Creek, 3699.
Mr. Colin R. Tann, c/o Mallee Research Station, Walpeup, 3507.
Mrs. Valda Dedman, 69 North Valley Road, Highton, 3216.

FNCV EXCURSIONS

Sunday, 5th July, Black Rock House, Ebden Ave., Black Rock. Take the 2.15 p.m. bus from Sandringham to Black Rock House or meet there at 2.30 p.m. Entrance fee $1.00. Should the weather be fine members could go earlier and spend the extra time on the beach behind the house. There is a foot-track a short way past the house on Second St. behind it. The bus runs every 40 minutes from Sandringham. Black Rock House is open from 2 to 5 p.m.

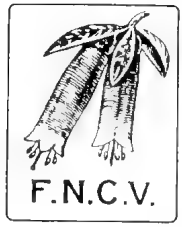
Sunday, 2nd August, Emerald Lake. Meet at Lakeside Station at 11.23 a.m. Puffing Billy leaves Belgrave at 10.30 a.m., fare $8.20 return, concession $5.40. The train from Flinders St. leaves at 8.43 a.m. Bring a picnic lunch.

Sunday, 6th September, Braeside Metropolitan Park. The coach will leave Batman Ave. at 9.30 a.m. Fare $10.00. Bring a picnic lunch.

Friday, 16th — Sunday, 18th October. Waranga Basin, Rushworth. This will be the venue for the Victorian Field Naturalists Club Association, and accomodation will be in the Holiday Lodge or camping (see last Naturalist). Lodge accomodation and coach will be $90.00, and bookings should be accompanied by $30.00 deposit and made with Marie Allender. Balance to be paid by Monday, 14th September. Members camping should book direct with Mr. and Mrs. Houghton (058) 56 1243. There is a kiosk and arrangements can be made for bread and milk etc. There will be an informal meeting at 8.00 p.m. Friday for those who have arrived, a day excursion on Saturday, departing at 10.00 a.m. and and evening meeting. On Sunday there will be a morning excursion, lunch and farewells before departing for home. Anyone wanting accomodation in the lodge but not going in the coach should contact Marie Allender as there may be some surplus bunks.

Friday, 8th January — Saturday, 16th January. Tasmania. We fly to Devonport, then proceed to Smithton, visiting Stanley etc. **en route.** Saturday a cruise on the Arthur River, Sunday overnight in Queenstown, Monday to New Norfolk, Tuesday, Lake Pedder and overnight New Norfolk. Wednesday to Hobart where the tall ships should be in the harbour, overnight Port Arthur. Thursday, we hope to see the start of the tall ships race to Sydney, then go on to Bicheno. Friday, visit Freycinet Peninsula. Saturday back to Devonport for 5.45 p.m. plane. Cost, based on 30 passengers, is $750.00 approximately for plane, accomodation D.B.B and coach. Bookings with Marie Allender should be accompanied by $200.00 for Apex fare and deposit.

(Continued inside back cover)



The Victorian Naturalist

Volume 104, Number 3

May / June, 1987
ISSN 0042-5184

Editor: R. Thomson. Assistant Editor: V. Spencer

Cover Illustration: Herb fields on Mt. Loch with Mt. Feathertop behind. (see FNCV excursion report p.91). *Photo:* Elizabeth Turner.

Bush-peas of Victoria — Genus *Pultenaea* Sm. (Fabaceae) — 21

By M. G. Corrick*

***Pultenaea williamsoniana* J. H. Willis in *Muelleria* 1:125-126 (1967).**

P. williamsoniana is a slender, erect shrub 1-2 m high. The stems are terete and covered with pale, loosely appressed hairs.

The leaves are alternate, linear, 6-12 (-18) mm long and 0.5 mm wide, spreading at right angles to the stem or occasionally slightly reflexed; they are tightly inrolled with a short, rigid, ± pungent point and sparsely covered with long, pale hairs or occasionally glabrous.

The stipules are lanceolate, dark brown, 1.5-2 mm long and 0.5 mm wide with very slender, recurved, fragile tips.

The inflorescence is a condensed raceme of 2-5 pedicellate flowers forming a loose head-like cluster at the end of a short, lateral shoot. Several lateral shoots are clustered towards the tips of the branches.

The pedicel is 3-4 mm long and densely covered with loosely appressed, pale hairs.

Bracts are absent, but the stipules on the floral leaves are slightly enlarged and form a tight little cluster at the base of the pedicel. The basal parts of these stipules are usually persistent and are retained on old wood after the axis of the shoot grows on.

The bracteoles are ovate to orbicular, 2-2.5 mm long and 2-2.5 mm wide, attached at the base of the calyx and very resinous.

The flowers are 11-12 mm long. The calyx is 4-5 mm long, resinous and sparsely hairy, The calyx lobes have ciliate margins. The standard is orange with dark red lines surrounding a pale orange blotch at the base of the lamina on the front surface; the back is slightly darker with longer, denser red lines. The wings are orange and the keel dark red.

The ovary is covered with pale hairs which extend along about one quarter of the style.

The pod is plump, exserted from the calyx and sparsely covered with pale hairs.

Flowering time is late September to early October.

P. williamsoniana is restricted to the northern Grampians, from the northern part of the Mt. Difficult Range to Mt. Zero. It is rather similar to some forms of *P. mollis* but the inflorescence lacks the densely clustered enlarged stipules of that species. The orbicular bracteoles and widely spreading, or sometimes recurved leaves are also distinctive. When Willis described this species he suggested an affinity with *P. vrolandii* of granite ranges in north eastern Victoria, on the basis of bracteole similarity and pedicellate flowers. However many forms of *P. mollis* have resinous bracteoles and pedicellate flowers. Leaf shape and stipule size and shape of *P. williamsoniana* are also close to *P. mollis*.

SPECIMENS EXAMINED included: Grampians; Mt Zero, *H. B. Williamson* (MEL 504745 – type), early Oct. 1927; W. of Mt Difficult, *T. B. Muir 2584* (MEL 680504), 29.ix.1962; E. of Mt Zero, *A. C. Beauglehole 30078* (MEL 680506), 17.xii.1968; Picnic Falls, *T. B. Muir 2217* (MEL 680505), 30.ix.1961.

***Pultenaea maidenii* F. M. Reader in *Victorian Nat.* 22:158-159 (1906).**

Pultenaea maidenii is an erect shrub 0.5-1 m high. The stems are terete, slightly ridged and with sparse, pale, spreading hairs on young growth.

The leaves are alternate, obovate, 6-8 (-10) mm long and 2-3 mm wide, with an obtuse or slightly cuneate apex terminating in a short point. The leaf margins are flat but the leaf is somewhat conduplicate,

*7 Glenluss Street, Balwyn, Victoria 3103.

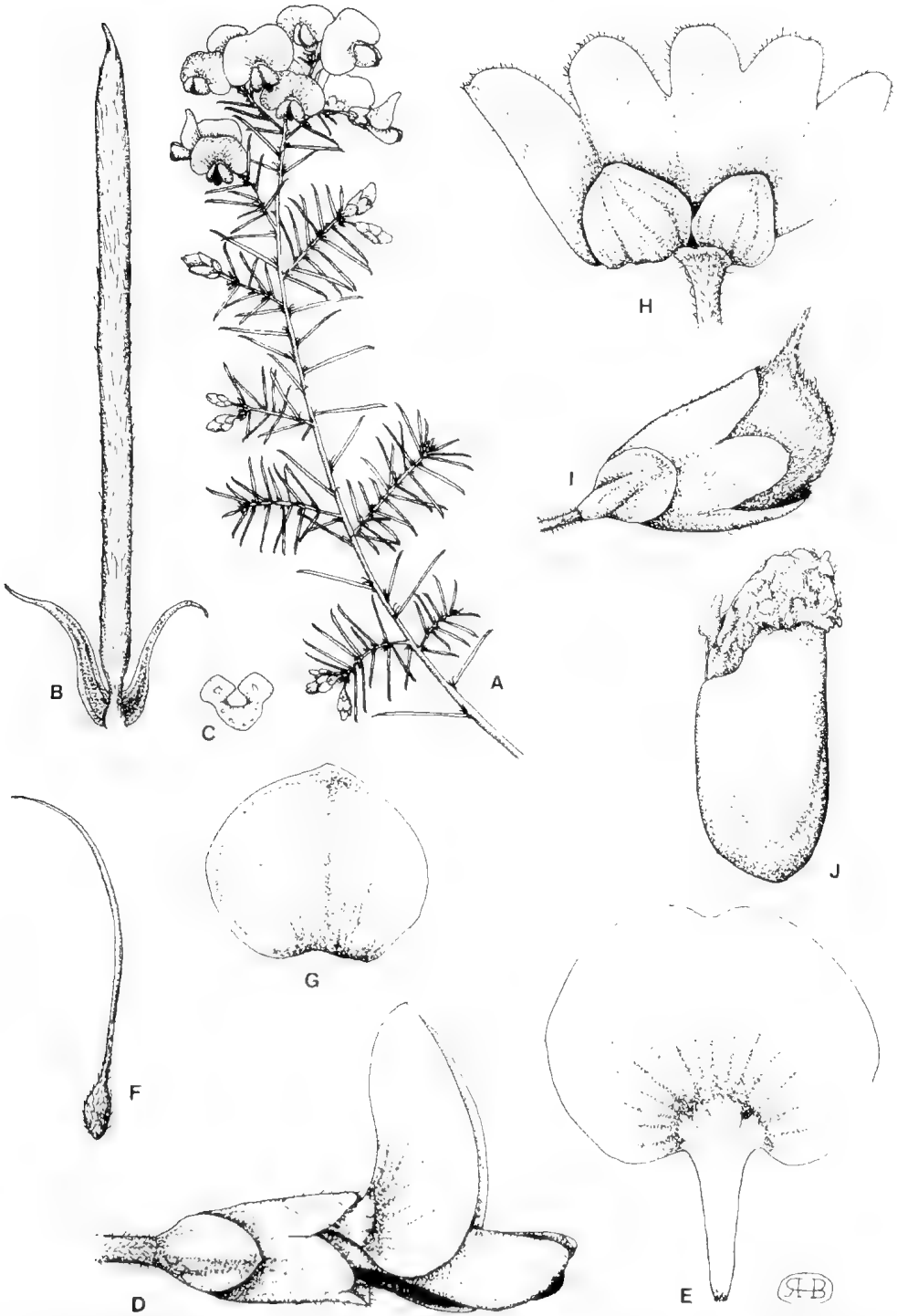


Fig. 35. Pultenaea williamsoniana. A, habit x 1; B, leaf with stipules, underside x 10; C, t.s. leaf x 10; D, flower x 5; E, standard x 5; F, ovary and style x 5; G, bracteole x 10; H, calyx opened out x 10; I, calyx with pod x 5; J, seed x 15. A-H from Muir 2584 (MEL); I-J from Beauglehole 30078 (MEL).

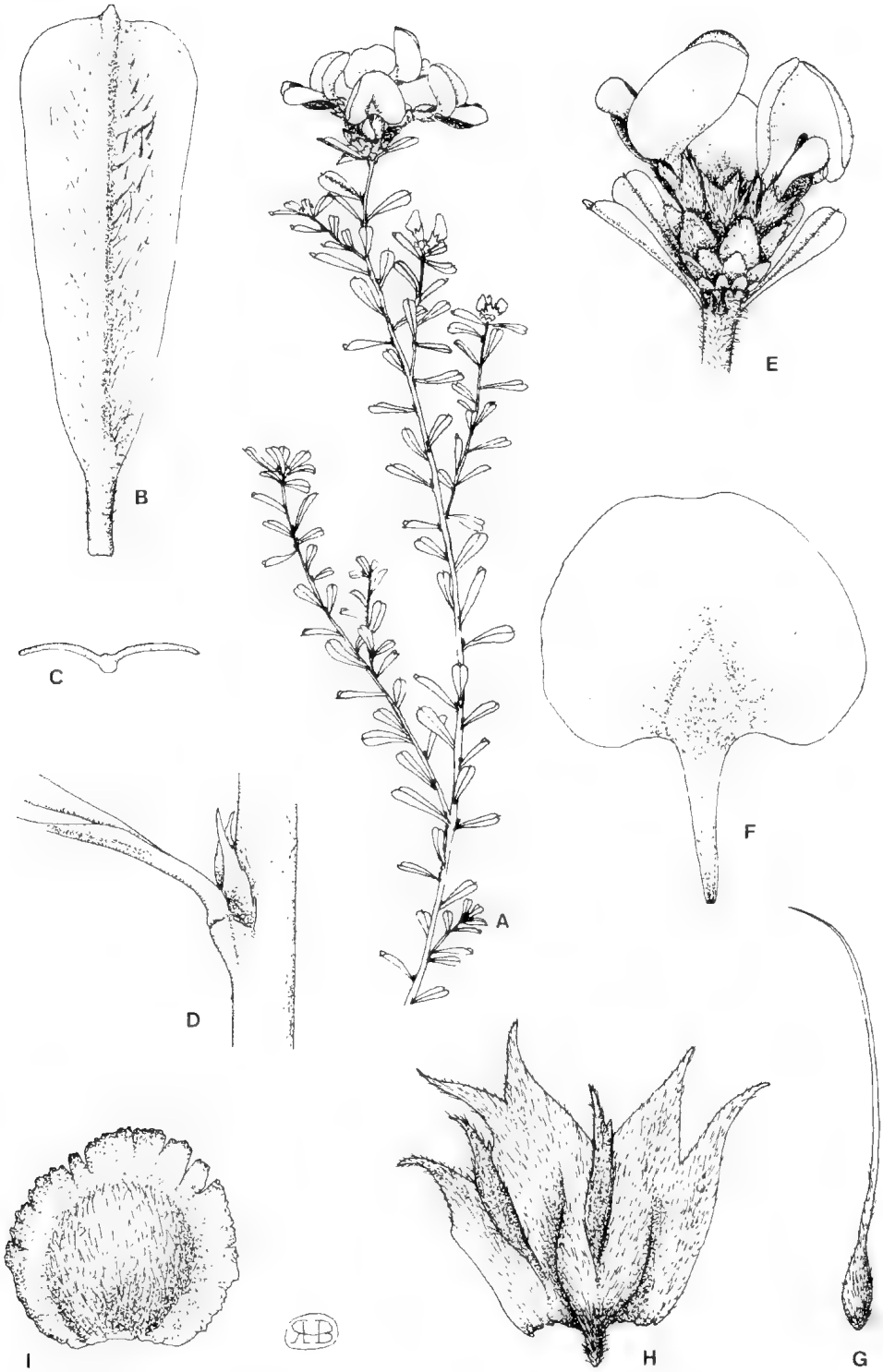


Fig. 36. Pultenaea maidenii. A, habit x 1; B, leaf, underside x 10; C, t.s. leaf x 10; D, leaf base showing petiole and stipules x 10; E, inflorescence x 3; F, standard x 6; G, ovary and style x 7, H, calyx opened out x 6; I, bract x 10; all from Williamson (MEL 35227).

with the mid-rib forming a keel on the lower surface. The upper leaf surface is glabrous except for some sparse hairs on young growth, the under surface is slightly hairy.

The stipules are dark brown, lanceolate, 1.5 mm long and 1 mm wide and usually united in the lower half.

The inflorescence is a very condensed raceme of 4-6 flowers forming a head-like terminal cluster. The pedicel is about 1 mm long.

The bracts are imbricate, dark brown and persistent; they are hairy except for the broad, scarious margin. The large inner bracts are often split, making them appear narrower or occasionally lobed. The inner bracts are about 3 mm long and 3 mm wide; outer bracts are smaller, grading down into the enlarged stipules of the floral leaves.

The bracteoles are lanceolate and dark brown. On the type collection the bracteoles are attached at the base of the calyx tube and are covered in pale hairs. On other collections they are attached near the centre of the calyx tube and hairs are restricted to a line down the centre.

The flowers are 10–12 mm long. The calyx is 5–6 mm long and silky hairy; the calyx lobes are narrowly lanceolate with the two upper lobes joined slightly higher than are the lower lobes. The standard is orange with dark lines surrounding a pale yellow blotch at the base of the lamina. The wings are orange and the keel dark red.

The ovary is densely covered with pale hairs which extend about one third of the way along the style.

The pod has not been seen. Flowering time is given as November.

P. maidenii is known only from three collections of H. B. Williamson and this description is based on that of Reader and on the original collections. Persistent searching in the type area in the Grampians, around the original head works of the Hamilton water supply has failed to rediscover this plant.

In recent years *P. maidenii* has been confused with plants which are evidently hybrids between *P. scabra* and *P. benthamii* (Corrick 1984), but none of the plants in the mixed populations so far examined resemble *P. maidenii*. I have seen plants grown from seed collected from one of the supposed hybrid populations and in every case the young plants developed the leaves of *P. benthamii* and were quite unlike the hybrid parent.

H. B. Williamson (1920) stated that the nearest affinity of *P. maidenii* was with *P. largiflorens* var. *latifolia* from South Australia. Both have similar shaped leaves with a distinctive granular upper surface. Williamson noted a difference in calyx shape, but this seems to be slight. *P. largiflorens* is more densely hairy, but the hairs are similar. The most significant difference

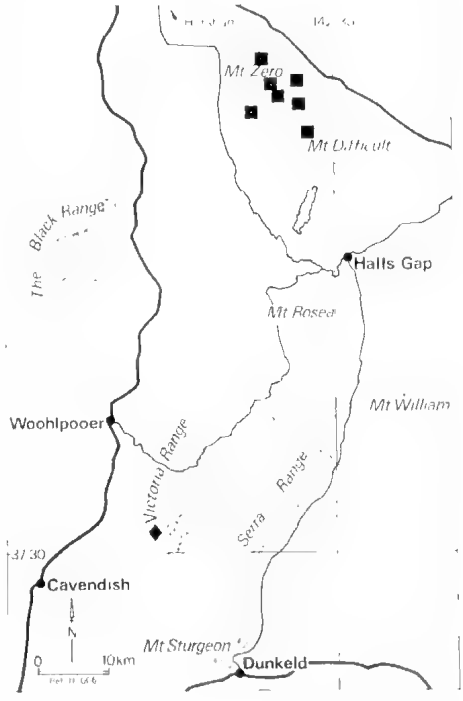


Fig. 37. The Grampians, Victoria, showing known distribution of:
■ *Pultenaea williamsoniana*
◆ *P. maidenii*

seems to be the persistent bracts of *P. maidenii*, whereas those of *P. largiflorens* are deciduous.

SPECIMENS EXAMINED:
Grampians, Victoria Range, Hamilton waterworks pipehead reservoir, H. B. Williamson: (MEL 627535 – type), Nov. 1904; (MEL 1519199), Nov. 1903; (MEL 35226), Mar. 1906.

Acknowledgements
I am most grateful to Richard Barley for preparing the accompanying illustrations. My thanks also to Gordon Paterson of Wartook for showing me plants he had grown from seed taken from the hybrid plants described above.

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The Australian Anchor Plant (*Discaria pubescens*): distribution and status west of Melbourne, Victoria

BY IAN D. LUNT*

Introduction

The Australian Anchor Plant, *Discaria pubescens* (Brongn.) Druce (Rhamnaceae), is a rigid shrub to 2 m tall, with opposite (decussate) spines to 3 cm long, and smaller, deciduous leaves (Costermans, 1981; Willis, 1955). A detailed description of the fruiting structure is given in Willis (1955) and illustrations of the species are presented in Costermans (1981), Galbraith (1977) and Willis (1955). In form, plants of *D. pubescens* in central Victoria bear a superficial resemblance to the introduced Gorse (*Ulex europaeus*).

D. pubescens occurs in New South Wales, Victoria and Tasmania. It is listed as "vulnerable" in Australia by Leigh *et al.* (1981), who recognise four categories of rare or threatened Australian plants; presumed extinct, endangered, vulnerable and rare. Vulnerable plants are those species "not presently endangered but at risk over a longer period through continued depletion".

In Victoria, the species is restricted to small populations in the eastern highlands and to the west of Melbourne (Willis, 1972; Beauglehole, 1980). This paper presents information on all populations recorded from the latter area.

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Methods

Information in this paper was collated from published sources of distributional material (*e.g.* Willis (1972), Costermans (1981), Beauglehole (1980; 1982; 1983a; 1983b), Land Conservation Council, Victoria (1985)). In addition, unpublished data held by the Flora Survey section of the Department of Conservation, Forests and Lands, and the Register of Rare Plants of Victoria (LaTrobe University) were examined.

All specimens of *Discaria* species held by the National Herbarium of Victoria (MEL) and the Herbarium of the University of Melbourne (MELU) were inspected. Selected areas on the Campaspe River were surveyed in 1986, including all sites from which the species was known.

Distribution

Discaria pubescens has been recorded from twelve sites west of Melbourne. Sites are restricted to two geographic regions; the Ballarat area and the Campaspe River, between Kyneton and Redesdale (Fig. 1). Information of each site is presented below.

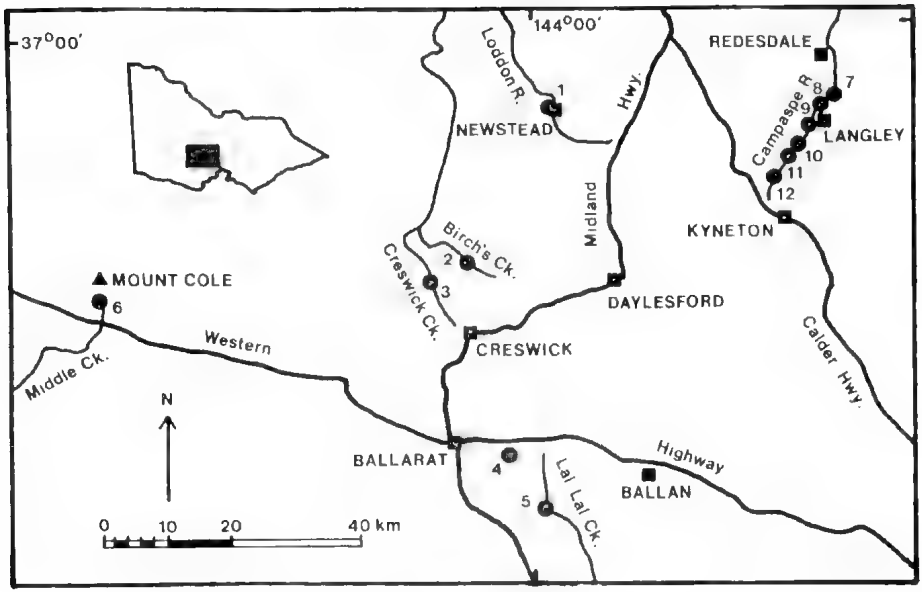

Fig. 1. Distribution of *Discaria pubescens* west of Melbourne, Victoria. Locality numbers follow those in the text.

Ballarat area

The first Victorian record for *D. pubescens* is from the Ballarat area. On 27 September 1836, Major Thomas Mitchell "saw for the first time the *Discaria pubescens*" (quoted in Willis, 1942), whilst travelling "in the vicinity of the Loddon River, near present-day Newstead" (Willis, 1942).

Seventeen years were to elapse before *D. pubescens* was collected for a Victorian herbarium. In February 1853, Baron Ferdinand von Mueller collected a specimen from "Between the Loddon and Creswick Creek" (annotation on herbarium specimen). Von Mueller's historic specimen is held by the National Herbarium of Victoria (MEL 56211).

Willis (1942) considered that *D. pubescens* was "confined in its distribution west of Melbourne to the basalt region within thirty miles of Ballarat". In 1955, Willis listed five sites west of Melbourne: Mt Warrenheip, Birch's Creek, Middle Creek near Mt Cole, Creswick Creek and Lal Lal Falls.

No further localities for *D. pubescens* have been recorded from the Ballarat region. At least two populations listed by Willis (1942; 1955) have since become extinct.

1. Newstead

Discaria pubescens has not been recorded from the vicinity of Newstead since Mitchell's sighting on 27 September 1836. The species must now be presumed extinct in this area.

2. Birch's Creek

The National Herbarium of Victoria holds two specimens collected from Birch's Creek by J. H. Willis in 1938. They were found "between Clunes Reservoir and Wheeler's bridge" and "near the bluestone weir, ±6 miles north of Creswick" (MEL 56218). The second specimen bears the note "only two old bushes seen".

Willis (1942) wrote that he found "several plants [of *D. pubescens*] in the narrow rocky valley of Birch's Creek (below Clunes reservoir, a few miles west of Newlyn)". This population declined

dramatically over the next 15 years:

> "A visit to Birch's Creek, near Creswick, in January 1953 showed that the small anchor plant colony there had dwindled to one decrepit, moribund bush, unequal to its battle for existence beneath encroaching tangles of introduced broom." (Willis, 1955).

After a further eleven years, this plant too had succumbed. On 24 February 1964, Willis wrote on a herbarium specimen collected in 1938 (MEL 56218): "now presumed extinct in this area".

3. Creswick Creek

"Three old, yet vigorous, bushes... [which] would appear fit to survive for many years" were noted from Creswick Creek by Willis (1955). No specimens are held by the National Herbarium of Victoria.

The Herbarium of the University of Melbourne holds a specimen collected from "Creswick Creek near Clunes" in 1966 by H. W. Bond. He noted that the species was "rare" at the site. An annotation made in 1962 by J. H. Willis on a specimen collected from Birch's Creek (MEL 56218 – see above) includes the remark, "still surviving on Creswick Creek near Cattle Station Hill".

More recent surveys of Creswick Creek by Scarlett (1986) have found four plants on private property to the west of Cattle Station Hill.

4. Mt Warrenheip

The Herbarium of the University of Melbourne holds an old, un-dated specimen of *D. pubescens*, collected by Lang from "Mt Warrenheip" (MELU 15244). It probably was collected around the turn of the century.

Locality information on old herbarium specimens often is cursory and frequently refers to broad zones or to nearby landmarks, rather than to specific, geographic locations. (For example, many specimens collected by von Mueller are defined only by the region "Port Phillip".) Lang's collection is the only record of *D. pubescens* from Mt Warrenheip.

As all known populations west of Melbourne are restricted to basaltic valleys, it seems probable that Lang's specimen was collected from a similar environment near Mt Warrenheip, and not from the forested mountain.

5. Lal Lal Falls

The Lal Lal Falls stand of *D. pubescens* has received more attention than all other populations of the species. It was first recorded in 1885 by the Field Naturalists Club of Victoria (Anon., 1885). Fourteen species from the falls, including *D. pubescens*, were "noted as uncommon near Melbourne" (Anon., 1885). (This list also included a number of widespread species, such as *Clematis aristata* and *Tetratheca ciliata*.).

H. B. Williamson collected a specimen from "Lal Lal Falls on Moorabool River (SE of Ballarat, Vic.)" in November 1913. This specimen is lodged with the National Herbarium of Victoria (MEL 56210), and was discussed by Willis (1942; 1955).

Willis collected two specimens (MEL 56216 and 56217) in 1962, from "200 yards upstream from [the] falls". The specimen labels include the note; "six very old bushes [were seen] on northern bank ... creek, in basaltic terrain." Two years later, Wheeler (1964) recorded two bushes "on the north bank ... 500 yards upstream from the falls". Recent surveys by Scarlett (1986) have discovered ten plants at the Lal Lal Falls.

Lal Lal Falls is the only site of *D. pubescens* in the Ballarat area which is under public ownership. Its importance for the preservation of *D. pubescens* was recognised by the Land Conservation Council, Victoria (1982), which recommended that *D. pubescens* be protected within the Lal Lal Falls Scenic Reserve.

6. Middle Creek

Willis (1942) noted having "seen an occasional Anchor Plant on the plains

adjoining Middle Creek, near Mount Cole." No specimens from this locality exist in either the National Herbarium of Victoria or the Herbarium of the University of Melbourne. No recent sightings from Middle Creek have been documented and the present status of this population is unknown.

Campaspe River

In contrast to the Ballarat area, from which all sites were known by 1955, only one population on the Campaspe River was documented prior to 1979. Populations on the Campaspe River increase the distribution of the species beyond the area "within thirty miles of Ballarat" which was known to Willis in 1942.

Six populations are presently known from the Campaspe River between Kyneton and Redesdale. However, the area has not been systematically surveyed and additional stands may be discovered.

7. Mitchell's Falls

The National Herbarium of Victoria holds a specimen (MEL 56209) collected in 1958 by M. Allender from "below Mitchell's Falls near Barfold columns." This is the only record from this site. Allender recorded on the herbarium label that "only one plant [was] seen".

Searches by the author in 1986 failed to find any plants of *D. pubescens*. However, a thorough survey of the steep gorge is very difficult and specimens may be discovered in the future. Given the apparent longevity of the plant and the absence of recent, vegetation disturbance at Mitchell's Falls, it has been assumed (Tables 1 and 2) that "one plant" still may occur below the falls.

8. Queen's Falls

In 1979, N. Scarlett discovered 12 plants just upstream of Queen's Falls. Of these, 11 were present in 1986 (Scarlett, 1986). This population is situated closer to the river bed than is any other stand on the Campaspe River. Many plants exist within the flood zone of the river and flood debris is piled around the upstream side of bushes.

The site is very weedy (see Table 3) and very rocky; rock outcrops may have protected the plants from grazing and clearing. Although all plants were healthy, no young plants were seen.

9. Turpin's Falls

D. pubescens was recorded from Turpin's Falls Scenic Reserve by Beauglehole (1982), as a "personal communication" from the late F. Robbins. Two, mature plants were located by the author in 1986. Turpin's Falls Scenic Reserve is the only *D. pubescens* site on the Campaspe River under public ownership.

The National Herbarium of Victoria holds a specimen of uncertain origin which may have been collected from Turpin's Falls. It was held by the private herbaria of F. Robbins and A. C. Beauglehole prior to being lodged with the National Herbarium of Victoria. The specimen label (written by Beauglehole) reads, "Victoria ? Trentham F. Robbins about 1937". No other records from the Trentham area are known, and it is possible the Robbins collected the specimen from Turpin's Falls.

10. Rogerson's Bridge

Two small stands comprising, in total, three plants were discovered by the author in May 1986, between Rogerson's Bridge and Turpin's Falls Scenic Reserve. Both stands are on the upper slopes of the river valley on eastern aspects. No young plants were present.

11. Langley

D. pubescens was discovered along the Campaspe River immediately west of Langley by Mrs L. Prictor and Mr and Mrs E. Watson in March 1986. Eighteen plants are scattered over approximately 1.5 km. The southern-most plant is approximately 200 m north of the Boundary Road Bridge across the Campaspe River. All plants are mature or senescent. Two plants consisted

Table 1: Number of plants of *D. pubescens* presently surviving in all recorded localities west of Melbourne.

Location	No. of plants	Location	No. of plants
Ballarat Area		Campaspe River	
1. Newstead	0	7. Mitchell's Falls	1
2. Birch's Creek	0	8. Queen's Falls	11
3. Creswick Creek	4	9. Turpin's Falls	2
4. Mt Warrenheip	0	10. Rogerson's Bridge	3
5. Lal Lal Falls	10	11. Langley	18
6. Middle Creek	?	12. Hazeldene	3

solely of basal regeneration from seemingly dead trunks. Many apparently "healthy" specimens also displayed basal regeneration.

12. Hazeldene

This small population, which consists of only three plants, was discovered and surveyed at the same time as the Langley stand. It is situated on the Campaspe River, immediately east of the "Hazeldene" property, and 0.6 km south of Rollinsons Road. No young plants were recorded.

The Hazeldene population represents the first extant record of *D. pubescens* from the Melbourne Study Area (Beauglehole, 1983b) The Land Conservation Council of Victoria (1985) lists *D. pubescens* as "presumed extinct" within the western half (District One) of the Melbourne area.

Discussion

Status

Fifty-two individuals and nine populations of *D. pubescens* exist to the west of Melbourne (see Tables 1 and 2).

Only two populations, at Lal Lal Falls and Turpins Falls, occur on public land. They comprise only 12 plants. Both sites were recommended as Scenic Reserves by the Land Conservation Council, Victoria (1981; 1982). Plants in the Lal Lal Falls reserve are protected by fencing, but no such protection exists at Turpin's Falls.

Two populations in the Ballarat area have become extinct in the past century, *viz.* Newstead and Birch's Creek. A record from a third population, Mt Warrenheip, probably refers to a broad region, near Mt Warrenheip, rather than to the mountain itself. The current status of the Middle Creek population is unknown.

In 1942, Willis remarked that: "from records at present available it would seem that the species is confined in its distribution west of Melbourne to the basalt region within thirty miles of Ballarat". *D. pubescens* now is known to occur in the Ballarat region and on the Campaspe River, north of Kyneton. Indeed, the Campaspe River area supports more extant populations and more individuals (38 *cf.* 14 plants) than does the Ballarat region.

Habitat

All stands west of Melbourne occur in stream valleys, on well-drained and usually stony, basaltic soils. Specific habitat

Table 2: Status of *D. pubescens* west of Melbourne.

Recorded populations	12
Extant populations	9
Extant populations on public land	2
Extant populations on private land	7
Extant plants	52
Extant plants on public land	12
Extant plants on private land	40

Table 3: Associated species at *D. pubescens* sites on the Campaspe River. Table shows dominant species only. Nomenclature follows Willis (1970; 1972) with amendments by Forbes *et al.* (1984) * = introduced species.

Species/site	Turpin's Falls	Rogerson's Bridge	Langley	Hazeldene	Queen's Falls
Acacia melanoxylon		x			
*Agrostis capillaris				x	x
*Avena sp.		x	x		
*Bromus sp.		x	x		
*Crataegus monogyna	x			x	x
Danthonia sp.			x		
*Holcus lanatus	x			x	
*Hordeum sp.			x		
Eucalyptus viminalis	x				
Eucalyptus camaldulensis		x			x
Hymenanthera dentata	x	x	x		x
*Phalaris sp.					x
Poa labillardieri	x				
*Rosa rubiginosa	x				x
*Rubus fruticosus spp. agg.					x
*Ulex europaeus					x

preferences within valleys are not known. Plants commonly occur at the upper edge of the stream valley. The Queen's Falls population, however, is situated very low on the slope, close to the river, and is frequently inundated by floods.

Prior to European settlement, the species probably grew extensively within stream valleys, from the break of slope adjacent to the plains, to lower slopes near the stream bed.

It is possible that *D. pubescens* also occurred on the adjacent plains prior to European settlement, and that its present absence is due to agricultural clearing and grazing. Unfortunately, the *total* lack of records from the plains provides no support for such a hypothesis. The absence of records from likely sites, such as less-intensively managed roadsides and railines, perhaps renders the hypothesis unlikely.

Unlike *Hymenanthera dentata* (Tree Violet) and *Dodonaea cuneata* (Wedge-leaf Hop-bush), which are common species of basaltic river valleys, *D. pubescens* has not been observed to grow on rocky cliff-faces. All populations at the Campaspe River occur on gentle or moderate slopes. Although plants frequently grow near rock outcrops, none have been observed in rock crevices or on cliffs.

D. pubescens has no preference for waterfalls, as may be imagined from the list of locality names. The relative abundance of waterfall records (33% of all records) could reflect the preservation of native vegetation at these sites, or may simply result from selective sampling of waterfalls by naturalists and botanists. Many other stretches of the Campaspe River are visited infrequently and surveyed very rarely.

Weed invasion

All sites on the Campaspe River have a high proportion of introduced species (Table 3). The Queen's Falls population, the second largest stand, is in danger of being over-run by introduced *Ulex europaeus* (Gorse) and *Rubus fruticosus* spp. agg. (Blackberry). Competition from

naturalised species such as *Holcus lanatus* (Yorkshire Fog) and *Phalaris* spp. (Canary-grass) may inhibit regeneration in many populations. An additional threat to remnant populations could arise from weed-eradication programs, due to confusion of the spiny *D. pubescens* with introduced *Ulex europaeus.*

Regeneration and rarity

Discaria pubescens is capable of vegetative regeneration from the base of the adult plant. A specimen collected from Wulgulmerang, East Gippsland (by J. H. Willis in 1962) displays coppice "regrowth after a burn" (quoted from herbarium label; MEL). Similar coppice growth occurs frequently, on both healthy and apparently dead plants, in Campaspe River populations.

Seedling regeneration is an extremely rare occurrence. Every plant of *D. pubescens* observed on the Campaspe River was mature or senescent. An absence of seedlings appears to be typical of remaining populations. Dr. J. H. Willis, in a personal communication (27.5.1986), remarked: "I have never yet seen any young seedling plants".

Previous writers largely have attributed the rarity of *D. pubescens* to the effects of grazing and agricultural clearing. Hooker (1855, quoted in Willis, 1955) wrote that the plant was "much browsed on by cattle and sheep", and Willis (1955) stated that its distribution was reduced by clearing and by grazing by rabbits and stock. Whilst these processes undoubtedly have contributed to the decline of *D. pubescens*, they are unlikely to be solely responsible for its present rarity.

No evidence of browsing of mature *D. pubescens* was observed at Campaspe River populations, even though most sites have been grazed by sheep, and probably by cattle, for a considerable period. Healthy plants usually possessed a squat, near-spherical shape. In contrast, the lower and middle branches of *Hymenanthera dentata,* which were growing near to *D. pubescens* at Langley, were grazed severely. It appears, from this circumstantial evidence, that *H. dentata* is grazed preferentially over *D. pubescens*; and yet the former species is very common on basalt plains and valleys.

Grazing by stock and rabbits does not account for the complete absence of young plants in relatively protected areas, such as between large rocks on moderately steep, riparian slopes. Adult bushes occur frequently on such sites. These environments rarely are subjected to high grazing intensities, and occasional seedlings (at least) would be expected to escape from predation by rabbits.

It appears that the present absence of young plants of *D. pubescens* is due to problems in seedling regeneration which are not directly a consequence of grazing. Detailed ecological studies of seed viability and germination, and of seedling growth are required urgently to determine the extent to which these factors are contributing to the decline of this rare species.

Outlook

The prospects for stands of *D. pubescens* to the west of Melbourne are not encouraging. The paucity of plants on public land (only 12); the weediness of existing populations; and the total lack of seedling recruitment, are likely to contribute to the continual decline of existing populations.

The decline of the Australian Anchor Plant is not a fortuitous event; but reflects the decimation of the flora and fauna of the basaltic plains and valleys of western Victoria.

The survival of *D. pubescens* in a near-natural environment requires further protection and restoration of the basaltic biota, and increased research into methods of rehabilitation. In the absence of such measures, *Discaria pubescens*, and many other species of indigenous flora and fauna, may vanish soon from the basaltic regions of western Victoria.

Acknowledgements

Special thanks are due to Dr R. F. Parsons for discussions on the present status of *D. pubescens* in Victoria; Dr R. F. Parsons, Jeff Yugovic and Ian Clarke for comments on drafts of the manuscript; members of the Ballarat Field Naturalists Club for information on distributions in the Ballarat area; Dr J. H. Willis for locality information; and to Mrs Lois Prictor of Kyneton, who first alerted me to the existence of *D. pubescens* on the Campaspe River.

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Plea for Naturalised Conifer Collections

Mr. Ken Hill, National Herbarium of NSW is preparing the account of conifers for the Flora of Australia, Volume 48.

Naturalised conifers are very poorly represented in Australian herbaria and collections are required to provide information for the Flora of Australia. A naturalised conifer is one reproducing outside of cultivation or plantations. Adequately pressed and dried herbarium specimens including a small branch 25-30 cm long with leaves or needles and terminal buds and if possible a cone are required. Specimens should include notes on locality, habit and habitat and the collector's name, collecting number and date of collection. Detailed instructions on plant collecting are available from the National Herbarium of Victoria. Specimens should be collected in duplicate so that one collection can remain in Melbourne and the other be sent on exchange to Sydney. Collections before the end of 1987 will be especially valuable.

Send collections to:

Stephen Forbes,
Department of Conservation Forests and Lands
National Herbarium of Victoria
Birdwood Avenue
SOUTH YARRA VICTORIA 3141
AUSTRALIA

Observations on a *Dasytes* Species (Melyridae : Coleoptera), a Pollen-Feeding Beetle on Daisies (Asteraceae) in Northern New South Wales.

By T. J. Hawkeswood*

Abstract

Observations are provided on a *Dasytes* species (Coleoptera: Melyridae), which feeds on the pollen of various daisies (Asteraceae) in the Ebor district, north-east New South Wales. Of 7 species of daisy growing in the area, 5 were visited by beetles. Only two species, *Hypochoeris radicata* L. and *Podolepis jaceoides* (Sims) Voss were frequently visited. No specimens were observed on *Crepis capillaris* (L.) Wallr. and *Senecio lautus* Forst. f. ex Willd. Of a total of 42 live beetles counted, pollen was observed on the bodies of 35 (83%). The majority of beetles carried pollen on the abdomen and elytra. Their role in the pollination of the daisies is probably minor due to their small population size.

Introduction

Almost nothing has been recorded on the biology of *Dasytes* species (Melyridae). Lea (1909) in the last revision of the genus, noted that one species, *D. bourgeoisi* Lea from Tasmania, was "common on flowers". Opportunity to observe one *Dasytes* species in the field arose on 11 February 1984, on a plateau above Ebor Falls, north-east New South Wales (30°24'S, 152°20'E). Beetles were resting, mating or feeding on pollen from the inflorescences of various daisies (Asteraceae). These plants were growing in a woodland community dominated by *Eucalyptus* species (Myrtaceae) and various grasses (Poaceae) (Fig. 1).

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Materials and Methods

(a) Identification of daisies: Samples of the flowering daisies at the study site were collected and identified by comparisons with named specimens in the Herbarium of the University of New England, Armidale (UNE). No voucher specimens were deposited in the Herbarium since most of the species are common and well represented from the Armidale region. The daisies collected were as follows: *Helichrysum bracteatum* (Vent.) Andrews, *H. apiculatum* (Labill.) DC., *Podolepis jaceoides* (Sims) Voss, *Brachycome nova-anglica* G. L. Davis, *Senecio lautus* Forst. F. ex Willd., *Crepis capillaris* (L.) Wallr. and *Hypochoeris radicata* L. (The later two taxa are introduced weeds from Europe). The daisies were dominant among the few herbaceous species in flower in the area.

(b) Identification of beetles: A small sample of beetles was collected for later identification and is deposited in the Australian National Insect Collection (ANIC) in Canberra; voucher No. ANIC 84-0054. The specific identity remains unknown, since the species does not key out in Lea (1909). (T. A. Weir, 1984, pers. comm., informs me that the Australian species of *Dasytes* will be eventually placed into another genus, so the name *Dasytes* is tentative at this stage).

(c) Sampling and observations on beetles: A transect of 30 metres was taken across the study area beginning at the edge of a cliff and leading towards the Ebor Falls car park. The number of inflorescences of each species situated within 3 m either side of the transect line was counted, in addition to the number of beetles on inflorescences and the percent-

Fig. 1. Study site with *Eucalyptus* species in the background and daisies and grasses dominating the ground zone strata. The cliff and falls are to the left of the photograph.

Table 1. Number of beetles (excluding dead individuals) counted on the inflorescences of 7 daisy species (Asteraceae) on 11 February 1984 at Ebor Falls, New South Wales.

Species	No. of inflorescences counted	Abundance index +	No. of beetles counted	% of inflorescences with beetles
Helichrysum bracteatum	279	1.00	1	0.4
Helichrysum apiculatum	144	0.52	5	2.8
Senecio lautus	7	0.03	0	0.0
Brachycome nova-anglica	19	0.07	3	15.8
Podolepis jaceoides	49	0.18	12	24.5
**Hypochoeris radicata*	108	0.39	21	13.9
**Crepis capillaris*	36	0.13	0	0.0
Totals	642	—	42	—

* Introduced species.
+ Based on number of inflorescences and not number of plants with *H. bracteatum* as base.

age of inflorescences possessing beetles at the time of observation (Table 1). The number of beetles per inflorescence of the various species was also recorded (Fig. 2). An abundance index for each plant species was calculated using the most common species as a base (Table 1). Each beetle counted was closely examined for pollen and the sites of deposition recorded (Table 2). Pollen from the flowers was clearly

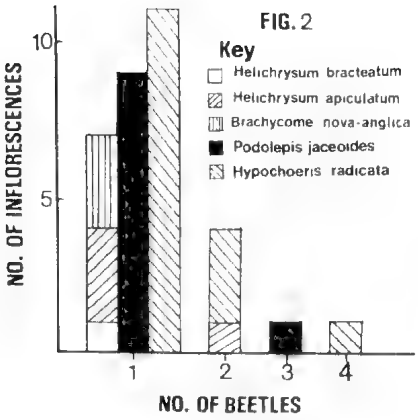

Fig. 2. Number of inflorescences of each plant species with 1,2,3, or 4 beetles at the time of observations.

visible to the naked eye as small, variable-sized, yellow clusters on the beetles' bodies. Any behavioural patterns were recorded.

Results

Of 642 inflorescences counted in the transect, only 33 possessed live beetles (Fig. 2). Another 6 inflorescences of 4 species possessed a single dead beetle each (Table 2). Cobwebs on two specimens indicated that spider predation may have been the cause of death in these cases. Abundance of a plant species generally did not correlate with the number of beetles on flowers, e.g. only one beetle was observed from 279 inflorescence of *Helichrysum bracteatum* examined (Table 1). The majority of beetles (50%) were found on the introduced plant *Hypochoeris radicata*, while (28.5%) visited *Podolepis jaceoides* (Table 1).

Pollen was most frequently carried on the abdomen and elytra in the majority of beetles examined, while some beetles carried pollen on all parts of the body (Table 2). Of the total 42 *Dasytes* sp. counted in the transect, 27 (64.3%) were found as single beetles on inflorescences, while rarely 3 or 4 beetles were observed together (Fig. 2).

Most of the beetles were observed resting on the petals of ligulate flowers (Fig. 3) or tubular flowers of the daisies or feeding from the stamens or the pollen

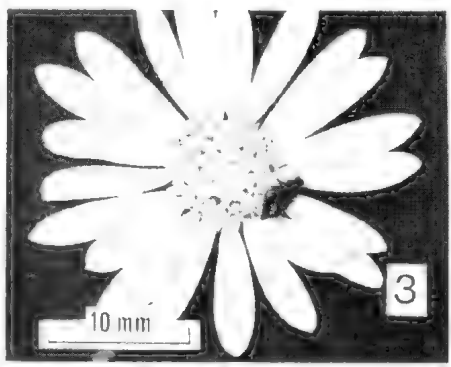

Fig. 3. Dasytes sp. on *Brachycome nova-anglica.*

Table 2. Number of dead beetles, sites of pollen deposition and the number of live beetles carrying pollen, observed on 5 daisy species on 11 February, 1984 at Ebor Falls, N.S.W.

Species	Place of pollen deposition +						No. of dead beetles counted
	A	B	C	D	E	F	
Helichrysum bracteatum	0	0	0	0	1	0	0
Helichrysum apiculatum	1	1	1	3	1	2	1
Brachycome nova-anglica	0	0	0	0	1	0	2
Podolepis jaceoides	0	1	3	8	11	3	1
**Hypochoeris radicata*	7	9	10	12	13	8	2
Totals	8	11	14	23	27	13	6

+ A = antennae, B = head, C = thorax, D = abdomen, E = elytra, F = legs.
* Introduced species

Fig. 4. Dasytes sp. on *Helichrysum apiculatum.* The male is attempting to mate with the female while the female feeds on pollen.

adhering to the styles of the bisexual tubular flowers (Figs. 4 and 5) (or in the case of *Hypochoeris radicata,* feeding from the ligulate flowers). The beetles were usually messy feeders. Pollen was often brushed from the stamens and style onto their bodies during movement and feeding. Some beetles attempted to mate during feeding bouts (Fig. 3). Most beetles were active and usually undertook flight upon disturbance.

Discussion

The Melyridae have been found to be exclusively anthophilous in Europe (Proctor and Yeo 1973) but since they are of little importance in the pollination of flowers compared to other insect vectors, their pollination biology has not been extensively investigated. In Australia, the taxonomy and biology of the 200 or so species are poorly known and nothing has been written about their role in pollination of native plants. Britton (1970) notes that Melyridae are "almost always carnivorous, and are commonly found on flowers".

The observations noted here indicate that *Dasytes* sp. frequently contact the anthers and styles of *Hypochoeris radicata, Podolepis jaceoides* and *Brachycome nova-anglica,* while flowers of *Helichrysum* species are occasionally visited. However, since the *Dasytes* sp. were present in low numbers, with individual beetles likely to visit more than one species of daisy during daily feeding, and since they are tiny beetles (3–4 mm total body length) unlikely to require large quantities of pollen for sustenance, their role in pollination of the daisies is probably minor. In addition, since many Asteraceae have flowers which are commonly apomictic, and/or self pollinating (autogamous), inter-flower or inter-plant cross-pollination by insects or other vectors is not required for viable seed set.

The majority of beetles carried pollen on the elytra and abdomen (Table 2). These regions of a beetle's body usually have the largest surface areas and are often covered to various degrees in hairs, which facilitate transportation of pollen. Many *Dasytes* species are characterized by having erect,

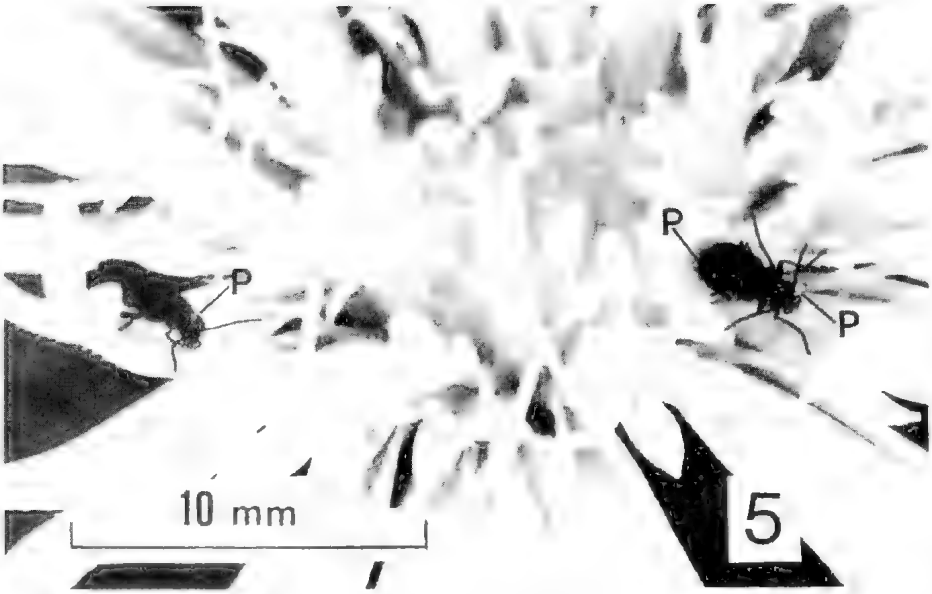

Fig. 5. Dasytes sp. on *Podolepis jaceoides.* The two beetles were feeding on pollen before being disturbed by the camera flash. Pollen grains (p) are attached to various parts of the dorsal body surface of the insects.

bristly hairs on the pronotum and/or elytra in addition to shorter micro-hairs (Lea, 1909). In the case of *Dasytes* sp. at Ebor, large clusters of pollen were frequently observed on the elytra which possess long, erect, stiff hairs (Fig. 5).

It is interesting to note that *Dasytes* were more common on *Hypochoeris* and *Podolepis* than on the other daisies despite these two genera not being the most common in terms of inflorescence numbers (Table 1). The reason for this anomaly may lie in the structure of the inflorescence. In *Hypochoeris,* the flowers are all ligulate (see Beadle *et al.* 1972) and the pollen is more accessible due to larger flower size and more abundant per flower than in the tubular flowers of the remaining species in this study. In addition, the flower heads (capitula) of *Helichrysum* and *Crepis* contain several hundred tightly clustered tubular flowers per inflorescence, while those of *Hypochoeris, Podolepis, Brachycome* and *Senecio* have fewer (mostly less than a hundred) bisexual flowers per inflorescence. In these four genera, the flowers are not so densely packed, a condition which appears to allow easier procurement of pollen by the beetles.

Acknowledgements

I would like to thank Dr. N. Prakash, Dept. of Botany, University of New England, Armidale, N.S.W. for reading and commenting on the manuscript. I also thank Messrs H. Wissman and W. Sheather for assistance with the identification of the Asteraceae and Mr. T. A. Weir, A.N.I.C., Canberra, for identification of the beetle. This research was privately funded and I thank my mother for assistance.

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A note on the existence of pre-Pleistocene fossils of parastacid crayfish.

BY ANTHONY SOKOL*

Fossil parastacids have rarely been documented and are generally listed only from the Pleistocene – Recent (Glaessner, 1960; 1969; Bishop, 1967). Woods (1964), however, noted the occurrence of an undescribed parastacid from the Lower Tertiary (Palaeocene) Darra formation of south-eastern Queensland. This specimen (Queensland Museum, QMF5740) was later figured, but not identified, in Hill *et al.* (1970), "Cainozoic fossils of Queensland". I have examined this specimen and, although it consists only of one chela, it is clearly closely allied to, or perhaps a member of the eastern Australian genus *Euastacus* (Fig. 1). The conspicuous tuberculation and spination (particularly the prominent dactyl spine) is characteristic of many extant species of *Euastacus* (Morgan, 1983).

The existence of a second Tertiary fossil from Queensland was noted by Rozefelds (1985), who questioned its original description as a zygopteran nymph. While the chelae, telson and uropods are apparent on this specimen, preservation is too poor to enable classification. This specimen was collected from the Eocene-mid-Miocene Duaringa formation in mid-eastern Queensland (Rozefelds, 1985). Stirton *et al.* (1961) also recorded the ocurrence of gastroliths and chela fragments in late Tertiary sediments from northern South Australia.

Extension of the above mentioned Pleistocene limit for parastacid fossils is not surprising given that northern hemisphere freshwater crayfish (family: Astacidae)

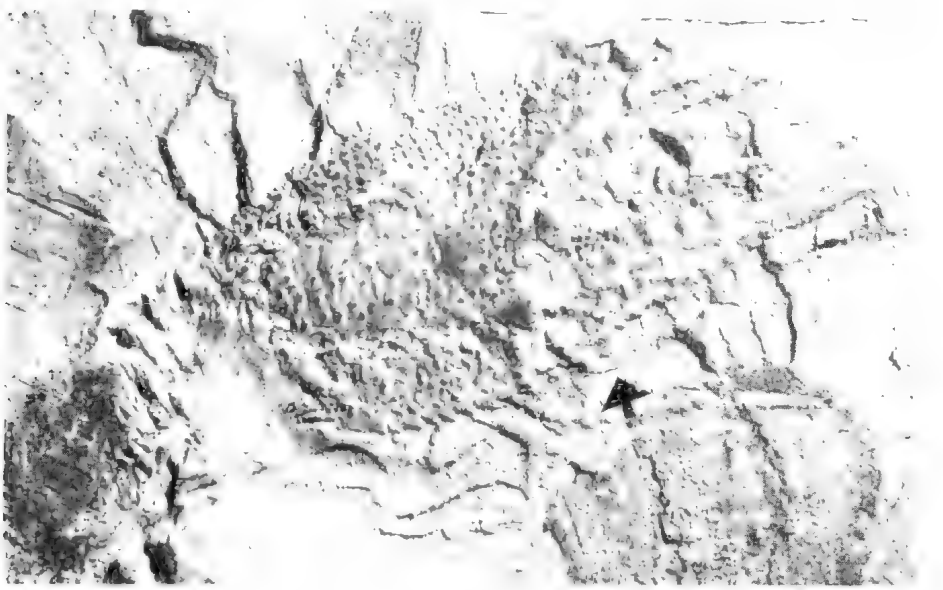

Fig. 1. Fossil parastacid chela from the Lower Tertiary Darra formation of south-eastern Queensland The prominent dactyl spine is indicated by an arrow. (approx. actual size).Photograph by B. Fuhrer.

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have been recorded from the Upper Jurassic-Lower Cretaceous (Glaessner, 1969). Some fossil freshwater crayfish material does lie unsorted in the collections of various researchers and examination of this and new material in the future may extend the fossil parastacid record into the Mesozoic.

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Notes from the National Herbarium of Victoria — 4
Richea gunnii J. D. Hook. (Epacridaceae) : A New Heath for Victoria

BY N. G. WALSH*

Richea is a genus of 11 species of alpine and subalpine shrubs, mostly restricted to Tasmania where the genus displays a high degree of structural diversity. Most species form compact shrubs to about 1 m tall but the largest species, pandani (*R. pandanifolia*), may form an impressive, often unbranched tree to 12 m with a habit strongly reminiscent of a palm or of the widely cultivated cordyline (*C. australis*).

Until recently the sole mainland representative of the genus was thought to be candle heath (*R. continentis*), a sharp-leaved, low, hummock-forming shrub usually fringing alpine sphagnum bogs and watercourses in Victoria and southern New South Wales. This plant will be especially recalled by bushwalkers who may emerge from thickets with minor lacerations to the lower legs! Bushwalkers beware! *Richea gunnii,* an equally sharp-leaved shrub recently discovered in Victoria grows to heights of 2 m or more, but perhaps fortunately for some, the plant does not form such dense swards as does its mainland relative and from current information, it is rare in Victoria, apparently restricted to depressions on and near the Baw Baw plateau and the Blue Range, between Marysville and Taggerty.

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Distinguishing features of *R. gunnii*:

Richea gunnii (Fig 1a – 1c) forms a spreading to narrowly erect shrub with at least the uppermost stems ascending. The stems are leafless for the greater part but have conspicuous scars from where the stem-sheathing leaves have fallen. The foliage is usually restricted to the upper 5-20 cm of the stems. The leaves are stiff, narrow and sharp-pointed to 6 cm long. Their margins are finely serrated and the leaf bases envelop and completely obscure the stems. In shape and form the leaves of

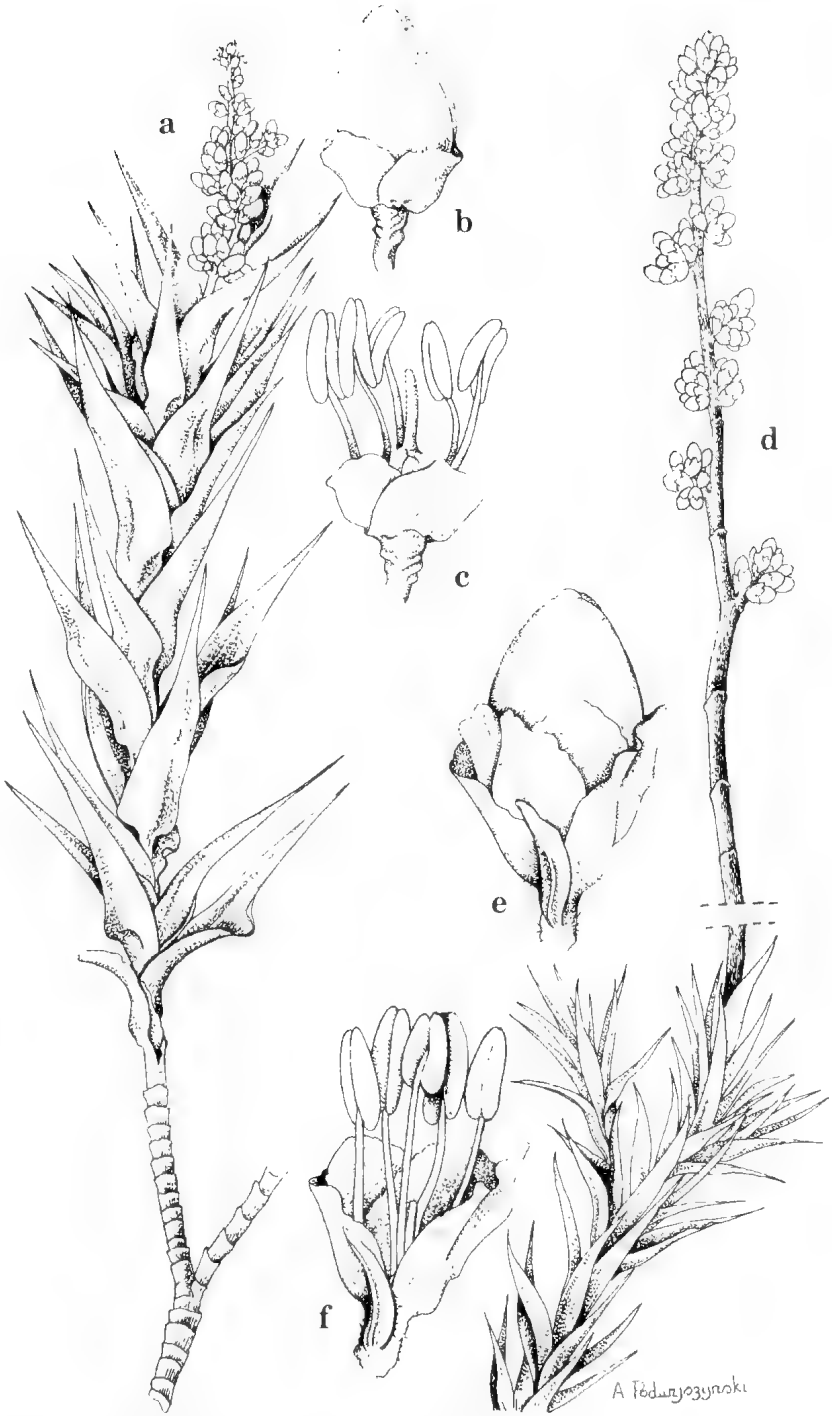

Fig. 1. Richea gunnii (a) habit x1 (b) flower with corolla attached x8 (c) flower after corolla has fallen x8. *Richea continentis* (d) habit x1 (e) flower with corolla attached x8 (f) flower after corolla has fallen x8. (a)–(c) drawn from specimen at Melbourne Herbarium, N. G. Walsh no. 694. (d)–(f) drawn from specimen at Melbourne Herbarium, T. B. Muir no. 1063.

R. gunnii strongly resemble those of *R. continentis,* however that species has leaves rarely exceeding 4 cm long and the older leaves or their withered remains are retained along the lower stems.

The flowers of both species are also similar, that is, they are shaped rather like a bell, about 3 mm long, with the petals entirely fused forming a closed hood over the 5 erect stamens and short style. The corolla is deciduous and falls as a whole in an analagous manner to the operculum of eucalypt flowers. the stamens of *R. gunnii* are rather long, 3-5 mm, far exceeding the 5 short (about 1mm), blunt sepals. Their anthers are narrowly oblong. The style is slightly shorter than the staminal filaments .

Richea continentis (Fig. 1d – 1f) has stamens barely exceeding the rounded or slightly pointed sepals which are generally 2-3 mm long. Their anthers are broadly elliptic when open but about as long as those of *R. gunnii.* The style is only about half the length of the staminal filaments, The flowers of both species are arranged in small clusters, each embraced by a deciduous bract 1-2 cm long which is somewhat fleshy and pink toward the base. It is the arrangement of the flowers in the inflorescence which clearly separates the two species. In *R. gunnii* the inflorescence is a rather dense, narrow, terminal panicle up to 10 cm long, not or barely exceeding the uppermost leaves whereas *R. continentis* has its flowers more sparsely arranged within the slender panicle which is 10-25 cm long and quite devoid of flowers in the lower half.

Ecology

Both *Richea gunnii* and *R. continentis* are known from alpine or subalpine sites near watercourses or bogs, usually associated with sphagnum moss and alpine swamp heath (*Epacris paludosa*). Present knowledge indicates that *R. gunnii* occurs at slightly lower altitudes than does its congener, in elevated valleys draining cool air from mountains upon which *R. continentis* is abundant. The known localities are from the headwaters of the Acheron and Thomson Rivers which drain the Mt Margaret-Lake Mountain system and the Baw Baw Plateau respectively. The Baw Baw Plateau shares a number of botanical curiosities with Tasmania, species which are otherwise unknown on the mainland, the most intriguing of which is probably the tiny flannel-flower (*Actinotus bellidioides*) which has not been seen since its discovery near Mt Whitelaw in 1928.

Conservation Status

Richea gunnii has ben collected from public land within both national park and MMBW water supply areas. Although *Richea gunnii* must be considered rare, it is locally abundant and its survival in Victoria seems assured. It is hoped these notes and illustrations may assist in the discovery of further haunts of this new Victorian.

Taxonomic Note

Early texts e.g. Ewart (1931) and Nicholls (1941, 1944), give *R. gunnii* as the only Victorian species of *Richea.* Following revisionary work by B. L. Burtt in 1941, all mainland representatives of the genus were included in *R. continentis,* a "new" species described by that author. There is no doubt that the two species are quite distinct (Burrt considered *R. gunnii*'s closest congener to be Tasmanian *R. scoparia*) and it is therefore something of an irony that true *R. gunnii* again appears on Victorian plant census.

Acknowledgement

I thank Anita Podwyszynski for the accompanying illustration which serves to clearly distinguish the two species.

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Naturalist Note

A magnificent blue toadstool *(Entoloma nitidum)*

BY J. H. WILLIS* AND ISOBEL CRAWFORD†

Blue is a rather uncommon colour among toadstools, some conspicuous examples in Victoria being *Mycena interrupta* ("pixie's parasol") and *Cortinarius rotundisporus.* While conducting a mycological excursion at the Rotamah Island Bird Observatory, Gippsland Lakes National Park, on 26 April 1985, we were delighted to find a large colony of gilled fungi with spectacular satiny-blue caps 4-8 cm wide. At first the species was assumed to be New Zealand *Entolama hochstetteri* which has a similar colour but more conical pilei; later, a careful examination revealed the correct identity, viz. *Entoloma nitidum.* The latter ranges widely in Europe, especially through cooler regions; but, as far as available records indicate, it has never been noted previously in Australia. The winter of 1985 was particularly wet at Rotamah, and favourable for fungal activity, whereas the same period in 1986 was exceptionally dry and no further specimens of *Entoloma nitidum* have appeared.

On Rotamah Island it inhabited sandy ground in open *Eucalyptus botryoides* forest about 1.5 km ENE of the jetty and Observatory H.Q. Present as a rather dense understorey were trees and tall shrubs of *Acacia mearnsii, A. longifolia, Banksia integrifolia, B. serrata, Monotoca elliptica,* with plentiful *Pteridium esculentum* (bracken fern). A comparison with habitats in Europe is interesting: according to R. M. and S. M. Dähncke, 1980 (*700 Pilze in Farbfotos,* p. 248), *E. nitidum* favours "mossy coniferous forest", while Lange and Hora, 1970 (*Collins Guide to Mushrooms and Toadstools,* p. 178), give "wet peaty soil, often under birch", the colour being "more or less indigo-blue".

The species belongs in Section Nitidi of pink-spored *Entoloma,* together with related *E. bloxamii, E. madidum, E. caelestinum* and *E. violaceum.* Of these, only the first (*E. bloxamii*) has been recorded for Australia – D. McAlpine, 1895)*Syst. Arrangement of Aust. Fungi,* p.20), ascribes it to S.A. and Vic., on "open exposed pastures" and coloured "blackish blue", although M. C. Cooke, 1892 (*Handb. Aust. Fungi,* p. 39), had cited only Victoria. If Cooke's *"E. bloxamii"* were really a misidentification of *E. nitidum,* then the Rotamah Island collection would not be a "first" for this continent – only critical examination of the specimen Cooke handled (should it still exist at Kew Herbarium) will settle the point.

In any case, there is a possibility that *E. nitidum* (and *E. bloxamii,* if a genuine record) may be adventitious fungi from Europe, as are several other toadstools in Australia (e.g. *Amanita muscaria* and *Lepista nuda*). Rotamah Island has been extensively cleared and grazed until 1975 when the National Parks Service took it over; earlier this century it was also used for vegetable production, so fungal introductions (as well as existing weeds) might be expected there. The original (1985) material of *Entoloma nitidum* from Rotamah has been lodged in the Botany Department of Monash University.

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Description of a New Genus of Carnivorous Snail (Mollusca : Rhytididae)

By Brian J. Smith*

Introduction

The purpose of this paper is to erect a genus name within the family Rhytididae to accommodate a common species of snail in south-eastern Australia that is shown not to fit into any existing genus. Iredale (1933) erected the genus *Strangesta* to accommodate the large rhytidids from Queensland and northern New South Wales, with *Helix leichardti* Cox, 1864 as type species. However, uncharacteristically, he broadened his concept of the genus (Iredale 1938, 1943) to include the majority of the rhytidids of eastern Australia (18 species) from small, highly sculptured forms from southern Tasmania to the large Queensland species. Examination of a large series of eastern Australian rhytidids has revealed the existance of several generic groupings (Smith - unpublished). *Strangesta* has been redefined (Smith, 1979) and most of the other described species can be placed into existing available genera, a full revision of which will be published elsewhere (Smith - in preparation). However, because of the choice by Iredale (1933) of the type species for the genera he erected for the various generic groupings, one group is left without an available generic name. This is the group based on the earliest species name of all the Australian rhytidids, *Helix capillacea* Ferussac, 1832. Because of the similarities in radula and genital anatomy structure between this species and the New Zealand genus *Rhytida* it was tentatively placed with that genus in a recent field-guide (Smith and Kershaw, 1979). However, this placement is not satisfactory due to differences in shell and radula structure described below and a new genus is here erected for the group.

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Taxonomy

Austrorhytida gen. nov.

Diagnosis: Shell medium, thin, 4-5 whorls, flattened with slightly elevated spire, convex, rounded with a fairly wide umbilicus, aperture ovate-lunate. Sculpture of fine, regular, radial striae above, usually smooth below. Colour light yellow to dark honey to russet, without patterning. Radula with few lanceolate, recurved teeth grading rapidly from an almost vestigial rhacidian to a major tooth at 8 or 9, outside which are two to six vestigial laterals. Tooth 8 or 9 is over twice the length of tooth 1 and is a large, heavy tooth on a long base plate which probably articulates with the same tooth on adjacent rows. The tooth formula is approximately (2 to 6) - (8 or 9) - 1 - (8 or 9) - (2 to 6). The reproductive tract is simple with the penis, epiphallus and vagina all of approximately equal length.

Remarks: The Australian rhytidid fauna is contained in seven genera which have either been recently redescribed using anatomical as well as shell characters (Smith 1969, 1979) or will be redescribed elsewhere shortly (Smith – in preparation). These seven genera, all described by Iredale (1933) are *Victaphanta, Prolesophanta, Saladelos, Tasmaphena, Strangesta, Namoitena* and *Torresiropa*. Other generic names present in the literature are considered synonyms of one of these (Smith - in preparation). An eighth generic name, *Occirhenea* Iredale, 1933, should be considered *incerta sedis* as the original description is inadequate and only two shells of the single species have ever been collected (Smith, 1971). All the available species names of Australian rhytidids, except four, can be located in these seven existing genera (Smith – unpublished). These four exceptions are synonyms of one species (see below), the senior name being *Helix capillacea*

Table 1. A comparison of the shell and radula characters of existing rhytidid genera with *Austrorhytida.*

Genera	Shell colour	Shell sculpture	Shell size	Radula type
Victaphanta	black and dark brown	smooth	large	I
Prolesophanta	light horn	smooth	v. small	II
Saladelos	yellow	v. fine	small	II
Tasmaphena	dark yellow	coarse	medium	III
Strangesta	yellow	v. fine	large	III
Namoitena	yellow	v. fine	large to medium	III
Torresiropa	pale horn	v. fine	small	unknown
Rhytida	dark yellow	irregular coarse	medium	IV
Austrorhytida	yellow	fine	medium	IV

Ferussac, 1832. Because of certain similarities between the radula structure of this species and members of the New Zealand genus *Rhytida,* the species was tentatively associated with that genus by Smith and Kershaw (1979).

The shell and radula characters of the seven existing Australian genera, the genus *Rhytida* and *Austrorhytida* are compared in Table 1. In the table, four different radula types are referred to. These are characterized as follows:-

Type I - teeth long, lanceolate with sharp points, all approximately the same size along a row with approximately 130 teeth per row.

Type II - teeth long, pointed, peg-like grading in size gradually to a series of large laterals, no one tooth dominant, approximately 50 teeth per row.

Type III - teeth long, lanceolate with sharp points, grading gradually to a dominant tooth towards the outer margin, dominant tooth only about 1.5 times the size of adjacent teeth, approximately 50 teeth per row.

Type IV - teeth long, lanceolate with sharp points, grading to a dominant tooth at about 8 to 10, dominant tooth over twice the size of adjacent teeth, approximately 32 teeth per row.

In radulae types III and IV the dominant tooth of each row may articulate with the same tooth on adjacent rows forming a line of strength down each side of the radular ribbon. The effect of this is to produce a pair of widely spaced "fangs" on every row, similar in appearance and function to the enlarged canine teeth of a mammalian carnivore. This can be called the "sabre-tooth" effect and is clearly an adaptation to the predatory habit.

Within this general pattern of a gradation of teeth to a major tooth towards the lateral margin, are a number of subsidiary patterns leading progressively towards a reduction in the number and size of both the central and marginal teeth and the dominance of the "fang" tooth. This will be described more fully elsewhere (Smith - in preparation).

Table 1 shows that only four of the genera listed appear to show similarities to *Austrorhytida.* These are *Strangesta, Namoitena, Tasmaphena* and *Rhytida. Strangesta* and *Namoitena* have a larger and more globose shell with much finer scultpure than *Austrorhytida.* Their radula is of type III with more teeth per row, the difference in tooth size of the larger teeth being much less and the dominant tooth is between tooth 12 and 18. In species of

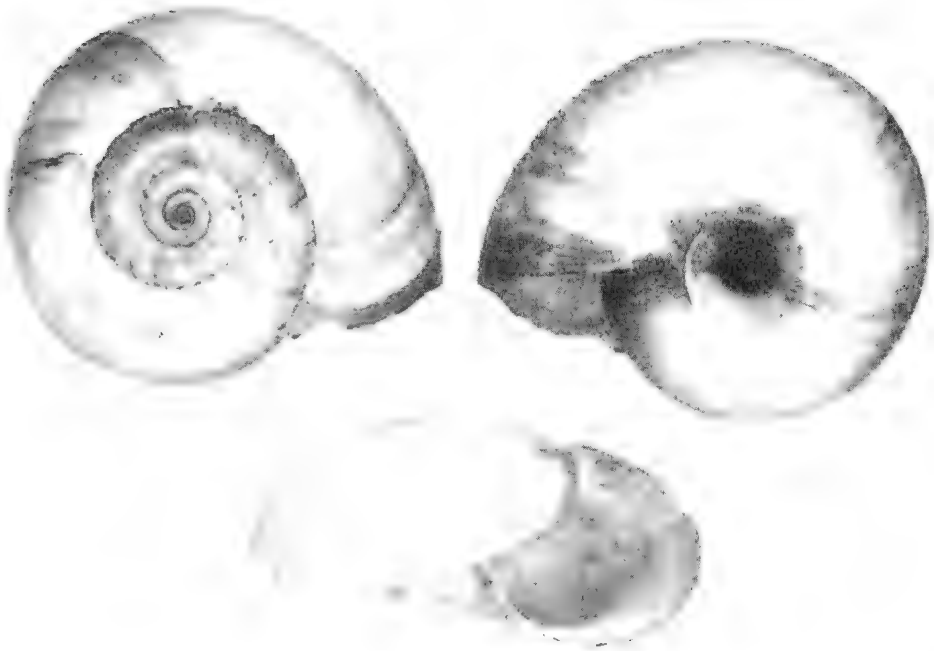

Fig. 1. Dorsal, ventral and apertural views of one of the syntypes of *Helix capillacea* Ferussac, 1832 (MNHP).

these genera that have been dissected there is no epiphallus whereas *Austrorhytida* has a large epiphallus.

Tasmaphena has a smaller more flattened shell than *Austrorhytida* with much coarser and more irregular sculpture. Some species show colour banding on the shell, a feature not seen in *Austrorhytida. Tasmaphena* has a type III radula with much less tooth graduation than seen in *Austrorhytida,* the radula formula being (18 to 24) - 1 - (18 to 24).

Rhytida and *Austrorhytida* both have type IV radulae with the dominant tooth in *Rhytida* being at tooth 9 or 10 while in *Austrorhytida* it is at tooth 8 or 9. The shell form and sculpture differs markedly between the two genera. *Rhytida* has very coarse, irregular sculpture giving the shell a rugose appearance and shells are usually strongly keeled. *Austrorhytida* has a shell with a rounded outline with no sign of keeling and the sculpture is of fine, regular, transverse striae giving the shell a finely textured appearance. *Rhytida* is without an epiphallus (Climo, 1977) while *Austrorhytida* has a prominent epiphallus.

Etymology: It is named *Austrorhytida* because of the similarity of its radula structure to that of the New Zealand *Rhytida* and because it is the only Australian genus to show this structure.
Type Species: *Helix capillacea* Ferussac, 1832.

Austrorhytida capillacea Ferussac, 1832
Helix (Helicella) capillacea Ferussac, 1821. *Tabl. Syst. Anim. Moll.* : 40 (nomen nudum).
Helix capillacea Ferussac, 1832. *Hist. nat. moll. terr. fluv.*, 27, pl. 82.
Nanina fricta Gould, 1852. U.S. Expl. Exped. Bost., 12: 32.
Strangesta glaciamens Iredale, 1938. *Aust. Zool.*, 9: 119.
Strangesta revera Iredale, 1943. *Aust. Zool.*, 11: 68.

Description: Shell medium, thin, with few calcareous elements, 4-5 whorls, spire flattened to slightly elevated, convex, rounded with a fairly wide umbilicus (approximately 1/3 shell diameter), aperture ovate-lunate. Sculpture of fine, regular, radial striae above and usually smooth below. Colour of the shell light yellow to dark honey, without patterning (Fig. 1). Some morphs have a greenish tinge to the shell. The animal ranges from cream to charcoal grey to greenish grey and often has a mid-dorsal line of a contrasting colour. The head is long and when actively crawling can extend nearly two shell diameters out from the shell. The shell is set back over the tail. This elongated head is to accommodate the very large buccal mass and enable the snail to insert the head into the aperture of a prey snail and is an adaptation to the carnivorous habit.

The radula consists of lanceolate, recurved teeth grading rapidly from an almost vestigial rhachidian to a major tooth at tooth 8, outside of which are about 3 almost vestigial laterals. Tooth 8 is over twice the length of tooth 1 and is very large with articulating surfaces with adjacent rows on the base-plate. Radular formula 3–8–1–8–3, though there appears to be some local variation (Fig. 2).

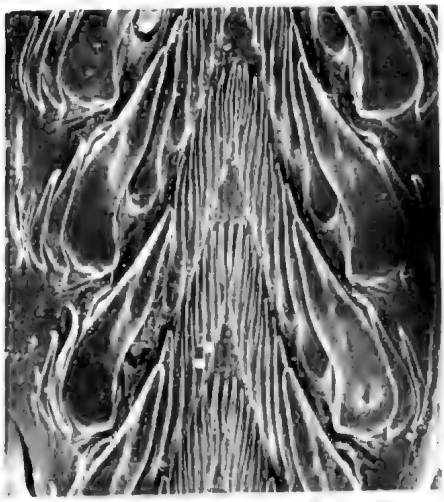

Fig. 2. Scanning electron microscope picture of the radula of *Austrorhytida capillacea* from Mt. Donna Buang, Victoria (NMVF5418) (x80).

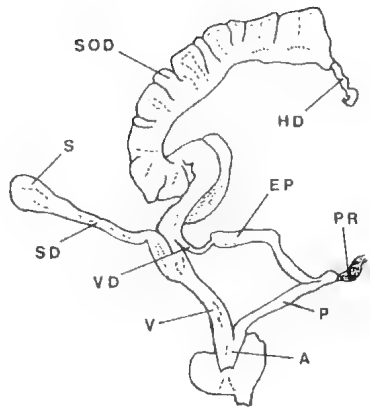

Fig. 3. Camera lucida drawing of the reproductive tract of *Austrorhytida capillacea* from Chatswood, N.S.W. (AM C101000). Abbreviations used are: A – atrium; EP – epiphallus; HD – hermaphrodite duct; P – penis; PR – penial retractor; S – spermatheca; SD – spermathecal duct; SOD – spermoviduct; V – vagina; VD– vas deferens.

The reproductive tract is simple without talon or flagellum. The penis has very fine papillae in even rows and there is an epiphallus about equal in length with the penis and vagina. The vas deferens is very short and the spermathecal duct moderately short leading to a simple wide spermatheca (Fig. 3).

Types: *Helix capillacea* Ferussac, 1832 – 2 syntypes MNHP (no number).
Nanina fricta Gould, 1852 – holotype USNM 5473.
Strangesta glaciamens Iredale, 1938 – holotype AM C55535; 2 paratypes AM C118189.
Strangesta revera Iredale, 1943 – type lost.
(Abbrev. MNHP – Museum National d'Histoire Naturelle, Paris; USNM – United States National Museum, Washington; AM – Australian Museum, Sydney).

Type Locality: Port Jackson, Sydney.

Distribution: Occurs from the coast and Great Divide of central New South Wales, along the Divide south through Victoria to about Mt Macedon and may occur in the Otway Ranges. Found in dry and wet forest in litter and under logs, but can be seen crawling on the surface and even on the trees in wet weather.

Remarks: This is the type species of the new genus *Austrorhytida* based on a type locality in the Sydney area. However the distribution given for the species is from central New South Wales to south western Victoria in habitats ranging from coastal dry forest and woodland to wet forest to subalpine snow-gum woodland. A more detailed examination of a large collection of individuals may reveal a number of separate species within this group. A wide variety of different colour and size morphs certainly exist but examination of the shell. anatomy and radulae of these different morphs has so far shown them to all fall within the species limits described above.

The species is an active carnivore and has been described killing and devouring a specimen of the native slug *Cystopelta petterdi* (Smith, 1980). It has also been observed feeding on the introduced snail *Helix aspersa* in Sydney gardens (P. Colman – pers. comm.).

Acknowledgements

I would like to thank the staff of the Department of Malacology, Museum National d'Histoire Naturelle, Paris for loaning the types of *Helix capillacea* Ferussac, 1832 and Mr. E, Rotherham of R.M.I.T. for taking the photographs. Thanks are also due to Mr. Phil Colman of the Australian Museum for access to their collections and information about the species. I am grateful to Mr. Phil Hollis and the Electron Microscope Unit of the Department of Anatomy, University of Melbourne for use of the Scanning Electron Microscope. This work was supported by the Bureau of Flora and Fauna by funds from the Australian Bioligical Resources Study.

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F.N.C.V. Excursion to the Eastern Highlands Harrietville, January 10-16 1987

Twenty seven persons travelled to the Feathertop Chalet at Harrietville on a sunny day making a lunch stop at Lake Nhillacootie.

Andy Blackburn explained to us in the evening how the Eastern Highlands has evolved from the erosion of the level Mesozoic surface of between 40-170 million years ago leaving resistant granite rock masses and broad flat bottomed river valleys many of which were later filled with lava flows during the tertiary volcanic era. We heard that uplift occurred producing the High Plains which were later warped and dissected by streams leaving lava residuals and plateaus. This region has Victoria's highest mountain (Mt. Bogong, 1983m) and several other mountains greater than 6000ft, including Mt. Hotham at 1832m.

On Sunday January 11th it rained as we visited Mt. Hotham and the Bogong Alpine Park. The road side was lined by golden (*Oxylobium alpestre*), the Prickly Shaggy-Pea and the cliffs covered with derwent Speedwell (*Veronica derwentiana).*

Near the summit we spent time exploring a Herb Field and found mountain Caladenia (*C. lyallii*) with glistening white segments, rosy red outside. Here also were golden flowers of a prostrate, the Alpine Phebalium (*Phebalium squamulosum* subsp *alpinium*) and the starry tufts of yellow flowers of the Yellow Kunzea (*K. muelleri*) and some low growing bushes with violet flowers (*K. parvifolia*). There were also small clumps of the pink Alpine Riceflower (*Pimelea alpina*), carpets of *Celmesia sericophylla* (many not in flower) and also some large snow daisies (*Brachycombe mivalis* var. *alpina*). We saw glacial and purple eyebrights (*Euphrasia Glacialis* and *E. collina*), the deep magenta of the Mountain Trigger Plants (*Stylidium graminifolium*), a prostrate grevillea (*G. australis*) and Hovea in flower on the rocks. We were all amazed at the prolific flowering of the snow gums (*Eucalyptus pauciflora*).

We continued on the Alpine road to Omeo where we visited an Historic Park and Museum. In the evening Dr. Roger Briggs and his wife gave us and audio-visual film on Queensland rainforests, and Andy Blackburn showed slides of alpine flora, photographed on previous visits.

The following day, Monday 12 January, and for the remainder of our visit the weather was glorious and sunny. We visited Mount Buffalo

Photo: Waddell Daisies (*Helichrysum adenoplurum* var. *waddellae).*

and were delighted with the red colour of the candlebarks (Eucalyptus rubida) en route. We lunched in a brand new Information Centre near the Cresta run and were briefed by the Ranger, one Grant Hull. Then we went back to Dingo Dell where there was a wonderful garden of Trigger plants mixed with lilac Daisy (*Brachycombe mivalis* and *B. scapigera*) and masses of the Waddell everlasting (*Helichrysum adenophorum* var. *waddellae*) mixed in amongst flowering lance-leaf Orites with carpets of small pinkish-white *Baeckia gunniara* and *B. utilis.* On the wet uplands on the other side of the road were Silver Daisies (*Celmisia asterilifolia*) and also Candle Heath in flower (*Richea continentis*) and common yellow Billy Buttons (*Craspedia glauca*) in abundance and three species of buttercup, the Granite (*Ranunculus graniticola*), 2 Gunn's Alpine (*R. cunniarus*), the Bog (*R. pimpinellifolius*). With them were the Mountain Hairy Willow Herbs (*Epilobium ginnianum* and *E. cinereum*) and two species of native violet (*V. betonicifolia* and *V. heder-*

aceae), both in flower. In the cutting nearby we found the Royal Grevillea (*G. victoriae*) and a white *Westringia senifolia*.There were also clumps of the violet kunzea and some snow aciphylls (*A. glacialis).*

On a walk around Lake Catani we saw beautiful specimens of the Black Anther Flax-lily (*Dianella revoluta) and the Waxberry (Gaultheria appressa*). Margaret Dacey found a clump of Skyblue Sky Lilies (*Herpolirion novaezealandiae*) on Mt. Hotham.

On the following day, Tuesday January 13, we travelled via Mt. Beauty to Falls Creek and the Bogong National Park below Mt. Bogong. We had picnic lunch overlooking the Rocky valley Dam near Alpine mint bushes (*Prostanthera cuneata*) and noted that the predominant roadside feature was the luxuriant golden sprays of Hop Bitter Pea (*Davisea latifolia*).

On Wednesday January 14 we had a day at Beechworth with a conducted tour of the town. We visited the Court House where Ned Kelly was tried in 1870 and had lunch in the Town Hall Gardens which had been planted under the direction of Baron von Mueller. In the evening a Mr. Clive O'Donnell, a local wild life photographer, gave a talk about the Mt. Buffalo region.

On Thursday, January 15 we had a leisurely day in Wandiligong, an old gold mining town in picturesque Bell's Gully which is only 6km from Bright and has been classified as a special landscape by the National Trust. About 120 people live there now, where formerly there were 4000.

One resident with a lovely garden invited us in to see the presently used bower of the Satin Bower-Bird surrounded with his collected blue objects such as drinking straws, plastic pegs etc.

The local school, No. 275 is large and has a bell tower and once accommodated over 300 pupils; at present it has 9 pupils. We has lunch on the grassy banks of Morses Creek in the Alpine Park.

In the evening we attended a concert given by the C.A.E. Music Camp in the tiny Harrietville Community Hall. It was a joyous if somewhat noisy occasion and lots of fun.

On the river sand of the Ovens Valley where grew the Ovens wattle (*Acacia parvissima*), Bill Lock, one of the party, had found and guided us to see, some beautiful specimens of Austral ladies Tresses Orchids (*Spiranthes sinensis*). The daisy bushes, Musk and Snowy, (*Olearia argophylla* and O. lirata) near our Chalet were worthy of note, also the Christmas Bush (*Prostanthera lasianthos*) was in flower along the Ovens river.

Dorothy Dawson and Pat Clancy had totalled 70 species of birds seen or heard. Amongst the most interesting were the satin Bower Birds (Bower only), Whip birds, King Parrots, Gang Gang and Red Rumped Parrots and the Rufous Fantail, Noisy Friar Bird, Mistletoe Bird, Rufous Whistler, Yellow faced and white eared honeyeaters seemed to be everywhere, and there were Crested Honeyeaters. Eastern Spinebills, and a Jacky Winter was seen on Buffalo. Predators were conspicuous by their absence, one Nankeen Kestrel only was seen. Pied Currawongs provided music all day at the Chalet and near the dining room was a nest of Striated Pardalotes who were feeding young. Black Cormorants were seen at Rockey Valley Dam.

On Friday January 16, we travelled home slightly the worse for wear as a virulent viral gastro-enteritis had played havoc amongst our ranks.

We had our lunch at Seven Creeks reserve in Euroa and travelled via Merton and Yea to the Maroondah Highway safely back to Melbourne driven in McKenzie's by Tom. It was a day of 39°C with a strong north wind and devastating bushfires were burning in Heathcote and S.W. N.S.W. but our route was unaffected.

Elizabeth K. Turner.

FIELD NATURALISTS CLUB OF VICTORIA

Reports of Recent Activities

General Meeting
Monday, 16th March

Honorary membership was awarded to Frank and Lucy May for 40 years of continuous membership. Mr. May worked for many years as a forester in the Dandenongs and he and Mrs. May had shared their interest in natural history since they were teenagers and used to cycle around the outskirts of Melbourne together.

The Speaker for the evening was Mr. Max Campbell of the Applied Biology Department at RMIT who spoke about "Venomous Animals in Australia."

Australia has one of the most deadly faunas in the world and has eleven species of snakes more venomous than the cobra.

In the early days of European settlement in Australia there were many deaths due to snake bite amongst settlers who did not heed Aboriginal warnings. In India thousands of people still die of snakebite each year, but in Australia today there are few fatalities due to the availability of antivenene and improved first-aid techniques.

Venom is a poison injected by one animal into another, either for protection or for food capture. The actions of various types of venom were described by Mr. Campbell; some immobilize muscles and lead to death of the victim due to respiratory failure, whilst others contain digestive enzymes which break down the muscles and other body tissues. In addition allergic reactions by certain individuals to particular venoms lead to many other deaths.

Mr. Campbell went through the correct first-aid treatment in case of attack by a venomous animal. In most cases a pressure bandage should be applied tightly to the limb and the limb immobilized (95% of bites are on limbs). The bandage constricts the lymphatic system and will stop the venom spreading for hours. Medical attention should then be sought and the bandage only removed by the treating doctor, as removal by untrained medical staff before emergency facilities are ready, may undo the first-aid treatment and lead to spread of the venom. As many venoms are heat labile, the area of the bite should be kept warm to help the venom break down.

Pressure bandages should not be appplied to Red-back Spider or Stonefish wounds as the venom causes so much pain that it is better to let it diffuse and death is not rapid (9½ days in the case of the spider), so there is plenty of time to get medical help.

In the case of a Blue-ringed Octopus bite (which causes respiratory failure) mouth-to-mouth resuscitation should be commenced as soon as any numbness or difficulty in breathing is experienced (do not wait until it stops, or blood pressure and heart rate will drop and death will ensue) and this should continue for a couple of hours until the venom wears off.

Stings by various types of jelly-fish may be painful but are not usually fatal (although the victim may be at risk of drowning). Vinegar should be poured on the sting to help neutralize the venom. Alcohol should never be applied as it causes further nematocyst discharge and so increases the dose of venom.

Other potentially dangerous animals include; ticks which should be pulled out gently by the head (the body should not be squeezed or more venom will be injected) and long-legged house centipedes.

In Australia the venom of other centipedes, millipedes, scorpions, cone-shells, insects and platypus may cause sickness but are unlikely to cause death except in a particularly sensitive individual. Mr. Campbell recommended that all spiders be treated as potentially dangerous as little is known about the venom of most species.

Exhibits

- A snake, probably the northern form of the Red-bellied Black Snake from Charters Towers. Dr. Jack Douglas.
- Under microscopes; sections cut through Devonian limestone from Inverloch and Waratah Bay showing fossilized coral, *Lithothamnion lichenoides* var. *patena* or "Chinese Toenails" a coralline red alga from Inverloch, *Myriophyllum integrifolium* a very small water milfoil and also old FNCV and Hawthorn Junior photographs from 1946. Mr. Dan McInnes.

Specimens of *Coprosma repens* and *C. robusta*,two New Zealand species, naturalized on the Mornington Peninsula. Mr. Tom Sault.

Nature Notes

- A Golden Orb Weaver spider lives by her front door. Miss Margaret Potter.
- Swamp Wallabys and a King Parrot seen at Mullam Mullam Creek at Mitcham. Miss Cecily Falkingham.
- A Bird-dropping spider in his *Banksia* has laid 12 egg sacs over the last 5 months. The female probably stores sperm in her body over this period. Mr. Tom Sault.
- About 50 White-throated Needletails seen in Botanic Gardens. Dorothy Naylor.

General Meeting

Monday, 14th April

The Speaker for the evening was Mr. Robin Youl of the Department of Conservation, Forests and Lands, who spoke on "The Government's Role in Tree Growing" with an emphasis on its role in encouraging the planting of trees on private land.

Two-thirds of Victoria's land is privately owned and much of this has been cleared for agriculture. In the past the indigenous trees of an area have been largely ignored when trees have been planted for windbreaks, timber etc., and yet it is the indigenous trees which are usually most suitable for planting as they are already adapted to survive in that environment, usually tolerate fires, fit in with the landscape and provide a habitat for wildlife.

The Government is currently encouraging landowners to revegetate their land with local indigenous flora and to protect existing stands of native vegetation. Several methods are used to revegetate an area; planting of seedlings grown from locally collected seed, transplanting of seedlings, direct seeding and natural regeneration by fencing off stands of remnant vegetation to exclude herbivores. Seedlings should be transplanted when very young and grass and weeds should be controlled. Direct seeding usually gives the best results and is very cheap.

Mr. Youl went on to describe various agroforestry schemes in Victoria and overseas and spoke of the need to educate people about the value of trees. Too much poor quality agricultural land has been, and still is being cleared, and as a result we have large areas of land going to waste due to erosion and rising water-tables and salination.

Exhibits

- Under microscopes; hydroids from Black Rock and a species of filter feeding gastropod cemented to the base of an alga. Mr. Dan McInnes.
- A wasp from a eucalypt gall. Mr. Urwin Bates.
- Antimony minerals from the Steele's Creek mine near Yarra Glen. Mr. Andy Blackburn.

Nature Notes

- Abalone were observed in a rock pool at Black Rock to scuttle away very rapidly when approached by a large starfish. Mr. Dan McInnes.

C. M. Ashburner

Special Note for Authors Using Wordprocessors

Many wordprocessing and microcomputer floppy disks can now be transcribed directly to our printer's typesetting equipment, saving the effort and cost of rekeying.

Authors of papers which have been typed on a wordprocessor should tell the editor (at the time the paper is first submitted), what type of machine and wordprocessing software was used. Note that printed copy must still be submitted.

Queries can be directed to Russell Thomson, 17 Powlett St., Heidelberg. 344 5704 (B.H.).

(Continued from inside front cover)

GROUP MEETINGS

All FNCV members and visitors are invited to attend any Group Meetings.

Day Group – Third Thursday.

Thursday, 18th June, Burnley Gardens. Meet at entrance of Gardens at 11.30 a.m. Leader: Joan Miller 836 2681.

Thursday, 16th July. The Museum of Chinese - Australian History. Meet at Carlton Gardens, corner of Spring and Victoria Sts. at 11.30 a.m. Leader: Mr. Andy Blackburn 379 8960.

Thursday, 20th August. Australian Gallery of Sports. Meet at the Conservatory, Fitzroy Gardens at 11.30 a.m. Leader: Betty Gillespie 578 1879.

At the National Herbarium, Birdwood Avenue, South Yarra at 8.00 p.m.

Botany Group – Second Thursday

Thursday, 11th June. Members' Night.

Thursday, 9th July. "Botany in the Service of Medicine." Dr. Elizabeth Turner.

Thursday 13th August. "Natural History Courses in North-east and South-west England." Miss Mary Doery.

Geology Group – First Wednesday

Wednesday, 3rd June. "The Ancient Floral History of South-east Australia." Dr. Jack Douglas.

Wednesday, 1st July. Some aspect of Mineralization in Victoria. Dr. W.R.H. Ramsay.

Wednesday, 5th August. "Minerals - a Practical Approach." Mrs. Gaby Love.

Mammal Survey Group – First Tuesday

Tuesday, 2nd June. Members' Night.

Tuesday, 7th July. To be announced.

Tuesday, 4th August. To be announced.

Microscopical Group – Third Wednesday

Wednesday, 17th June. "The Diatom Experts." Mr. Bob Graham.

Wednesday, 15th July. Display Night of Exceptional Slides from the Group's Slide Collection. Mrs. Barbara Ward.

Wednesday, 19th August. "Fungi." Mr. Bob Graham

GROUP EXCURSIONS

All FNCV members and visitors are invited to attend any Group Excursions

Botany Group

Saturday, 27th June. Royal Botanic Gardens.

Saturday, 25th July. Boneseeding at Seawinds, Dromana and Winter Orchids. Leader: Mr. Tom Sault.

Saturday, 22nd August, Warneet Heathland.

Mammal Survey Group.

Saturday, 6th – Monday, 8th June. Upper Lerderderg Gorge.

Australian Natural History Medallion

Council appointed Mrs. Tess Kloot to fill the vacancy left by Cecily Allen's death, as Secretary to the General Committee of the Australian Natural History Medallion Unfortunately, ill health has forced Tess regretfully to resign from the position. Mrs. Shiela Houghton has now been appointed, and any correspondence relating to the Medallion should be addressed to her, c/- F.N.C.V. National Herbarium, Birdwood Avenue, South Yarra, 3141.

LATE FEE

The increasing costs of reminder notices – postage, stationery, and the numbers of late renewers have resulted in the need for a late fee to recoup some of these costs, which are substantial.

Therefore, in 1987 a Late Fee of $2.00 shall be imposed on members who do not renew their subscriptions by the end of March, 1987.

Council draws members' attention to the following points:

- Subscriptions cover the calendar year from January to December.
- Persons joining the Club in the second half of the year may pay a six month or an eighteen month subscription. Anyone paying a full year subscription in the second half of the year will be regarded as having paid for the current year and will receive back issues of that volume of *The Victorian Naturalist.*
- Subscriptions do **not** run from mid year to mid year.
- Members who fail to renew their subscriptions by 15 May will automatically be removed from the mailing list.
- Prompt payment greatly facilitates the Club's operations.

M. D. HOWES
Hon. Secretary

Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria

Established 1880

Registered Office: FNCV, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron
His Excellency, The Rev Dr John Davis McCaughey, The Governor of Victoria.

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Group Secretaries

Botany: Miss MARGARET POTTER, 1/249 Highfield Road, Burwood, 3125 (29 2779).

Day Group: Mr D. E. McINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

Geology: Miss HELEN BARTOSZEWICZ, 16 Euroa Avenue, Nth. Sunshine, 3020 (311 5106 A.H.)

Mammal Survey: Mr JULIAN GRUSOVIN, 17 Sutherland Street, Chadstone, 3148. (211 4997)

Microscopical: Mrs ELSIE GRAHAM, 147 Broadway, Reservoir, 3073 (469 2509)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1987

Metropolitan Members (03 area code)	$25.00
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Affiliated Clubs	$25.00
Subscriber Clubs	$23.00
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FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10th August, 8.00 p.m.
Dr. Robin Hirst. "Where on Earth are We?" (Astronomy)
Monday, 14th September, 8.00 p.m.
Members' Night
Monday, 12th October, 8.00 p.m.
Dr. Jim Bowler. "Environmental Changes and Human Occupation – the Last 60,000 Years."

New Members

Metropolitan:
Mr. Max Bartley, 27 Yarra Road, Croydon, 3136.
Margaret Panter, P.O. Box 166, Clifton Hill, 3068
Miss Heather Rae, 49 Riley Street, South Oakleigh, 3167.
Mr Graeme Gillespie, 13 Halstead Street, North Caulfield, 3162.
Carol and Bob Booth-Mylius, 10 Lloyds Avenue, Carnegie, 3163.
Mrs G. Condron, 96 Shannon Street, Box Hill North, 3129.
Mr. Iain Livingstone. 34 Grattan Street, Montrose, 3765.

Country:
Mr. Peter Dingle, Rubicon School Camp, Rubicon, 3712.
Mr. Thomas R. White, Kardella R.M.B. 2080, Korumburra, 3950.
Mr. John M. Goss, 13 Essex Road, Mt. Martha, 3934.
Mr. Anthony T. Mitchell, P.O. Box 2508, Mildura, 3500.

FNCV EXCURSIONS

Sunday, 6th September. Braeside Metropolitan Park. This is a new Metropolitan Park with a good patch of heathland and wetlands and the public is asked for opinions on the proposed layout for the area – so come along and see it. The coach will leave Batman Avenue at 9.30 a.m. Fare $10.00. Bring a picnic lunch.

Sunday, 4th October. Blackwood and The Garden of St. Erth. Leader: Mr. J. Myers. We will visit Long Forest (to look for orchids etc.) then lunch at Blackwood Mineral Springs. If desired bring cordial to flavour the mineral water. After lunch proceed to The Garden of St. Erth where we hope Mr. Tom Garnett will meet us. Coach will leave from Batman Avenue at 9.30 a.m. Fare $12.00. Bring a picnic lunch.

Friday, 16th - Sunday 18th October. Waranga Basin, Rushworth. This is the Victorian Field Naturalists' Clubs Association Spring get-together and most details have appeared in the two previous Naturalists. Cost for the weekend is $90.00 and this should be paid by the 14th September. The coach will leave from Flinders Street by the Gas and Fuel Building on Friday at 9.30 a.m. Bring a picnic lunch.

Friday, 23rd - Sunday, 25th October. The King Island F.N.C. is celebrating its 25th anniversary and it is also 100 years since the first F.N.C.V. expedition to the Island so it has been suggested that some members might like to go over for the weekend. Should any members wish to do this contact Kendall Airlines who run flights to the Island including packages with motel, guest house or caravan accommodation. Phone Melbourne (03) 670 2677.

Friday, 8th - Saturday, 16th January. Tasmania. Details are in the May/June Naturalist and bookings should be made as soon as possible so we can obtain Apex air fares. Should anyone prefer to go on the ferry and join us in Devonport they should arrange this and deduct the Apex fare of $146.00 from their payment. Balance of all payments should reach the Excursion Secretary by Monday, 9th November.

GROUP MEETINGS

All FNCV members and visitors are invited to attend any Group Meetings.

Day Group – Third Thursday
Thursday, 20th August. Australian Gallery of Sports. Meet at the Conservatory, Fitzroy Gardens at 11.30 a.m. Leader: Betty Gillespie 578 1879.
Thursday, 17th September, Blackburn Lake. Meet at Blackburn Lake at 11.30 a.m. Catch the 10.50 a.m. train at Flinders Street to Blackburn. Leader: Marg Wilson 836 3521.
Thursday, 15th October. Banyule Flat Reserve. Meet at Rosanna Station at 11.30 a.m. Catch 10.56 a.m. train from Princes Bridge. Leader: Dan McInnes 211 2427.

At the National Herbarium, Birdwood Avenue, South Yarra at 8.00 p.m.
Botany Group – Second Thursday.
Thursday, 13th August. "Natural History Courses in North-east and South-west England." Miss Mary Doery.
Thursday, 10th September. "Flowers of the Anglesea Area." Mrs. Ilma Dunn.
Thursday, 8th October. "Biological Control of Australian Acacias in South Africa." Dr. Tim New.

Geology Group – First Wednesday.
Wednesday, 5th August. "A Brief Geological History of Australia." Mrs. Gabi Love.
Wednesday, 2nd September. "Borate Minerals from Anatolia, Turkey." Mr. Kemal Inan.
Wednesday, 7th October. Some aspects of volcanics in Victoria (title to be confirmed). Mr. E. B. Joyce.

Mammal Survey Group – First Tuesday.
Tuesday, 4th August. To be announced.
Tuesday, 1st September. To be announced.
Tuesday, 6th October. To be announced.
Tuesday, 27th October. (from November) To be announced.

Continued on inside back cover.

F.N.C.V.

The Victorian Naturalist

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Editor: R. Thomson. Assistant Editor: V. Spencer

Cover Illustration: The Mountain Dragon (see p. 101) Photo: Deborah S. Kent.

President's Note

Sometimes I consider two or three themes before plunging ahead with my President's Note, but this time I have no doubt about the item I wish to bring to your attention.

I am going to record the marvellous effort of Mr. Alex Burns of Burleigh Heads Queensland who has achieved the magnificent total of 70 years FNCV Membership, or rather 71, now that 1987 has half-run its course!

What a record!

We recognize the support of those who attain 40 years with the Club by granting Honorary Life Membership and I'm pleased to say that we have 50 of these on our books at the present time - but 70 years takes a lot of beating. In fact our records indicate it has been achieved only once before, by Mr. George Coghill (Vict. Nat. Vol 69 July 1952), who incidentally was well known to Alex, and remembered as never appearing at Club Meetings without a buttonhole of *Grevillea rosmarinifolia* - They had style in those days!

Alex is 88 and has been involved in many aspects of natural history. He has a world-wide reputation as an entomologist, and worked in Queensland as well as with the National Museum in Melbourne.

He served in WWII and retired to Burleigh Heads where he remains after the death of his wife.

He has about 30 publications listed in our Author Index, including a dozen "Nature-Notes from the Gold Coast".

His standing in entomology has been recognized by several awards, and he is listed in numerous directories, e.g. "Who's who in the Commonwealth", and "Who's who of Intellectuals".

He received a Doctorate from the World University in 1986 and is one of 9 Deputy Delegates to that institution in Australia.

He is well known in orchid circles, and is related to our last Australian Natural History Medal winner, Graham Pizzey.

We are reading a citation at the September General Meeting, and although I don't expect Alex to travel to Melbourne to receive it, I hope that a few of his old friends may attend to aplaud this effort.

Jack Douglas

Notes on the Biology and Osteology of *Amphibolurus diemensis* (Gray, 1841), the Mountain Dragon

By Deborah S. Kent*

Amphibolurus diemensis is distinctive amongst Australian dragons in occurring in some of the coolest habitats occupied by any member of the group in Australia. However, despite its proximity to major south-eastern Australian centres of human population, very little is known of its biology. This note reviews certain aspects of this distinctive species' biology. Taxonomically, I follow Cogger (1986) in using the generic name *Amphibolurus* for the species.

Amphibolurus diemensis is a medium-sized dragon (maximum snout-vent length = 82mm) with females attaining much larger size than males. For example, the largest male in the Australian Museum collection measures 64mm SVL, but 33 females attain or exceed this size, the largest being 82mm SVL.

The species is restricted to open habitats in the cooler regions of south-eastern Australia and is the only dragon occurring in Tasmania. In the northern part of its range it is restricted to higher altitudes but in the south it also occurs at lower elevations (e.g., Flinders Island, Bass Strait) (Rawlinson, 1967). Its occurrence at high altitude has led to its common name, mountain dragon.

Previously, *Amphibolurus diemensis* was thought to extend north only as far as Sydney (Cogger, 1973; Rawlinson, 1974), but two independent records now extend this distribution north to the Tamworth area. The first record, though lacking a voucher specimen was caught at Dungowan dam (31°24'S; 151°21'E) (Tasoulis, 1980), and the second (AM R 107179), collected in 1982, was from the northern end of Werrikimbe National Park (31°08'S; 152°14'E).

* The Australian Museum, 6-8 College Street, Sydney, N.S.W. 2000.

Specimens from the Australian Museum collection of *Amphibolurus diemensis* (N = 161) were examined for both reproductive and osteological information. All specimens were examined for reproductive information while a selection of specimens (1/3 museum's current holdings) representing three different areas within the dragon's range were examined for osteological information. The three areas are: Sydney region (bounded by Munghorn Gap in the north and Kanangra Walls in the south); Snowy Mountains-Victoria area, and Tasmania (including one specimen from Flinders Island).

Osteology

Forty-nine specimens of *Amphibolurus diemensis* were x-rayed for osteological data. Presacral vertebrae number is 22-24 (mode = 23; mean = 22.5; SD = 0.54; N = 48) and shows no sexual dimorphism. Moody (1980) recorded 20-25 presacral vertebrae for the family Agamidae, with the majority of species having 23-24 vertebrae. The Sydney region specimens have a mode of 22 and a mean of 22.3 (SD = 0.47; range 22-23; N = 22) and the Tasmanian specimens have a mode of 23 and a mean of 22.8 (SD = 0.50; range 22-24; N = 19). A Kolmogorov-Smirnov two-sample test (Sokal and Rohlf, 1981) between Sydney and Tasmanian specimens indicated that the two sample populations differed significantly ($P < 0.025$). The geographically intermediate Snowy Mountains-Victorian specimens have a mode of 22 and a mean of 22.4 (SD = 0.53; range 22-23; N = 7). No tests were carried out using the Snowy Mountains-Victorian specimens as they were represented by too few individuals.

The number of lumbar vertebrae (i.e., those posterior presacral vertebrae with

Figure 1. *Amphibolurus diemensis* – low light intensity/cool phase (photo A. E. Greer).

noticeably smaller ribs) is 5-8 (mode = 7; mean = 6.5; SD = 0.62; N = 48) overall but possibly with some clinal variation: Sydney region specimens have a mode of 7 and a mean of 7.0 (SD = 0.47; range 6-8; N = 23); Tasmanian specimens have a mode of 6 and a mean of 6.1 (SD = 0.40; range 5-7; N = 19) while the Snowy Mountains-Victorian specimens have a mode of 6 and mean of 6.3 (SD = 0.51; range 6-7; N = 6). A two-sample test between Sydney and Tasmanian specimens yielded a similar result as before, i.e., that the two samples were significantly different ($P < 0.001$).

Postsacral vertebrae number is 40-48 (mode = 40; mean = 43.6; SD = 2.78; N = 20). Moody (1980) recorded 25-63 postsacral vertebrae for the Agamidae, with a bimodal distribution: "one group, about 40 vertebrae" and "a second group between 50 and 60 vertebrae". The postsacral vertebrae number also shows clinal variation: Sydney region specimens have a mode of 47 and a mean of 46.5 (SD = 1.41; range 44-48; N = 8); Snowy Mountains-Victorian specimens a mode of 43 and a mean of 42.2 (SD = 1.17; range 40-43; N = 6), and Tasmanian specimens a mode of 40 and a mean of 41 (SD = 1.67; range 40-44; N = 6). Hence in terms of vertebral number, there is a north to south cline in *Amphibolurus diemensis* for lengthening of the body and shortening of the tail.

The number of phalanges in the front and rear feet (manus and pes, respectively) is 1(1)-2(87). 3(88). 4(87). 4(5)-5(83). 3(87) and 2(86). 3(87). 3(1)-4(91). 5(96). 3(7)-4(87) counting both sides of the specimen. Thus the modal phalangeal formula is 2.3.4.5.3/2.3.4.5.4 which is the primitive agamid phalangeal condition (Moody, 1980). Fourteen cases of digit reduction, each involving only one phalanx, were en-

Figure 2. *Amphibolurus diemensis* – high light intensity/warm phase (photo A. E. Greer).

countered; all were in five specimens. Ten of the 14 cases were in three animals from one location (Ouse River, Tasmania). Ten of the 14 cases were also bilaterally symmetrical (not the same ten). Reduction occurred seven times in the fifth toe of the pes, five times in the fourth toe of the manus, and once each in the first toe of the manus and third toe of the pes. The most common reduction, i.e., in the fifth digit of the pes, is the same reduction that has also occurred in the species *Ctenophorus clayi* (Greer, in review) and the genera *Moloch* and *Tympanocryptis* (sensu Storr, *et al.*, 1983, less *aurita*), and the second most common reduction, i.e., the fourth toe of the manus, has occurred in *Moloch*. The reduction in the first toe of the manus is interesting because reduction in this digit in lizards usually involves both phalanges, not just one (A. Greer *pers. comm.*); in *Amphibolurus diemensis* the one remaining phalanx is differentiated as a claw.

Reproduction

Amphibolurus diemensis is an oviparous species laying 2-7 eggs per clutch (Hewer and Mollison, 1974; Rawlinson, 1974; James, 1983). James' (1983) summary of certain reproductive parameters was based on the Australian Museum collection, but since his work, the number of gravid specimens in the collection has doubled. The data below summarize all available specimens in the A.M. collection.

Eighteen gravid *Amphibolurus diemensis* females were examined for reproductive data, 15 by dissection and 3 by observation. A total of 64 eggs was recorded, 33 from the left ovary and 31 from the right. Ovarian eggs were found in seven specimens collected in October and November, and

oviducal eggs in eight specimens collected from October through to January. The three clutches laid in captivity were from gravid females collected on 3 November 1985 from the Mt. Wilson area, N.S.W. The first clutch (6 eggs) was laid 21 November 1985, the second clutch (5 eggs) on 5 December and the third clutch (6 eggs) over a 13 day period (8 December - 4 eggs, 18 December - 1 egg and 20 December - 1 egg). Overall clutch size ranged 2-7 (mode = 5; mean = 4.5; SD = 1.62), and female SVL ranged 50-73mm (mean = 64.2mm; SD = 7.5). There was a positive correlation between clutch size and female SVL ($r = 0.71$, $P < 0.01$).

The three gravid *Amphibolurus diemensis* mentioned above were initially placed in a large tank with a light/heat source and already containing several other species of small dragons. All three were dark in colour, tended to avoid the other lizards and were not interested in food. After the first female laid, she lightened appreciably in colour, became more active and began feeding. The animals were offered and fed on arthropods (mealworm larvae and adults, and cockroaches) and plant material (both fruit and vegetables). The second female after laying also lightened noticeably in colour; although not as light as the first female, she could easily be distinguished from the third female that was yet to lay. The second female also began feeding after laying. The third female which laid over a period of nearly two weeks was preserved immediately after laying the final egg, thus no further observations were made. Colour changes similar to those exhibited before and after parturition were also observed in the species at different temperature/light conditions. For example, a gravid female *A. diemensis*, chilled in the dark for 26 hrs exhibited dark body coloration (Fig.1), and the same individual warmed for 3/4 hr under a light exhibited light body coloration (Fig. 2).

Mouth Colour

The mouth colour of *Amphibolurus diemensis* may also show clinal variation; the Sydney region specimens have a blue lining to the mouth (Swanson, 1976) with a bright orange coloured tongue (pers. obs.); the Victorian specimens are reported by Beste (1971) as having "a lilac coloured mouth and gums" and the Tasmanian specimens are reported as having "the inside of the mouth a pale flesh colour, the tongue deeper coloured" (flesh colour?) (Hewer, 1948; Hewer and Mollinson, 1974).

Acknowledgements

I wish to thank A. Greer for his encouragement, assistance and the use of his photographs in Fig. 1-2. I wish also to thank W. Boles, A. Greer, G. Shea and G. Swan for critically reading the manuscript.

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The Identity of the *Tuan*

By L. E. Conole*

Introduction

Tuan has long been recognised as a vernacular name for the Brush-tailed Phascogale *Phascogale tapoatafa* (Marsupiala:Dasyuridae). Strahan (1980) was unable to choose between the two Aboriginal names, **Tuan** from Victoria and **Wambenger** from Western Australia, and recommended Phascogale as the common name for the genus *Phascogale*. Mansergh and Hercus (1981) state that **Tuan** is a widespread name in Victorian Aboriginal languages for *P. tapoatafa*. The name **Tuan** is widely used in south-eastern Australia by naturalists and professional biologists for *P. tapoatafa*. I will show that in fact **Tuan** is not *P. tapoatafa*, from references in ethnographic literature.

information on the Aboriginal usage of **Tuan** listed in table 1.

From the information in table 1, it appears that in western Victoria **Tuan** is the Sugar Glider *Petaurus breviceps*, and in eastern Victoria the Feathertail Glider *Acrobates pygmaeus*. I am aware of only three references (possibly four) in the Victorian ethnographic literature to *Phascogale tapoatafa* (see table 2).

The Reverend James Clow occupied the Corhanwarrabul run on the Dandenong Creek east of Melbourne in 1838 (Bride 1898). His homestead was called **Tirhatuan** - meaning "flying squirrel" (Bride 1898). **Tirhatuan** appears to be either a corruption of **Tu-an-tu-an** recorded by Smyth (1878), or it may actually mean "place of the flying squirrel". I would normally interpret "flying

Table 1. Victorian Aboriginal Usage of *Tuan*.

Aboriginal Names	Tribe	Area	Species	Source
Duan	Wotjobaluk	Lake Hindmarsh	*Petaurus breviceps*	Smyth 1878
Doan	Wotjobaluk	Victorian Mallee	*Petaurus breviceps*	Massola 1968
Tuan	Tjapwurong	South-west Victoria	*Petaurus breviceps*	Dawson 1881
Tuugan	Gunditjmara	South-west Victoria	*Petaurus breviceps*	Dawson 1881
Tuukan	Gunditjmara	South-west Victoria	*Petaurus breviceps*	Dawson 1881
Tu-an-tu-an	Bunurong/Woiworung	Melbourne	*Acrobates pygmaeus*	Smyth 1878
Tuan	Krauatungalung	Lake Tyers	*Acrobates pygmaeus*	Howitt 1880
Toan	Krauatungalung	Lake Tyers	*Acrobates pygmaeus*	Smyth 1878
Tirhatuan*	Woiworung	Dandenong	*Petaurus breviceps/ Acrobates pygmaeus*	Bride 1898

* *probably means place of the* **Tuan** Tribe names after Tindale (1974)

Discussion

During interpretation of the identity of the fauna in Dawson (1881) (Conole, in preparation), and compilation of an Aboriginal faunal vocabulary database for Victoria at the Victoria Archaeological Survey, I found that **Tuan** is not applied to *Phascogale tapoatafa*. Reading of the Victorian ethnographic literature produced the squirrel" as *Petaurus breviceps*, but Smyth (1878) was quite specific in describing the Bunurong and Woiworung **Tu-an-tu-an** as *Acrobates pygmaeus*. For this reason, and because Bride (1898) does not have any reputation for zoological competence, I favour *A. pygmaeus* as the identity of **Tirhatuan.** Clearly, **Tirhatuan** is not *Phascogale tapoatafa*.

Mansergh and Hercus (1981) conclude

* P.O. Box 131, Albert Park 3206.

Table 2. Victorian Aboriginal Names for *Phascogale tapoatafa*

Aboriginal Names	Tribe	Area	Source
Warnda	Krauatungalung/Braiakaulung	Lake Tyers	Howitt 1880
Knoore kye	Jaara	Daylesford	Smyth 1878
Kutar*	not given	not given	Smyth 1878
Mundarung	Ngarigo	Cobberas-Monaro	Howitt 1904

* also used for *Phascogale calura* (note similarity to **Kultarr** for *Antechinomys laniger*)

that Howitt (1880) erred in recording **Warnda** as the Krauatungalung and Braiakanlung name for *Phascogale tapoatafa* as he also recorded it for a large gliding-possum (Yellow-bellied Glider *Petaurus australis* or Greater Glider *Petauroides volans*). I believe Howitt was wrong in recording the same name for two clearly different animals, but the widespread use of **Tuan** in Victoria for small gliding-possums indicates that **Tuan** is not *Phascogale tapoatafa.* Therefore, the doubt expressed by Mansergh and Hercus (1981) that **Tuan** was correctly used for *Acrobates pygmaeus* by Howitt (1880), as opposed to *Phascogale tapoatafa* as in current English usage, is unfounded.

Howitt (1904) refers to a **Tuan** in his list of Ngarigo totemic animals – but gives little clue to which species he is referring. He does however distinguish it from the *Petaurus* gliding-possums, leaving the possibility that he is actually referring to *Phascogale tapoatafa.* This use of **Tuan,** if for *P. tapoatafa,* is perhaps the earliest literature use of the word for that species – although no origin for its use is given. The Ngarigo call Howitt's (1904) **Tuan** the **Mundarung.**

Menkhorst (pers. comm.) provided the following information on early literature references to *Phascogale tapoatafa* as the **Tuan.**

The possible first use of **Tuan** in the natural history literature was by Daley (1925) in reference to a "Brush-tailed Rat or Tuan" observed on an excursion to Wilson's Promontory. Fleay (1929) used **Tuan** in his paper on *Phascogale tapoatafa.* Jones 1923-5), Troughton (1941) and Brazenor (1950) did not use **Tuan.** Wakefield (1971) stated "the origin of Tuan is unknown but is preferable to Brush-tailed Phascogale". Although Wakefield (1971) did not explain why **Tuan** was preferable one could speculate that its brevity and obvious Aboriginal origin were appealing.

Conclusion

In light of the information presented above, **Tuan** is an inappropriate vernacular name for *Phascogale tapoatafa.* **Tuan** appears to have been used by Victorian Aborigines for small gliding-possums. The Melbourne tribes of Bunurong and Woiworung, and the far-east Gippsland Krauatungalung and Braiakaulung applied **Tuan** to the Feathertail Glider *Acrobates pygmaeus.* The Gunditjmara, Tjapwurong and Wotjobaluk of western Victoria used **Tuan** for the Sugar Glider *Petaurus breviceps.* The only references to the Brush-tailed Phascogale *Phascogale tapoatafa* that I have identified are in Howitt (1880) where the Krauatungalung are recorded as using **Warnda,** in Howitt (1904) where the Ngarigo possibly used **Mundarung,** and in Smyth (1878) where the Jaara called it **Knoore kye.** A reference in Smyth (1878) to the use of **Kutar** for *Phascogale tapoatafa* and the Red-tailed Phascogale *Phascogale calura* gives no precise location or tribe – it may be Victorian.

Acknowledgements

To Peter Menkhorst (Fisheries and Wildlife Service) for his valuable criticisms of an early draft of this paper, and for contributions on the early literature use of **Tuan** by Victorian naturalists.

To David Clark (Victoria Archaeological Survey) for comments on a draft, and information on **Tirhatuan.** Also to Don Hough (V.A.S.) for applying some clear thinking to a later draft of this paper.

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A Donation of Seeds to FNCV Members by Mr. Leonard Fell

Over the years when Mr. Leonard Fell has travelled about the Australian countryside he has collected the seeds of native plants and propagated them in the harsh conditions of his property at Metung.

He has now sent the Club some seeds (see list below), from the abovementioned plants that have been growing on his property for at least ten years, for free distribution to club members interested in growing native plants.

Unless indicated, in parenthesis, the seeds are of 1986 vintage.

The seeds will be stored, along with spare envelopes, in the Club Library area for members who can attend club meetings. Members who are unable to attend meetings can obtain some seeds if they write to the Secretary, enclosing a stamped, self addressed envelope.

M. D. Howes

List of Seeds Supplied

(all 1986 seeds unless otherwise marked)
Acacia beckleri (Flinders Ranges, S.A.), (2 packets),
A. heteroneura
A. doratoxylon (Snowy, N.S.W.)?
A. cognata (East of Orbost)
A. dactyoneura
A. lasciocalyx (W.A.) (3 packets)
A. obliquinervia (Upper Tambo, Buchan)
Callistemon teritifolius (Flinders Ranges, S.A.) (2 packets)
Cassia artemisioides (2 packets)
C. nemophila
Eucalyptus tetragona (W.A.) (2 packets)
E. caesia (W.A.) (2 packets)
E. redunca (2 packets) (1980)
E. nutans (1980)
Grevillea banksii (Northern N.S.W. and Qld.)
G. leucopteris (W.A.)
Kunzea baxteri (2 packets) needs moisture to flower well
Kennedia macrophylla (W.A.)
K. nigricans
Syncarpia sp. – a *small* densely foliaged tree with attractive bark
Trachymene coerules (previously *caerulea*) (Rottnest Island daisy) – blue mauve – a good pot plant, – an annual
Banksia speciosa (W.A.)
Callitris columellaris
A pink flowered shrub from Mt. Sonder, Central Australia, originally confused with *H. multilineata* Germinates well
Melaleuca spp. selection from Cane
A tall free-flowering mallee from W.A. (very fine)

From list supplied by Margaret Potter

Rare and Endangered Victorian Plants
4. *Olearia* sp. aff. *pannosa*

By John E. Wisniewski*, N.H. Scarlett* and R.F. Parsons*

Introduction

This fourth paper in the series deals with *Olearia* sp. aff. *pannosa,* the Velvet Daisy-bush. While the populations dealt with here have previously been treated as *Olearia pannosa* Hook. (Willis 1972), a relatively common plant in South Australia, they are now believed to be either a separate species, following work by Wheeler (Hj. Eichler personal communication) or to be *O. pannosa* subsp. *cardiophylla* (F. Muell.) D. Cooke (Cooke 1986 and personal communication). Pending completion of the revision by N.S. Lander (PERTH), this report will call them *O.* sp. aff. *pannosa* following Victoria: Land Conservation Council (1986). *O. pannosa* subsp. *pannosa* does not occur in Victoria, (Cooke personal communication) despite the statement in Cooke (1986).

The aim of the present work is to establish the conservation status of this taxon in Victoria by comparing 1979 with 1986-7 assessments of size and condition of all Victorian stands still known. Field work was completed in May 1987.

Fig. 1. Olearia sp. aff. *pannosa* in flower, Anakie Gorge, 1977.

Description

O. sp. aff. *pannosa* is a sprawling shrub to 1m high with entire, ovate-oblong leaves about 7cm long and 4cm wide, glabrous above and densely tomentose below. The flowerhead, of white ligulate florets up to 25mm long and yellow disc florets, is large and spectacular (Figs. 1 & 2).

The root systems include many tuberous roots up to 30cm long (Fig. 3). Although the species is said to be root-suckering (Cooke 1986), sectioning of some horizontal organs up to 0.5m long carrying sucker shoots (Fig. 4) showed them to be stems. These were buried at the junction of the litter layer and mineral soil and carried abundant roots. A proportion of the plants scored later as 'small' (Table 3) will certainly be shoots arising from such decumbent stems. However seedlings also occur; their presence occasionally at site D2 was confirmed by excavation.

The one mature plant excavated did not have a rootstock. While it is likely that some plants from near Point Addis resprouted after destruction of aerial parts by the 1983 wildfire, details of such resprouting are not known (M. White personal communication).

Distribution

At present, the species appears to be restricted in Victoria to seven sites in and near the Brisbane Ranges and, disjunct from those, four sites near Point Addis (Fig. 5).

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Fig. 2. Olearia sp. aff. *pannosa* in flower, Whroo Forest, about 1968. Photograph by B. Fuhrer.

Fig. 3. Whole plant of *Olearia* sp. aff. *pannosa* showing tuberous roots (expanded cortex). Scale bar divisions are 0.1m. Photograph by T. Phillips.

Fig. 4. Segment of decumbent stem, showing fine roots and new erect shoots adjacent to an older dead shoot. Scale bar divisions are 0.1m. Photograph by T. Phillips.

A further site in Reilly's Creek Gorge (J.H. Willis unpublished species list for Brisbane Ranges, undated), could not be relocated. Otherwise for Victoria there is only a 1854 collection by Blandowski in MEL from Mt. M'Ivor near Heathcote (the area was searched unsuccessfully by Willis) and an unvouchered record 'Wedderburn' (Willis 1978) of unknown source (J.H. Willis personal communication). An unsubstantiated You Yangs report has not been exhaustively checked. Finally, a stand in

Table 1. General characteristics of *Olearia* sp. aff. *pannosa* sites in Victoria.
Sites A to F are in and near the Brisbane Ranges; sites G to I are near Point Addis.

Site	Topography	Geology	Topsoil texture	Plant community	Land tenure
A	N-NE slopes	Ordovician slate and sandstone	Silty loam	*Eucalyptus leucoxylon-E. macrorhyncha* with *Acacia pycnantha*	Road reserve
B	Crest of SW slope	Ditto	Sandy loam	*E. macrorhyncha-E. polyanthemos* with *A. pycnantha* and *Xanthorrhoea australis*	Road reserve
C1	Crest of SE-facing spur	Ditto	Sandy loam	*E. macrorhyncha-E. goniocalyx* with *A. pycnantha* and *X. australis*	Private property
C2	NE slope	Ditto	Loam	*E. macrorhyncha-E. sideroxylon* with *Myoporum viscosum*	Private property
D1-4	SW to SE slopes	Ditto	Sandy loam	*E. macrorhyncha-E. goniocalyx* with *A. pycnantha* and *X. australis*	Brisbane Ranges National Park
E	E and S aspects of ridges	Ditto	Sandy loam	*E. macrorhyncha-E. goniocalyx* with *A. pycnantha*	Private property
F	SW facing cliffs	Ditto	Loam	*E. macrorhyncha-E. polyanthemos* with *A. pycnantha*	Water frontage reserve
G	Ridgetop	Tertiary sediments	Sand	*E. sideroxylon* with *X. australis*	Council nature reserve and road reserve
H	Ridgetop	Ditto	Sand	*E. baxteri - E. obliqua*	Private property
I	SE slope	Tertiary sediments	Ironstone gravel	*E. sideroxylon E. viminalis* with *A. pycnantha* and *X. australis*	Lorne to Queenscliff Coastal Reserve and road reserve

'Whroo Forest' was photographed in about 1968 (Fig. 2) but it has not been possible to relocate this (B. Fuhrer, personal communication). Information from readers would be most welcome.

Since the present work finished, 20 to 30 *O.* sp. aff. *pannosa* plants were found 8.4km ENE of Whroo. However, the site is on private property recently subdivided into two small allotments (J. Strachan personal communication). It is not the site photographed by Fuhrer (Fig. 2).

In South Australia, its range needs further work. There may be as few as ten collections scattered over southern South Australia from Port MacDonnell to as far NW as Encounter Bay and Waitpinga. If Cooke's (1986) treatment is accepted, to this should be added the subsp. *cardiophylla* collections from the Mt. Remarkable area. The reservation status of the South Australian stands is unknown.

Table 2. Characteristics of fruits of *Olearia* sp. aff. *pannosa*.
n – total no. of fruits examined.

Site	Date	n	No. of fruits (%) Unexpanded and/or empty	Partly eaten by insects	Filled*
D4	23 Fe 1987	334	78	19	3
E	23 Fe 1987	496	33	66	1
I1	19 Mr 1987	546	29	68	3
I2	19 Mr 1987	291	90	7	3

*Fruits filled with white, apparently live tissue.

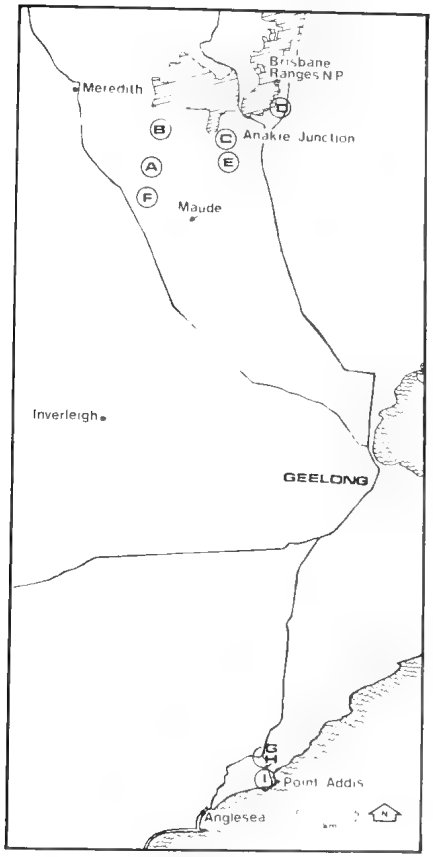

Fig. 5. Location of the nine Victorian sites still carrying populations of *Olearia* sp. aff. *pannosa*. Hatching shows Brisbane Ranges National Park.

Habitat

In Victoria, *O.* sp. aff. *pannosa* is a species of shallow, rocky soils in woodland and open-forest areas where mean annual rainfall ranges from 600 to 650mm. It occurs on a range of aspects but not on exposed NW slopes (Table 1). All Brisbane Ranges stands were on Ordovician slates and sandstones with sandy loam, silty loam or loam topsoils, while all stands near Point Addis were on Tertiary sediments with either sand topsoils over sheet ironstone or topsoils of ironstone gravel.

In the Brisbane Ranges stands, *Eucalyptus macrorhyncha* is always present (Table 1), but it does not occur in the Point Addis area. *Acacia pycnantha* and *Xanthorrhoea australis* often occur with *O.* sp. aff. *pannosa* in both areas. Soil fertility probably ranges from moderate in some Brisbane Ranges sites to low near Point Addis.

Table 3. Number of plants of *Olearia* sp. aff. *pannosa* at all known Victorian sites, 1979 and 1986-7.

	Number of Plants			
	1979		1986-7	
Site	Large	Small	Large	Small
A	15	76	5	12
B	2	-	1	12
C1	13	1		29
C2	5	5	0	150
D1	29	20	5	0
D2	36	100nds	62	265
D3	44	100nds	40	32
D4	Undiscovered		8	-
E	61	100nds	109	100nds
F	44	11	8	0
G	14	65	51	94
H	4	2	8	15
I	Undiscovered		112	72
Total	267		419	

Reproductive Biology

The peak flowering period seems to be in about October. Fruits can be found between December and May; in 1987 some were still in the heads on 3 May. A high proportion of such fruits can be empty (Fig. 6) and a further large proportion can be lost to a beetle seed predator. Even given the widely varying level of predation, percentages of filled seeds do not exceed 3% (Table 2). The very few filled fruits available were placed on moist seed test circles in petri dishes at 25 °C in light. At 15 days, 14 fruits were opened and their seeds removed and replaced in the dishes. Germination of these commenced at 22 days and reached 58 per cent at 42 days. For the similar number of fruits left unopened, germination did not start until 60 days and reached 47 per cent at 84 days. A further germination trial is in progress. Work is badly needed to see if seed viability problems limit regeneration in this species.

Field evidence suggests that seed dispersal is limited. H.A. Boardman of She Oaks stat-

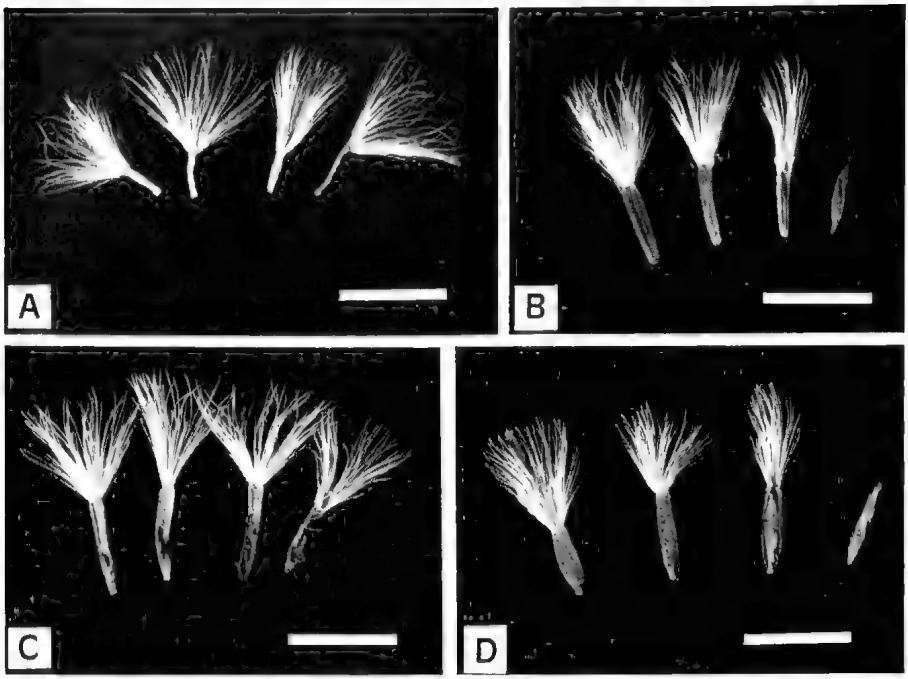

Fig. 6. Olearia sp. aff. *pannosa* fruits collected on 23 February 1987. Categories of fruits, A: Unexpanded, B: Expanded but with undeveloped or shrivelled seed (opened achene and shrivelled seed shown at right), C: Partly eaten by insects, D: Expanded fruit with developed full seed (opened achene and seed shown at right). Scale bars are 0.01m. Photograph by T. Phillips.

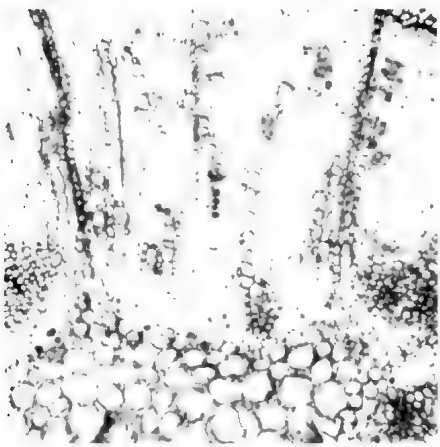

Fig. 7. Transverse section of young *Olearia* sp. aff. *pannosa* stem showing three distinct growth rings. Outer margin of section just visible in top right hand corner. Section by Mrs. S. Chung, photo by Dr. I.A. Staff (X60).

ed that some site A plants present in 1979 had been present since at least 1941, indicating a minimum lifespan of 38 yr; the species appears to be a long-lived, slow-growing one. Field data suggest that intensive browsing by marsupials, sheep and rabbits can destroy adult plants and prevent seedling regeneration.

Stem sections revealed distinct growth rings (Fig. 7). These could facilitate future studies on population age structure.

Abundance and threats

During monitoring, plants were scored in two size classes (Table 3), those with four shoots or more and having heights greater than 30cm being scored as large.

Site A, a road reserve near Maude, has shown a major decline in numbers of both large and small plants, despite absence of

stock or roadworks. Causes for the decrease are unknown, although rabbit browsing or excess runoff from the bitumen road could be involved. Roadworks remain a serious threat to all plants.

At the site B road reserve near Steiglitz, of the two 1979 plants, only one remained while 12 small plants have appeared. Roadworks remain a threat to all plants, especially burial by spoil from grading. This is presumably the stand treated as being within Steiglitz Regional Park by Victoria: Land Conservation Council (1986) as the road reserve is unfenced here and contiguous with the Park.

Sites C1 and C2 occur on private property near Steiglitz upon which sheep and cattle are grazed. All larger plants have now disappeared (Table 3), though the numbers of small plants have increased markedly. It is possible that the large plants recorded in 1979 have been browsed off, with most small plants being sprouts from either the stem base or roots and few being seedlings. Though site C2 had a stock-proof fence in 1979, by 1986 the fence was no longer stock-proof. Several small plants were present outside the fence, possibly indicating some spread of the species since 1979.

Because the growth habit of the species means that it can not grow out of reach of stock, it seems certain that, in the long term, browsing has the potential not only to eliminate mature plants but also to prevent seed production and seedling establishment. Species survival at sites like C1 and C2 is totally dependent on the goodwill of landowners in providing protection from browsing.

The four Anakie Gorge stands are within Brisbane Ranges National Park. While stand D1 has declined for reasons unknown, D3 has held its own and D2 may be increasing. These areas lack obvious threats.

Since subdivision for housing in 1980, site E near Demott's Road is now located entirely on a single, privately-owned, 10 ha house block. House construction has not yet started and two of the three patches of the plant are on steep, rocky spurs. Effects of changes if and when the whole subdivision is occupied are unknown. Present threats include rubbish dumping. Nevertheless, this is one of the few sites showing a big increase in the number of large plants.

Site F in the Moorabool Gorge is within a water frontage reserve. The main threat in 1979 seemed to be the chance of spoil from adjacent gravel quarries spilling downslope and burying plants. In 1986, no quarrying was occurring. Small plants, rare in 1979, were absent and numbers of large plants had declined, perhaps reflecting continued browsing pressure from wallabies and rabbits which both seem common. All plants seen in 1986 were in sites which appeared difficult for browsing mammals to reach.

A further Brisbane Ranges stand, of 200-300 plants on private property near Steiglitz (a single crown allotment in the Parish of Durdidwarrah) was found in 1982 (John Miller, personal communication). This was omitted from the present work.

At the sites near Point Addis known in 1979, site G shows increases in both large and small plants. Interpretation is difficult because of patchy burning in the 1983 wildfire and the appearance of small plants both on gravel road verges and on road edges which receive runoff plus the occasional removal of some small plants by road grader (Miss M.D. White, personal communication). Eighty percent of the large plants are within 5m of the road verges. Threats include roadworks and presence of *Chrysanthemoides monilifera* (boneseed). *Phytophthora cinnamomi* (dieback) appears to be active just to the north but its effect on *O.* sp. aff. *pannosa* is unknown. Roadside plants at site I were reported to us by Miss M.D. White in 1986; we subsequently found further plants (112 large plants in total) here on public land (Table 1 & 3), with appreciable numbers more than 10m from the road. Threats include roadworks, erosion of cuttings and embankments and rubbish dumping. Again, boneseed is present.

It is a pity that studies on possible seedling and rootstock regeneration were not done after the 1983 wildfire at sites G and I.

Site H is private land adjoining site G. Cattle browsing has eliminated much of the shrub layer and the *O.* sp. aff. *pannosa* population remains low. In 1986 a further private property stand was found west of site I. The stand contains at least 34 large plants. Both these sites and site E are unconservable in the long term given present government policies on private land acquisition.

Conclusions

In comparing the 1979 with the 1986-7 plant numbers (Table 3), small plants have been ignored given that many will be sucker shoots, some probably induced by fire and browsing. The long-term behaviour of the sucker shoots is not understood.

In terms of large plants, most of the increase in numbers is due to discovery of an additional large stand. Plant numbers at most of the 1979 stands tend to have remained similar (Table 3). This is perhaps not surprising given the apparent long lifespan of individual plants and the fact that few or no changes to management have been made. The discovery of a new reserved site carrying 122 large plants since 1979 is most welcome given the continuing rarity of this species.

Regarding the conservation biology of *Olearia* species, of the nine species assessed for palatability by Cunningham *et al.* (1981), three have aromatic leaves and the total range of palatability recorded is from not browsed to 'sparingly browsed at times'. However, four of these have since been listed as becoming rare because of sheep browsing (Boehm 1983). Also, *Olearia microdisca* is an endangered species known to be threatened by browsing (Davies 1986). In the present case, there is clear field evidence that *O.* sp. aff. *pannosa* can be intensively browsed by mammals (H.A. Boardman, personal communication).

At least four species of *Olearia* are known to be colonizers following fire or clearing and two such species are known to be endangered (Cunningham *et al.* 1981; Davies 1986; Leigh, Boden and Briggs 1984). Although there are indications that *O.* sp. aff. *pannosa* is long-lived and with poor seed dispersal, colonizing behaviour may be suggested by increasing densities of the species along disturbed road edges near Point Addis. Work is badly needed on the extent to which seedling establishment is disturbance-dependent.

Although the species is now known from four reserves, known numbers of large plants remain small. Because of this and the uncertainties regarding viable seed production and need for disturbance, we regard the species as vulnerable Victoria-wide. Annual monitoring of all sites and careful management of all public land sites is essential. The conservation status of the species Australia-wide will only be known after field checking in South Australia and taxonomic revision.

Acknowledgements

We thank H.A. Boardman and Mary D. White for their interest and their invaluable field observations; the work was funded in part by a grant from the National Estate Program of the Australian Department of Home Affairs. Max Bartley provided expert assistance with later phases of the work.

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Notes from the National Herbarium of Victoria – 5
Monotoca glauca (Labill.) Druce (Epacridaceae), an interesting record from southern Victoria.

By David Albrecht*

Introduction

Although approximately twenty per cent of the presently known vascular plants of Tasmania are endemic to the island (Brown et al, 1983) many of the species represented in the Tasmanian flora also occur in Victoria and southern New South Wales. The floristic similarities between southern Victoria and Tasmania were recognised by early Australian botanists such as Ferdinand Mueller who in 1853 wrote "That the vegetation of the southern parts of our province accords greatly with the Tasmanian flora may be demonstrated by the fact that more than half of the enumerated species are known to inhabit Van Diemen's Land. . .". The Victorian alpine region, the Grampians, Wilsons Promontory and the Otways in particular share many species with the Tasmanian flora. Of particular biogeographical significance are those species with a very restricted distribution on the Australian mainland but with a more extensive range in Tasmania. *Pimelea drupacea* Labill. and *Lindsaea trichomanoides* Dryander for example occur on the mainland only at Wilsons Promontory and *Cyathodes juniperina* (J. R. and G. Forster) Druce and *Lepidium desvauxii* Thell. occur at Wilsons Promontory and few other sites on the mainland. The only Victorian populations of *Phebalium squameum* (Labill.) Engl. *sensu stricto* and *Correa backhousiana* Hook. complex, occur in the Otways; both species have a more extensive distribution in Tasmania. The recent discovery of *Calorophus elongatus* Labill. (Harris, 1984) and *Grammitis magellanica* Desv. ssp. *nothofageti* Parris (Barnett and Beattie, 1986) in the Otway region further strengthen the view expressed by authors such as Carr (1971) that there are strong phytogeographical links between the Otways and Tasmania.

This article reports the occurrence of *Monotoca glauca* (Labill.) Druce in the Otway and south Gippsland regions of Victoria, a species hitherto believed to be a Tasmanian endemic. The mainland occurrences provide further evidence for the close relationship between the southern Victorian and Tasmanian floras. The mainland populations of *M. glauca* are not a recent field discovery, herbarium specimens of this species were collected in Victoria as early as 1874 but have been incorrectly ascribed to *M. elliptica.*

The genus Monotoca and its Victorian representatives

Monotoca is a small endemic Australian genus in the family Epacridaceae (tribe Styphelieae). The genus occurs in all states except the Northern Territory and contains 11 currently recognised species (Powell, 1983). *Monotoca* is derived from Latin, meaning producing offspring but once (Stearn, 1978), which alludes to the usually 1-celled ovary. Other characters that contribute to the distinctiveness of the genus are the glabrous corolla lobes that are not overlapping in bud and the two opposite bracteoles subtending each flower.

In addition to *M. glauca,* there are three other Victorian species, viz *M. rotundifolia* J. H. Willis, a wiry prostrate or ascending shrub < 30cm high, known in Victoria only from Brumby Point, Nunniong Plateau; *M. scoparia* (Sm.)R.Br., an erect shrub to approximately 1.2m high, widespread in heathland and forests with healthy understoreys on poor sandy or skeletal soils and

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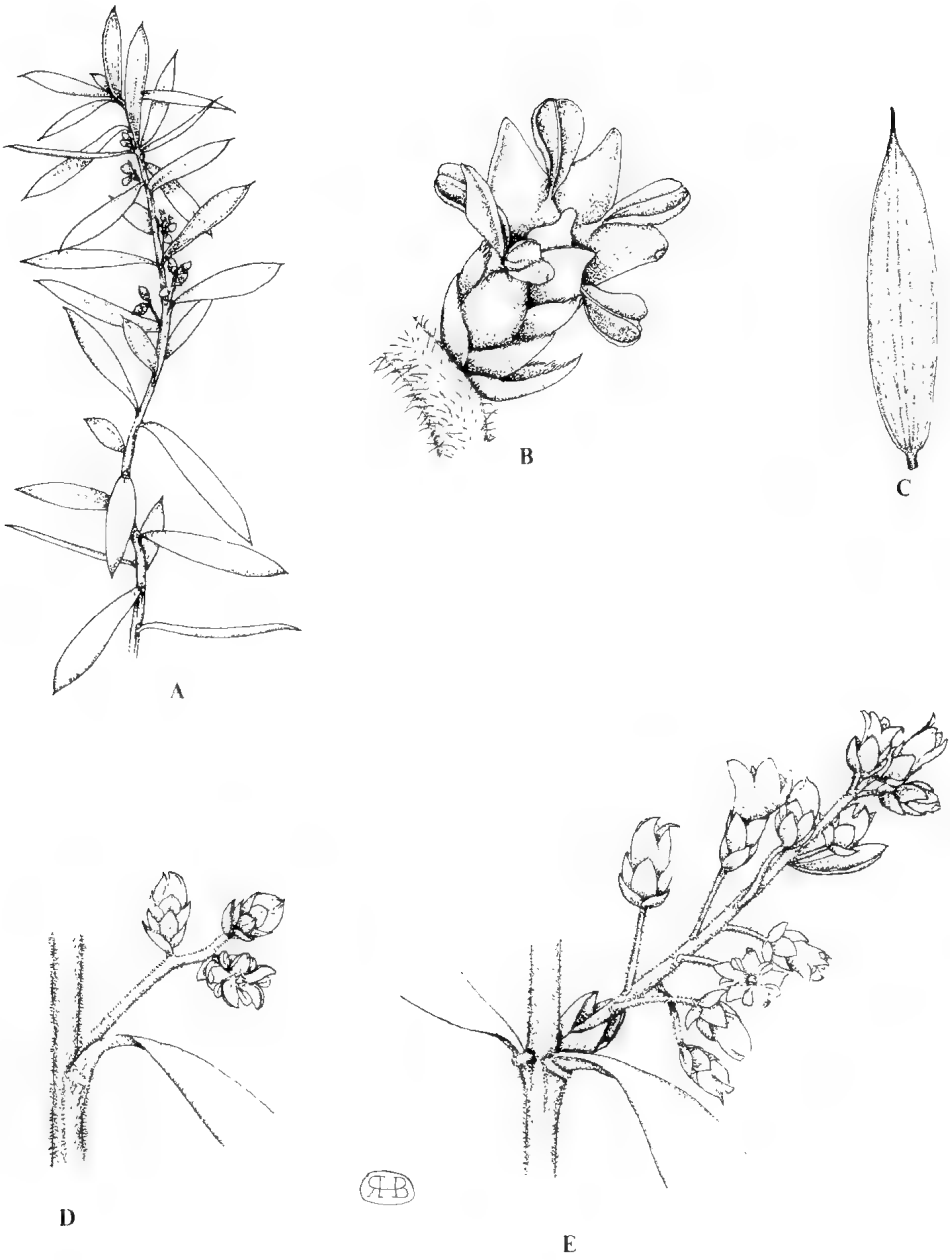

Fig. 1. *Monotoca glauca* a-d. a. section of flowering shoot xl; b. flower x20; c. leaf undersurface x3; d. inflorescence x5. *M. elliptica* e. inflorescence x5.

Fig. 2. A 6m high *M. glauca* specimen at Waratah Bay, South Gippsland

M. elliptica (Sm)R.Br., a shrub or small tree to approximately 6m high occurring in near coastal areas from Wilsons Promontory east to the N.S.W. border (all collections from the Otways previously referred to *M. elliptica* are *M. glauca*). Table 1 outlines the principal characters distinguishing *M. glauca, M. scoparia* and *M. elliptica.* The number of *Monotoca* species in Victoria remains only tentative as the identity of populations from the Victoria Range in the Grampians and populations from several subalpine localities in eastern Victoria is currently uncertain.

Description of Monotoca glauca

A densely branched shrub or small tree 2-8m high. Bark ultimately rough and fissured. Branchlets brown, covered with short spreading hairs, becoming glabrous with age. Leaves alternate, spreading or reflexed. Petioles 0.5-1.7mm long. Lamina narrowly elliptic to oblanceolate or occasionally obovate, 8-36mm long, 2.1-7mm wide; apex pungent with a 0.2-1.5mm mucro; margins plane or slightly recurved; upper surface green, glabrous; lower surface glaucous with conspicuous venation. Inflorescences axillary, each a 2-9- flowered shortly pedunculate spike or occasionally reduced to single flower. Bracts, bracteoles and sepals ovate-orbicular, obtuse, margins ciliate. Bracts 1 per flower (or sometimes absent when inflorescence reduced to a single flower), 0.4-1mm long, usually persistent on the straight or zig-zag puberulent rhachis, usually absent from the base of the peduncle. Bracteoles 2 per flower, 0.5-1mm long, inserted immediately below calyx. Flowers bisexual or unisexual by abortion of pollen or ovules (in such cases the plants dioecious). Calyx of 5 imbricate segments 0.7-1.1mm long. Corolla white, rotate, composed of a short tube 0.5-0.8mm long, and 5 lobes 0.8-1.5mm long, the corolla tube shorter than or occasionally almost equal to the calyx. Anthers exserted from the corolla tube, 0.5-1mm long. Ovary tapering to a short style, together c.1mm long, glabrous. Nectary a 5-lobed cup, 0.2-0.4mm long. Fruit an ovoid drupe, c.2mm long, maturing to a pale yellowish-brown colour. See Figs 1 and 2.

Distribution – past and present

The formation of Bass Strait in the Oligocene or Miocene epochs, 10-38 million years before present, resulted in the initial separation of Tasmania and mainland Australia which until then had formed one continuous land mass (Gill, 1962; Galloway and Kemp, 1981; Barlow, 1981). Since its formation, Bass Strait has been open and closed many times. The history of the later tertiary period is uncertain (Barlow, 1981), however during the Pleistocene epoch alone (2,000,000-10,000 years before present), five major worldwide glacial phases have been recognised (Ericson and Wollin, 1968; Rawlinson, 1974). During these glacial periods vast amounts of water were locked up in expanses of ice and consequently an extensive landbridge between Tasmania and the Australian mainland was formed by the drop in sea level. Exchange of plant species

Table 1. Principal characters distinguishing *M. glauca, M. elliptica* and *M. scoparia*

	M. glauca	*M. elliptica*	*M. scoparia*
Habit	shrub or small tree 2-8m high	shrub or small tree 2-6m high	shrub 0.2-1.2m high
Leaves	8-36mm long, 2.1-7mm wide	10-25mm long, 3-7mm wide	6-15mm long, 1-2.6mm wide
Inflorescence	a 2-9-flowered axillary spike (individual flowers sessile or almost so) or occasionally reduced to a single flower	a terminal or axillary raceme (individual flowers distinctly stalked) or rarely reduced to a single flower	a 2-4-flowered axillary spike (individual flowers sessile or almost so) or reduced to a single flower
Bracts	0.4-1mm long, those subtending flowers usually persistent, but often absent from the base of the peduncle	> 1mm long, sometimes leaf-like and to c. 4mm long, those subtending flowers deciduous; overlapping deciduous empty bracts also present at base of peduncle	0.4-0.6mm long, those subtending flowers usually persistent, a pair of empty bracts usually present at base of peduncle
Calyx/corolla tube	corolla tube < calyx	corolla tube > calyx, or sometimes equal to calyx in female flowers	corolla tube > calyx
Anthers	exserted from corolla tube	half exserted from corolla tube	half exserted from corolla tube
Flowering season	summer (Dec.-March)	late winter-spring (July-Oct.)	autumn (March-June)

between Tasmania and the Australian mainland would have been possible during these glacial periods, however dune formation on the exposed floor of Bass Strait may have restricted migration to those species adapted to this edaphic condition (Galloway and Kemp, 1981). Hope (1978) analysed the pollen-bearing sediments in Cave Bay cave on Hunter Island and presented a reconstruction of the vegetation on the Tasmanian - Australian mainland landbridge during the last pleistocene glaciation. The oldest sediment zone which spans the period 28,000-c. 23,000 years before present contained relatively high frequencies of heath pollen, principally from the genera *Monotoca* and *Sprengelia.* This led Hope to suggest that an open shrubland may have prevailed on parts of the landbridge during this period. Although the *Monotoca* pollen was not identified to specific level it is very probable that *M.glauca* was involved. If this were the case *M.glauca* may have had a more or less continuous distribution from Tasmania to parts of the Australian mainland.

During interglacial periods the sea level rose as glacial ice melted and the transgressing water drowned the landbridge, isolating Tasmania from the Australian mainland. The islands of Bass Strait are considered to be more elevated remnants of the former landbridge that have escaped inundation (Jennings, 1971). The sea level reached its present level about 6,000 years ago, but there is some controversy as to whether it has since then remained stationary, oscillated slightly or whether there has been a small but persistent rise (Marginson and Ladiges, 1982). Despite the periodic opening

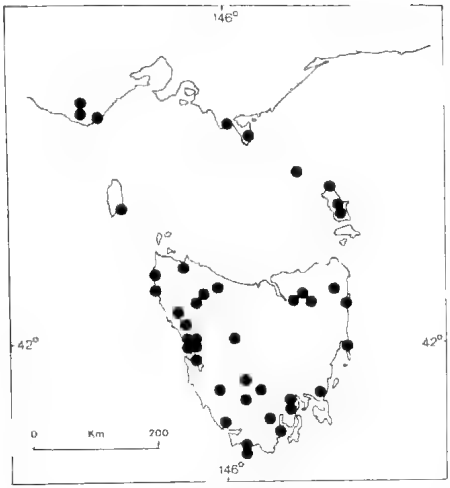

Fig. 3. Distribution of *M. glauca* based on herbarium specimens lodged at MEL (Victorian localities) and HO (Tasmanian and Bass Strait Island localities, from Brown et al (1983)).

of Bass Strait during interglacial periods, it has been the rule rather than the exception for Australia and Tasmania to form one land mass during the last few million years (Galloway and Kemp, 1981).

The present known distribution of *M. glauca* is shown in Fig. 3. In Victoria *M. glauca* occurs at Sealer's Cove on Wilsons Promontory, Waratah Bay and several localities in the Otways. It is relatively widespread in Tasmania (see Brown et al (1983) for additional unvouchered Tasmania records) and also occurs on some Bass Strait islands such as Flinders, King and Kent group islands. The present pattern of distribution suggests that the current populations are remnants of a formerly more extensive distribution.

Marginson and Ladiges (1982) and Wiltshire and Reid (1987) have recently investigated the pattern of variation within *Eucalyptus* species that have an Australian mainland-Tasmanian distribution. Wiltshire and Reid (1987) found that although considerable genetic variation exists between mainland and Tasmanian *E. perriniana* F. Muell. ex Rodway there is no question of altering the taxonomic status of the species. Marginson and Ladiges (1982) on the other hand found major differences in seedling morphology between mainland and Tasmanian-Bass Strait populations of *E. nitida* J. D. Hook. The mainland taxon was subsequently described as a new species, *E. willisii* Ladiges, Humphries and Brooker (1983). Although detailed study of the geographical variation within *M. glauca* is beyond the scope of this article, such a study would doubtlessly provide fascinating insights into the pattern of variation between mainland and Tasmanian-Bass Strait populations isolated at least since the last pleistocene glaciation.

Habitat

In Tasmania *M. glauca* grows in, or on the edge of open forest on relatively infertile soils derived from sedimentary parent material (J. Kirkpatrick pers. comm.). The known Victorian populations occur in similar habitat. At Waratah Bay *M. glauca* is a relativley common species in *Eucalyptus obliqua – E. radiata* open forest. The soil at this site is a relatively infertile sandy loam and the understorey varies from sclerophyllous to fern dominated. *M. glauca* attains tree proportions (to c.7m high) in moister sheltered positions. In the Otways, *M. glauca* grows on tertiary sands in vegetation ranging from tall open forest dominated by *E. obliqua, E. regnans* and 'Otways messmate' to heathy woodlands dominated by *E. baxteri* (G. Carr and S. Harris pers. comm.). Beauglehole et al (1977) also record *M. glauca* (listed as *M. elliptica)* from *Leptospermum juniperinum – Melaleuca squarrosa* closed scrub in the Otways.

Acknowledgements

I am most grateful to Mr. G. Carr, Mrs. M. Corrick, Dr. P. Gullan, Dr. J. Kirkpatrick and Mrs. S. Harris for providing information on the habitat and distribution of *Monotoca* species in Victoria and Tasmania; to Mr. R. Barley for preparing the illustrations in Fig. 1. and Dr. R. Spencer for assistance with word processing; and to Mr. S. Forbes and Dr. J. Ross for valuable comments on the manuscript.

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Naturalists Review

BY J. H. WILLIS

'A Field Guide to the Larger Fungi of the Darling Scarp and South West of Western Australia'

BY KEVIN GRIFFITHS

Private publication (1986). 21 x 15 cm. 80 pp. colour reproductions of 113 species.

The fungal flora of Australia is so vast, and as yet *so* poorly documented, that any serious attempt to render it identifiable must be praiseworthy. Monographs are certainly needed on each of the multitudinous genera of agarics, puffballs, pore-fungi, coral-fungi, cup-fungi etc.; but, befor this is feasible (doubtless many years hence), there is a place for regional accounts of the better known species. Apart from J. B. Cleland's two volumes on the larger fungi of South Australia (1934), much of his nomenclature now superseded, only two States (Victoria and Queensland) would seem to have produced anything in the nature of descriptive manuals for the fungi of their particular regions.

Thus, the first-ever illustrated guide to larger fungi in Western Australia is especially welcome. This slender handbook evolved from the delight and fascination evoked in its author, an amateur, by appearances of local fungi at Parkerville, W.A. Kevin Griffiths painted water-colours of more than 150 species, and then had them identified by Mr. Roger N. Hilton (University of Western Australia). With microscope facilities and further critical study of fungal affinities, he decided to share his knowledge (and enthusiasm) in book form, hoping that others might be inspired to enter this exciting if very neglected field of research.

Text and colour reproductions are attractively

arranged on strong glossy paper, the descriptions being simple but interestingly presented. Of the 113 species depicted, at least 91 (81%) are known to occur also in Victoria, so the Griffiths **Guide** would be quite useful to fungus hunters in our south-eastern State. The area covered – "Darling Scarp and South West" – is about 90,000 sq. km., less than half that of Victoria which is much richer mycologically.

A novel approach to arrangement of the various genera, and their species, is to emphasize the fungal *families* as a basis of classification throughout this guide-book; familial features had been largely ignored by former mycological writers, at least in Australia. There are 16 families to accommodate the 48 genera treated – an average of only 3 genera per family. A budding excursionist might well be daunted by the prospect of carrying around a powerful microscope, instead of simple hand lens, in order to tell whether a toadstool with white gills and ringed stem fitted into the Amanitaceae (gill trama "divergent") rather than the lepiotaceae (gill trama "inverse"), or whether one having rusty-brown gills and spores belonged to Bolbitiaceae (apical pore on the spore) instead of to Cortinariaceae (*no* apical pore). Incidentally, Roy Watling [*Vic. Nat. 102* : 119 (July/Aug. 1985)] had assigned *Descolea* to the Cortinariaceae, yet Griffiths (p. 37) now places it in Strophariaceae (*with* apical pore) – both can't be right!

The double-page colour key to genera (pp. 72 and 73) is good, though sometimes misleading; for instance, the "large volva" ascribed to members of *Agaricus* is seldom apparent. One may be pardoned for querying the accuracy of some identifications, e.g.:

p.24 *Lacrymaria asperospora* (Coprinaceae) – where are the coarse, shaggy brown fibrils so characteristic of the caps in this species?

p.48 *Polyporus pelliculosus* (Polyporaceae) – this "tough woody type of fungus" appears quite unlike true *Tyromyces pelliculosus* which is soft, spongy and with very shaggy pellicle.

p.55 *Clathrus pusillus* (Clathraceae) – it looks much more like *Anthurus rothae* as depicted in Cleland's *Toadstools and Mushrooms* etc. *of South Aust. 2*:t.10, fig. top right; the reviewer has found genuine *C. pusillus* in the Wongan Hills (Sept. 1963), with all the features ascribed to this species by Cleland (pp. 280-81).

In Roger Hilton's *Foreword* (p. 3) it is stated that "Those [water-colours] of Willis (1965) and Cleland (1934) suffer from outdated printing methods and bear little resemblance to nature." If that be so, and I doubt it, then the updated printing methods of the present Field Guide have not achieved any better resusts with *Hypholoma fasciculare* ("Sulphur Tuft" – p. 37) which is hardly recognizable as the same toadstool (yellow top and lime-green gills) that abounds in Victoria; also, the Griffiths portrayals of *Ramaria fumigata* (p. 44), *Phellinus rimosus* (p. 49) and *Tremella mesenterica* (p. 52) have such a bleached-out appearance that they are not at all representative of the same colourful species with which Victorians are familiar. Compare *Cortinarius subarcheri* (p. 25) with the same but brilliantly purple fungus depicted in our *Victorian Toadstools and Mushrooms* t. 1 fig. 5 (ed. 4, 1965).

Despite the above criticisms of some illustrations, Kevin Griffiths must be warmly congratulated for breaking new ground and, together with his accomplished printer, producing such an excellent, reliable and useful book. The whole slim volume is so pleasant and profitable to peruse that one has no hesitation in recommending it to the field naturalist, botanical student, and more seasoned mycologist. No price is indicated, but a figure between $12 and $16 would be realistic; may good sales fully justify all the work expended.

Naturalist Note

Platypus in Melbourne

BY IAN FAITHFULL*

On 29th January 1985 at 8.05 p.m. I saw a platypus in the Yarra River at a bend 330m north of the Johnston Street road bridge in Kew. It swam upstream close to the northern bank, alternately diving and on the surface: 7 s under, 3 s on the surface, 7 under, 3 up, 5 under, 5 up; and then disappeared. I have returned on numerous occasions to this place but have not seen a platypus again.

Since the sighting was unusual I sought out other observations. Mr. Domenic Quaresima provided some confirmation with his report of the animal some time in October or November 1984 near the Walmer Street footbridge, a point further downstream and below Dights Falls. The river had been running high and about a week after the downpours a single platypus was watched as it frolicked near a rocky bank in the early morning. It swam off upstream after being watched for several minutes.

Mr. Will Ashburner has related some observations by his father at Burnley Gardens in the 1950s. Mr. Ashburner senior reported that the species was common at this place, which is further downstream again, at this time, the river being fringed by willow trees which are now absent.

Peter Menkhorst of the Arthur Rylah Institute (Department of Conservation, Forests and Lands) has kindly provided further information (Pers. Comm., Nov. 1985). He notes that there are numerous early records for the Yarra and its lower tributaries including the Plenty River, Gardiners, Darebin, Merri and Koonung Creeks, but that the platypus seems to have disappeared from all but the Yarra and Plenty by the early 1960s. It persisted in the Plenty at Yallambie (Macleod) until March 1983 when Mr. Ian Temby made the last of his long series of sightings there.

The records for the metropolitan section of the Yarra since the mid 1970s are given as follows by Mr. Menkhorst (records up until November 1985):

April 1976. One observed by Mr. Howard Jarman at Bulleen, 3km ENE of the Banksia Street Bridge.

14th August 1976. One observed in the same area by Mr. Menkhorst.

10th July 1976. One found dead at Fairfield Park (Fisheries and Wildlife registration number 10 846).

Further records are desirable. Naturalists should search their favourite section of river during the evening and early morning or at night and report sightings to the Mammal Survey Group.

I am grateful to Mr. Peter Menkhorst for his help.

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100 Years Ago

PLATYPUS IN THE YARRA. — Two old pupils of mine, Messrs. Grove and Nye, while boating recently on the Yarra, just above the Johnston Street Bridge, observed a platypus swimming about. They gave chase, and succeeded in effecting a capture, and kindly brought me the specimen alive. It was a young male, about fifteen inches in length. I fed him, and placed him in a warm nest, after watching him swim and dive a while. But he seemed to have been injured by the oar during capture, and he died twenty-four hours after I received him. It is, I think, some time since one of these amimals has been met with so near Melbourne. — A. H. S. Lucas.

Victorian Nat. V3 March 1887 p.153.

A. H. S. Lucas was editor of the Victorian Nat. (1884-92) and President of the F.N.C.V. from 1887-89.

Proposed MMBW Braeside Park

BY RON PEARSON*

Following the closure in 1980 of the Melbourne and Metropolitan Board of Works sewage treatment farm at Braeside, 25km South-East of Melbourne, the Board decided to convert the area into one of their series of Metropolitan Parks.

The land has an area of 295ha, being approximately half of that bounded by Lower Dandenong Road, Springvale Road, Governor Road and Boundary Road. Prior to its acquisition by the Board of Works in 1928, the land was used as a grazing property by a number of users.

Arising largely from interest shown by a number of individuals and groups concerned with the flora and fauna of the area the Board decided to investigate the possibility of converting it to a park which placed special emphasis on the natural features of the area.

To assist in the planning of the park an Advisory Committee was appointed comprising Board Officers, members of five local Councils and four local interest representatives.

Now that the Committee has been sitting regularly for 18 months, and after consultation with the general public a plan has been prepared for the development of the park. It will be developed progressively over the next 5 years aiming towards the concepts in the prepared plan:

(a) to upgrade the existing heathlands and woodlands by allowing the natural regeneration of certain areas, and where plausible in other areas, by revegetation utilising plants raised from seeds collected locally. Revegetation will be designed to conform to the natural species composition. The heathland area, because of its ecologically sensitive nature will be fenced and entry will be by a permit system. A heathlands education centre will be erected adjacent to the entry to the heathland area. This total area comprises about 30% of the park.

(b) the wetlands which initially were the northernmost arm of the former Carrum Swamp were used as part of the system for sewage disposal during the period the MMBW used the park as a sewage treatment farm. Over the years this area has become a favorite haunt for many species of birds. It is planned to extend the wetlands, encourage growth in and around its boundaries and provide observation points and low key bird hides. This area comprises about 20% of the total area.

(c) in the centre of the park, an area of about 25% of the park, mainly grazed woodland will be fenced to provide a marsupial grazing area.

(d) the remaining 25% of the park, largely adjacent to main roads, will be used for picnic areas, car parking, park maintenance facilities and buffer plantings of indigenous trees and shrubs.

Surveys have been conducted which record over 330 vascular plant species in the park, of these about 200 are native. Among the native plant species a number are considered to be rare in the Melbourne area:

Eucalyptus pauciflora, Diuris punxtata, Monotoca scoparia, Ricinocarpus pinifolius, Acacia ulicifolia var. *brownei, Trachymene anisocarpa* and a naturally occurring hybrid of *Leptospermum myrsinoides* and *L. laevigatum*. About 100 bird species have been recorded in the area, as well as 9 mammals, 8 reptiles and 5 amphibians.

* Mr. Ron Pearson has recently been appointed a member of the FNCV Council and is a member of the Braeside Park Advisory Committee.

Natural History Audio – Visual Presentation

Council has decided to sponsor an audio-visual type presentation of the plants, animals and birds of a section of Australia, or preferably Victoria. It has been suggested that the 'audio-visual' could illustrate the flora and fauna to be seen along the path of an early Australian explorer at the time of the expedition, or some acceptable alternative proposal.

It is envisaged that the presentation would be used by a variety of organisations such as schools, senior citizens clubs, garden clubs and historical and natural history societies. It would allow an 'expert type' presentation by anyone who could handle the equipment.

Members who have some expertise in these fields and who would like to participate in bringing this project to fruition are asked in the first instance to contact Ron Pearson (Hon. Secretary) by telephone on 584 7443.

Mammal Survey Group Annual Report 1986-1987

Introduction

This report reviews the activities of the Mammal Survey Group during the year covered by trapping permit 86-41 issued by the Department of Fisheries and Wildlife. A summary of the groups trapping activities and successes is presented and a list of currently scheduled activities for the coming year is provided.

Administration

The following are members of the outgoing committee:

Chairperson	Bill Farrugia
Honorary Secretary	Julian Grusovin
Treasurer	Ray Gibson
Records Offficer	Peter Myroniuk
Members Without Portfolio	Mibel Aguilar
	Tom Sault
	Malcolm Turner

At the time this report was written a new committee had not yet been elected

Newsletter

A group newsletter is produced monthly prior to the regular meeting. The newsletter is freely available but there is a charge of $4.50 to cover postage costs. The newsletter is currently received by about forty club members. The newsletter includes information about forthcoming meetings and camps and provides reports on previous meetings and camps. General news items and matters of concern are also communicated.

Policy Directions

1. The group has adopted a policy of actively pursuing prospective members. This policy will be expedited by publicising the work of the group through articles in natural history and conservation magazines and publications; providing publicity at venues likely to be frequented by nature lovers and interested parties; and attempting to involve other natural history groups in field survey work. Any successes in this area will be of benefit to the Club as a whole.
2. Survey trips are to be planned with at least one of the following criteria in mind:
   - The area has sensitive conservation values and/or natural history interest
     The area is abundant in wildlife and is useful for training new members and in maintaining animal handling and identification expertise.
     Baseline data exists from previous surveys and fresh data could yield interesting results
   - An area may be surveyed by request if it looks promising.

Monthly Meetings

The group meets on the first Tuesday of the month at 8.00p.m. in the Herbarium. Eleven such meetings are held each year, with the exception of January which is our normal Christmas recess. The meetings are open to all members, their guests and visitors. Average attendance at meetings during the year has been 16 members and 3 visitors.

Guest speakers provided us with a varied and informative set of presentations throughout the year. Our program was as follows:

4th March 1986	Steven Craig	The Yellow-bellied glider
25th March	Grant Norbury	Nutritional aspects of the Western Grey Kangaroo
6th May	Peter Mitchell	Social Behaviour of Koalas
3rd June	Martin Schultz	Seals of Victoria
1st July	Peter Durkin	Conservation values of East Gippsland
5th August	Amanda Embury	Primates at the Melbourne Zoo
2nd September		Members Night
7th October	Graham Coulson	Radio Tracking Western Grey Kangaroos
28th October		Discussion on Big Desert Wilderness Trapping Work
2nd December		Members Night/End of year party

3rd Feb. 1987	Simon Ward	Pygmy Possums of Victoria
3rd March	Laurie Conole	Sub-fossil remains in the Brisbane Ranges
7th April	Andrew Bennett	Fauna of the North-West Study Area

Field Work

Eight field trips were conducted during the period that F&WD Trapping Permit No. 86-41 was in force. These are listed together with trapping and other survey results elsewhere in this report.

Surveys to be conducted under the 1987/88 permit are as follows:

March	Strathbogies
April	East Gippsland
June	Upper Lerderderg
August	Snow trapping at Lake Mountain
September	Mt. Strickland
November	Sunday Island

Further surveys may be initiated from time to time as opportunity arises or as a need is perceived.

	Big Desert Wilderness		Gram-pians	Rush-worth	Currawong Bushpark	Big Desert Wilderness	
Locality Lat.	35°21'S			36°37'S	37°46'S	35°45'S	
Lon.	141°09'E			145°04'E	145°12'E	141°22'E	
Date	31.3.86	1.4.86		17.8.86	19.10.86	3.11.86	4.11.86
Species:	0			0			
Cercartetus concinnus		1					
Rattus rattus					2		
C. lepidus						1	4
Pseudomys apodemoides						1	1

	Frosty Hollow East Gippsland					Big Desert Wilderness		MMBW Farm Werribee
Locality	37°18'S 148°58'E					35°47'S 141°20'E		37°59'S 144°33'E
Date	28.12	29.12	30.12	31.12	1.1.87	25.1.87	26.1	15.2.87
Species								
Rattus fuscipes	3	6	3	8	9			
Antechinus stuartii	1		2	2	1			
A. swainsoni		1	1	1				
Eptesicus sagittula			1					
E. regulus				5				
Chalinolobus morio				1				
Nyctophilus gouldi				1				
P. apodemoides						1	2	
Mus musculus								4
R. rattus								5
Hydromys chrysogaster								3

Big Desert Wilderness March 1986	*Macropus fuliginosus, Vulpes vulpes, Lepus capensis, Oryctolagus cuniculus, Morethia boulengeri,* Bearded Gecko, Painted Dragon
Grampians June 1986	*Petrogale penicillata* scats, predator scats
Rushworth August 1986	*Macropus giganteus, Trichosurus vulpechula,* gecko *Pseudocheirus peregrinus, Petaurus breviceps* (heard)
Currawong Bushpark October 1986	*Petaurus breviceps Pseudocheirus peregrinus* Tawny frogmouth
Big Desert Wilderness November 1986	*Ctenotus robustus, C. schomburgkii,* Jacky lizard, Stumpy tail lizards, Mallee Dragons
Errinundra Plateau Christmas 1986	*Petauroides volans, Trichosurus caninus, Vombatus ursinus, Tachyglossus aculeatus, Petaurus breviceps, Felix catus, Vulpes vulpes,* copperhead snakes, various skinks
Big Desert Wilderness January 1987	Jacky Lizards Blind Snake sp.
MMBW Farm Werribee February 1987	*Oryctolagus cuniculus, lepus capensis, Mustela putorius,* White-lipped snake, Tiger snake

This is not an exhaustive list as not all field observations have as yet been consolidated.

Botany Group Annual Report 1986

President: Miss Margaret Potter
Minute Secretary: Mr. Arthur Thies
Programme Committee: Miss Marie Allender, Mr. Peter Carwardino, Mrs. Helen Stanford, Mrs. Hilary Weatherhead.

The Botany Group meetings have again been well supported, the usual attendance being approximately 30. One meeting, that at which Dr. Jim Willis spoke on his trip to China, proved so popular that we were pleased to welcome a very large number of visitors, the hall being filled to capacity.

The programme and speakers for 1986 were:

Feb.	"Australia Spring in Summer"	– Miss Mary Doery
Mar.	"Fraser Island"	– Mr. Andy Blackburn
Apr.	"Crete: a Flora in Isolation"	– Mrs. Hilary Weatherhead
May	"Daisies"	– Mrs. Judy Barker
June	Members' Night	
July	"Wildflowers of the Nepean State Park Walking Tracks"	– Mrs. Ilma Dunn and Mrs. Stefanie Rennick
Aug.	"Endangered Plants"	– Mr. David Cheal
Sept.	"Sandringham Flora Revisited"	– Ms. Daintry Fletcher
Oct.	"Prostanthera and its Allies: a discussion of problems and diversity"	– Mr. Barry Conn
Nov.	"A Botanist Visits China"	– Dr. Jim Willis
Dec.	Annual Meeting and Members' Night.	

In addition, excursions were conducted on the fourth Saturday of each month from February to November. Numbers participating in these were disappointing. Venues and leaders were: Point Lonsdale – Seaweeds (Mrs. D. Sincora); Kinglake National Park (Mr. A. Thies); Nepean State Park (Mrs. S. Rennick); Fungi at Fernshaw (Mr. T. May); Organ Pipes and Brimbank Park (Mr. A. Blackburn); Studley Park, Kew (Mr. R. Robinson and Mr. J. Yugovic); Warrandyte – Acacia (Mr. I. Morrison); Sandringham – Bay Road Reserve and Beaumaris HS. Heathland (Ms. D. Fletcher); Courtney's Road, South Belgrave (Mrs. H. Weatherhead); Lake Mountain (Mrs. I. Dunn).

The visit to the Nepean State Park resulted in a group returning later in the year to pull boneseed at "Sea Winds". It was an eye-opener to see so many native species struggling to survive under the boneseed and hence the possibility for regeneration of the native flora once the boneseed is eradicated. This could become an on-going project to which, hopefully the Botany Group will commit itself.

Once again we are indebted to all those from outside the Club especially, as well as to those within the Club, who have given of their time and knowledge and so contributed to another successful year.

Margaret Potter
(President)

Day Group Annual Report 1986

Chairman; Mr. Ian Gillespie
Vice Chairman: Mrs. Joan Miller
Secretary: Mr. Dan McInnes

Once more excursions suitable for public transport were arranged for the year 1986. Interesting visits were made to the places listed below and a member of the group acted as leader and supplied historical and background information for each excursion.

Month	Excursion	Leader
Feb.	Red Bluff and Half Moon Bay	Margaret Wilson
Mar.	Puffing Billy Trip to Lakeside	Ian Gillespie
April	"The Seeing Eye Dog School" Malvern	Joan Miller
May	Brimbank Park M.M.B.W. Keilor	Andy Blackburn
June	Fawkner Park and The Jewish Museum	Dan McInnes
July	Ringcraft Diamond Salon	Dan McInnes
Aug.	Mounted Police Depot St. Kilda Road	Betty Gillespie
Sept.	Warrandyte	Joan Miller
Oct.	Zoological Gardens	Ian Gillespie
Nov.	Kananook Creek Seaford	Margaret Wilson

The average attendance was the same as last year 14 with a top of 20 at Red Bluff and Half Moon Bay.

D. E. McInnes
(Secretary)

Microscopical Group Annual Report 1986-87

The Group was under the Chairmanship of Mr. Urwin Bates.

The group's membership and attendances remained constant throughout the year.

Miss Phyliss Johnston donated books and microscopical equipment, including slides prepared by the late Dr. Wishart, with a request that they be included with the slides in the Wishart Collection held by the Microscopical Group; this request has been complied with.

Lectures and Speakers of the year.

Mr. J. Dawes (2)	1. Microscope slides and Accessories over the years.
	2. Early Books on Microscopy and Natural History.
Mr. D. McInnes (1)	Rotifers, with a film on Rotifers made by the late P. Genery.
Mr. J. Endacott (1)	Rheinberg Filters and Crystals under Polarised Light
Mr. U. Bates (1)	Moths and Butterflies, with film on Slime Moulds.
Dr. E. Peters (2)	1. Parasites affecting Mankind.
	2. Movie and Still photography through the Microscope.
Mr. R. Ward (1)	Grinding a Telescope Mirror.
Mr. R. D. Graham (1)	Diatoms of the Latrobe Valley.

Members' Interests and Display Night (2). Two evenings were enjoyed by the members and visitors during the year.

Mrs. E. C. Graham
(Secretary)

Geology Group Annual Report 1986

This year being my 14th as your Chairman (I took over from Roy Dodds in 1973) I begin to worry whether I am still performing my duties to the desired standard. I place this sobering thought before you as we ring in our 40th year as a group.

Annual reports always seem difficult to write. What to include; what to omit; who have I forgotten to thank. The highlight for 1986 was probably three rather superb slide nights; (1) Galapagos Islands, Ms. L. Bennett (it was good to see Leslie back with us), (2) Kashmir and the Himalayas, thanks to Graham Baker, (3) Antarctica, re Messrs. G. Clarke, P. Marsh, and K. Stuwe (all graduates at Melbourne University). It was probably due to these that, once again, attendances increased (by 15%). Maybe 1987 will see us break the 1971 attendance figure!

The year presented both scope, and variety, with respect to subjects. How many have we remembered; Mr. D. Tworek (Conservator, Melbourne Museum) - Monuments and their conservation; Dr. E. Lohe (Melbourne University) - Carbonate Complex of the Lennard Shelf, Kimberleys, W.A.; Mrs. Gabi Love with "Petrology for Beginners", and Dinosaur Extinction Theories along with an expose of the Tangshan (1976) Earthquake in China.

To our regular, participating stalwarts, I say, thank you. Please remember the 4th February 1988 and our 40th Anniversary "celebration". Our speaker that evening is Dr. Andrew Prentice (NASA and Monash University); his subject is obviously, "Voyager", the Solar System, and confirmation of his theories.

As is customary I take this opportunity to thank everyone who has helped me throughout 1986. Last, but not least a special thank you to Helen, my secretary, for being there when needed.

Graeme C. Love
(Chairman)

Citation For Outstanding Service – Alex. N. Burns

At the General Meeting on Monday September 14, 1987 a Citation for Outstanding Service will be presented to Alex N. Burns.

Dr. Burns, who during his working life worked as an entomologist, has been a member of the FNCV for 71 years.

All members are urged to be present for this important event.

Macedon and Pyrete Ranges Bibliographies

The Macedon Range Conservation Society has published a valuable research document entitled "Annotated Bibliographies to the Flora, Fauna and Landscape of the Macedon and Pyrete Ranges".

The 18 page document, compiled by Ian Lunt, includes 95 reports, articles, books and submissions which relate to the natural environment of the two ranges.

All articles are arranged in categories (e.g. flora, mammals, planning, etc.) to enable easy reference. A select list of recent and comprehensive reports, which provide the most useful information on the biology of the ranges, is also included.

The annotated bibliographies will prove invaluable to everyone with an interest in the flora, fauna and landscape of the Macedon and Pyrete Ranges and surrounds. Copies are available for $3.00 (to cover production and mailing costs), from the Macedon Range Conservation Society, P.O. Box 51, Macedon, 3440.

Past Issues of the Victorian Naturalist

Do you have any unwanted copies of past **Victorian Naturalist** issues? Dan McInnes (Victorian Nat. Sales Officer) frequently gets requests for past issues, and stocks are running low for some volumes. In particular, Vol 103 No. 2 (March/April 1986) is in low supply.

If you have any old copies of the **Naturalist** you wish to donate to the club, please contact Dan McInnes, 129 Waverley Rd., Malvern, 3145. Ph.: 211 2427.

FIELD NATURALISTS CLUB OF VICTORIA

Reports of Recent Activities

Annual General Meeting
Monday, 11th May

The annual report of the Club for 1986-87 was read by the President, Dr. Jack Douglas.

The Treasurer's report for the year 1986 was then read by the Treasurer, Ms. Yvonne Gray. The Auditor's report has already been printed in the March/April issue of the Naturalist.

Election of Office-bearers and Council Members

All positions were declared vacant before the elections began and the results are as follows: President; Dr. Jack Douglas, Vice-President; Mr. Graeme Love, Hon. Treasurer; Ms. Yvonne Gray, Assist. Treasurer; Mrs. Helen Stanford, Editor; Mr. Russell Thompson, Assist. Editors; Miss Diana McLellan and Miss Vicki Spencer, Librarian; Mrs.Sheila Houghton and Acting Excursion Secretary; Miss Marie Allender.

Positions which remained vacant were: Hon. Secretary, Assist. Secretary, Assist. Librarian and Programme Secretary.

R. M. Bland of Danby, Bland, Provan and Company was re-elected as the Club's Auditor.

The Council of the FNCV consists of the President, Vice-President, Immediate Past President (Dr. Douglas) and ten other members. The following people were elected to Council: Ms. Yvonne Gray, Mrs. Sheila Houghton, Mrs. Helen Stanford, Mr. Stephen Forbes, Miss Marie Allender, Mr. Richard Faragher, Mr. Ron Pearson, Mr. Michael McBain and Mr. Stephen Henry.

Other positions were filled by the following people: Conservation Co-ordinator; Mr. Stephen Henry, Club Reporter; Mrs. Christine Ashburner, C.C.V. Representatives; Mr. Ian Faithfull and Mr. Michael McBain, Book Sales Officer; Mrs. Helen Stanford, Vic. Nat. Sales Officer; Mr. Dan McInnes, Publicity Officer; Miss Margaret Potter and Information Officer at General Meetings; Mr. Norm Stanford.

The President, Dr. Jack Douglas, then gave his Presidential Address entitled "A Naturalist's Reminiscences."

Dr. Douglas commented on the naturalists of today and yesterday and then presented his own story as a field naturalist as a series of reminiscences illustrated by many slides. He divided his memories into childhood, student, work and recreational experiences and began by recalling getting his Gould League Certificate when in Grade 5 at school in the Otways and being awarded a prize for best bird imitation for his impression of a Boobook Owl.

His memories from student days included seeing rockpools crawling with crayfish at Moonlight Head and a reported Tasmanian Tiger further along the coast. He also recalled some of the places he had been to in his early field days as a geologist in the Victorian Mines Department.

One memorable holiday incident was the "Cobra in the Scrub" which turned out to be a Black Swan with a broken wing, which took a lot of getting into a large sack before it could be released into the fox-free environment of a local lagoon. A number of highlights from overseas trips were recounted including an encounter with a bear in the Western Rockies and the bleak but beautiful Yorkshire Moors.

The variety of observations and love of nature were typical of most naturalists, claimed Dr. Douglas, and he urged everyone to go on a trip through their own past and recall some forgotten incidents that had meant a lot to them at the time.

Exhibits

- Under microscopes: Hydroids, including some in the process of budding; Pondlife from Caulfield Racecourse Lake; Foraminifera and a note that the gastropod exhibited last month was of the family Vermetidae (worm shells). Mr. Dan McInnes.
- Fossil shells of the Miocene age from Muddy Creek. Mr. Andy Blackburn.
- a number of dead wasps which had, as larvae, infested a Grape Vine Moth caterpillar. Mr. Urwin Bates.

Nature Notes

Miss Stephanie Rennick spoke about conservation issues on the Mornington Peninsula. The Peninsula is undergoing very rapid development and the need to save some of the remaining natural areas is becoming more urgent. Although the Government has purchased some land they lack funds to purchase Greens Bush Farm, an important corridor between parts of the Nepean State Park. The Victorian Conservation Trust has set up a trust to obtain money to purchase the Farm. Some land has already been bought but more money is needed to ensure a sufficiently wide buffer zone. All donations would be gratefully accepted and the Government is matching all funds raised.

General Meeting
Monday, 15th June

Silence was observed by the meeting to mark the recent death of Miss Violet Ballam, as Honorary Life Member, who joined the Club in 1943. Miss Ballam had been a member of the Botany Group and had been especially interested in Acacias.

The Speaker for the evening was Dr. Bill Birch, Curator of Minerals, Rocks and Meteorites at the Museum of Victoria, who spoke about "Crystals."

Dr. Birch began by defining crystals and describing how they are formed. Crystals are solid bodies bounded by natural plane surfaces and their geometry depends on the chemical composition of the mineral. They grow by mineral deposition on the outside of the crystal. This may occur as hot liquids crystalize, by drawing out of solutions, from gases (e.g. around volcanos) or, in the solid state, within metamorphic rocks.

A particular mineral may exhibit different crystal shapes. It is not always known why a particular shape has developed but all can be formed by rotations around the crystal's planes of symmetry and its internal structure remains the same.

The most perfect crystals are those which are able to grow in free space without interference. Gold forms cubical crystals on the rare occasions it has been found to have had the space to do so. Crystalline gold is very highly prized due to its rarity.

Dr. Birch told of some of the techniques used by crystallographers to study crystals and finished by describing some of Victoria's more interesting crystal deposits. His talk was well illustrated by slides.

Exhibits

- under microscopes: slides by Mr. Paul Genery showing a Hymenopteran and a section of a tecoma. Mr. Urwin Bates.
- a fungus, *Pluteus cervinus* Mrs. Sheila Houghton.

Nature Notes

- Two yellow rosellas were seen feeding on a nature strip in Rosebud. As they were either the South Australian or the Tasmanian form of the Crimson Rosella they were a long way out of their range. Mr. Tom Sault.
- Perhaps they had escaped from an aviary. Mr. Andy Blackburn.
- Large flocks of seagulls recorded from the Essendon area coming from the south in the morning and back again in the evening. They breed on Mud Island and near the Westgate Bridge. Mr. Urwin Bates.
- A discussion followed about seagulls and the need to control them as they are out-competing other seabirds for nesting sites.

C.M. Ashburner

New Legislation to Protect Flora and Fauna – But Can it Work?

On Friday 24th July 1987, the Victorian Minister for Conservation Forests and Lands (Joan Kirner) released for public comment proposed legislation for a **Flora and Fauna Guarantee Act 1987.** The government intends to introduce the Bill for this Act in the spring session of parliament later this year. The proposed legislation provides a public process for identifying and protecting threatened species and communities of flora and fauna, as well as a new instrument for protecting habitat crucial for their survival – the Interim Conservation Order.

Copies of the proposed legislation and explanatory information are available from the Department of Conservation Forests and Lands (DCFL).

Whilst this legislation is a bold new initiative, it is difficult to see how the DCFL can address the many additional demands upon its resources which will flow from the introduction of this legislation. Indeed, at the time of printing, staff of the Wildlife Management and Freshwater Fisheries Management branches of the DCFL are involved in a formal industrial dispute with the Department over the existing staff crisis and its inevitable impact on the conservation of fish and wildlife in Victoria.

Ed.

Continued from inside front cover

Microscopical Group. – Third Wednesday

Wednesday, 19th August. "Fungi." Mr. Bob Graham.
Wednesday, 16th September. "Aquatic Life." Mr. Ray Power.
Wednesday, 21st, October. "Movie and Still Photography through the Microscope." Dr. E. Peters.

GROUP EXCURSIONS

All FNCV members and visitors are invited to attend any Group Excursions.

Botany Group

Saturday, 22nd August. Warneet Heathland.
Saturday,26th September. Anglesea for the Wildflower Show.
Saturday, 24th October. Bush Reserves at St. Andrews and Panton Hill. Leader: Ms. Dorothy Mahler.

INSTRUCTIONS TO AUTHORS

The Victorian Naturalist invites contributions of original papers relating to Australian natural history, particularly of Victoria. All papers are assessed by an independent referee before publication.

Short contributions of natural history observations are also invited for use as "Naturalist Notes". These contributions may be edited, or excerpts published, at the Editors' discretion. Such notes are not normally refereed, and may be submitted more informally.

All contributions are to be written in concise, simple English.

For cost reasons, authors of original papers submitted for publication are requested to conform with the following guidelines. Any author who has difficulty in complying with these guidelines, or has queries concerning manuscripts, should consult the Editors before submitting a manuscript.

Submission of Manuscripts

Manuscripts should be sent to The Editorial Committee, Victorian Naturalist, F.N.C.V., C/- The National Herbarium of Victoria, Birdwood Ave., South Yarra, 3141.

Two typewritten copies of the manuscript should be submitted. Authors are advised to retain a further copy.

Format

Text should be fully revised, typed double spaced on one side of the paper only, with a wide margin, pages numbered consecutively, and should conform in style to recent issues of the *Victorian Nat.*

Author's name and address or institution should appear beneath the title. Underline only those words to be italicised in the text i.e. genus and species names, and titles of periodicals and books. All measurements should be expressed in the metric system (SI units).

References should be cited in the text as Brown (1981) or (Brown, 1981). Footnotes must be avoided. Acknowledgements should be grouped at the end of the paper before References.

References should be listed alphabetically by author's surname at the end of the paper. All references should be cited in the text. Abbreviations of titles of periodicals should conform with those in *A World List of Scientific Periodicals* (4th ed., Butterworth). Refer to recent issues of the *Victorian Nat.* for the formatting of references.

Tables and Figures

Tables should only be used for essential data needed to show important points in the text. They should be numbered consecutively, referred to in order in the text, and designed to fit within the print area of 115 x 180 mm. Each table must have an explanatory caption.

Figures may be in the form of drawings or photographs. They should be identified on the back with the author's name and the figure number. The top should be indicated and the magnification by scale where appropriate. Compass directions must be indicated where necessary. All figures should be referred to in the text and numbered consecutively (Fig. 1, Fig. 2 etc.).

Figures should be carefully prepared and should be submitted ready for publication. Each should have a short caption. Maximum size is 115 x 180 mm; single column width is 55 mm. Figures are preferably submitted at actual size. Lettering on Figures should be done by the author; care is needed to ensure that all letters are legible after reduction.

Line drawings should be made in black ink.

Photographs should only be used where essential due to the high cost of printing plates. They should preferably be unmounted, glossy black & white prints, showing good detail and moderate contrast.

Proof and Reprints

Galley proofs will be sent to the author, who should correct and return them as soon as possible. Only the minimum of corrections should be made.

Multiple copies of articles can be prepared for the author only at the time of printing. These will be in the form of print run-ons and priced as follows for each multiple of 50 copies:

1-2 pp	3-4 pp	5-6 pp	7-8 pp	9-10 pp	11-12 pp	13-14 pp
$18	$25	$35	$45	$55	$65	$75

Orders for these 'reprints' must be made at the time authors return their corrected proofs to the editor.

Taxonomic Papers

Papers describing new taxa will not be accepted for publication unless the primary type material is deposited in a recognised public museum or herbarium.

It is suggested that in other more general papers where taxonomy is discussed, voucher material be lodged in a public collection, and the repository details cited in the text.

Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria
Established 1880

Registered Office: FNCV, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron
His Excellency, The Rev Dr John Davis McCaughey, The Governor of Victoria.

Key Office-Bearers 1985-1986

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Microscopical: Mrs ELSIE GRAHAM, 147 Broadway, Reservoir, 3073 (469 2509)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1987

Metropolitan Members (03 area code)	$25.00
Joint Metropolitan Members	$27.00
Country/Interstate/Retired Members	$23.00
Joint Country/Interstate/Retired Members	$25.00
Student (full-time)	$18.00
Junior (under 18; no Victorian Naturalist)	$5.00
Subscription to Victorian Naturalist	$23.00
Overseas Subscription to Victorian Naturalist	$30.00
Affiliated Clubs	$25.00
Subscriber Clubs	$23.00
Individual Journals	$3.50
Late Fee (Renewing Members), after end of March	$2.00

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The Victorian Naturalist

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FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12th October, 8.00 p.m.

Dr Jim Bowler, "Environmental Changes and Human Occupation – The Last 60,000 Years."

Monday, 9th November, 8.00 p.m.

Australian Natural History Medallion Presentation to Dr. Ron Green of Victoria Museum, Launceston.

Note: Meeting will be held at the Royal Society, 9 Victoria Street, Melbourne. Buffet dinner 6 p.m. $12.50. Please notify Acting Secretary if you wish to attend. Payment on the night.

Monday, 14th December, 8.00 p.m.

Professor Roger Short, "Chimps and Gorillas in the Wild."

New Members

Metropolitan

Mr. Maurice Riga – Springvale

Student

Mr. Frank Udovicic – Sunshine

Mr. C. Buckingham – Warrak

Joint Metropolitan

Mr. Fred Thorpe and Mrs. Dorothy Thorpe – Hawthorn

Mr. Peter Newall and Mrs. Robyn Newall – Research

F.N.C.V. EXCURSIONS

Friday, 16th – Sunday, 18th October. Victorian Field Naturalist Clubs Association Spring weekend. See previous Naturalists or contact Marie Allender 527 2749.

Friday, 23rd – Sunday, 25th October. King Island. See last Naturalist.

Sunday, 8th November. Mt. Beckworth. This will be a combined excursion led by the Ballarat F.N.C. which will be attended by the Nature Plants Preservation Society and the Creswick F.N.C. We have been invited to join the excursion and meet at Crockers at the corner of Sturt and Armstrong Streets, Ballarat at 9.30 am or at the Public Gardens in Clunes at 12.30 pm. This will be a *private car* excursion and I would appreciate it if members with cars could offer a lift to members without transport. Should you have a spare seat and not know of anyone requiring transport could you let me (Marie Allender) know and if anyone without transport will give me their name I will try to put them in touch. The morning will probably be mainly birding in swampy areas near Clunes and the afternoon at Mt. Beckworth. Take a picnic lunch.

Sunday, 6th December, Presidents Picnic Winchelsea area. This is the final excursion for the year so we hope to see a good attendance. The coach will leave from Batman Avenue at 9.30 am. fare $12.00. Bring a picnic lunch. Members going by car should contact the President or Excursion Secretary about a week before the excursion.

Friday, 8th – Saturday 16th January 1988. Tasmania. Members are reminded final payments are due Monday, 9th November. Details of the trip have appeared in the previous Naturalists but anyone requiring further information should ring Marie Allender.

GROUP MEETINGS

All FNCV members and visitors are invited to atend any Group Meetings.

Day Group – Third Thursday

Thursday, 15th October. Banyule Flat Reserve. Meet at Rosanna Station at 11.30 a.m. Catch 10.56 a.m. train from Princes Bridge. Leader: Dan McInnes, 211 2427

Thursday, 19th November. Patterson River, Carrum. Meet at Carrum Station 11.33 a.m. Catch the 10.40 a.m. train from Flinders Street. Leader: Dan McInnes 211 2427.

At the National Herbarium, Birdwood Avenue, South Yarra at 8.00 p.m.

Botany Group – Second Thursday

Thursday, 8th October. "Biological Control of Australian Acacias in South Africa." Dr. Tim New.

Thursday, 12th November. "Operation Revegetation": Community Nursery, Knox. Mr. Andrew Paget.

Thursday, 10th December. Annual General Meeting and Member's Night.

Continued on inside back cover.

The Victorian Naturalist

Volume 104, Number 5

September/October, 1987
ISSN 0042-5184

Editor: R. Thomson.

Cover Illustration: Litoria peroni see page 137.

President's Report 1986-87

Although no significant anniversaries or notable events were recorded in the FNCV 1986-87 year, I am pleased that this Annual Report is presented to a Club in good condition in most aspects of its activities.

Our General Meetings continue to be well supported with attendances rarely below 60, and this is in large measure due to the efforts of our Programme Secretaries who have managed to obtain first class speakers on pertinent subjects, and to the large range of interesting and informative exhibits.

It is pleasing to note an element of visitors and new members at all recent meetings.

Field excursions continue to be reasonably well patronized with some very successful overnight trips and the memorable KANGAROO ISLAND excursion of several days as highlights. Our group meetings have a keen following under capable and enthusiastic leaders.

We still however have problems filling Council and other offices, and again I appeal to any who may now find the time available to nominate for positions at the May elections.

The Victorian Naturalist continues as a high standard publication acquired by dozens of local and overseas Libraries as well as being received as part of subscription benefits. Many members may not realize that early issues published at a time when there were few if any other vehicle for naturalists comments, have become a most important focus for research studies.

The appointment of an Editor to lead the editorial group should facilitate production.

Honorary Memberships were granted to members, Mr. Frank May and Mrs. Daphne Boyle, making a total of 52 in this category. This number, unusually large for most organizations, is a measure of the support received over a lifetime by these recipients and an indication of the longevity of naturalists, but fortunately still well within our financial capabilities. Special congratulations must go to Mr. Alec Burns formerly of the Museum of Victoria and now a resident of Burleigh Heads, Queensland, for obtaining the 70 years membership mark, achieved I believe only once before in the history of the club.

As indicated above our finances are in a very healthy condition, with contingency funds for foreseeable commitments in special accounts for publication, Australian Natural History Medallion etc. Although we all deplore the need for recent small subscription increases I hope members realise that we must continually maintain a viable economic position.

The name of Graham Pizzey was added to the honour role of winners of the Australian Natural History Medallion this year. My congratulations again, and I suggest that members unable or disinclined to attend other meetings might try to get together with us next November at the Royal Society Hall where the 1987 award will be made.

This venue has been chosen because of rebuilding and extensions to the Herbarium, our headquarters for many years. We are currently negotiating with the Department fo Forests Conservation and Lands about our future occupancy.

Finally I am very grateful for the magnificent support I have received from the outgoing Council and office bearers. Without this dedicated band of workers your Club would not be in the satisfactory condition that it is as we approach our 108th year of existance.

J. Douglas
President FNCV

Litoria peroni (Anura: Hylidae) : An Addition to the Amphibian Fauna of the Melbourne Area

By M. J. Littlejohn* and P. A. Harrison*

The anuran amphibian fauna that occurs within a radius of 40km of the Melbourne General Post Office was first described by Littlejohn (1963), who listed 11 species known to occur in the area. *Litoria lesueuri* (Dumeril and Bibron) was subsequently added by Martin, Littlejohn and Rawlinson (1966), after its discovery at Riddell by B. Smith and G. F. Watson and later at Bulla (within the Melbourne Area) by P. A. Rawlinson.

On the night of December 17th, 1985, while on field work in the Whittlesea area, we heard the distinctive advertisement call of a male of *Litoria peroni* (Tschudi), a species not previously known to occur in this area. The male was calling from emergent vegetation in a swamp on the east side of Dunnett Road, adjacent to the Yan Yean Reservoir, 2.5km SSE of Whittlesea (37°32′ S, 145°08′ E). This specimen was subsequently located and collected (Fig. 1), and is now preserved in the Research Museum of the Department of Zoology, University of Melbourne (Catalogue No. 31/85). Calls of two other individuals of *L. peroni* were also heard on the same evening, on the eastern side of Dunnett Road adjacent to the retaining wall of the Yan Yean Reservoir,

Fig. 1. Litoria peroni - adult male collected 2.5km SSE of Whittlesea, Victoria, on 17 December 1985.

* Department of Zoology, University of Melbourne, Parkville, Victoria 3052.

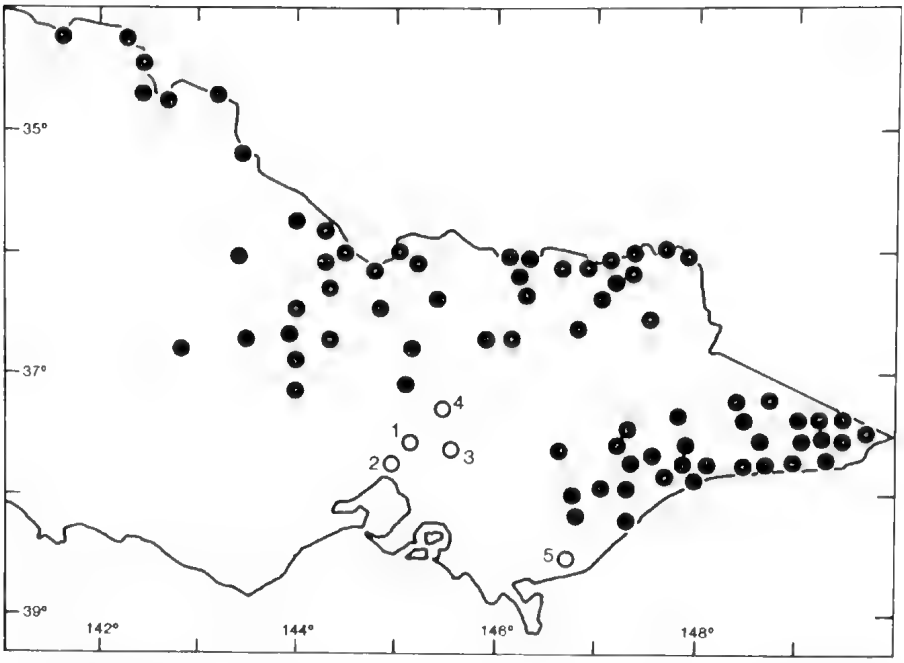

Fig. 2. Geographic distribution of *Litoria peroni* in Victoria (solid circles), based on Brook (1982), with adjacent localities being represented by a single symbol. Localities mentioned in text (open circles) are numbered as follow: 1 = Yan Yean Reservoir; 2 = Coburg; 3 = 5.6km S of Healesville; 4 = 8.0km SSE of Yea; 5 = 6.0km NNE of Yarram.

6.0km S of Whittlesea (37°34′ S, 145°07′ E). It is indeed surprising that *L. peroni* had not been recorded from the Whittlesea area previously, considering the amount of field research that had been carried out there over the previous 25 years. We can only attribute the oversight to a lack of trips to the area during the early summer, and to cool weather during visits made in the late spring. The species may be (or have been) extensively distributed along the valley of the Plenty River.

Moore (1961) listed one specimen of *L. peroni*, from Coburg, (37°45′ S, 144°58′ E) (Fig. 2), in the collection of the American Museum of Natural History; but in the absence of supporting data, we had treated the locality as possibly incorrect, and so had not listed it as a species which is present in the Melbourne Area. It now seems reasonable to consider that *L. peroni* also occurs, or may have occurred, in the drainage of the Merri Creek. The Museum of Victoria has four specimens of *L. peroni* (D44880-3) from 5.6km S of Healesville (37°42′ S, 145°31′ E) (Fig. 2), collected by Mr. D. Thomas in 1973. It is possible, however, that the population of *L. peroni* in the Healesville area is derived from introduced specimens (J. Coventry, pers. com.).

Brook (1982) summarised the known geographic distribution of *L. peroni* in the Atlas of Frogs of Victoria, including the locality 5.6km S of Healesville (Fig. 2). Since publication of the atlas by Brook (1982), we have also heard calls of *L. peroni* along the Yea River, 8.0km SSE of Yea (37°16′ S, 145°28′ E) (Fig. 2), and obtained tape recordings of calls and collected specimens of adults from marginal and emergent vegetation associated with a fire dam in a forested area, 6.0km NNE of Yarram (38°31′ S, 146°42′ E) (Fig. 2).

The morphology of adults, larvae and

eggs, the structure of the male advertisement call, and the electrophoretic properties of haemoglobin of *L. peroni* were described by Martin et al. (1979) in their account of the closely-related, new species, *L. tyleri*. The limited data on breeding activity in Victoria have been summarised by Brook (1980). Unless otherwise indicated, the following account is based on information presented by Martin et al. (1979) and our unpublished observations.

white vegetal pole; there are three layers to the jelly capsule. No detailed information is available on the size, appearance or locations of egg masses.

Larvae

A full description (with illustrations) was provided by Martin et al. (1979). The larvae are pale golden-yellow in life, with a dark lateral stripe extending from the snout, through the eye, and along the dorsal edge of the body and tail musculature. An

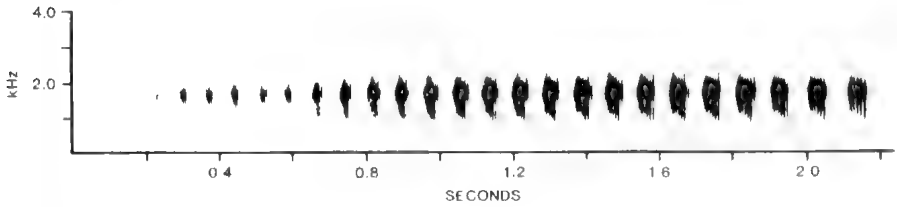

Fig. 3. Audiospectrogram (FFT shape, 300 Hz bandpass) of the advertisement call of a male of *Litoria peroni* (Tape Reference R367, No. 9) recorded 6.0km NNE of Yarram, Victoria, at a wet bulb air temperature of 14.3°C, on 1 December 1980.

Morphology

Adults

Litoria peroni is a distinctive species which is unlikely to be confused with any other anuran occurring in the Melbourne Area. The adults are medium-sized frogs (about 45 to 55mm snout-vent length), with the typical body-form of a tree frog. There are well developed discs and almost complete webbing on the fingers and toes; and the second finger is longer than the first. *L. peroni* is an excellent climber. The dorsal surface is light grey-brown, scattered with fine green spots, and the texture is warty. The posterior surfaces of the thighs are yellow with fine black variegations. The ventral surface is white and granular, except for the dark vocal sac of mature males.

Eggs

The diameters of the clear jelly capsules range from 2.80 to 3.12mm (mean = 3.00mm), and those of the embryos from 1.48 to 1.56mm (mean = 1.52mm). There is a dark brown animal pole and a creamy-

Larvae

A full description (with illustrations) was provided by Martin et al. (1979). The larvae are pale golden-yellow in life, with a dark lateral stripe extending from the snout, through the eye, and along the dorsal edge of the body and tail musculature. An advanced larva with a total length of 44.2mm had a tail length of 26.8mm. The mouth disc is typical of most Australian hylid larvae; there are two upper and three lower rows of teeth, and two or three rows of papillae extend around the sides and back of the mouth disc. Development from fertilization to metamorphosis takes about six months.

Breeding Biology

Calls have been heard from September to January in Victoria (Brook 1980). Males usually call from elevated sites in marginal and emergent vegetation associated with permanent or near-permanent still water; they may also call from the ground or floating vegetation. Breeding pairs of *L. peroni* were obtained in the Jervis Bay area, N.S.W., in late October (Martin et al. 1979). Barker and Grigg (1977) reported that males begin calling in September from elevated positions or on the ground; clasping occurs at the calling site, then the amplectant pair

Table 1. Physical characteristics of the advertisement calls of three males of *Litoria peroni*, recorded 6.0km NNE of Yarram, Victoria, on 1 December 1980 (Tape Reference R367).

	Subject No.			
	367/3	367/7	367/9	Mean
Wet-bulb air temperature (°C)	16.2	16.1	14.3	15.5
Call duration (s)	1.97	1.96	2.16	2.03
Notes per call (n)	34	29	27	30
Note repetition rate (notes/s)	17.0	14.7	12.2	14.6
Note duration (ms)	39.5	51.2	51.2	47.3
Pulses per note (n)	9	9	11	9.7
Pulse repetition rate (pulses/s)	264	191	185	213
Dominant frequency (Hz)	1602	1699	*1748	1683

* A second peak of equal intensity was present at 1914 Hz.

descends into shallow water where several hundred eggs are deposited.

The advertisement call consists of a drawn-out sequence of rapidly-repeated, short notes, gradually increasing in intensity. The call may be described as a long, loud "chuckle". A full description, including an audiospectrogram, was provided by Martin et al. (1979), who included only one small sample of calls of three individuals from Victoria (recorded at Gipsy Point, East Gippsland). As this attribute can greatly facilitate identification and detection of *L. peroni* in the field, another brief physical description is presented. No tape recordings were obtained in the Whittlesea area. Accordingly, recordings of three males from 6.0km NNE of Yarram were analysed on a processing digital oscilloscope (Norland 3001/DMX). Values for selected physical attributes of one call of each individual are given in Table 1, and an audiospectrogram of one of them (produced on a Kay Elemetrics 6061-B Sona-Graph) is presented in Figure 3.

Acknowledgements

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Legacy from the Late Violet E. Balaam

The Club has received a collection of books and an amount of $500 from the estate of the late Miss Violet E. Balaam, a Life Member of the Club. Miss Balaam, who joined the Club in 1943 was also a member of the Bird Observer's Club and the Society for Growing Australian Plants.

The Club is grateful for this benefaction and will put the money towards the improvement and upkeep of the Club's Kinglake property.

R. B. Pearson
Hon. Secretary.

Bush-peas of Victoria – Genus *Pultenaea* Sm. (Fabaceae) – 22

By M. G. Corrick*

***Pultenaea hispidula* R.Br. ex Benth. in Fl. austral. 2:133(1864).**

Pultenaea hispidula is a spreading shrub 0.6-1.1m high, usually with widely spreading, arched branches. The stems are terete and densely covered with a mixture of long and short hairs.

The leaves are alternate, oblong-elliptic or obovate with a acute but blunt tip and distinct petiole. Including the petiole they are (4-)5-7(-8)mm long and (0.7-)1-2(-3)mm wide. The leaf margin is incurved. The upper leaf surface is light green with a few scattered pale hairs, the lower surface is darker, usually slightly scabrid and more hairy than the upper surface. Occasionally the leaves are glabrous.

The stipules are 1-2mm long, lanceolate with long, slender recurved points and are partially united. Their colour varies from medium to very dark brown.

The flowers are axillary with 2-5 clustered towards the tips of short lateral shoots along the length of the branches. The pedicel is about 1-1.5mm long and densely hairy with short, erect hairs.

Bracts are absent but the stipules on the floral leaves are enlarged.

The bracteoles vary from broadly ovate to narrowly lanceolate, 2-5.5mm long and 0.5-3mm wide. In some forms the bracteoles are three-lobed from the base. Their colour varies from medium to very dark brown, occasionally the three lobed form has the centre lobe green. They are attached to the base of the calyx tube and can be shorter than the calyx tube or up to almost as long as the whole calyx.

The calyx, excluding the pedicel is 3-5.5mm long with acute lobes about equal in length to the tube with the upper two joined higher than the lower three. It is variously hairy or glabrous, or occasionally viscid.

The standard is orange with dark brick red lines surrounding a pale yellow blotch at the base of the lamina; the wings are orange and the keel dark brick red. Colour varies considerably between populations, some forms being more yellow than orange and with the dark markings much reduced. The Black Range form is deep orange with dark red lines and shading on both surfaces of the standard and on the tips of the wings and keel.

The ovary is densely covered with pale hairs and scattered hairs extend half-way up the style.

The mature pod is plump and at least half enclosed by the calyx.

Flowering time is from about mid October to late November.

P. hispidula is a most variable species and this description follows Willis (1972) in which he synonymized *P. recurvifolia* (Benth.) Williamson, *P. readeriana* Williamson and *P. pubescens* Williamson under a broad concept of *P. hispidula*. The characters which Williamson used to distinguish his species are extremely variable. Three-lobed bracteoles occur sporadically in almost all forms of the species, and can be present or absent on the same plant. Leaf shape and size vary markedly, and although plants with a soft hairy appearance and arched, or slightly weeping branches are fairly typical, some populations, e.g. from the Grampians Black Range are more rigid and erect, whereas populations from near Nelson are almost glabrous with very narrow, recurved leaves. A form in the southern Grampians is notable for its very broad, almost flat leaves, richly coloured flowers and dark stipules. Further studies may show both this and the Nelson form to be worthy of recognition as distinct taxa.

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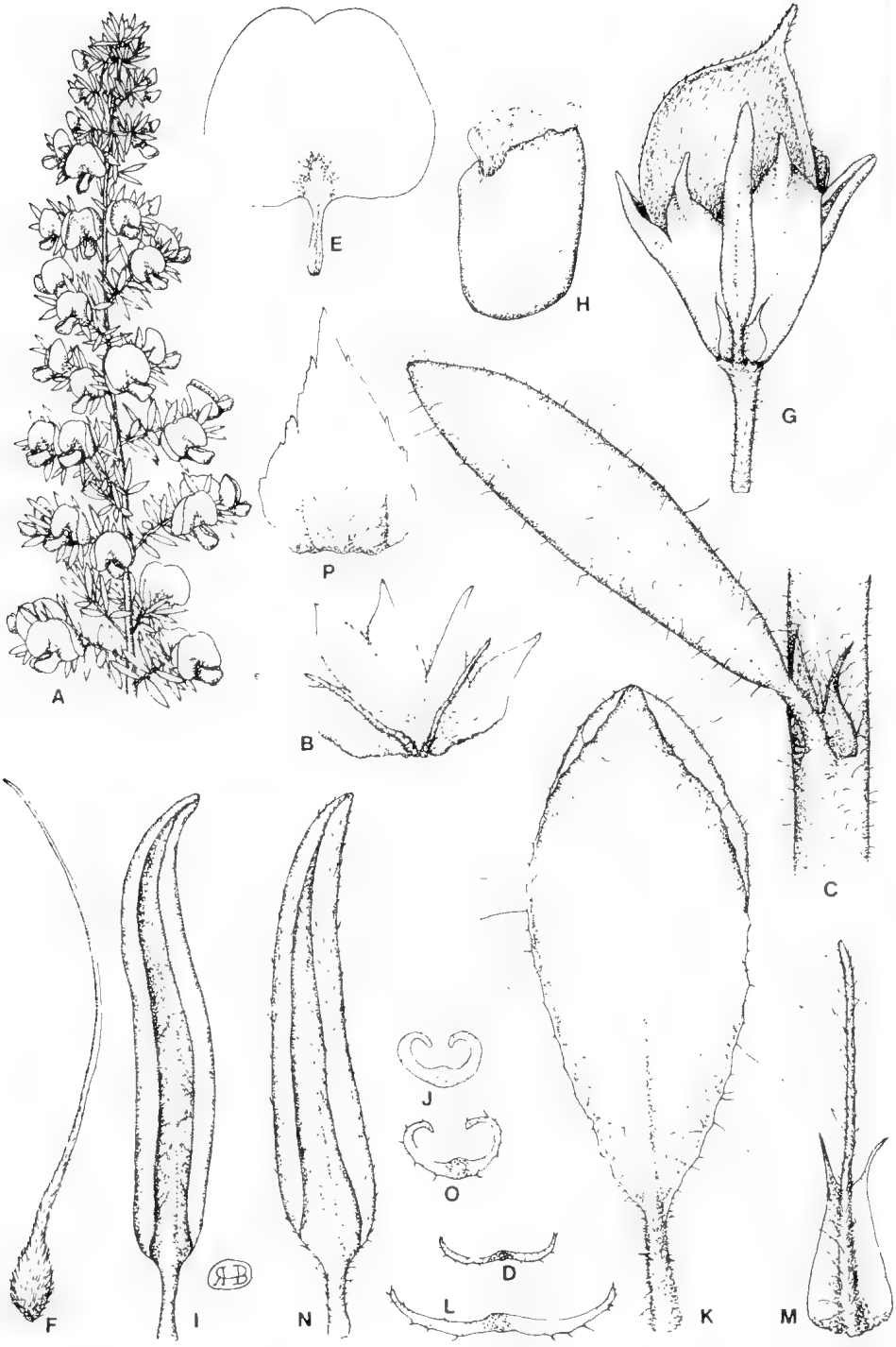

Fig. 38. Pultenaea hispidula. Belgrave form: A, habit x 1; B, calyx x 5; C, leaf, lower surface showing stipules x 12; D, t.s. leaf x 12; E, standard x 5; F, ovary x 10 (A-F from Corrick 5972, MEL). Cape Nelson form; G, pod and calyx showing three-lobed bracteole x 10; H, seed x 10; I and J, leaf x 12 (G-J from Woolcock 1523, MEL). Southern Grampians form; K and L, leaf x 12; M, bracteole x 10 (K-M from Corrick 5728, MEL). Black Range form: N and O, leaf x 12; P, bracteole x 10 (N-P from Corrick 1912, MEL).

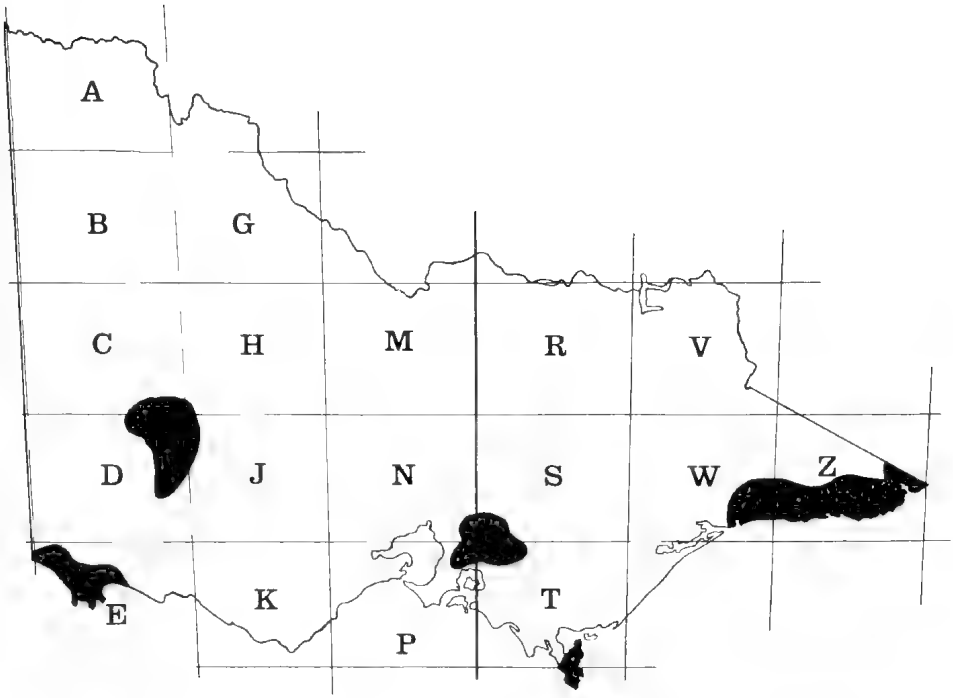

Fig. 39. Known distribution of *P. hispidula* in Victoria.

Fig. 40. P. graveolens. Stipules, from Corrick 7871.

P. hispidula is also occasionally confused with *P. graveolens* (see following note for discussion of differences).

At Teddy Bear Gap in the Grampians Serra Range there is an interesting population which appears to be a series of hybrids between *P. hispidula* and *P. mollis.* Both species are present as well as numerous plants showing intermediate characters. Gordon Paterson of Wartook has shown me unusual forms in the northern Grampians near Roses Gap and Wallaby Rocks which may also be hybrids, some possibly involving *P. costata.*

P. hispidula is widely distributed in forests across southern Victoria, mainly south of the Dividing Range except for occurrences in the northern Grampians. It also occurs in south-eastern South Australia and in New South Wales.

SPECIMENS EXAMINED included: New South Wales, Near Georges R., *Robert Brown* (BM-Type); Grampians: Victoria Range, *A. C. Beauglehole 4068* (MEL), 23.ii.1957; Black Range, *M. G. Corrick 1912* (MEL), 27.x.1969; Teddy Bear Gap, *M. G. Corrick 5728* (MEL), 20.xi.1976. Dandenong Range, *M. G. Corrick 5972* (MEL), 20.x.1977; Cabbage Tree Creek, *W. Hunter* (MEL 651520), x.1950; Langwarrin, *H. Weatherhead* (MEL 530557), x.1977; Cape Nelson, *C. and D. Woolcock 1523* (MEL), 13.x.1983.

***Pultenaea graveolens* R. Tate**

A full description and illustration of *P.*

	P. hispidula	*P. graveolens*
Inflorescence:	Axillary but clustered at tips of lateral shoots; stipules of floral leaves enlarged.	Axillary but not clustered at tips of lateral shoots; stipules of floral leaves not enlarged.
Flowers:	Subsessile or with pedicel 2mm	Distinctly pedicellate, pedicel up to 3mm long.
Bracteoles:	Usually lanceolate, 2-5.5mm long tapering to long, slender tip, occasionally trifid or leaf-like, slightly hairy to glabrous.	Boat-shaped with mid-rib forming a thickened keel, glabrous, resinous 1-2(3)mm long, never trifid or leaf-like.
Stipules:	Lanceolate, 1-2mm long, flat with ± recurved, slender tip, usually united in the lower half, slightly hairy to glabrous.	Boat-shaped with mid-rib forming a thickened keel, not united, tip incurved but whole stipule standing away from the stem, glabrous, resinous.
Perfume:	Unobtrusive, sweet, no waxy exudation.	Highly aromatic, and with a yellow waxy exudation.

graveolens has already been published in this series (Corrick 1981). More recently, however, Webber in Jessop and Toelken (1986) has placed it in synonymy under *P. hispidula*.

I consider *P. graveolens* to be a distinct taxon readily distinguishable from any of the forms of *P. hispidula* described above.

The following table sets out the main differences between the two species. The most obvious and consistent distinguishing features of *P. graveolens* are the small boat shaped stipules, the strong perfume and the waxy exudation.

Acknowledgements

I am most grateful to Richard Barley for preparing the accompanying illustrations, to the Keeper of Botany, BM, and the Director, AD, for the loan of specimens and to Gordon Paterson for help in the field.

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100 Years Ago

EXPERIMENTS WITH A TADPOLE. — In the late Mr. Denton's little book, "Is Darwin Right?" there occurs the following statement:— "If tadpoles be kept in the dark they will never turn into frogs." Being sceptical as to the truth of the statement, I resolved upon putting it to the test, and accordingly captured two tadpoles of the beautiful golden-green frog *(Ranoidea aurea)* in the Fitzroy Gardens. I placed them in a wide-mouth glass jar and put them in a dark cupboard, where not the faintest gleam of light could penetrate. This was on the 20th January last. I replenished the water each night. On the second day one of the tadpoles died. I removed the dead tadpole and well washed the jar, re-filled it, and returned the living tadpole; but it also died on the seventh day, I believe owing to absence of light. Hence, I conclude, whatever truth the statement mentioned may contain, it is based on the fact that under such conditions they never live to pass through the metamorphosis from the tadpole state into the mature batrachian.

— S. H. WINTLE.

Victorian Nat. V3 March 1887 p.153.

Insect Visitors to *Helichrysum bracteatum* (vent.) and some other Asteraceae near Bombala, New South Wales

By G. A. Webb*

Introduction

In recent years there has been an increased interest in the role of insects in the pollination of Australian native plants (Armstrong 1979, Hawkeswood 1978, 1981 a and b, 1982, Ireland and Griffin 1984, Webb 1985, 1986a and b, Williams 1977, Williams and Williams 1983). Most of these studies have concentrated on species of the Myrtaceae. Little has been recorded of the insect visitors to species in other plant families, including the Asteraceae.

Hawkeswood (1978) and Williams and Williams (1983) reported several species of Buprestidae from flowers of some *Helichrysum* and *Cassinia* from around Sydney, New South Wales. To my knowledge, except for *Stenoderus* ssp. (Cerambycidae) on *Helichrysum* and *Senecio* (Best 1882), no other Coleoptera have been recorded on flowers of Asteraceae in Australia.

During the summers of 1983-84 and 1984-85, insects were collected from flowers of *Helichrysum bracteatum* (Vent.) Andr. and some other Asteraceae near Bombala, New South Wales and these data are presented here.

Study Areas and Methods

Several localities near Bombala were visited: **1. Bombala town** – *Helichrysum obcordatum* (DC) Benth. and *Helichrysum semipapposum* (Labill.) DC. occurred on a rocky hillslope in a low shrub heath. Many *H. obcordatum* plants were examined while only 3 *H. semipapposum* plants were in flower. Other plant associates were *Casuarina nana* Sieber ex Spreng., *Platysace lanceolata* (Labill.) Norman, *Bossiaea foliosa* A. Cunn., *Oxylobium procumbens* F. Muell. and stunted *Eucalyptus pauciflora* Sieber ex Spreng. **2. Coolangubra State Forest** (30km south east of Bombala) – *Helichrysum bracteatum* (Vent.) Andr. was widespread and abundant in disturbed areas, particularly on roadsides, in the forest. *Bedfordia arborescens* Hochr was a common understorey shrub of tall open moist eucalypt forest of the area. A number of flowering *B. arborescens* plants were examined but few insects were observed. **3. Nalbaugh State Forest** (35km south east of Bombala) – *Cassinia longifolia* R. Br. was widespread and abundant in forest and woodland, and particularly in young *Pinus radiata* D. Don plantations. Two sites (A and B) both in *P. radiata* plantations were visited.

Insects were collected at various times of the day either by hand or with a manually-operated aspirator. *H. obcordatum*, *H. semipapposum*, and *B. salicina* were examined on single occasions only (12 Dec. 1983, 12 Dec. 1983, 11 Dec. 1983 respectively) while insects were collected from *H. bracteatum* on several occasions between 19 Dec 1983 and 17 Jan 1984. *C. longifolia* was examined on 21 and 23 Jan 1985. All specimens are currently held in the Forestry Commission of N.S.W. Insect Collection.

* Forestry Commission of New South Wales, P.O. Box 100, Beecroft, N.S.W. 2119.

Results and Discussion

Most Asteraceae are characterized by having narrow florets arranged in a compact head or capitulum (Hamilton 1919; Lawrence 1985). In *Senecio* (Lawrence 1985), florets may be female or bisexual with bisexual florets undergoing anthesis before developing into the female phase. Anthers dehisce inwardly into the tube formed by the ring of anthers before the floret actually opens. These anthers and later the pollen mass within the anther tube are pushed upwards by the elongating style so that the pollen is usually dispersed before the stigma, emerges, thus reducing in-breeding. This pattern of floral development may vary according to longevity, self-compatability and tendency towards out-breeding (Lawrence 1985). Unlike most flower types (Faegri and Van der Pijl 1979) where pollinators have to brush past pollen bearing anthers to gain access to the nectar sources, in the Asteraceae the outer florets of a capitulum are usually female and thus an insect which alights on the rim of the capitulum will contact receptive stigmas first and then move inwards towards male florets. Thus, self-pollination is minimised while the chance of cross-pollination is enhanced. The concentration of flowers into a compact head also enhances pollination success by ensuring maximum use of the pollen vector.

Cribb (1969) considers the floral arrangement of the Asteraceae to be one of the most efficient for pollination.

Thirty-eight species of beetle, representing 15 families, were recorded from one or more of the 5 species of Asteraceae examined (Table 1). All beetles had pollen present on the body though it is not known what proportion was pollen of species of Asteraceae. Clerids carried the greatest amount of pollen, trapped within the dense covering of hairs and setae over the entire body. However only small numbers of clerids were recorded during the study. Hawkeswood (1981) and Ireland and Griffin (1984) have noted the importance of clerids as vectors of *Angophora* and *Eucalyptus* pollen. The Scarabaeidae appear to be the most important beetle pollen vectors since they are common, relatively large, and trap substantial amounts of pollen amongst hairs on the body and legs. The importance of the Scarabaeidae as pollen vectors has been noted before for other plants (Hawkeswood 1978, 1981, 1982; Webb 1985, 1986). Despite the great abundance of Moredellids on some of the flowers examined, they carried little pollen and are therefore unlikely to be major pollen vectors.

Interestingly the Buprestidae, often one of the most abundant and conspicuous elements of blossom fauna (Hawkeswood 1978, 1982; Webb 1986a,b), were uncommon on the species of Asteraceae examined. In fact only a single individual of *Stigmodera bella* Saunders was recorded on *Cassinia longifolia* while one and two *Stigmodera scalaris* (Boisd) were recorded on *Helichrysum obcordatum* and *Cassinia longifolia* respectively. None of the five buprestids so far recorded from species of Asteraceae (this study, Hawkeswood 1978, Williams and Williams 1983) are host specific since all have been recorded from other plant families, principally Myrtaceae and Proteaceae (Hawkeswood 1978; Webb 1986a,b; Williams and Williams 1983).

Species of Diptera, Hymenoptera, Hemiptera and Orthoptera were also recorded on *H. bracteatum* but no specific identifications are available yet. Since all had pollen adhering to the body they must also be considered potential pollen vectors. The most numerous insects on *H. bracteatum,* other than beetles, were syrphid flies, scoliid wasps and native bees (Apoidea). All three groups proved difficult to capture, however, the few specimens of each that were taken had heavy pollen loads (*** in the beetle rating) and are probably important pollen vectors. A wide range of insects, other than beetles, have previously been recorded from the flowers of species of Asteraceae (Table 2). These include the orders Hymenoptera, Lepidoptera, Mecoptera, Diptera, Hemiptera and Thysanoptera. The majority of these records, however, are anecdotal and no indication of their relative importance in pollination has been given. Recently, however, Lawrence (1985) recorded a number of insect taxa from Australian *Senecio* and indicated that native bees (Halictidae) and to a lesser extent Syrphid flies were the most important pollen vectors. Lawrence also observed thrips (Thripidae) on *Senecio* which she suggests were feeding on nectar in the corolla tubes. It would seem, from this study and that of Lawrence (1985), that a wide range of insects may be involved in the pollination of species of Asteraceae though Scarabaeid beetles, syrphid flies, scoliid wasps and native bees (Apoidea) are probably the most important pollen vectors.

By virtue of their floral structure, Asteraceae seem well suited to pollination by pollen seeking insects however the presence of nectar in at least some Asteraceae (Clemson 1985, Lawrence 1985, Webb pers. obs.) suggests that pollen is not the only attractant. The occurrence of many primarily nectar seeking beetles on the Asteraceae examined also supports this contention. However, Clemson (1985) noted that a number of Asteraceae used by the introduced honey bee *Apis mellifera* L. only produce small quantities of nectar. Since the nectar of two species of Asteraceae, *Cassinia longifolia* and *Helichrysum diosmofolium* (Vent.) Sweet (Webb, pers. obs.), is strong smelling but quantities of available nectar may be small (Clemson 1985), there may be

Table 1: Coleoptera recorded from flowers of some Asteraceae near Bombala, New South Wales.

	Pollen Load	*Helichrysum bracteatum*	*Helichrysum obcordatum*	*Helichrysum semipapposum*	*Bedfordia arborescens*	*Cassinia longifolia* a	*Cassinia longifolia* b
Col: Buprestidae							
Stigmodera bella Saunders	*					R	
Stigmodera scalaris (Boisduval)	*		R				R
Col: Lycidae							
Metriorrhynchus rhipidius Macleay	*					U	
Metriorrhynchus rufipennis Fabricius	*	R					
Col: Scarabaeidae							
Eupoecila australasiae Don.	**					R	
Diaphonia dorsalis (Donovan)	**					R	
Diphucephala nr. *aurolimbata* Blanchard	*	C					
Phyllotocus erythropterus Blanc	**					C	
Phyllotocus macleayi Fisch.	*					C	C
Phyllotocus rufipennis (Boisduval)	**		C			C	
Col: Mordellidae							
Mordella nr. *australis* (Boisd)	*					*	*
Mordella dumbrelli (Lea)	*		C				
Mordella leucosticta Guerin	*						*
Mordella nr *promuscua* Erichs	*	*	C			*	*
Mordella nr *sydneyana* Blackburn	*	* A	C	R		* A	* A
Mordella nr *tristis* Lea	*	*					
Mordella nr *humeralis* Waterhouse	*					*	*
Mordella nr *limbata* Waterhouse	*					*	*
Mordella sp. 1	*					*	*
sp. 2	*					*	
Col: Cleridae							
Phlogistis nr *eremita* Blkb.	**						R
Eleale intricata? Klug.	***		R				
Eleale pulchra Newman	***					R	
Eleale nr. *viridus* Guerin	***	C	R				
Neoscrobiger sp.	***					R	
Col: Coccinellidae							
Coccinella repandra Thb.	*	C					
Diomus notescens Blkb.	**	C					
Harmonia conformis (Boisduval)	*	R	R				
Col: Cerambycidae							
Pempsamacra pygmaea Newman	*				R		
Stenoderus suturalis Oliv.	*		R			R	
Col: Cantharidae							
Chauliognathus pulchellus Macleay	*	R	R				
Chauliognathus nobilitata Er.	**	R					
Col: Belidae							
Belus nr. *tenuis* Lea	*		R				
Col: Curculionidae							
Perperus sp.	*	R					
Col: Tenebrionidae							
Lepispilus rotundicollis Blkb.	*		R				
Col: Cistelidae							
Neocistela ovalis Blkb.	*	U					
Col: Oedemeridae							
Asclera sublineata Waterhouse	*	U				U	
Pseudolyces haemorrhoidalis F.	*					U	U
Col: Chrysomelidae							
Monolepta nr *picticollis* Blkb.	*						U
Paropsisterna nucea Er.	*						U
Col: Elateridae							
Anilicus xanthomus (Macleay)	*					R	

Pollen Load
* - light (scattered covering, isolated patches or grains)
** - medium (concentrated isolated patches or moderate coverage)
*** - heavy (heavy covering overall or most of body)

Abundance
R (rare) - 1 to 3 individuals
U (uncommon) - 4 to 10 individuals
C (common) - 10 to 100 individuals
A (abundant) - more than 100 individuals

Abundance data for the Mordelidae have been lumped. For some species of Asteraceae it was physically impossible to collect and sort the vast number of individuals present.

Table 2. Asteraceae visited by insects.

	Coleoptera	Hymenoptera	Lepidoptera	Mecoptera	Diptera	Hemiptera	Thysanoptera
Arcototheca (Cryptostemma)		Colletidae (15)					
Celmesia		Halictidae (5) Colletidae (18)					
Cotula						*(6)	
Brachycome		Halictidae (5,17)					
Cassinia	Buprestidae (8,20)	Halictidae (16)					
Helichrysum	Buprestidae (20) Cerambycidae (4)	Anthophoridae (12) Colletidae (12,19) Formicidae (1) Halictidae (12,19)	*(13)		*(13)	Lygaeidae (3)	
Helipterum		Halictidae (12)	*(9)				
Leptorhynches		Halictidae (12)					
Olearia		Colletidae (16)	*(2,6)		*(6)		
Podolepis		Apidiae (3,12)		Bittacidae (10)			
Senecio	Cerambycidae (4)	Apidiae (11) Halictidae (11)			Syrphidae (11)		Thripidae (11)
Asteraceae		Halictidae (12)	Armatidae (14) *(1,2,7)				

* Indicates identification of insects to order only.

(1) Anonymous (1977)
(2) Anonymous (no date)
(3) Armstrong (1979)
(4) Best (1882)
(5) Burrows (1960)
(6) Costin *et al* (1979)
(7) Davey (1969)
(8) Hawkeswood (1978)
(9) Hearn (1984)
(10) Keighery (1974)
(11) Lawrence (1985)
(12) Michener (1965)
(13) Morcombe (1974)
(14) Press (1984)
(15) Rayment (1931)
(16) Rayment (1935)
(17) Rayment (1948)
(18) Rayment (1949)
(19) Rayment (1953)
(20) Williams and Williams (1983)

some element of deception in attracting pollen vectors. Further data on quantity and concentrations of nectar is required.

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Trap Disturbance during the Survey of Small Mammal Communities

By V. T. Read*

Abstract

Trap disturbance was recorded during a study of capture methods for small mammal communities in Bodalla State Forest (N.S.W.). Up to 80% of the traps were set off each night before the cause of the disturbance was identified and deterred. Dingoes are suspected as the cause.

Introduction

Faunal surveys, which are designed to provide information on the size and distribution of animal populations and the structure of the community in which they co-exist, require habitats to be sampled in a standardized way (Myers, *et al.*, 1984). Standard sampling methods are important for robust statistical comparison of animal communities from different habitats. The importance of standard methods is re-emphasised for survey teams using grid configurations, as they are more sensitive to the intensity of trap placement compared with traps set along index-lines (Read, submitted paper).

With the requirement for robust statistical results goes the concern that the traps and trapping intensity used to sample the community are the same during the sampling period. However most faunal surveyors will acknowledge that disturbance to their sampling does occur due to animals moving or springing traps, although this is rarely discussed in their reports and less frequently accounted for in their analyses.

Disturbance to a trapping programme is reported here. The disturbance occurred to small mammal traps during a research project which was designed to assess the efficiency of eight sampling methods (i.e. grid and index-line configurations with 5, 7.5, 10 and 20 metre spacings between traps) for their ability to adequately represent the small mammal community in three forest environments with different logging histories (Read, 1984).

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The three sites were located in the Bodalla State Forest, 16km WSW of Narooma (N.S.W.) and adjacent to Mt. Dromedary. Site 1 (more than 50 years since logging) had a few large mature eucalypts with a dense, entangled undergrowth and ran along a creek bed. Site 2 (14 years since logging) had a well developed upper canopy, sparse lower canopy and a species-rich ground cover, dominated by up to six species of ferns. Site 3 (7 years since logging) was dominated by silver top ash (*Eucalyptus sieberi*) with a poorly developed lower canopy. The dominant species at each site are listed in Table 1.

The small mammal species found at the sites were *Antechinus stuartii, A. swainsonii, Rattus fuscipes, R. Rattus, Mus musculus, Perameles nasuta, Pseudomys novaehollandiae* and *Sminthopsis leucopus.*

Elliot aluminium live-capture traps (300x100x90mm) were set during seven field trips between May and July, 1982. The traps were baited with a mixture of peanut butter, rolled oats and honey; they were enclosed within a plastic bag and contained cotton wool bedding inside to reduce stress to captive animals. The traps were set on the first afternoon of each field trip and were checked and cleared during the early mornings of the following three days. As disturbance to the traps became evident, they were left during day-light hours.

Evidence of disturbance

Following the first night of trapping, three traps had been set off without capturing animals. This was unquestioned and attributed at that stage to either the trigger mechanism being too sensitive or medium sized mammals (e.g. *R. fuscipes*) setting them off without capture.

Table 1. List of dominant plant species at each site

	SITE 1 (50 years)	SITE 2 (14 years)	SITE 3 (7 years)
Upper Canopy	*Acacia irrorata* *A. obtusifolia* *Eucalyptus bosistoana* *E. botryoides* *E. muellerana*	*Acacia falciformis* *A. irrorata* *A. obtusifolia* *Angophora floribunda* *Eucalyptus globoidea* *E. longifolia* *E. sieberi*	*Angophora floribunda* *Eucalyptus globoidea* *E. muellerana* *E. sieberi*
Lower Canopy	*Indigofora australis* *Nolalaea longifolia* *Persoonia linearis* *Psychotria esculentum* *Synoum glandulosum* *Zieria smithii*	*Acacia obtusifolia* *Elaeocarpus reticulatus*	*Acacia irrorata* *A. obtusifolia* *Correa reflexa*
	(8)	(11)	(8)
Ground Cover	*Gahnia sp.* *Geitonoplesium cynosum* *Hibbertia dentata* *Oplismenus imbecillis* *Poa sieberana* *Pteridium esculentum* *Smilax australis*	*Lichen* *Pandorea pandorana* *Poa sieberana* *Pteridium esculentum*	*Acacia irrorata* *Entolasia stricta* *Lomandra filiformis* *Microsorium diversifolium* *Moss* *Pteridium esculentum*
	(29)	(18)	(25)

N.B. Species with percentage cover values 10% included as dominants (data supplied by Division of Water and Land Resources CSIRO).
Numbers in parenthesis for the two lower strata are the total number of species occurring.

Fig. 1. Disturbed Elliott trap with bag, hinge wire and cotton wool removed.

During the second night, a further trap was sprung but this time with the bait removed. Then on the first night of the third trip, the cotton wool was removed from one trap. The second night resulted in 12 traps having their plastic bag systematically removed, and on the third night of this trip, two traps were found with the hinge wire removed (Figure 1).

The following nights of the third trip resulted in widespread unbagging of traps and pilfering baits. This was of concern as at times, a considerable proportion of the traps were set off.

Records of the disturbance are listed in Table 2. They clearly show the increase in the percentage of traps being disturbed, particularly during Trip 3. This suggests that the animal was learning how to get the bait by first removing the bag and later by removing the hinge wire.

The cause of the disturbance

Initially, the disturbance was attributed to the long-nosed bandicoot (*Perameles nasuta*). Mascot wire cage traps, set in conjunction with the regular trapping program, caught the bandicoots (which were released each morning) but did not prevent the disturbance. Additionally, bandicoots were never recorded at Site 3 where disturbance to the traps was as troublesome as the other two sites.

Teeth marks in the sheet aluminium of the traps and perforations in the removed plastic bags suggested that the disturbance was caused by dingoes (*Canis familiaris dingo*). Patches of sand were laid at the sites and dingo tracks were recorded subsequently near disturbed traps. Prior to this, dingoes had been heard howling nearby and were occasionally seen along bush tracks. They were never observed at the trapping sites.

Once, when setting traps along an index-line, the sound of traps being unbagged was heard at the beginning of the line, about 50 metres away. Even careful retracking along the line failed to expose the cause although the sounds made by the retreating animal could be better attributed to a dingo than a bandicoot.

Other possible causes of disturbance were

Table 2: The percentage of traps disturbed for all three sites in Bodalla State Forest

		% of traps disturbed as recorded by the following observations				
Date	*No. traps set*	*unbagged*	*bait taken*	*set off*	*bedding out*	*wire out*
Trip 1 26.5.1982	198			1.5		
27.5.1982	198		0.5	1.5		
28.5.1982	198			2.0		
Trip 2 1.6.1982	249			2.0		
2.6.1982	249			0.4		
3.6.1982	249			4.4		
Trip 3 9.6.1982	34		2.9	11.8	2.9	
10.6.1982	59	20.4	15.3	13.6	5.1	
11.6.1982	59	22.0	10.2	20.4		3.4
12.6.1982	91	40.6	8.8	36.2		2.2
13.6.1982	100	52.0	12.0	33.0		4.0
14.6.1982	100	71.0	10.0	51.0		4.0
15.6.1982	34	61.8	23.5	52.9		8.8
Trip 4 17.6.1982	34		2.9			
18.6.1982	59	81.6	30.5	79.7	25.4	6.8
19.6.1982	59	84.7	35.7	78.0	27.2	11.9
20.6.1982	109	20.2	9.2	34.9	11.0	9.2
21.6.1982	100		3.0	13.0		1.0
22.6.1982	100		8.0	5.0		
23.6.1982	50		4.0	14.0		
Trip 5 29.6.1982	67	24.0	3.0	18.0	3.0	1.5
30.6.1982	67	48.0	21.0	43.5	4.5	4.5
1.7.1982	67	7.5	10.5	9.0	1.5	1.5
Trip 6 7.7.1982	198	20.7	5.0	19.2		
8.7.1982	198	17.2	7.1	21.2	2.0	3.5
9.7.1982	198	1.5	3.0	8.1	1.5	1.5
10.7.1982	35	8.6	14.3	8.6		
11.7.1982	35	60.2	22.6	45.7		11.3
12.7.1982	35	11.3	8.6	17.2	2.9	
Trip 7 23.7.1982	25					
24.7.1982	25					
25.7.1982	25	2.0		16.0		
26.7.1982	34	5.8	2.9	14.7		
27.7.1982	34	2.9	5.8	11.6		
28.7.1982	34		2.9	2.9		

considered. Double-sided adhesive tape was attached to the door of a large number of traps, including many that were disturbed. No hairs recognizable as being from sugar gliders (*Petaurus breviceps*), Greater Gliders (*Petauroides volans*) or possums (*Trichosurus vulpecula* and *Pseudocheirus peregrinus*) were collected, although these species had all been observed at some of the sites. The brush-tailed possum (*T. vulpecula*), a potential suspect, was common at Site 1 but not at the other two sites. However, no hairs from dingoes were recorded either.

Method adopted to reduce the disturbance

Assuming that dingoes were the cause of disturbance, measures were taken to deter them. Yellow rain-coated scarecrows, orange flashing roadlights, blaring transistor radios and blazing camp fires were attempted in that order. They were placed near the site, but of sufficient distance to not influence small mammals. Each deterrent was effective for the first night of its use but no longer.

Attempts were then made to lure dingoes away from the sites by cooking beef off-cuts approximately 500 metres from the sites. Even if they did succumb to the odours, there was no reduction in the rate of disturbance.

The final solution was to have people sleep close to where the traps were set. Table 2 shows the effectiveness of this by the reduced disturbance during the later trips.

Discussion

The suspicion of dingoes as the agents of disturbance is based on circumstantial but substantial evidence. Foxes have been suggested as a further alternative but neither they nor their signs were observed near the sites.

The impact of disturbance on the research project could not be objectively assessed. One of the trips was abandoned because of the problem and the methods were repeated at a later date. Before the problem was solved, the traps were checked frequently during the night and although it is accepted that some traps were closed for some time, it is considered that the methods were reasonably tested in each situation.

Whether or not animals were taken from the traps is unknown. The fact that traps without captive animals as well as those with them were disturbed suggests that the disturbing animal was seeking the bait. However, at Site 1, two frequently caught *Antechinus stuartii* individuals failed to appear in traps during the final days of the project. They may have fallen victim to the suspected dingoes, or they may have dispersed or died through natural causes. No other individuals were obviously missing from the records.

Acknowledgements

Dr. Chris Dickman of the Department of Zoology at the University of Western Australia critically reviewed the manuscript.

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Naturalist Note

Another Strange Foraminifera Found at Black Rock. Port Phillip Bay. *Boderia turneri* (Suborder Allogromiina)

By D. E. McInnes*

In the **Victorian Nat.** V. 100(6) under the heading "A strange Foraminifera found at Black Rock" a description was given of *Shepheardella,* a foram that looked like a thin thread of red cotton with fine root-like processes called myxopodia, streaming out from each end. The strange story was told of how the *Shepheardella* broke up into many parts and then rejoined to form one complete *Shepheardella* again.

This article is about quite a different Foram, but one that is still closely related to the *Shepheardella.* The Foraminifera are single celled animals like amoebae but with fine threadlike pseudopodia which can join together (anastomose); most Forams are marine and most have small calcareous shells, but one suborder has only a chitinous outside layer instead of a shell, and the chitinous layer is flexible and capable of changing shape. This suborder is named the **Allogromiina** and it contains both the *Shepheardella* and the foram now to be described.

On the bottom of petri dishes kept in marine aquaria could be seen, now and again, a tiny piece of what seemed to be brown seaweed stuck on the glass. It was 1 to 4mm long and irregular in shape, but on examination with the low power microscope, from each pointed irregularity there was a tuft of fine 'roots'. On further examination, these fine 'roots' were seen to be the same as the myxopodia of *Shepheardella.*

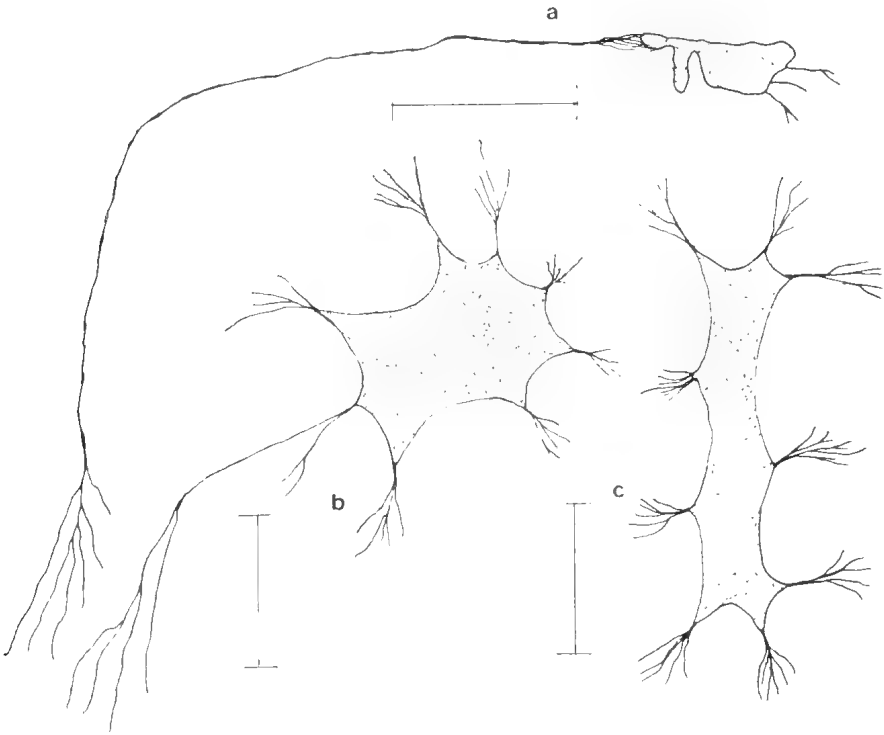

Fig. 1. Boderia turneri: various shapes (a) bar – 5mm (b,c) bar – 2mm.

*129 Waverley Road, East Malvern 3145.

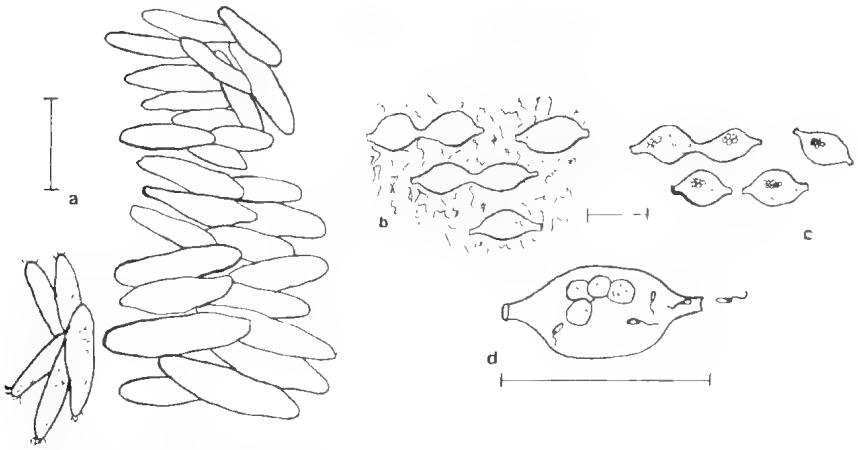

Fig. 2. Boderia turneri (a) first division (bar 1mm) (b) formation of ovals (bar 0.1mm) (c) clusters forming in ovals (d) escape of flagellates (bar 0.1mm).

Greater magnification revealed that it was one of the Foraminifera characterised by a chitinous outside skin but with variable shape (see Fig. 1). One feature is that sometimes from one projecting corner, the myxopodia stream out like a long river then branch into an array of fine threads as in Fig. 1(a).

The myxopodia, which are the pseudopodia of the animal, are best described as a river of protoplasm, a river that may be short or very long, breaking up into tributaries then into streams here and there joining and forming a network. The remarkable part is that, not only do all parts of the river system carry a flow inwards but, amazingly, also carry a flow outwards, bringing food particles in and carrying waste particles out. Sometimes even large masses can be seen caught in the flow, bumping along, stopping, then on again, continuing until the body of the foram is reached. Here the incoming load flows into the body of the foram where it is churned around in an inside current, the internal current must then carry the waste material outside where it is taken away by the outgoing current of the myxopodia. Perhaps some material is rejected before entering the body as some large particles have been seen to be caught up in the outgoing flow as soon as they arrive.

This foram was named *Boderia turneri* by Strethill Wright (1867) and his description includes some observations about the reproductive process. As I have had the opportunity to observe this process of reproduction several times, and as these observations are different to those of Strethill Wright, it has been suggested that these observations be placed on record, hence this article. The specimens of *Boderia* I have seen are always the brown seaweed colour when seen with transmitted light but with top lighting look more a grey colour. In size they can vary from 1mm to 5mm in length and up to 2mm wide. The shape in always irregular, like a series of bays and pointed headlands from which stream the myxopodia, which may be short, like fine roots or long, like a river system. The myxopodia change in length from time to time but the inward and outward flow continues always. If a myxopodium breaks, the ends branch out and meander around until they touch, then they join up, and continue as before.

The first sign of reproduction is the breaking up of the foram into 20 to 30 parts each shaped like fingers or long ovals, sometimes very irregular, (as shown in Fig. 2(a) and 2(b), then usually by the next day these parts will divide into tiny ovals 0.07mm to 0.1mm in length and 0.05mm to 0.07mm in width; some of the ovals may still be joined together (Fig. 2(b)). The contents of the ovals are granular in appearance, similar to the contents of the foram.

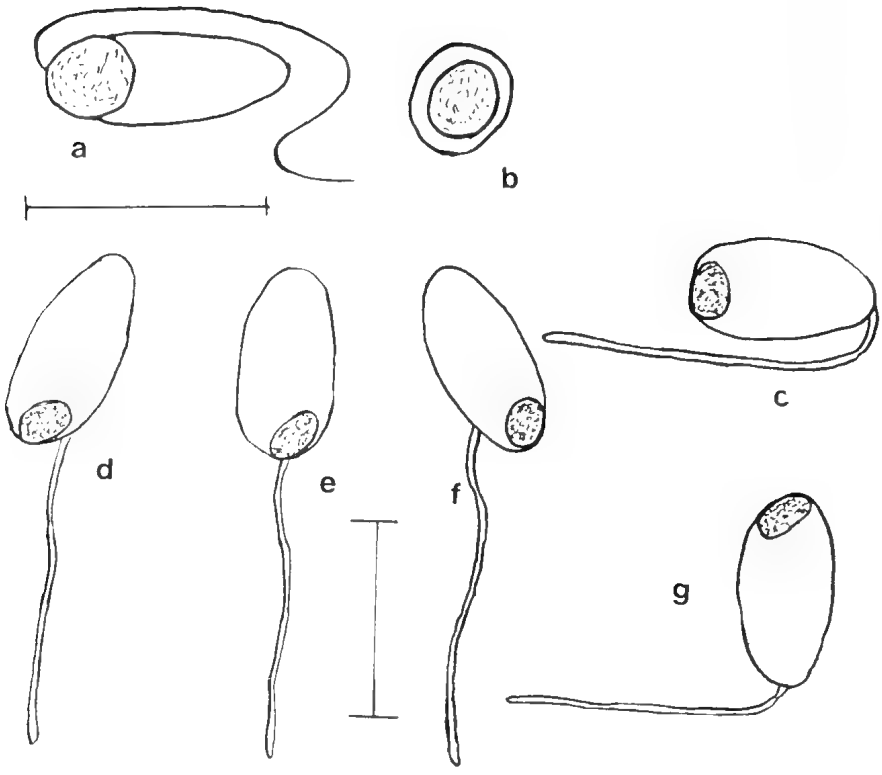

Fig. 3. Boderia turneri flagellate form (a) bar = 0.002mm (b) at rest in upright position (c-g) five day old flagellates (bar = 0.006mm) (c) side view (d-f) view from above (g) view when flagellate is vertical.

At a later stage the contents of the ovals are seen to be clustered into a dense clump near the centre of the oval (Fig. 2(c)). About 12 hours later some of the ovals will show a few flagellates swimming around inside the oval and other ovals will be a packed mass of flagellates swimming actively around, every now and again one will escape out through the neck of the oval and swim out into the great unknown. (Fig. 2d).

Under 800 x magnification they were seen to be jelly-bean shaped with a dense round area at the front and the very vigorous swimming action of a flagellate, although I could not actually see the flagellum. However with the help of Dr. Richard Hamond and his super objectives using the "Nomarski" system of illumination the flagellate was seen as shown in Fig. 3(a). The length of the body of the flagellate was approx. 0.002mm.

Thousands of flagellates could be seen but most were consumed as soon as they emerged by the various protozoans moving around. One observation of interest was that some flagellates came to a resting position in a vertical stance with the dense front end at the top and the rear end stuck to the glass as in Fig. (3b).

To avoid this predation I transferred one *Boderia* to a fresh petri dish clear of debris and predators.

At first it adhered to the bottom of the dish (in a form similar to Fig. 2b) and then it developed to the stage of small ovals as in Figs. 2(c) – 2(d). Later the bean shaped flagellates as in Fig. 3(a) could be seen moving around inside the ovals but this time the dense nucleus at one end was tinged a bright red colour, this made observation much easier.

When the flagellates emerged from the ovals, they moved with a side to side swinging movement with the red nucleus trailing along at the rear end, at times the flagellate would gyrate around and

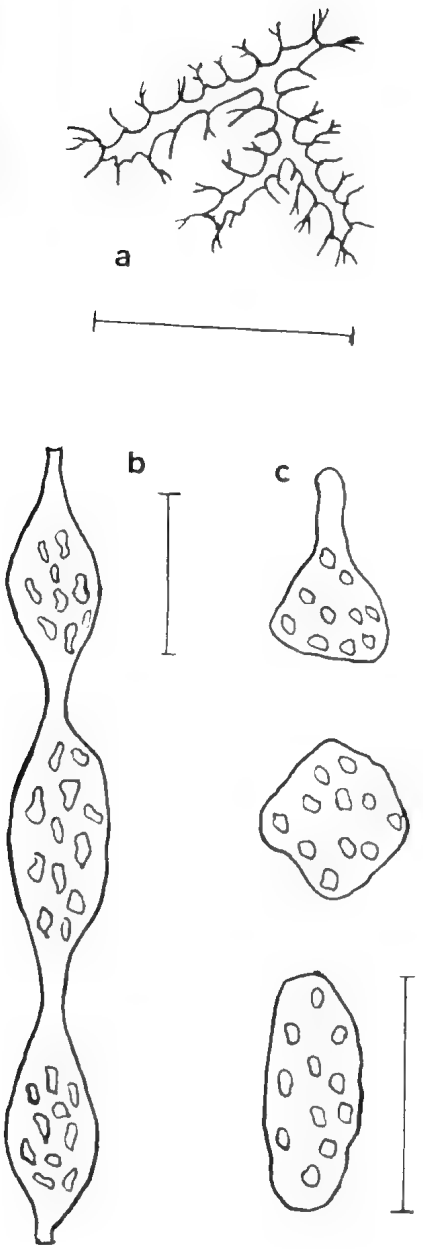

Fig. 4. Boderia turneri (a) before division (bar = 5mm) (b) ovals with "Euglenoids" inside (bar = 0.1mm) (c) various shapes assumed by Euglenoids (bar = 0.016mm).

around as though tied to an anchor, then the final stage would be for the jelly bean shaped flagellate to come to a stop in the vertical position and this time the red colour of the nucleus was quite easily seen in the upper position. Hundreds could be seen resting in this vertical stance, always red spot upward. From this position some would gyrate around or swim away with the side to side motion.

Up to this time I had never been able to see any actual flagellum but after looking vainly with 800x magnification, I changed to 400x and with a slight alteration to the lighting then saw the flagellum at last. No wonder I had not seen it, I was looking for the flagellum at the front but there it was trailing out behind.

Although close to the limit of vision I was able to observe the action of the flagellum for long periods and find an explanation of the unusual antics of the flagellates as follows; the flagellum, twice as long as the body and attached to the end of the body opposite the dense nucleus rests on and drags along the bottom like a soft wet rope as in Fig. 3(c). The gyrating motion is easy to understand if the flagellate is anchored to one spot by the flagellum. The forward motion is explained by a swinging from side to side attached at the front by the flagellum as in Fig. 3(d)–3(f). The resting stage with the flagellate vertical with the dense nucleus at the top is shown in Fig. 3(g).

The observations of the breakdown of *Boderia turneri* into 20 or 30 initial parts and then into tiny ovals were similar to those of Strethill Wright. However, instead of flagellates appearing from the ovals, he describes "a swarm of naviculoid bodies. . . from each of which, in a day or so, there issued a minute nucleated amoeboid mass. These little amoebae existed for weeks. . . near the surface without assuming an envelope or putting forth pseudopodia." I had observed the process of *Boderia* breaking down into smaller parts then into the tiny ovals several times, and the result had always been the formation of flagellates, never was there anything like the amoebaes that Strethill Wright recorded. But, on January 19th 1986 I found a *Boderia* in one of my petri dishes, and made the following observations:

From my notes (condensed).

January 19 11.00am
Found another *Boderia*. Quite unusual in shape, nearly filled 5.0mm field of microscope. Is it ready to break up? (Fig 4a)

2.00pm
Yes, it has started to break up into small parts. Will keep a time check on it.

7.00pm
Boderia completely broken into thin lines and

some of these are starting to contract into small ovals. Over 200 thin lines.

11.00pm
Nearly all the thin lines have divided into small ovals that cover an area in a circle 10mm wide.

January 20 10.00am
Ovals not fully developed, some still attached. Dense clusters can be seen formed in the ovals. Most ovals still connected by thin strands of protoplasm.

January 21 11.00am
A breakthrough? I have observed with 800x (40x water – immersion and 20x eyepiece) at least 8 amoebae inside an oval. They are 0.016mm long 0.009mm wide. Their movement is similar to a *Euglena*. The more I look at them the more they look like *Euglena*. (Note, Euglena are cigar shaped flagellates that can alter the body shape rapidly). Their rapid movement is quite different to the slow spreading of amoebae. They are not amoebae, I will call them "Euglenoids". Some of the ovals are still connected together and with the "Euglenoids" inside look like Fig. 4(b).

January 22 11.00am
Have spent half an hour watching the "Euglenoids" that have hatched out of the ovals of the Boderia, they are now moving around the outside of the ovals. The "Euglenoids" are long ovals in shape and move and swim rapidly with one end to the front but their shape can be quickly altered to any shape from a normal fat cigar to the shape of a sphere then to a flattened pancake then back to the long oval then a swim forward. Round granules can be seen inside the "Euglenoids". See Fig. 4(c)

This change is typical of the action of a Euglena, there is simply no sign of the flowing action of an amoeba, but even with 800x magnification and with "Modulation Contrast" I cannot see any sign of the flagellum although it must be there to cause the vigorous swimming action (unless there are cilia too fine to see).

Strethill Wright states that an amoeboid mass emerged from the ovals, and it is easy to see how the "Euglenoids" could be thought to be amoebae, the contortions in shape would lead to that conclusion unless you were also familiar with the contortions of Euglena.

Now a question arises. Is the *Boderia* with the reproductive "Euglenoids" a different species from the Boderia with the reproductive flagellates? Or are they two phases of the one species? It is known that some species of Foramanifera have a dimorphic life cycle (Albani, 1979) with a 'schizont' asexually producing embryos (possibly the euglenoid form here) which grow into a form known as the "gamont" which then produces gametes (often flagellated). These gametes then conjugate to form a zygote which developes into the schizont form. Some species may even have a trimorphic life cycle.

I have observed the breakdown of Boderia into ovals and then into flagellates several times now but this is the only time I have observed the breakdown into ovals with "Euglenoids". Although the ovals are the same in size, there are hundreds of flagellates in an oval but only about up to 25 "Euglenoids" in an oval.

Strethill Wright states that his "Amoebae" floated on the surface and that later he found minute *Boderia* on the bottom of the dish but in my case as it was summer I had to put the petri dish back into the aquarium to keep cool. On January 23rd I searched among the empty ovals for half an hour but did not see any trace of the "Euglenoids". If they had risen to the surface I would have lost them in the aquarium or they would have fallen as prey to the various protozoans in the water.

An observation showing the similarity in behaviour between *Shepheardella* and *Boderia* in breaking down into small parts then rejoining together to form one complete body.

September 12th 85
Found a *Boderia* 4.5mm long 0.75mm wide. Close to side of one of the petri dishes.

September 13th
Moved *Boderia* to the centre of dish to observe with higher power but it broke into two pieces. 1.75mm long and 0.75mm long. Within 5 minutes myxopodia were streaming out.

September 15th
The two *Boderia* have disappeared, there is just a network of threads. Is it in the stage to form into the tiny ovals? Observed with the 40x water immersion objective and 10x eyepiece the whole network of threads is seen to be streaming in all directions, joining up and separating, with clumps of the contents moving in any direction but no sign of concentration into larger clumps. The direction of the flow of clumps seems to be quite erratic, although there seems to be a constant flow of the protoplasm in both directions in the threads, the clumps seem to move in one way then reverse and go the other way.

September 16th
What has happened? There is no sign of the network of myxopodia but nearby is a complete *Boderia* 3.0mm long and 0.5mm wide with

myxopodia streaming from 7 to 8 points. Has the network of wildly streaming threads and clumps combined to again form the original *Boderia*? The *Shepheardella* reformed after breaking down into a dozen small pieces (as described before, McInnes, 1983). The *Boderia* has gone one better and reformed after breaking down to just threads of streaming myxopodia.

Again we can say, as we did with *Shepheardella*, – What a remarkable creature!

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Comment on the Flora and Fauna Guarantee Act, 1987

In Victoria, many species of flora and fauna have become extinct since European settlement and while these losses were probably unrecognized and certainly unmourned during the first century of occupation, the last 50 years has brought on increasing awareness of the quality of our environment; this has been reflected in a number of largely unconnected Parliamentary Acts that have sought to reduce the extinction rate. The Flora and Fauna Guarantee brings most aspects of flora and fauna conservation under one Act. The Act has also changed the emphasis from protection of individual species, as was inherent in the Wildflowers and Native Plants Protection Act 1958 and Wildlife Act 1975, to that of protection of species or communities through the protection of their habitat. This legislative change of emphasis has been made to catch up with the technical realities of conservation and is welcome.

For those who haven't read it, the Act intends '....to establish a legal and administrative structure to enable and promote the conservation of Victoria's native flora and fauna and to provide for a choice of procedures which can be used for the conservation, management or control of flora and fauna and the management of potentially threatening processes'. Lofty aspirations indeed and Ms Kirner, the Minister for Conservation, Forests and Lands (CFL), should be congratulated for having a go at what has always been a difficult political, legislative and technical problem.

The Act contains two main approaches to conservation, the best of which is undoubtedly the establishment of a new seven member committee of scientific experts which will streamline the previously cumbersome operation of focussing special attention ('Listing' in the new terminology) on either threatened species, threatened communities or potentially endangering processes. The committee have been left with vague terms of reference and will have to decide their own definitions and measures of endangeredness. The final recommendation for 'Listing' is to be approved by the Minister. Once listed, the species, communities or processes must be investigated by the Director-General of CFL who will provide an Action Statement that deals with conservation and management. For the 'critical habitat' of a listed species or community, a short term protection of up to 2 years and 60 days is to be provided; in special circumstances, by an Interim Conservation Order (ICO) which has power over all land, public and private.

The second main approach is the preparation, by CFL, of a Conservation Strategy which will set out how conservation and management objectives for all flora and fauna are to be achieved. In addition, the Director-General of CFL may direct that management plans be prepared for any group of flora or fauna.

Conceptually the Act is good but in the area of management and implementation of action it is vague and inconclusive. The 'Strategy', Action Statements, preparation of management plans etc. falls back to the operation of CFL which has been shown to lack either funds, manpower, efficiency or energy when dealing with exactly these questions in the past. How does the Minister propose to overcome these problems? Will extra funds be allocated? Will extra staff be allocated to field research from the plump upper and

middle management area? The information that forms the basis of management decisions simply hasn't been collected in the field.

The Interim Conservation Order, which has been heralded as a major initiative, is at best a short term stop-gap measure to provide protection against unspecified dangers and at worst will be dangerously counter productive. It has already stretched further the strained relations between country landholders and CFL through statuary provisions that appear overbearing and unjustified. There is precedence for private landholders bulldozing interesting areas of bush just to avoid the possibility of public interference. It is sad to see that the farming community, which to a large extent was the mainstay of the country Field Naturalist Groups and a constant source of data and specimens, should be alienated to the point of aggressive confrontation. In contrast to the threats implicit to private 'land managers', the way in which ICOs apply to public land managers is far from clear. It is on public land that the major conservation battles have and probably will take place (e.g. *Burramys* on Mt Hotham and the forests of the Errinundra Plateau) and the new ground rules must be clearly explained.

As a statement of intent, this Act is an excellent step forward, as a committment to action it is decidedly shaky. In large part, the successful implementation of the crucial management section of the Act will rest with the research staff of CFL. It will not work in the current atmosphere of cynicism caused by underfunding in the research wing.

Work-to-rule at Arthur Rylah Institute, Heidelberg

As reported in our last issue (Vol. 4, no. 104, p. 130), Wildlife Management and Freshwater Fisheries Management Officers of the Department of Conservation, Forests and Lands (DCFL) have undertaken industrial action claiming that continual reductions in staffing and funding cannot proceed hand-in-hand with a steady increase of new programs and initiatives.

According to the Victorian Public Service Association, API staff have been placed under an ever-increasing burden of work which many officers have addressed by working longer hours, taking work home and by continually deferring due leave. However, for many staff, the burgeoning work-load is overshadowed by their concerns as to the long-term effects of inadequate staff resources upon the conservation of Victoria's fish and wildlife.

As a result of negotiations, DCFL has now accepted that selected programs on both fish and wildlife must be deferred, and that the Department, rather than individual officers, will bear the responsibility for any ramifications. DCFL has also agreed to small increases in staff for worst-affected sections of the two Divisions, however it will be some time before the precise number of new positions will be finalised.

While these measures, together with a 'work-to-rule' banning unpaid over-time, will bring limited relief for pressured wildlife and fisheries staff, morale remains low at the Arthur Rylah Institute and at other research sections of the DCFL. This does not auger well for flora and fauna conservation in Victoria.

Australian Natural History Medallion 1987

Dr Robert H. Green, Curator of Zoology, Queen Victoria Museum, Launceston, has been selected to receive the award for 1987. The Medallion will be presented at the General Meeting on Monday, 9 November 1987 at 8pm., and Dr Green will give the Medallion address.

The meeting will be held at the Royal Society, 9 Victoria Street, Melbourne, and a buffet dinner will be available there from 6pm., price $12.50. If you plan to come to the dinner, please notify the Acting Secretary, F.N.C.V., National Herbarium, Birdwood Ave. South Yarra, 3141, because we need to know numbers for the caterers. Payment to be made on the night.

Library Report 1986/87

During the year the library has benefitted from donations or bequests from members, most particularly from the library of the late Cicely Allen, which contained many books which our library did not have, or later editions than the ones we possessed. Donations have also been received from Tom May, Dr. Elizabeth Turner, Mrs Florence Vasey, John Strong, Mrs Hilary Weatherhead and Miss Pat Carolan. Notable additions to the library, from donation or by purchase include *Flora of Australia v.46*; *Zoological catalogue of Australia v.1 & 2*; Duncan/ Isaac: *Ferns and allied plants of Victoria, Tasmania and South Australia*; Hollands: *Eagles, hawks and falcons*; Ride: *Guide to native mammals of Australia*; and Petherham/Kok: *Plants of the Kimberley region of Western Australia.* In all 72 books were added.

The library will in future be receiving *Australian wildlife research*, as a result of a new exchange agreement with CSIRO; and a subscription has been taken out for *Australian mammalogy*, at the request of the Mammal Survey Group.

It is gratifying to see that the library continues to be well-used. 101 books and periodicals were borrowed during the year. It appears, however, that some members are unclear about the conditions under which books can be borrowed. By-law 9(iii) reads, in part,

> The maximum retention of library books without renewal shall be two months. Books may be renewed monthly for a maximum period of six months provided no other member requires the book.

Since the library is there for the use of members we have no wish to impose undue restrictions, but as the only time that there is access to the library is during meetings, many people wish to use it for reference only, and the continuing absence of books can be very frustrating. If you have books overdue from the library, please return them.

In November a very successful book sale was held, of books, mainly duplicates, withdrawn from the library, wich raised nearly $800. Council has agreed that some of this money should be used for the care and maintenance of the archives, and it is hoped to put this matter in hand in the coming year. Some cataloguing and indexing has already taken place. We recently acquired an interesting photograph album from the 1940s of the Nature Show exhibits and other activities of the Club and the Junior Field Naturalists Club, now the Hawthorn Juniors.

A start has been made on the slide library of Club activities, with a collection from Claire Taylor. We were also fortunate to obtain a large collection of slides from the late Joyce Annear. There have been few interlibrary loan requests this year, but we have had two requests for archival material: one from the Phillip Institute of Technology for photographs taken on the Club excursion to the Grampians in the 1890s, and the other from the Australian National Gallery for material relating to J. W. Lindt, N. J. Caire and W. Baldwin Spencer, in connection with an exhibition of nineteenth century photography which they are mounting for the Bicentenary.

Finally I should like to thank Mrs Olive O'Hagan for her continuing help with the library, and also those who have acted as library assistants at Group meetings.

Sheila Houghton
Hon. Librarian

FIELD NATURALISTS CLUB OF VICTORIA

Reports of Recent Activities

General Meeting
Monday, 13th July

The Speaker for the evening was Mr. John Coventry, the Curator of Herpetology at the Museum of Victoria, who spoke on "Prohibited Imports/Exports – Reptiles."

Mr. Coventry began with a rundown of the regulations set out in the Wildlife Protection Act to protect plants and animals potentially, or actually endangered. Many third world countries have not signed the internation wildlife protection treaty and continue to allow endangered species to be imported and exported. Australia, as a signatory to this treaty, must do all it can to halt this exploitative trade. It is because of this obligation that the Museum is called on to provide an identification service for the Customs Department.

Any animal products apprehended by

Customs and suspected to be from an endangered species are sent to the Museum for indentification. Indentification can be quite difficult for inexperienced people and Mr. Coventry told of one case where what was initially thought to be crocodile skin turned out to be moulded kangaroo skin. If an item turns out to be prohibited it may be either kept by the Museum, returned to its place of origin at the expense of the importer or destroyed.

Attempts are being made to educate people so that they will not attempt to bring prohibited items into the country. Buyers for large retail chains are being taught to use simplified keys to distinguish between different leathers and so tell the legal from the illegal. By taking this trouble importers will not have to risk the very large fines they will face if found in possession of prohibited imports.

There are displays in all Australian international airport departure lounges so that the public will be aware of the regulations. Mr. Coventry believes that the situation regarding prohibited imports is improving in Australia as he sees many fewer turtle shells and such things than he once did.

Mr. Coventry went on to give many instances of operations to smuggle protected species into and out of the country and finished by showing specimens of items (shoes, handbags, turtle-shell guitars, etc) which had been siezed by Customs.

Exhibits

- Under microscopes: a stalked jellyfish from Black Rock, a walking jellyfish from Sydney and a geological specimen under a microscope donated to the FNCV by Dr. Wishart. Mr. Dan McInnes.
- Fungal spores and a *Eucalyptus* leaf epidermis under a microscope. Mr. Urwin Bates.
- An album of old FNCV photographs. Mrs. Sheila Houghton.
- An exhibit of *Baragwanathia* and older Silurian flora from Yea has been sent to a geological conference in Canada. Dr. Jack Douglas.

Nature Notes

- It was observed that on a reef at Cronulla, N.S.W., there was a lot of Cunjevoy and a much higher density of sea urchins than can be seen locally. The urchins were about 5cm in diameter and more than 50 could be counted in a 3m circle. Mr. Dan McInnes.
- Populations of Silver Gulls have increased well beyond their natural limits and they are outcompeting other native sea-birds for breeding sites. Although this is recognised there is a lot of debate in many quarters about whether and how to control them. Mr. Tom Sault.
- Goannas were observed in kakadu standing upright and looking like a stump. Miss Marie Allender.
- The dramatic landforms of Kakadu and their beauty especially in the morning light were remarked on by Mr. Andy Blackburn.

Proving their point

'Ants are among the most ubiquitous, abundant and familiar of insects.' So begins the introduction to a book which arrived recently in the Club's library. When the sticky tape was removed and the cardboard container opened thousands of ants swarmed from within. And the book? Vol. 2 of the Zoological Catalogue of Australia - on ants! We hope the performance will not be repeated with the arrival from Canberra of Vol. 3 on spiders.

General Meeting
Monday, 10th August

The Speaker for the evening was Dr. Robin Hirst, Director of the Planetarium at the Museum of Victoria, who gave a talk entitled "Where on Earth Are We?"

He began by pointing out that just as a building, like the Museum, has an address and may be located by referring to the other buildings and streets in the City, so may our Earth be located among the other planets of the Universe.

After locating the position of the Museum on the Earth, Dr. Hirst began a journey outward from the Earth through the Universe. He discussed such things as: the relationship of the Earth to the Sun and the

Continued from inside front cover.

Geology Group – First Wednesday

Wednesday, 7th October. Some Aspects of Volcanics in Victoria (title to be confirmed) Mr. E. B. Joyce.

Wednesday, 4th November. Mr. Marcus Marsden. (subject to be confirmed)

Wednesday, 2nd December. Member's Night.

Mammal Survey Group – First Tuesday

Tuesday, 6th October. To be announced.

Tuesday, 27th October (November meeting) to be announced.

Tuesday, 1st December. Christmas Member's Night.

Microscopical Group – Third Wednesday

Wednesday, 21st October. "Movie and Still Photography through the Microscope" Dr. E. Peters.

Wednesday, 18th November. "The Ostracoda." Mr. Russell Ward.

GROUP EXCURSIONS

All FNCV members and visitors are invited to attend any Group Excursions.

Botany Group

Saturday, 24th October. Bush Reserves at St. Andrews and Panton Hill. Leader: Ms. Dorothy Mahler.

Saturday, 28th November. Sorrento Back Beach.

Mammal Survey Group

Saturday, 31st October – Tuesday, 3rd November. Camp.

other planets of our Solar System, other objects such as comets and meteors in our Solar System, the position of our Sun amongst the other stars in our galaxy, the Milky Way, and the fact that our galaxy is only one of so many in the Universe. The talk was well illustrated by slides and many questions followed.

Exhibits

– under microscopes: a section of a rock containing ocolites (small spherical rock particles with a concentrically laminated structure), crystals of Salacene illuminated with plane polarized light and a slide of butterfly scales arranged to look like a vase of flowers. Mr. Dan McInnes.

– Minerals: Australite and a portion of an iron meteorite from Central Australia and Fulgarite (sand fused by a lightning strike) from Fraser Is., Qld. Mr. Andy Blackburn.

– A copy of the 1871 edition of "The Mammals of Australia" illustrated by the Scott sisters (from the FNCV library) and a recent article in "Aust. Nat. History" on the Scott sisters and a specimen of the fungus *Calostoma fuscum.* Mrs. Sheila Houghton.

– A Blackfellows Bread fungus. Mr. Tom Sault.

C. M. Ashburner

Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria
Established 1880

Registered Office: FNCV, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

Patron
His Excellency, The Rev Dr John Davis McCaughey, The Governor of Victoria.

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Mammal Survey: Mr JULIAN GRUSOVIN, 17 Sutherland Street, Chadstone, 3148. (211 4997)

Microscopical: Mrs ELSIE GRAHAM, 147 Broadway, Reservoir, 3073 (469 2509)

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

Subscription rates for 1987

Metropolitan Members (03 area code)	$25.00
Joint Metropolitan Members	$27.00
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Late Fee (Renewing Members), after end of March	$2.00

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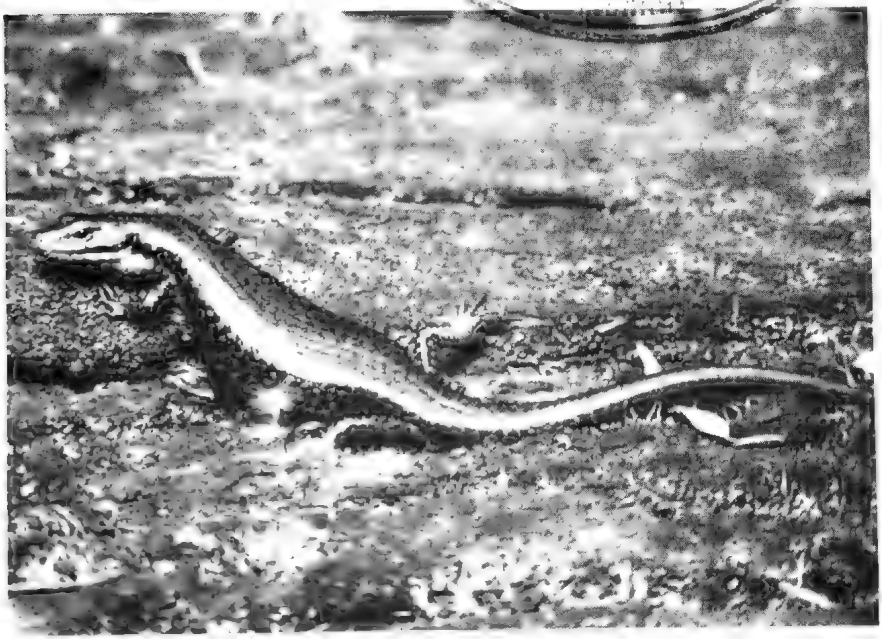

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FNCV DIARY OF COMING EVENTS

GENERAL MEETINGS

Note: Until further notice, General Meetings will be held at the Royal Society Hall, 9 Victoria Street, Melbourne.

Monday, 8th February, 8.00 p.m.
Cam Beardsell "Fauna of the Melbourne Area".

Monday, 7th March, 8.00 p.m.
Robert King "Conservation of Geological Features".

New Members

Metropolitan:
Mr. Stephen Holliday – North Balwyn.
Miss Lesley Wheeler – Glen Iris.
Mr. Richard Kastraby Altona.
Mr. Gary Richardson Frankston.

Joint Metropolitan:
Mr. Ian D. Enderby and Mrs. Margaret Enderby Montmorency.
Ms. Dianne Beevers and Mr. Geoffrey Beevers – Fitzroy.
Mr. Angel Villamarzo and Mrs. Valentine Villamarzo – Box Hill.

Country:
Mr. Alan Jenkins – Ballan.

FNCV EXCURSIONS

Friday 8th – Saturday 16th Jan. 1988. Tasmania. See Sept-Oct Victorian Nat. for details or ring Marie Allender.

January 23rd-26th. Annual **Australia Day Alpine Campout.** Dargo High Plains. Contact Will Ashburner 789 8485 (AH).

Sunday 7th Feb. Mt. Donna Buang. Insects and General. Leader: Peter Carwardine. Coach will leave Batman Ave. at 9.15. Fare: $14. Bring a picnic lunch.

Saturday 12th – Monday 14th March. Please keep this date free for the Victorian Field Naturalists Clubs Association Weekend. Program details will appear in the next Victorian Naturalist.

GROUP MEETINGS

Note: Until further notice, Group meetings will be held at the Astronomers Residence, Birdwood Avenue. (A few metres nearer the Shrine than the Herbarium.)

Botany Group – Second Thursday

Thursday, 11th February. "Food Plants of Butterflies and Moths". Mr. John Reid. Mr. Reid will lead an excursion on 27th February to follow up this talk. Contact Margaret Potter.

Day Group – Third Thursday

No meetings in December or January.

Thursday, 18th February: Garden City and West Gate Parks. Meet at the bus terminus 11.30 am, or catch bus 201 at Corner Flinders and Elizabeth Streets at 11.10 am.

Microscopical Group – Third Wednesday

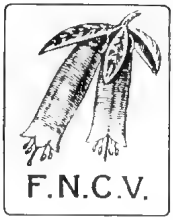
Wednesday, 20th January: Members' night, bring your own exhibits.

Wednesday, 17th February: Making your own microscope. For beginners.

Mammal Survey Group

First Tuesday, 2nd February. Dr. Cath Handesyde "Life style and veneral diseases of the Koala".

Easter Trip: Meds Corner, Mallee.



The Victorian Naturalist

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Editor: R. Thomson.

Cover Illustration: Gravid Southern Water Skink, *Sphenomorphus tympanum* (see page 178) photo: Chris Banks.

President's Note

It won't be long before it's time to pay Club subscriptions again, and I'm worried about the increasing numbers who fail to renew each year. There will always be some who for one reason or another are unable to do so, but despite regular Club intake of new members, there has been a decline in membership over the past few years.

For most of you the 'Victorian Naturalist' is your only regular contact, and your Council feels that it may not be offering what you seek.

The best way to rectify that is to contact me with your suggestions, or better still, send **your** contributions to the Editor who will consider offerings in all appropriate sections. Country members in particular should be able to provide considerably more input of 'Naturalist Notes' theme than we receive at present: – Something after the style of the Platypus sightings on page 122 of the last July/August issue, for example.

We want to ensure that the Club remains a large and respected natural history association, and your continued membership is vital for this. I also remind you that for many members (students, teachers, scientists, for example) subscriptions **may** be tax deductible.

Jack Douglas
President, FNCV

Notes from the National Herbarium of Victoria – 6
Recording the Distribution of Weeds in Victoria

By P. S. Short*

An analysis of the flora of Victoria by Ross (1976) showed that 747 (22.49%) of 3,322 species of vascular plants were naturalized aliens. Previous records (Ewart 1931) reveal that in 1909 there were 363 alien species in Victoria. By 1928 the number had increased to 461. The figures indicated an addition of almost six alien species per year for over 100 years. The naturalization of alien species is an on going process and in 1984 approximately 825 naturalized species were recorded for Victoria (Forbes *et al.* 1984).

Some naturalized species, such as cereals and pasture grasses, are valuable additions to Victoria and are of little threat to native flora. However the majority cannot be seen in this manner. Many infest agricultural land (there are over 100 declared noxious weeds in Victoria) and some invade tracts of native vegetation. Furthermore many alien species, although as yet untroublesome, have the potential to become a problematic addition to our flora. For example Conran (1987) has recently drawn attention to a population of *Kniphofia uvaria* (L.) Hook.f. (Red Hot Poker) which is established on Phillip Island. In the 1985-86 season it was estimated that the 61 mature plants in the colony produced 550,000 seeds. The high fecundity of the population is also reflected by the presence of 15-20 seedlings and immature plants per square metre. The population of *K. uvaria* is established in a dune swale and the species certainly seems to have the potential to spread further in the dune system, to the detriment of native vegetation.

The recognition of weeds, both naturalized and native, and their distribution in Victoria is clearly of concern to conservationists and agriculturalists. But how many people show their concern in a useful and constructive manner? How many readers collect weeds for the National Herbarium of Victoria?

The National Herbarium of Victoria (MEL), since its inception in 1853 by the then Government Botanist, Ferdinand Mueller, has been the State Government of Victoria's centre for taxonomic research. It has been and remains the most important Victorian repository of dried plant specimens. This suggests that anyone wishing to obtain information on the introduction, spread and general distribution of weed species need only consult herbarium specimens at MEL. Well documented herbarium collections should after all give information as to the locality, date of collection and collector's name. In theory it should be possible to construct historical distribution maps of weed species from collections. Sadly this is rarely possible. Even common weeds such as *Cichorium intybus* L. [Chicory], *Hypochoeris glabra* L. [Cat's-ear] and *Chondrilla juncea* L. [Skeleton Weed] are poorly represented. We may know, or think we know, the distribution of our weeds but clearly many of our distributional records are not substantiated by herbarium specimens deposited in MEL. In the absence of such specimens how can we be certain that a species recorded for a particular area was correctly identified?

Anyone concerned about the introduction and spread of weeds and wishing to produce useful information should seriously consider collecting specimens for the National Herbarium of Victoria. Notes on collecting and preparing plant specimens are available from the Herbarium.

Despite a general paucity of collections of many weeds it has been possible to compile historical distribution maps for some species and they are incorporated in this article. In the case of noxious weeds

* National Herbarium of Victoria, Dept. of Conservation Forests and Lands, Birdwood Ave., South Yarra 3141.

distributions based only on herbarium records are compared with distributions recorded by Parsons (1973), who included both vouchered and unvouchered records in the preparation of maps. (The reference in the figure caption to 'all records' thus refers to records published by Parsons plus records based on herbarium specimens.) The dearth of herbarium collections in such cases is all too apparent. In including unvouchered or unsubstantiated records I have *assumed* that the species concerned were correctly identified. This applies not only to maps published by Parsons (l.c) but to published reports by others on the distribution and spread of species.

Although few in number, collections housed at the Botany Department, University of Melbourne (MELU), as well as MEL, were consulted before distribution maps were compiled. The possibility that historically interesting herbarium specimens are housed at MELU can never be overlooked. This is, at least partly, a reflection of the fact that Professor A. J. Ewart was associated with both MEL (as part-time Government Botanist) and the University of Melbourne (as Professor of Botany). Ewart also compiled a Flora of Victoria (Ewart 1931) and wrote a number of articles on weeds (e.g. Ewart & Tovey 1906, Ewart 1909).

***Chrysanthemoides monilifera* (L.) Norlindh [Boneseed] Compositae**

Boneseed, a native of South Africa, was cultivated in the Royal Botanic Gardens, Melbourne as early as 1858 (Mueller 1858). For a considerable time it seems to have stayed within the confines of gardens and Ewart (1931) merely recorded it as an 'occasional garden escape'. Wheeler (1964) stated that boneseed 'became established at Cheltenham in 1908 and Brighton Beach in 1910. Ten years later it was spreading rapidly along coastal regions from Point Lonsdale to Lorne, and about the same time from Frankston to Arthur's Seat, on the Mornington Peninsula' (p. 225). Wheeler also noted that *C. monilifera* was first noticed on the western slopes of the You Yangs in 1950. Parsons (1973) stated that 'in 1910 it [was] recorded as being established at Cheltenham and Brighton Beach and soon afterwards in the You Yangs and on the Mornington Peninsula, but by 1930 it was still recorded as only an occasional escape. Since the 1940s the spread and development of boneseed has been remarkable. . .' (p. 101). An examination of collections at MEL and MELU (table 1, fig. 1a-c) does not confirm the establishment of *C. monilifera* at either Cheltenham in 1908 or Brighton in 1910. A collection from the former locality does not seem to exist and that from the latter is labelled as being a cultivated specimen. The earliest specimen which may be wild collected was gathered near Geelong in 1910 (table 1). However the occurrence of boneseed at Lorne in the early 1920s is confirmed by the Gates' collection. The herbarium collections also fail to highlight the remarkable spread of boneseed, alluded to by Parsons, since the 1940s. It is also surprising that we lack specimens from the You Yangs, an area well known to be infested by the species.

Norlindh (1943) recognized six subspecies of *C. monilifera.* All collections cited in table 1 are referrable to the subspecies *monilifera.* However whether the unsubstatianted records only pertain to this subspecies is open to question. Jacobs and Pickard (1981) record *C. monilifera* subsp. *rotundata* (DC.) Norlindh for New South Wales as do Simmons and Flint (1986) in their study of the two subspecies in South Australia, Victoria and New South Wales. *C. monilifera* subsp. *rotundata* has also recently (5 Sept. 1985) been gathered by Randell Robinson (MEL 1553295) from Studley Park. Robinson has also gathered specimens (e.g. MEL 1553297) from Studley Park with morphological attributes somewhat intermediate between subsp. *monilifera* and subsp. *rotundata.*

***Dittrichia graveolens* (L.) Greuter [Stinkwort] Compositae**

Stinkwort is native to the Mediterranean region and until recently was referred to the genus *Inula* L.

A record (Anon. 1893) of plants naturalized in Victoria since 1889 listed 52 species,

one of which was *Dittrichia graveolens*. Ewart (1909) recorded that Stinkwort entered Victoria via South Australia and subsequently stated (Ewart 1931) that it is 'a fetid weed, proclaimed for the whole State...widely spread in Victoria, and recorded as naturalized in 1893. This weed first appeared in 1850 in South Australia...and did not reach Gippsland until 1919 (Nowa Nowa)' (p.1146). Parsons (1973) noted that the weed became firmly established in the Wimmera and southern Mallee during the first 20 years of this century. The collections at MEL and MELU (table 1, fig. 1 d-f) generally confirm the published findings on the weeds introduction to Victoria, at least in regard to the direction and timing of its spread. However its early abundance in the Western Districts is by no means indicated and there are marked discrepancies between the maps primarily based on unsubstantiated records and those compiled entirely from herbarium specimens.

***Hypericum perforatum* L. [St. John's Wort] Guttiferae**

This weed, a native to Europe, has long been known to have medicinal properties. Gerard (1597) noted that 'St. John's woort, with his flowers and seede boiled and drunken, provoketh urine, and is right good against the stone in the bladder and stoppeth the laske. The leaves stamped are good to be laide upon burnings, scaldings, and all wounds; and also for rotten and filthie ulcers...Dioscoroides saith, that the seed drunke for the space of fortie daies togither, cureth the Sciatica, and all aches that happen in the hips' (p. 433).

French (1905) recorded that St. John's Wort was introduced to a garden in Bright in the 1880s by an elderly lady seeking to make use of its medicinal properties. Parsons (1982) says that the lady was a German midwife who acquired the plant because of its alleged ability to induce abortions. In any case her garden at Bright was soon overrun and seeds from uprooted plants thrown over her fence were quickly conveyed by stock to the Bright race-course and in a short time had spread along stock-routes radiating from the township. The plant was considered to be naturalized in 1893 (Anon. 1893). Its abundance in the Bright district was noted by Maiden (1900), who stated that 'it is very abundant in paddocks and along the side of the road, the district being over large areas ablaze with its yellow flowers...my driver called [it] the pest of the district' (p.44). French (l.c.) recorded that by 1905 *H. perforatum* had spread from the Ovens Valley to Benalla, Rutherglen and Tallangatta and had successfully established itself around Omeo and the Dargo region. It was estimated that over 10,000 acres had been invaded in the 20-25 years since its introduction. Parsons (1973) noted that by 1917 it had spread further, with over 200,000 acres infested. Apparently it was dispersed by gold-miners to places such as Bendigo and Newstead, the seed being a contaminant of the chaff for their horses. The construction of railway lines also hastened its spread.

From the accompanying maps (fig. 1 g-i) and the data in table 1 it is apparent that the published records and the information recorded by herbarium specimens match well, at least until about 1930. The collection from Box Hill Railway Station, gathered by French in 1908, does not seem to have been noted in publication, but is consistent with the observation that the species has spread along railway lines. However there are considerable discrepancies when the total distribution of the species as inferred from herbarium records is compared with published records.

***Marrubium vulgare* L. [Horehound] Labiatae**

Horehound, a member of the mint family is a native of Europe.

Ferdinand Mueller (1885), in a book detailing plants suitable for cultivation in Australia, said horehound 'can nowhere be unwelcome, as it does no unduly spread, ...has important medicinal properties...and excellent honey' (p. 209) *M. vulgare* was in fact cultivated at the Melbourne Botanic Gardens in 1852 (Ginn 1852). Ewart (1931) recorded that it was 'a

Table 1: Earliest Victorian records of *Chrysanthemoides monilifera* subsp. *monilifera, Dittrichia graveolens, Hypericum perforatum, Marrubium vulgare* and *Senecio elegans* at MEL and MELU.

Date	Locality	Collector	MEL, (MELU) number
Chrysanthemoides monilifera* subsp. *monilifera			
1910	Brighton Beach - cultivated	Tadgell	49304
1910	Geelong	Williamson	(19232)
1921	Lorne	Gates	49305
1940	Black Rock	Goudie	49310
1943	Frankston	Smith	1535443
1949	Red Cliffs	Parke	(19230)
1959	Hurstbridge	Aston	49308
1959	Anglesea	Smith	1527791
1961	Warburton	Giovanni	49309
1961	Frankston	Hallet	(19229)
1962	Somers	Hay	49306
1965	Portland	Anway	49307
Dittrichia graveolens			
1892	Dimboola	Reader	1553391
1892	Lowan District	Ag. Dept.	1553397
1897	Rosstown	Anon.	649240
1897	Rostown	Baker	650148
1905	N. Victoria	Gamble	1553394
1906	Wannan District	Shire Secretary	1553398
1907	Mansfield	Thom	1553389
1908	Deer Park	Read	1553400
1910	Benalla	St. John	649241
1912	Oakleigh	Dixon	1553392
1917	Eltham	Truill	1553407
1917	Tyabb	Krcouse	1553393
1920	South Yarra	Tovey	1553399
1921	Kew	Pocket	1553395
1922	Fawcett	Taylor	1553396
1929	Mildura	Paret	1553408
1943	Heidelberg	Smith	1534063
Marrubium vulgare			
1880s (?)	Geelong	Wilson	1553405
1887	Junction of Darling & Murray	Minchin	1553403
1892	Grampians	Fiddian	1553404
1903	Altona	St. John	575427
1910	Wilsons Prom	Audas & St. John	682078
1912	Pt. Lonsdale	Tiden	1553402
1922	Dandenong	Williamson	(17570)
1943	Williamstown	Smith	1533994

Date	Locality	Collector	MEL, (MELU) number
Hypericum perforatum			
1901	Eldorado	Welsh	643951
1903	Ernani	Cowle	579657
1908	Box Hill Railway Station	French	643962
1908	Eldorado	Anon.	643952
1909	Woodfield district	Anon.	643955
1909	Bright	St. John	623201
1913	Shire of North Ovens	Anon.	643959
1913	Shire of Newstead	Anon.	643953
1916	Majorca	Outtrim	643960
1916	Muckleford	James	643963, (15473)
1917	Huntly	Anon.	643956
1919	Cathkin	Robertson	643961
1922	Limonite	Nott	643958
1922	Mt. Clear via Ballarat	Vaudeary	643950
1922	Jumbunna	Cruishshank	643957
1928	Lang Lang	Williamson	(15474)
1928	Bright	Pitcher	643965
1933	Eurobin	Black	643943
1935	Eurobin	Anon.	643944
1941	Mt. Buffalo	Smith	1533164
Senecio elegans			
1893	Port Fairy	Wilhamson	684185
1895	Mouth of Hopkins River	Williamson	(19124)
c. 1898	Mouth of Hopkins River	Wilhamson	684183
1910	Wilsons Prom.	Audas & St. John	648812
1913	Darby River bridge	Anon.	648811
1916	Warrnambool	Anon.	684184
1929	Wilsons Prom.	Anon.	684182
1935	Warrnambool	Robbins	539464
1942	Bridgewater Bay	Beauglehole	539002
1952	Bridgewater Bay	Melville	536697

garden escape. . .widely spread in Victoria and recorded as naturalized in 1870. . .used medicinally for catarrh' (p.991). His reference to 1870 as the date of introduction seems to refer to Bentham's (1870) account of the Labiatae in *Flora Australiensis.* Bentham noted that *M. vulgare* had been gathered in Victoria. Ewart (1909) recorded that the plant was widely spread early this century, so much so that it was proclaimed as a weed under the Thistle Act for the Warrnambool District in 1905 and for the Shire of Maldon in 1908. He (Ewart 1931) subsequently reported that it had been proclaimed for Colac, Dundas, Minhamite and Ramsey.

Horehound is currently represented in MEL and MELU by over 50 collections from Victoria. Although this is a sizeble number there are still marked discrepancies when the distribution of the species discerned from the collections is compared with the map (fig. 1 j-l) based on all records. The recorded history of the spread of the

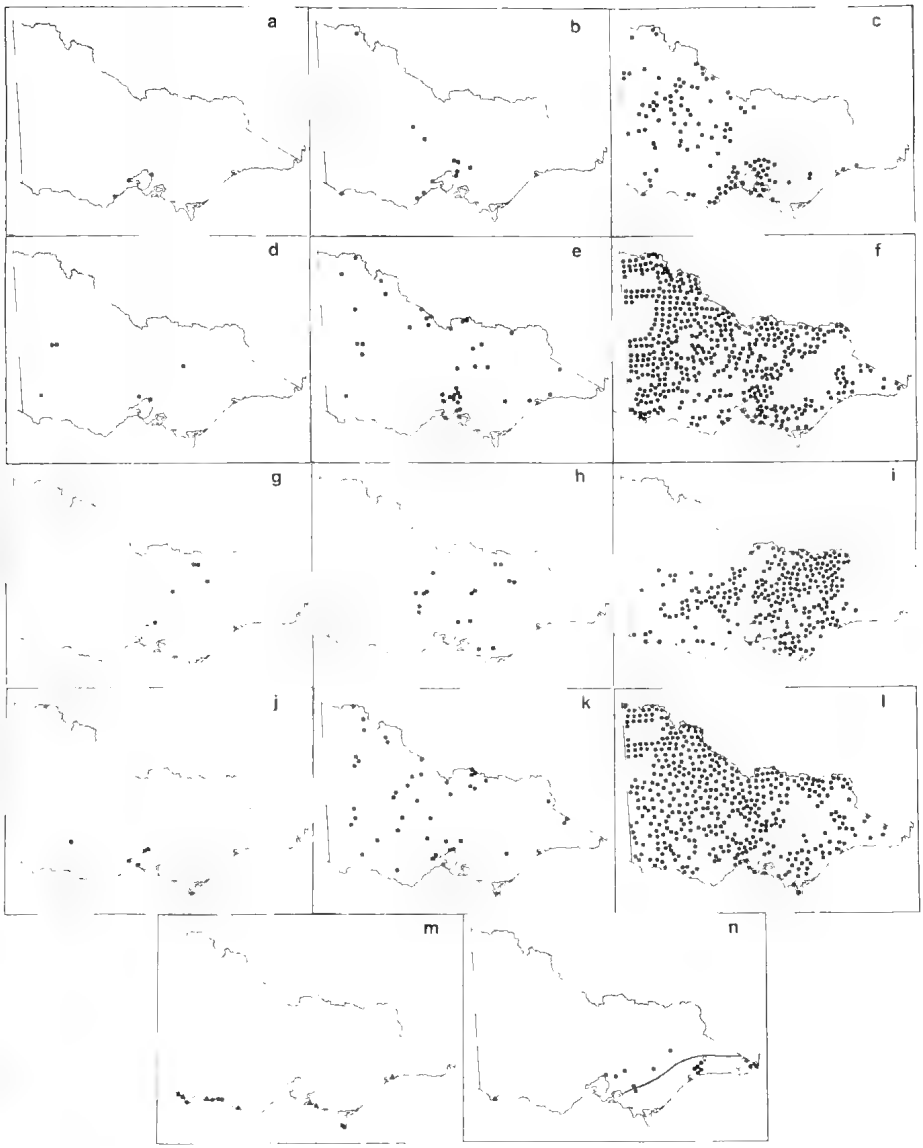

Fig. 1. (*a-c*)Distribution of *Chrysanthemoides monilifera* in Victoria; *a* – herbarium specimens pre 1940, *b*, – herbarium specimens pre 1986, *c* - all records. (*d f*)Distribution of *Dittrichia graveolens* in Victoria; *d* – herbarium specimens pre 1910, *e* – herbarium specimens pre 1986, *f* – all records. (*g-i*) Distribution of *Hybericum perforatum* in Victoria; *g* – herbarium specimens pre 1910, *h* herbarium specimens pre 1928, *i* - all records. (*j-l*) Distribution of *Marrubium vulgare* in Victoria; *j* - herbarium specimens pre 1913, *k* – herbarium specimens pre 1986, *l* – all records. (*m*) Distribution of *Senecio elegans* in Victoria; dots refer to pre 1936 collections, triangles to post 1936 collections. (*n*) Distribution of *Pittosporum undulatum* in Victoria; circles refer to pre 1940 collections, dots to post 1940 collections. The natural range of *P. undulatum* is considered to be to the seaward side of the Great Dividing Range and is indicated by the broad line on the map.

species is also not well reflected by the specimen data.

***Pittosporum undulatum* Vent. [Sweet Pittosporum] Pittosporaceae**

Pittosporum undulatum apparently occurs naturally on the seaward side of the Great Dividing Range, extending from near Brisbane to Western Port Bay (but excluding Wilsons Promontory). Populations in the environs of Melbourne, along the Otway Coast, the Mornington Peninsula and in the vicinity of Portland have only become established in recent years. The spread of the species has been documented by Gleadow and Ashton (1981). They have suggested that its increasing abundance in the Melbourne area is, to some extent, the result of vigorous fire-supression policies in Victoria since 1939. For that reason the distribution map (fig. 1 n) displays collections gathered prior to 1940 and after 1940.

The distribution map published by Gleadow and Ashton (l.c.) is not too dissimilar to that in Fig. 1 although there is an absence in both MEL and MELU of specimens to substantiate some of their locality records along the Otway Coast and the Mornington Peninsula.

***Senecio elegans* L. [Purple Groundsell] Compositae**

This species was cultivated in the Melbourne Botanic Gardens as early as 1852 (Ginn 1852) and is now to be found along much of the Victorian coastline. Ewart (1931) described it as an annual but noted that in cultivation this 'handsome weed, native to South Africa...grows as a biennial or even perennial, and may develop double forms with numerous ray florets' (p. 1173).

Senecio elegans presumably became established as a weed following its escape from gardens. The first published record of this species as a naturalized plant in Victoria appeared in this journal in 1905. It was noted that Mr. H. B. Williamson had exhibited a dried specimen of the plant from the mouth of the Hopkins River. Ewart (1931) subsequently referred to this note and gave the localities 'Hopkins River from 1898; Darby River, National Park, from 1900. Five mile Beach, 1910'. There is no collection from the Darby River at MEL or MELU for 1900 but the early occurrence of *S. elegans* in the vicinity of Wilsons Promontory is recorded (see table 1). In fact published records and information from herbarium records are in general agreement. However just how the species has spread along the coast is open to conjecture. Do seeds spread by wave action or wind? Has the species spread as the result of one or several introductions? And how accurately does the map (fig. 1 m) reflect the true distribution of the species?

Acknowledgements

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Naturalist Note
Prey Constriction in the Adelaide Hills Copperhead *Austrelaps labialis*

BY T. P. MORLEY*

Shine & Schwaner (1985) presented data on prey constriction in 16 species of venomous Australian snakes, representing four genera of colubrid, six genera of elapid and one hydrophiid. The purpose of this note is to report prey constriction in an additional genus of Australian elapid.

Fig. 1. Adelaide Hills Copperhead *Australeps labialis* constricting an adult *Hemiergis peronii.*

On the 9.V.1986, I acquired a juvenile Adelaide Hills Copperhead *Austrelaps labialis* (Shine, 1987), 163mm SVL and 197mm total length. For the first five months the snake ignored live, newborn mice provided as prey, and fed on small skinks (i.e. *Hemiergis decresiensis, H. peronii, Morethia adelaidensis* and *M. boulengeri).* On 25.VI.1986 when offered an adult *Hemiergis peronii,* the snake immediately seized it in the nape region and wrapped itself around the lizard in a series of coils (Fig. 1). The snake continued constricting biting the lizard for approximately five minutes before swallowing the prey, head first. The snake continued to hold the lizard within coils of its body until only the lizard's hind legs were visible.

This note is an important addition to the work of Shine and Schwaner (1985) who showed that prey constriction is quite common in venomous snakes, and that there is no significant difference in the proportion of venomous and non venomous genera utilizing constriction.

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Habitat of Gunn's Orchid *(Sarcochilus australis)* from the Northern Strzeleckis, Victoria

BY DAVID CHEAL*

In *Vict. Nat.* V103(6): 168-9, Barnett and Beattie listed sixteen host species for *Sarcochilus australis* in the Otways. This short note further characterises the habitat and host species of this uncommon epiphyte from a comparable locality in the northern foothills of the Strzelecki Ranges in South Gippsland, Victoria.

The study site was in a reserve managed by the Department of Conservation, Forests and Lands. Vegetation in the Reserve varied with topography, soil type, exposure and other environmental features, but the *S. australis* was restricted to tall open-forest dominated by *Eucalyptus cypellocarpa,* with a dense understorey of mesic small trees (see Table 1), with scattered emergent *Acacia melanoxylon.*

Methods

A broad transect of 20m width and approx. 100m length was laid out through a section of forest in which *S. australis* was relatively common. A 3m radius circular quadrat was taken around the first shrub encountered on the transect that supported *S. australis.* All vascular plant species occurring in or projecting over the quadrat were then recorded. The girth of the trunk of the supporting shrub/tree at 1m was then measured. After moving 10m along the transect this procedure was then repeated at the next shrub encountered that supported *S. australis.* Eleven quadrats and their associated data were taken.

The relative importance of each shrub species at the study site was calculated by counting the number of individuals present along a representative segment of the transect (see Table 1).

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Results

The most frequent co-occurrences of vascular plant species with *S. australis* are illustrated in Table 2.

The eleven *S. australis* occurrences studied were on *Pittosporum undulatum* (4), *Coprosma quadrifida* (3), *Olearia argophylla* (2), *Pomaderris aspera* (1) and a dead *Bedfordia arborescens* (1). In spite of extensive searching up and down the gully *S. australis* was not found on live *Acacia melanoxylon,* live *Bedfordia arborescens, Eucalyptus* spp., *Helichrysum dendroideum, Olearia lirata* or *Rapanea howittiana.*

S. australis did not occur in the deeply incised gully of the study site, but on a raised

Table 1. Relative Importance of Woody Species at the Study Site.

Species	Number of Individuals	Percent of Total
Pittosporum undulatum	65	47
Coprosma quadrifida	18	13
Pomaderris aspera	17	12
Olearia argophylla	15	11
Bedfordia arborescens	11	8
Rapanea howittiana	6	4
Helichrysum dendroideum	4	3
Olearia lirata	2	1
TOTAL	138	

Table 2. Co-occurrence of *S. australis* and other vascular plants

Species	No. quadrats
S. australis	11
C. quadrifida (orchid host)	11
P. undulatum (orchid host)	11
Microlaena stipoides	10
Clematis aristata	9
Pellaea falcata	9
Polystichum proliferum	9
Sambucus gaudichaudiana	9
Stellaria flaccida	9
Pandorea pandorana	8
Olearia argophylla (orchid host)	6
Pomaderris aspera (orchid host)	5

shelf 30m or more above the creek. However, the creek banks had been severely disturbed before the reserve was proclaimed and thus the orchid may have been eliminated there.

Girths, at 1m above ground, of the hosts ranged from 7cm (*C. quadrifida*) to 83cm. (*P. undulatum*) with a mean of 41cm. (Excluding *C. quadrifida*, the mean girth of hosts was 50cm.). Many of the plants at the study site attained unusually large size. The largest *Olearia argophylla* had a girth of 159cm at 1m and the largest *Bedfordia arborescens* was measured as 156cm at 1m.

Discussion

At this study site, *S. australis* was restricted to dense closed-forest, with or without emergent *A. melanoxylon* or *Eucalyptus* spp. The only hosts were species found in relatively undisturbed vegetation. Woody species of marginal sites or forest clearings (such as *H. dendroideum* and *O. lirata*) did not support the orchid. *S. australis* was never found, even on otherwise suitable hosts, adjacent to breaks in the canopy. The two most frequent hosts (*C. quadrifida* and *P. undulatum*) are able to successfully regenerate in unburnt (and otherwise undisturbed) vegetation.

Not all species were equally favoured as hosts for the orchid. *C. quadrifida* and *P. undulatum* were equally frequent as hosts, but *C. quadrifida* was apparently favoured as host over *P. undulatum* as there were far fewer individuals of this species at the study site (Table 1). Some woody species did not support *S. australis* even though they had apparently suitable niches for it.

It is useful to record some indication of host species frequency and the frequency that they supported *S. australis* as well as a list of the host species.

Summary

1. *S. australis* clearly favours the dense shelter provided by the closed canopies of mesic closed-forest or similar understoreys in tall open-forest. It does not occur in exposed or recently-disturbed sites.
2. Even within this habitat some species are clearly favoured over others as hosts and the reasons for this are presently obscure.

Acknowledgement

Dr. Paul Gullan (Flora Survey) provided useful comment and advice on an early draft of this article.

Green's Bush, Mornington Peninsula

This large patch of bush, currently an important remnant for the Peninsula supports a large population of Grey Kangaroos and some rare and vulnerable communities of plantlife.

An appeal to purchase the land and prevent impending subdivision is underway, but recently this has been given a great boost. **The Government and the Ross Trust have each offered $1 for every $1 donated** i.e. your donation of $1 becomes $3. Donations also may be tax deductable.

For information, contact Stephanie Rennick on (03) 578 1679.

Donations to: Greens Bush Appeal, Victorian Conservation Trust, 6th floor, 250 Victoria Pde., East Melbourne.

Land Conservation Council Investigation of Rivers and Streams in Victoria

The LCC is preparing a descriptive reprot of the scenic, recreational, cultural and ecological values of rivers and streams in Victoria.

When this report is published, submissions from the public will be invited, and will be considered in the preparation of Recommendations regarding use and management of these waterways and the ways in which their values can best be protected.

Information is available from the Secretary, LCC, 4th floor, 464 St. Kilda Rd., Melbourne 3004, Phone: (03) 267 1311.

Notes on Birth and Early Development in Three Species of Common Victorian Reptiles

By Chris B. Banks*

Introduction

It is a policy of the Royal Melbourne Zoo's Reptile Department to record all reproductive data arising from specimens within the collection. This applies equally to those species regarded as common due to their ubiquity, as it does to those which are rare or endangered.

In 1985, representatives of three common species were received into the collection – a gravid female Jacky Lizard *(Amphibolourus muricatus)* was received as a donation and groups of Red-bellied Black Snakes *(Pseudechis porphyriacus)* and Southern Water Skinks *(Sphenomorphus tympanum)* were lodged at the Zoo as confiscated stock.

Jacky Lizards are small agamids (100mm snout-vent) inhabiting dry sclerophyll forests and coastal heathlands from south-east Western Australia along the coasts and ranges to northern New South Wales and south-east Queensland (Cogger, 1986). The female received at the Zoo originated in the Buxton area, 80km north-east of Melbourne, Victoria (S. Eliades, pers. comm.).

The Southern Water Skink is usually encountered near or along small creeks in southern and eastern Victoria and south-east New South Wales. Isolated populations occur in the Fleurieu Peninsula, South Australia, and the northern tablelands of New South Wales (Cogger, 1986). The lizards lodged at the Zoo were of the population referred to as the 'cool temperate form' by Rawlinson (P. Rawlinson, pers. comm.).

The Red-bellied Black Snake is a medium-large snake (1.5m total length), usually found in association with swamps and streams from far north Queensland to south-east South Australia (Cogger, 1986).

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Materials and Methods

The *A. muricatus* eggs were incubated in moist Vermiculite (80% water by weight) in a sealed plastic container positioned in a circular, still-air fowl incubator.

Eggs, neonates and young specimens were weighed on a triple-beam balance to the nearest 0.1g. Egg lengths and widths were measured with vernier calipers to the nearest 1mm. Snout-vent and total lengths of neonates and young lizards were measured against a standard 300 mm ruler to the nearest 1mm, and a squeeze-box was used for the snakes (Quinn and Jones, 1974).

Each group of young lizards or snakes was maintained separately in steel-framed glass aquaria measuring 530 x 250 x 310mm height. Wood-framed, fly-wire lids provided good ventilation and lighting. A 1.2m Trulite fluorescent tube was suspended 30mm above the tops of the tanks containing both groups of lizards. A substrate of washed, coarse river gravel was cleaned or changed as necessary and a network of branches was provided for the *A. muricatus*.

Small pieces of terra-cotta plant pots and strips of bark were provided as cover for the snakes and skinks. Fresh water was available at all times.

Results

Amphibolurus muricatus

A heavily-gravid female measuring 76mm snout-vent was received on 22 December, 1985. It was set up in a tank having dimensions and furnishings as previously described. A piece of slate was angled against a small rock in the hope that the lizard would lay her eggs in the sand cavity underneath. The air temperature in the tank at this time was 25-28°C. On 11 January, 1986, 12 eggs were deposited on the floor of the tank. They weighed 1.1-1.2g (mean 1.15g) and measured 11-12mm (mean 11.2mm) wide x 14-17mm (mean 16mm)

long. They were incubated at a constant 28 °C. Four eggs were discarded after 21 days, as they had become deeply sunken – each contained a single embryo which had died early during incubation.

Hatching commenced on the 48th day with two lizards emerging. A further lizard emerged the next day and two more on day 50. Two had slightly kinked tails and the tail of a third was bent almost double, with the distal section being shorter and having a blunt tip. The remaining three eggs were opened on day 51 – one was infertile but two each contained a full-term dead foetus. One had a slightly twisted spine and the other a large, unabsorbed yolk sac.

The young lizards were very lethargic until sprayed lightly with water. This stimulated immediate activity and drinking from the branches and tank walls. Within a week the lizards were readily accepting small, live crickets *(Teleogryllus oceanicus)* dusted with D.C.P. 340 (dicalcium phosphate). On three occasions during the first month, 'foot-waving' was observed when crickets were introduced. One specimen with a slightly kinked tail died after three weeks from an unknown cause.

The lizards spent the majority of the time basking on the uppermost branches under the True-lite. The temperature was allowed to decrease to 18-21 °C from early June to late August, during which time feeding was curtailed. By the eighth month the only individual with an obvious deformity was that possessing the tail bent double at hatching. This specimen had the greatest snout-vent length but did not appear to be as agile as

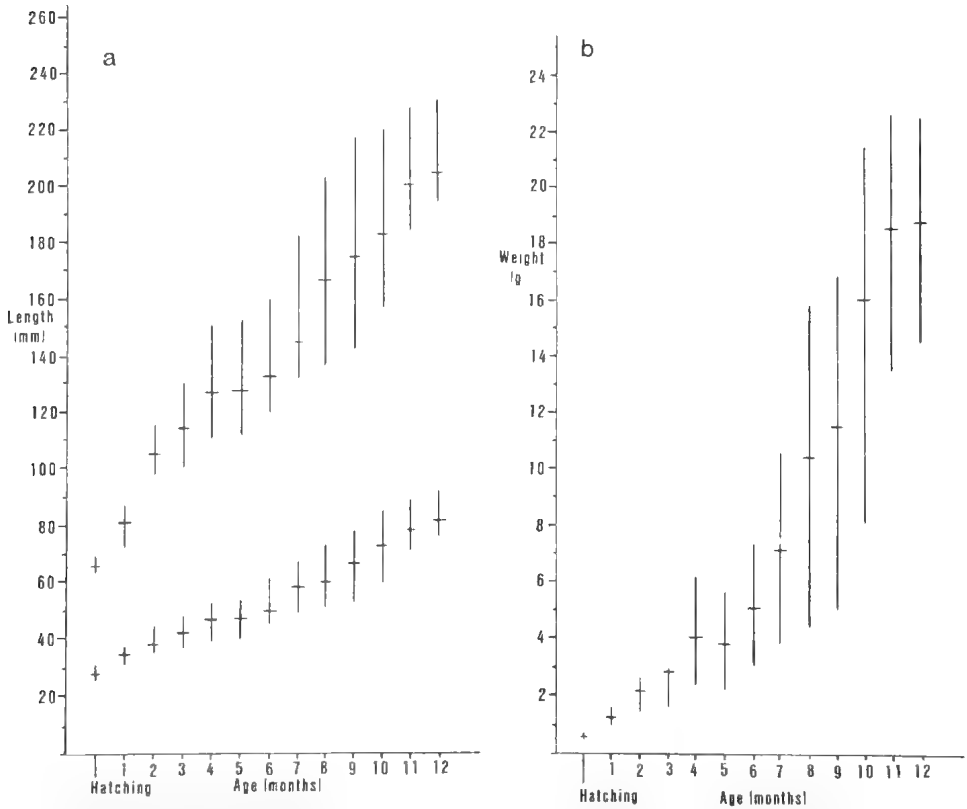

Fig. 1. Growth rate to 12 months for *A. muricatus* at Melbourne Zoo. (a) Total length (upper) and snout-vent (lower). (b) Weight. (vertical line is range, horizontal bar is mean).

its siblings, and its total length was not included in the growth data (Fig 1). All four lizards grew steadily and there was no obvious aggression from the larger individuals towards their small siblings.

Sphenomorphus tympanum

A group of six confiscated lizards was lodged at the Zoo on 30 November, 1985. Although none were obviously gravid, one female produced five live young on 13 December. When another specimen appeared close to giving birth, it was separated from the group to avoid possible injury to the resultant neonates.

The lizard was maintained in a tank as previously described, and at 25-28 °C, and produced five young on 27 December. One week following the birth she weighed 11.5g and was measured at 86mm snout-vent and 220mm total length. She was then returned to the group.

The young lizards had developed a golden-olive dorsum by one month of age. One was found to have lost the tip of its tail during the fifth month and another died from unknown causes during the eighth month. The lizards basked readily but would immediately hide at the approach of a keeper. The temperature was allowed to decrease to 17-20 °C from early June to late August, during which time feeding was curtailed, resulting in a decreased growth rate (Fig. 2).

Pseudechis porphyriacus

A group of two pairs was lodged at the Zoo as confiscated stock on 17 January, 1985. The females were not obviously gravid but one, 820mm snout-vent length, produced 13 young (8 dead) and 1 unfertilised ovum on 22 March, 1986. She had not fed since arrival.

The young snakes were all thought to be dead when found but two were seen to be moving within the transparent membranes

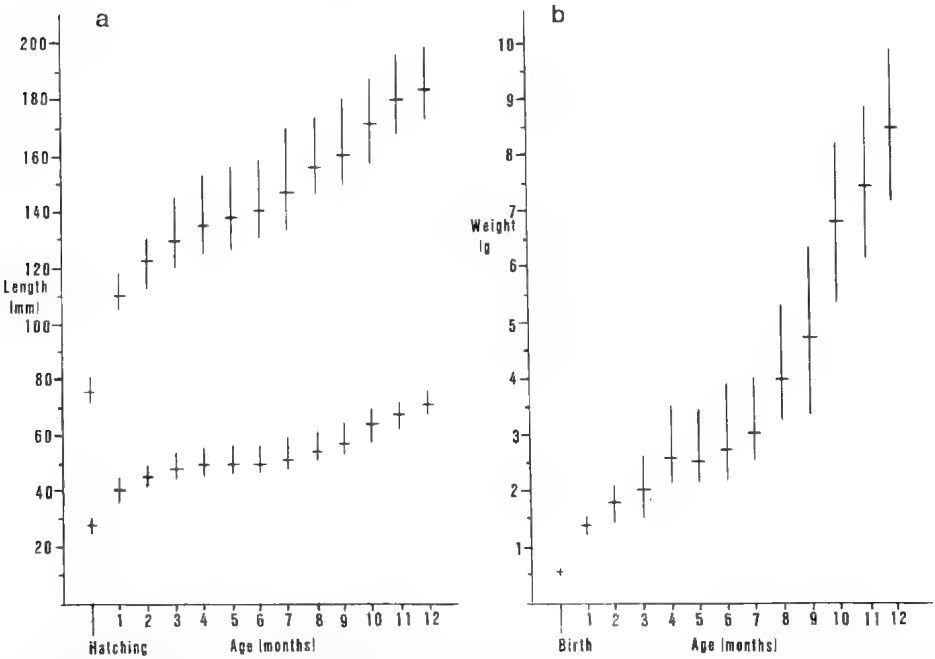

Fig. 2. Growth rate to 12 months for *S. tympanum* at Melbourne Zoo. (a) Total length (upper) and snout-vent (lower). (b) Weight. (vertical line is range, horizontal bar is mean).

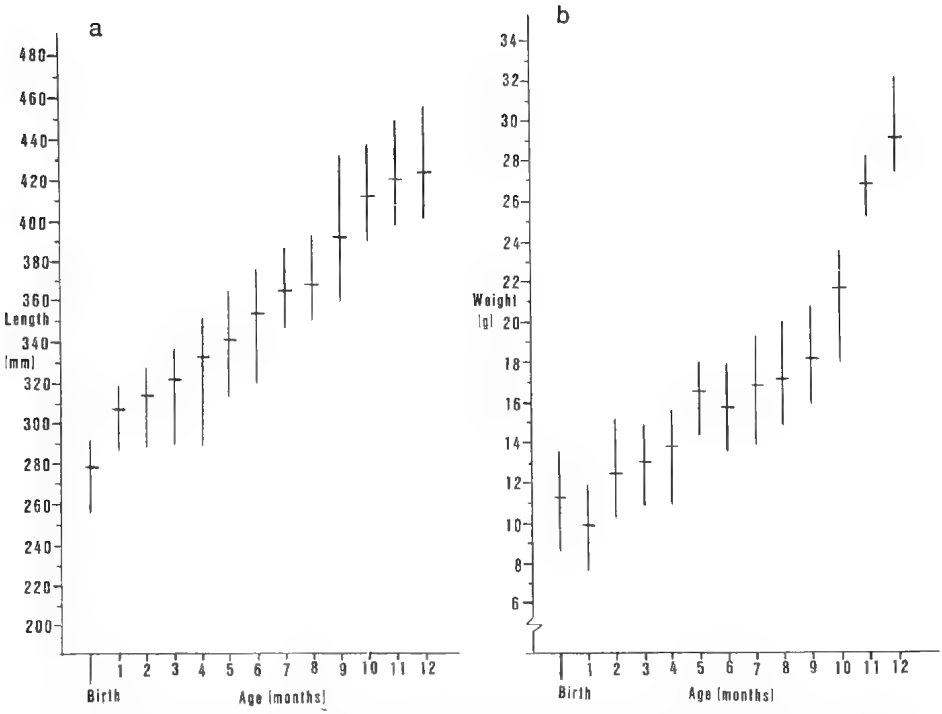

Fig. 3. Growth rate to 12 months for *P. porphyriacus* at Melbourne Zoo. (a) Total length (upper) and Snout vent (lower). (b) Weight. (vertical line is range, horizontal bar is mean).

at least four hours after being expelled. All sloughed 10 days after birth, followed by a first inter-slough period of 37-40 days.

Pink mice, unscented or scented with skinks, were refused as food and the snakes were, therefore, force-fed with dead, new born mice. Early in the tenth month, dead mice rubbed with fish were accepted voluntarily, resulting in a noticeable increase in the snakes' growth rates (Fig. 3).

Discussion

Only one other reference was found to incubation and hatching in *A. muricatus* (Lawton, 1982). This related to a dead-on-road female in the Ourimbah State Forest of central coastal New South Wales. Six fertile eggs were removed from the lizard and incubated at 20-30 °C for 79-81 days – each produced a viable young lizard. Allowing for the larger clutch and consequently smaller hatchlings in this study, the young lizards had similar total and snout-vent lengths to those arising from the Ourimbah female. Lawton (1982) did not record growth past one month of age and provided no weight data nor egg dimensions. Bustard (1970) records gravid females occurring in October and November in the northern parts of the species' range, and about six eggs being laid. Poor hatching rates and hatchling malformations in reptiles, resulting from excessively high incubation temperatures, have been reported by a number of workers (Banks, 1983; Bustard, 1969; Dunn, 1981; Zweifel, 1980). It is likely that the constant incubation temperature of 28 °C produced the deformities seen here.

Foot-waving, or circumduction, is well-known among agamids and that observed in the juvenile *A. muricatus* in this study, falls within the activity patterns recorded by Carpenter et. al. (1970). Few useful data are

available on growth in young agamids and those presented here are, therefore, of comparative value.

Even fewer observations appear to have been made on *S. tympanum*, although the related *S. quoyii* has been the subject of a number of studies (Daniels and Heatwole, 1984; Veron, 1969). Jenkins and Bartell (1980) state that the birth of 2-5 live young occurs in summer in *S. tympanum* and hence the data obtained in this study appear to be within the normal ranges for this species. Weeks (1927) suggested a snout-vent length of 30mm at birth, although this could have referred to *S. tympanum* or *S. kosciusko*, species which attain a similar size and are sympatric through much of the range of the cool temperature form of *S. tympanum*. The growth of the young skinks in this study suggests that they would have been capable of reproduction in their second year.

P. porphyricaus is perhaps the most studied of these three species. In particular, Shine (1977 a,b,c; 1978) has studied the species extensively in northern New South Wales. In this study, the time of parturition, clutch size, length and weight of neonates, and female's snout-vent length are within the normal ranges for wild specimens (Cogger, 1986; Shine, 1977b and 1978). The young snakes' very slow growth rate over their first 12 months of age was probably due to the absence of their natural prey items of lizards and frogs (Shine, 1977 c).

Conclusion

Although *A. muricatus*, *S. tympanum* and *P. porphyriacus* are regarded as common in Victoria, being found throughout the State except for areas in the west and south-west, few records have been published on their birth and early development. The data recorded here are, therefore, of value despite their basis on captive animals.

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Naturalist Note

A Puzzling Bottlebrush from Western Victoria

By T. E. George*

In December 1953, while examining the plants growing in the creekbed below the wall of the new Rocklands Reservoir on the Glenelg River, east of Balmoral, a group of Melaleucas or paperbarks in the creekbed, excited me. I collected specimens showing flowers, seed capsules, etc. for myself and for the Melbourne Herbarium, and suggested that the plants were perhaps a natural cross between *Melaleuca gibbosa* and *Melaleuca decussata,* as both shrubs grow in the area, but as far as I know, nothing was decided.

Also growing in dense thickets in the creek bed were many thin stemmed, bright green leaved callistemons, but as the flowering season had long since finished, I collected quite a lot of mature seed capsules for growing in my nursery back home in Reservoir. Germination was highly successful, so as well as potting on single seedlings, I also potted on two or three and even up to six seedlings to each pot, just as an experiment to see if they would eventually help or hinder each other. Even though I had many varieties of callistemons growing in my half acre garden and nursery in Reservoir, I planted out perhaps a hundred in various places in the garden, singles, doubles and more, just from the pots where they had been grown on. All grew very well, and I gave several to a friend in the next street, who was just starting a new garden, and also to other friends, schools and school children. All our seedlings grew very well, tall, thin and spindly, with nice, fresh, light green leaves, with a point, not as stiff leaved or hard pointed as *C. rugulosus (macropunctatus)* from Yanac further north in the Great Desert, so I was looking forward to their eventual flowering.

Perhaps because they were mostly under and near larger trees, they were extremely tardy in flowering. The flowers were all on top of all the branches, and the colour, a very pale pink, wsa not at all showy, as nearly all our other callistemons are. My friend was disappointed with his, but we have persevered with them, as all plants are very healthy, strong, and with a good thick rootstock. This first attracted my attention only last year, after I had read an article on **phyllotaxis** written by my colleague, Schleiger (1985) Phillip Institute of Technology. As well as the thickened rootstocks, lumps were also developing in various places on the trunks of these callistemons. Further examination has shown that the lumps are growing spirally around the stems and increase in size each year as the wood enlarges, so that you can see a gradual increase in size from year to year. Further examination shows that these lumps grow exactly where the leaf stalk grew, so that the lumps grow in spirals exactly where the leaves grew (Fig. 1). Every single individual of the Callistemon from the creek bed below the spillway, has developed the same spiralling on its stem. Not one other callistemon of all the species I have grown, and I have them in quantity, shows this characteristic, yet it has taken me all these years to notice it. I know that some plants, such as mangroves have breathing tubes or **pneumatophores**, which help them to breathe in oxygen while under water, and some swamp plants have lumps on their trunks to help the same process, but to develop a whole set of spiral breathing tubes right up the trunk, requires at least some investigation.

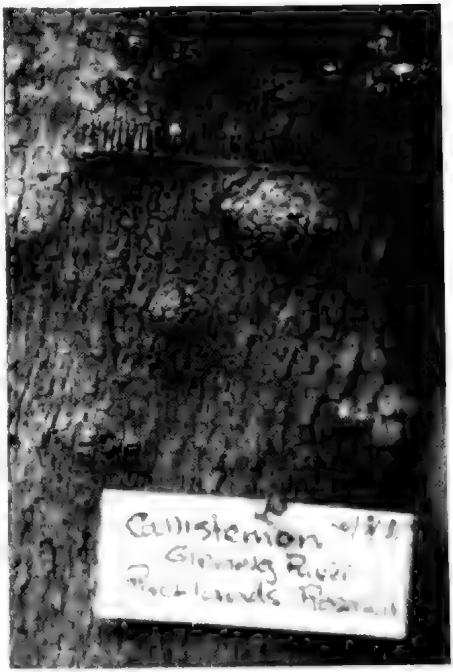

Fig. 1. Two views of the trunk of the mystery *Callistermon* from Rocklands Reservoir.

*17 Ashley Street, Reservoir, Victoria 3073

Fig. 2. Another view of the mystery *Callistemon* showing the spiralling of lumps on the trunk.

The lumps are definitely not galls caused by parasitic wasps piercing the scar at leaf fall to lay their eggs, as even they could hardly be so accurate in measuring exactly where to lay them to achieve such perfect delineation. The lumps are growing tissue and all increase regularly in size with increasing age. I told my friend Dr Jim Willis of my predicament and he suggested that I contact Mr Peter Lumley of the Herbarium who is in charge of reviewing the callistemons. Mr Lumley has already been out and is sending collectors to find the plants in situ, if still there after thirty-four years. If not, they could be lost except for those I grew from seed collected thirty-four years ago.

Finally, perhaps the lumps are a series of developing root and leaf buds in anticipation or preparation for a coming flood or ice age, or, more likely is this callistemon an ancient survivor of glacial movement from the Antarctic continent, like some of our other plants? Our plants have developed over millions of years, and many are the ways and means of survival. Although I have been growing, studying and loving Australian plants for over fifty years, I must admit with Yul Brynner in 'The King and I' the "It's a puzzlement".

Any help in solving this 'puzzlement' would be greatly appreciated.

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100 Years Ago

During the past few weeks the director and assistant director of the Zoological and Acclimatisation Society have been very busy distributing young English trout in various rivers and creeks in the Upper Yarra and Gippsland districts, and also several creeks in the Dandenong Ranges. Altogether about 15,000 young fish have been turned out. About 3,000 of these were hatched at the Royal Park, having been purchased as ova from the Salmon Commissioners of Tasmania. The remainder were hatched at Sir Samuel Wilson's estate, Ercildoune, near Ballarat, and presented by him to the Society for distribution. It is also intended to stock the Wimmera with a large number of different varieties of carp.

Victorian Nat. V.3 (8) Dec. 1886 p. 111

External Sexing of Galaxiid Fish

BY PAUL HUMPHRIES*

Many species of fish have distinct secondary sexual characters by which the sexes can be distinguished. These can range from bright colours in males, to nuptial tubercules, to specialised intromittent organs involved in reproduction. Such organs are well known in the class Chondrichthyes where males of many species possess clasping organs and in live bearing poeciliids where males have gonapodia. Several Australian fish species are sexually dimorphic in the shape and position of genital papillae, such as *Gobiomorphus coxii, Gobiomorphus australis* (Hoese *et al.*, 1980) and the Tasmanian whitebait, *Lovettia sealii* (McDowall, 1980). the occurrence of sexual dimorphism based on secondary sexual characters within the family Galaxiidae is rare and has been thought to be restricted only to *Galaxiella pusilla* (and possibly *G. munda* and *G. nigrostriata*), where the male is smaller than the female and has a distinct red stripe down its flanks (McDowall, 1978).

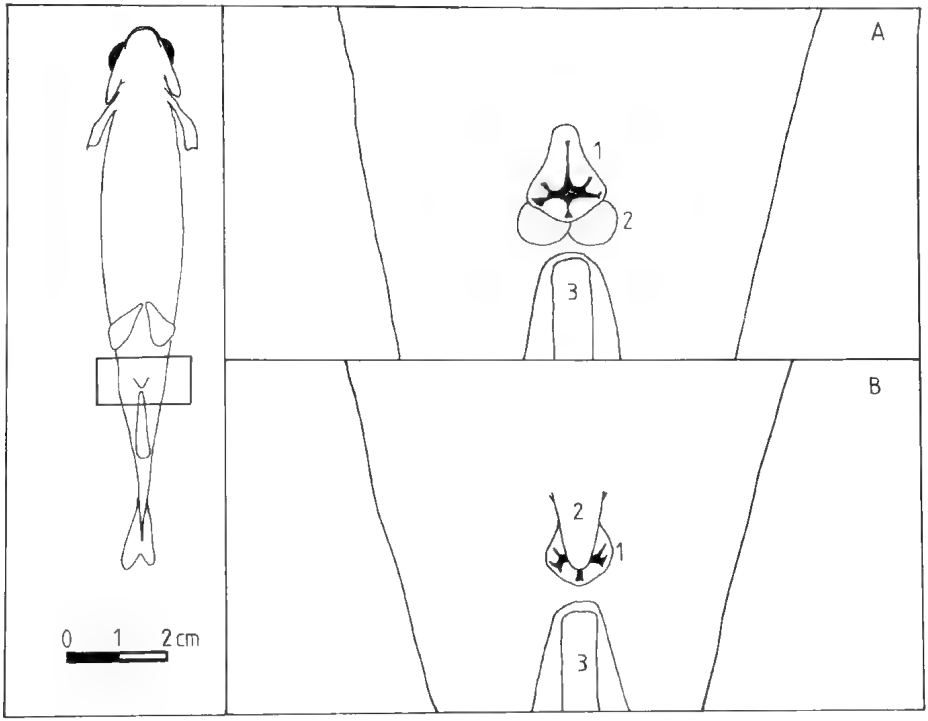

Fig. 1. Diagram of the genital papilla of a mature female spotted galaxias (A) and a mature male spotted galaxias (B). 1: anus; 2: genital papilla; 3: anal fin.

During a two year study of four Tasmanian populations of the spotted galaxias *Galaxias truttaceus,* from March 1985 to October 1986 (Humphries, 1987) the shape of the genital papilla was recorded for all live, sampled fish. The fish were then pre-

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served in 10% neutral buffered formalin (Hale, 1965), dissected and sexed by macroscopic examination of the gonads.

The sex of all maturing, ripe and spawning fish could be distinguished externally on the basis of the genital papilla immediately anterior to the anus in the male and immediately posterior to the anus in the female. In maturing females the papilla formed into two lobes (Fig. 1A), whilst males possessed a single elongate structure (Fig. 1B). The papilla of immature fish was not developed and sexes could not be distinguished externally at this stage. The papilla regressed after spawning.

The existence of distinctive genital papillae has not been recorded in galaxiids before and their functions, if any, are not known. During the present study these papillae were also observed in the golden galaxias, *Galaxias auratus* and the climbing galaxias, *G. brevipinnis*. The occurrence of genital papillae and the ability to sex some galaxiid fish by external examination only, may prevent killing of fish unnecessarily. This may prove useful in the study of small populations and possibly endangered species of galaxiids.

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Naturalist Note
The Water Rat *Hydromys chrysogaster* in Melbourne

BY IAN FAITHFULL*

On 6th October 1986 at 7.10 p.m. I was surprised to see a Water Rat *Hydromys chrysogaster* in the Yarra River under Princes Bridge, Melbourne. On the southwest side of the bridge there is a powerful floodlight which illuminates the bridge and a section of the water. The rat was first seen swimming on the surface and making brief dives. Its prominently flattened head was apparent. After a short time it emerged onto a narrow mud flat on the river edge and proceeded to devour a small item it had collected. The long tail with long white tip was clearly visible. After this meal the animal swam under the bridge and was lost to sight.

I have also seen the species in the pondage above Dights Falls, Collingwood, and in the Merri Creek under the Eastern Freeway Bridge. On 13th April 1986 at least two animals were seen at this latter locality.

Seebeck (1977) reported that the number of Water Rats seemed to be decreasing downstream from Heidelberg, so it is pleasing to note their continued existence in the inner city.

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Naturalist Note

Behaviour of Common Imperial White Butterflies

BY MICHAEL F. BRABY*

Perhaps one of the most splendid butterflies to be seen around Melbourne is the large and beautiful common imperial white *Delias harpalyce* (Donovan). This attractive insect, when in the adult state, has on the wing undersides conspicuous bright yellow-gold and crimson markings against a dark background of velvet black and silver-grey. In contrast, the wings above are pearl-white in the male and olive-green in the female, and the wing margins, in both sexes, are jet black with the forewings possessing a series of terminal white (male) or cream-yellow (female) spots.

The species is not uncommon through the suburbs (I recently saw one heading north along Spring Street, Melbourne on 25th March 1987) and breeds on several species of mistletoe (Loranthaceae). It has a long flight period, spanning over ten months. My earliest observation near Melbourne is late August (26th August 1987, Steels Creek) and my latest is early May (9th May 1987, Christmas Hills), and I have recorded adults in each month between August and May. Two generations are said to be completed annually, although usually three broods are actually completed (F. Douglas, pers. comm.).

The beauty of the imperial white is further revealed by its habits of flying gracefully about the upper canopy. Let me quote a passage on the behaviour of this butterfly as described by two of our pioneer lepidopterists, E. Anderson and F. P. Spry:

> "This fine butterfly has earned its common name from its habit of soaring with outstretched but motionless wings round the lofty gum trees that support its foodplant when in the larval state, thus it will soar with majestic air as though conscious of dominion over all the rolling sea of tree-tops sloping down the hill sides and stretching away into the grey distance. But not always is this kingly flight, at times we observe a sportive mood, and down by creeks and watercourses one may see his erstwhile unapproachable majesty playfully darting at his own shadow in the placid water, rising and falling every few minutes n much the same manner as the swallows in their untiring flight." (Anderson and Spry, 1893).

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The imperial white spends much of its time gliding effortlessly high around the tops of trees, and as a consequence of this behaviour, is usually difficult to net. I have noticed that adults also devote a good deal of time to feeding, extracting the rich nectar from eucalypt blossoms and a variety of plants. In February and March, and sometimes during April, large numbers of imperial whites may be observed feeding on the attractive, scarlet flowers of box mistletoe *Amyema miquelii*, one of its larval host plants. Wood whites *Delias aganippe* also feed on these flowers at the same time, and thus they may compete with imperial whites for nectar.

Male imperial whites, in particular, exhibit a distinct tendency to congregate on hill-tops (referred to as "hill-topping"), a behaviour that is believed to be a mate location strategy in which virgin females instinctively seek hill-tops to mate. On prominent peaks, hills and ridges males are frequently seen patrolling the tops of the tallest trees. This behaviour is generally restricted to days which are cool but sunny. On very warm days such activity is usually confined to the cooler hours of the morning, and only rarely have I observed imperial whites hill-topping on hot days. During very hot weather this behaviour appears to cease altogether. I have often wondered why hill-topping behaviour in this species apparently varies with temperature, while in other species it appears to have little effect. Burns and Rotherham (1980) state that: "On very hot days they (imperial whites) often come down to ground level in shady gullies, and rest on leaves with their wings folded over the back." This behaviour probably accounts for the general absence of imperial whites on hill-tops during hot weather. But why? Perhaps the imperial white is unable to tolerate hotter, drier conditions and by becoming less active it conserves moisture and reduces the risk of desiccation. The species is largely confined to coastal and mountain areas of south-eastern Australia and such a possibility may be one factor limiting its distribution from the hotter inland areas where the species is generally absent.

On two extremely hot and windy days earlier this year I was fortunate to observe this inactive, resting behaviour of imperial whites. The behaviour which I observed, and will describe, seems to support the notion that adults dislike high temperatures.

While exploring the bush at Christmas Hills, some thirty-five kilometres north-east of Melbourne, on 31 January 1987 and again on 7 February 1987 (maximum temperatures were 35 °C and 40 °C respectively) I found two relatively large congregations of butterflies (over twenty in each) at the entrances of two disused gold mine-shafts located at the bottom of a steep, sheltered, and ferny gully. The adults, most of which were males, were not active but at rest in the quiet shade. Most butterflies were situated on several large, moist rock slabs forming the entrances of the mine-shafts, though some were delicately poised on the fronds of various ferns. They sat remarkably still; with their wings closed they beautifully decorated the excavated rocks. All butterflies were quite oblivious to my presence as I could approach them with extraordinary ease, even pick them up with my fingers! This non-active, resting behaviour was in contrast to their familiar habits of soaring high about the tree canopy.

Temperatures at the entrances of the mini-shafts were considerably cooler than elsewhere, and as no adults were seen flying about the nearest peaks and ridges they were clearly seeking refuge from the prevailing hot northerly wind and taking advantage of the sheltered, and cooler conditions provided by the mine-shafts. This resting behaviour, as opposed to flying, would no doubt reduce body moisture loss, and apparent preferences for the coolest sites may indeed suggest that imperial whites are not adapted to very hot conditions.

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Naturalist Note
The Smokey Mouse (*Pseudomys fumeus*) Outside Victoria

BY G. MAYO*

This note reports the capture of an adult specimen of Smokey Mouse *Pseudomys fumeus* in Namadgi National Park, ACT. This animal was trapped near the summit of Mt. Kelly at an altitude of 1,800 metres in February, 1987. While the animal was released, A. Cockburn confirmed its identification from the photographs taken.

This is only the second specimen of this species to be trapped outside Victoria; the first being near Bulls Head in the Brindabella Ranges, some 37 kilometres north of Mt. Kelly. Subsequent intensive trapping of the Bulls Head site has been unsuccessful (Osborne and Preece, 1986).

The capture of Smokey Mouse on Mt. Kelly is also noteworthy in that it is the highest altitude at which this species has been trapped. (A. Cockburn, personal communication).

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Past Issues of the Victorian Naturalist

Do you have any unwanted copies of past **Victorian Naturalist** issues? Dan McInnes (Victorian Nat. Sales Officer) frequently gets requests for past issues, and stocks are running low for some volumes. In particular, Vol 103 No. 2 (March/April, 1986) is in low supply.

If you have any old copies of the **Naturalist** you wish to donate to the club, please contact Dan McInnes, 129 Waverley Road, Malvern, 3145. Phone: 211 2427.

AUSTRALIAN NATURAL HISTORY MEDALLION 1987

Robert G. H. Green

In selecting Dr Robert Green to receive the award for 1987 the Award Committee has achieved another landmark in the history of the Medallion. This is the second time that the Medallion has gone to a Tasmanian, but Bob Green is the first man from that state to receive it, the award in 1976 having gone to Dr Winifred Curtis.

Bob Green is Curator of Zoology at the Queen Victoria Museum, Launceston, a position he has held since 1961. Born in Launceston in 1925 he attended Launceston Grammar School, but left at the age of fifteen to work on his father's property at Antill Ponds in Tasmania's midlands. During the next twenty years he developed a keen interest in natural history, especially in ornithology, and was appointed Honorary Ornithologist to the Queen Victoria Museum in 1959. The establishment of what is now the finest scientific reference collection of Tasmanian oological material in existence, is testimony to his abiding interest in birds, as is the fact that of eighty photographs by him, held in the National Photographic Index of Australian wildlife, the majority are of birds.

As Curator Bob Green has built up zoological research and reference collections which have achieved national and international importance. The wide range of his interests and his willingness to help people both in Australia and from overseas with their research is evidenced by the long list of books and journals in which his assistance is acknowledged, including Ride *A guide to the native mammals of Australia* (1970), Hall and Richards *Bats of eastern Australia* (1979), Blakers et al. *Atlas of Australian birds* (1984), and articles on mammals in *Sports illustrated (U.S.A.)* 1981 and *Equinox (Canada)* 1983.

He has undertaken many collecting and field survey expeditions to various parts of Tasmania and the surrounding islands, the results of which have appeared in the *Records of the Queen Victoria Museum.* He made several trips overseas during the 1970s, visiting museums, wildlife reserves and research stations in south-east Asia, Europe and North America, which have resulted in numerous exchanges of data and specimens.

Bob Green has always been concerned with the preservation of wildlife. From 1960-65 he was the representative of the Tasmanian Farmers, Stockbreeders and Orchardists Association on the Animals and Birds Protection Board (now the National Parks and Wildlife Service), and from 1970-83 a member of the Wildlife Advisory Committee of this service. He was a foundation member of the Conservation Programme Committee of the World Wildlife Fund Australia. In 1975 he established a Museum field station on Maggs Mountain in Tasmania's Central Highlands to monitor the changes in fauna distribution caused by clear-felling.

The work of a curator involves not only collection and preservation but also interpretation and education. Bob Green has given many talks to field naturalists' clubs, adult education groups, Rotary clubs and the like, and is always available for radio and television interviews when newsworthy items of a zoological nature occur. He has not hesitated to involve himself in local environmental issues.

Bob Green lists as his principle fields of activity, ornithology, mammalogy, herpetology, ichthyology, entomology, marine biology, ecology and conservation. The range of subjects in articles in *The Emu,* the *Tasmanian naturalist,* the *Tasmanian rover,* the *Australian bird bander* and others bears witness to this, as does the list of eight species named after him, which include molluses, insects and a lizard.

In April 1987 the University of Tasmania conferred on him an Honorary Doctorate of Science in recognition of his contribution to zoology, and we congratulate him on adding the Australian Natural History Medallion to his achievements this year.

Bob Green was nominated for the Medallion by the Launceston Field Naturalists' Club, with supporting nominations from the Burnie Field Naturalists' Club, the North East Tasmanian Field Naturalists' Club and the Federation of Field Naturalists' Clubs of Tasmania.

Sheila Houghton

NATURALIST REVIEW

BY D. B. FOREMAN*

'Flora of Australia' Volume 45 (Hydatellaceae to Liliaceae).

Australian Government Publishing Services, Canberra (1987)
Bureau of Flora and Fauna, Canberra.
(Griffin Press, Netley, South Australia).
(25.5 x 18 cm. 521 pp., 6 col. plates, 125 fig., 477 distribution maps.
Price $54.95 (Casebound)
$44.95 (Softbound)

Although the eighth volume of the 'Flora of Australia' to be published is the most expensive issued up to the present time it is also by far the biggest. At 521 pages Volume 45 (Hydatellaceae to Liliaceae) is more than twice the size of Volume 46 (Iridaceae to Dioscoreacee) which was recently reviewed by Mr Stephen Forbes in the 'Victorian Naturalist' and about 100 pages longer than Volume 8 (Lecythidales to Batales) which was the previous longest volume.

The layout of Volume 45 follows that of recent issues with the distribution maps being conveniently grouped together towards the end of the text. Unlike previous volumes the colour plates have been grouped together at the beginning of the text and make an impressive introduction to the work which follows.

After some problems in earlier volumes the quality of the line drawings has steadily improved and it is reassuring to see this quality maintained in Volume 45. It is also pleasing to see that several authors have also included scanning electronmicrographs of seeds of some species in their treatments.

As with previous volumes of the 'Flora of Australia' the system of classification follows that proposed by Arthur Cronquist in the 1981 edition of 'An Integrated System of Classification of Flowering Plants'. As a consequence of this, readers will find members of the widely accepted family Amaryllidaceae included in the family Liliaceae which is treated in a very broad sense. Another family to be embraced in the Liliaceae which will be familiar to some Victorian readers is the Hypoxidaceae. On the other hand *Trithuria submersa*, which is placed in the Centrolepidaceae in Willis' 'A Handbook of Plants in Victoria' Volume 1, is now found in the Hydatellaceae.

The treatment of Typhaceae by Dr B. G. Briggs indicates that there are 3 species of *Typha* in Victoria although no specimen is cited for *T. domingensis* for Victoria. This differs significantly from the earlier treatment by Dr Jim Willis in Volume 1 of his 'Handbook' where only one species was recognized.

Although no taxa occur naturally in Victoria most readers will find something of interest in the treatment of the Haemodoraceae including a number of new taxa in genera such as *Conostylis* (Cottonheads) and Angiozanthos (Kangaroo Paws and Catspaws).

By far the largest family treatment in Volume 45 is the Liliaceae with the work being shared between 15 contributors. The number of changes to the taxonomy of this diverse family have been kept to a minimum by adopting the broad view of the family taken by Cronquist rather than adopting what to some people seems the more radical approach of Dahlgren, Clifford and Yeo (1985).

Of particular interest to Victorian readers will be the new species and varieties in *Hypoxis*, *Dionella*, *Caesia* and *Corynotheca* proposed by Mr R. Henderson. Also specimens from Victoria and other eastern Australian states previously referred to *Laxmannia sessiliflora*

* National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria, 3141

have now been placed in a new species, *Laxmannia orientalis* by Mr G. J. Kerghery. Brief Latin descriptions are given for all the new taxa in the Appendix. In contrast to the brief Latin descriptions of the new taxa the new combination and lectotypication of *Bulbine glauca* by E. M. Watson is accompanied by a quite lengthy discussion.

Unfortunately there was a slight lapse in the usually very high editorial standards we have come to expect in the 'Flora' with labelling errors occurring on two figures. Dr Roger Hnatiuk in a note in a recent issue of the Australian Systematic Botany Newsletter advised on the following corrections:

Figure 59 (p. 174) of *Neoastelia spectabilis:* the lettering was left off. It is as follows, starting at the top of the plate and working left to right: "A" is the top illustration; then "B", "E" and "D" in the next row; below "E" is "C"; "H" is in the lower left corner; "F" is above the two black seeds which are "J" and "K"; "G" is next to the right; and "I" is in the lower right corner. Figure 118 (p. 399) *Wurmbea centralis:* the illustration immediately below "F" is unlabelled and should be "H", the one immediately below "G" should be "I". The illustration at the centre, bottom row, already labelled "H" should be changed to "J" and the one to the right labelled "I" should be changed to "K".

The purchase of Volume 45 is strongly recommended and both amateur and professional naturalists alike will find it an invaluable addition to their library.

* The 'Flora' is available through the Club's Book Sales Officer.

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Cronquist, A. (1981). *An integrated system of classification of flowering plants.* Columbia University Press, New York.

Dahlgren, R. M. T., Clifford, H. T. and Yeo, P. F. (1985). *The families of the Monocotyledons.* Springer-Verlag, Berlin.

Forbes, S. (1987). *Flora of Australia, Volume 46 (Iridaceae to Dioscoreaceae) – Naturalists Review.* Victorian Nat. 104:49-50.

Willis, J. H. (1970). *A Handbook to plants in Victoria.* Volume 1, 2nd ed., Melbourne University Press, Melbourne.

Notes on the F.N.C.V. trip to Kangaroo Island, 22nd-28th November, 1986

Our party, happily augmented by friends from the Latrobe Valley and Frankston and numbering thirty, was taken by bus from the overnight train to the Short 360 plane for the twenty-five minute flight, Adelaide to Kingscote.

Once the Island came into view, lines of trees bordering farms and roads stood out, and Elsie Costermans could tell us these were the endemic eucalypt with leaves which point up, *Eucalyptus cneorifolia.* We later learnt that the conservation policy for Kangaroo Island requires that at least 25% of all land be kept under native vegetation and that the roadsides be preserved. Certainly, in the western half of the Island, these are a joy when one is driving past bush gardens of grass trees (*Xanthorrhoea australis*) with varying flashes of colour – gold of the pennants and the pea flowers, mauve and blue of the endemic *Tetratheca halmaturina* and *Dampiera,* and pinks of *Boronia edwardsii* and *B. filifolia,* with sometimes a canopy of small trees and *Eucalyptus remota* (again an endemic) in flower.

We were fortunate to have Miss Jean Galbraith with us and were able to seek her help in identifying plants and flowers.

Our bus driver for the tour was Tom, a proud islander of four years' standing, who had a planned itinerary but was happy to make an earlier departure daily, to allow for the interests of bird watchers, botanists and photographers necessitating many stops en route.

The first afternoon was a short historical tour to the old Kingscote site – Pt. Rickett – and the meeting-house cum school at Wisanger. At Emu Bay a hooded dotterel with young skipped past the sea-weed on the beach, delighting the viewers.

The trip on the 23rd took us past Pelican Lagoon, with a short stay near Pennington Bay, where we walked among a sea of *Orthrosanthos, Scaevola* and *Lasiopetalum,* and to Dudley Conservation Park, where we found the large endemic "burr daisy", *Olearia rudi* and the scarlet flowered mint bush, *Prostanthera aspalathoides.* The day ended with a visit to Willoughby Lighthouse and

the Devil's Kitchen blowhole on the most easterly point of the Island.

The following day we visited the only National Park, Flinders Chase. Tom paused once to point out the expanse of bush all round, with the sandy road visible in places ascending and descending among the low growth. He said he finds that with Americans it is "the bush" they associate with Australia and what they hope to see.

We lunched at Park Headquarters after unsuccessfully looking for signs of platypus in the Rocky River. After offering the bread provided to the K.I. kangaroos, Marie's camera was poised when one "toddler" in the pouch came out, went to his reclining mum's head, stretched himself tall to at least one foot, then teased his mum about the head until she called a halt, a playful act we had not seen before. The Cape Barren Geese were in great numbers grazing on the flat, only outnumbered by the clumps of rushes and flowering *Orthrosanthos.*

Here we also counted seven koalas in the treetops, one nursing a youngster while she held on to the swaying branch. Koalas, like the geese, have been introduced to the Island.

The highlight of the day must have been to reach and explore the Remarkable Rocks, though gale force winds made us wary of unsheltered areas. In spite of conditions, and flying into the wind, there was a constant stream of Short-tailed Shearwaters.

We went on to see historic Weir Bay and the picturesque Admiral's Arch where three albatrosses were seen, probably Black-browed. The strong wind enhanced the wonderful vistas of seaspray being thrown against the rocks of Casuarina Islands (The Brothers) lying south of Cape Du Couedic. Occasional seals where spotted resting on the shores below.

We added another endemic flower to our list - the pink *Adenanthus macropodiana* flowering at the Remarkable Rocks area and Weir Bay. We later saw the cream form at Western River Conservation Park when Mrs. Ida Jackson told how it was named *macropodiana* for the Island by an Irish naturalist doing his Master's thesis on the plant.

A Gould's goanna was seen crossing the road when we were on our way to Kelly Hill Caves next day and during lunch at the Caves Park the promised "regulars" appeared to the smell of the barbecue; and also a K.I. wallaby surprised us by nibbling a chop bone. Some of the party toured the caves while others went bird watching, and orchid hunters found several – one almost certainly *Caladenia filamentosa.* There was a profusion of *Prostanthera spinosa* in flower and the bright yellow *Hibbertia stricta.*

We crossed to the northern shores to visit Cape Borda lighthouse and glimpsed the spectacular 700 foot cliffs of Harvey's Return. Passing a recently burnt area of Flinders Chase, we searched for orchids in a promising roadside area and were pleased to find some lovely specimens of *Thelymitra fuscolutea* and photographers were soon zooming in.

The Seal Bay trip was a day we all enjoyed, and the seals appeared to accept our presence on their beach - mostly with indifference: one lady had the bag on her arm inspected by an inquisitive nose and found she had swinging company as she moved along the beach. On again to Vivonne Bay, a lovely sweep of blue sea this day, and we walked among interesting rocks at Point Ellen and found some penguin young, safe in their burrows.

The last day started with a detour to pick up Mrs. Ida Jackson, a resident botanist, and Miss Galbraith enjoyed being able to share the questions. The destination was Western River Conservation Park, with selected stops where Mrs. Jackson knew of special botanical treats. At Amen Corner there were numerous blossoming plants with the endemic *Pimelia macrostegia* gracing the roadside with its large drooping creamy flowers, and at Watters Mailbox we had the promised introduction to the *Hakea* enigma which never sets seed, reproducing vegetatively.

There was a pleasant walk through the Park when we learnt among other things, the difference between the *Isopogon* and the "wild Irishman" of K.I., the *Petrophile* which hapily, often grew side by side.

Last chance to stretch out legs and bend backs was at Snelling Beach, where we crouched to walk through the natural rock tunnel – and someone sighted an osprey.

We all enjoyed an informative week and a comfortable Motel, and our thanks go to Marie for all her work and care in the organisation.

Dora Lee

Report on Victorian Field Naturalists Clubs Association Meeting at Inverloch (Labour Day Weekend) March 7th, 8th, and 9th 1987.

Some 50 people attended this meeting from 12 Clubs, some camped, some were accommodated at the Inverlock Motel and some were at the Esplanade Hotel, where the Annual General Meeting was held on the evening of Saturday March 7th.

The Association was very much indebted to the invaluable help given by Mr. and Mrs. Os. Brewster during the entire weekend, who guided us initially to their Environmental Centre, a converted butchers shop, almost opposite the Hotel.

The Brewsters had arranged the speakers and excursion leaders, all local and all of a very high quality, in the absence of our pre-arranged leader.

Eulalie Brewster then acted as courier in the bus and gave a brief resume of the history of the area. Samuel Anderson, after whom the Inlet was named, was one of the first settlers on the Bass River in 1835. The Tarwin River enters Andersons Inlet at Inverloch and the word Tarwin was said to be of Aboriginal extraction meaning thirsty.

We were taken to admire the extensive view from Townsends Bluff. Townsend was Assistant Surveyor sent in 1840 to survey Anderson's Inlet. We drove down Henderson Road; apparently the Henderson Bros. were the first settlers on the Inlet, circa 1870. In the Harbour there were a few crayfish, abalone and shark boats at anchor, but their numbers have decreased in recent years.

We found 4 common eucalypts on this coast:
(a) Swamp Gum *(Eucalyptus ovata)*
(b) Narrow-leaved Peppermint *(E. radiata)*
(c) Coastal Manna Gum *(E. viminalis)*
(d) Messmate *(E. obliqua)*

The town water supply is from the Lance Creek Reservoir and is chlorinated, some people complain of the taste, but we visitors noticed nothing disagreeable.

We next visited Screw Creek by walking along the firm sand. Along the banks of Screw Creek are the White Mangoves *(Avicennia marina)* which appeared to be spreading into banks of Rice Grass *(Spartina sp.)* introduced in 1957 which could seemingly cause some serious silting of the creek mouth where it enters the Inlet. Along the banks were Brookweed *(Samolus valerandii)* and a yellow statice *(Limonium australe)* and a top heavy looking yellowish-green plant of *Lawrencia spicata,* of the Malvaceae family. From here we travelled to the jetty, labelled "unsafe" because of the depredations of Teredo worms, the original jetty was apparently built more than 100 years ago and stretched much further out into the Inlet. A new jetty was built in 1962 and this was washed away. We were shown where the Customs shed, store shed and where the rocket house had stood, the rocket house is still there but apparently in another position. It is said that the only time rockets and breechers buoy were used in a real ship-wreck was when the N.Z. boat Manawta was wrecked and at this time (early in this century) one of the operatives became tangled in the line and fouled the rescue procedure! Further northwest we visited the original site of the entry of three creeks into the inlet, now represented by a concrete drain and then we visited the Shell Trust in which is housed an historic and extensive collection of Australian and some other shells.

The Annual General Meeting of the V.F.N.C.A. was held in the Upstairs Lounge of the Esplanade Hotel after dinner and it was unanimously decided to rotate the positions of **President**, at present held by Mr. Albert Perry of the Creswick F.N.C., and of the **Secretary/Treasurer** Dr. Elizabeth Turner of the Victorian F.N.C., Melbourne, so that these positions would be held for 12 months by the President and Secretary/Treasurer of the Host Club in the area designated for the holding of the next 6 monthly Get-together meetings.

After the meeting, Dr. Andrew Chapman, a local scuba diver who had assisted the Museum of Victoria to investigate the waters along the Bunurong Coast, gave a fine illustrated lecture with slides of unique beauty of the marine gardens in this area.

At the conclusion of the evening, a cold rain was descending, whipped along by a strong wind, and the bus had flat batteries, thus the Motel guests had to be "ferried" home by the private cars and taxis.

Next morning, Sunday March 7th, the excursion to Walkerville and Cape Liptrap was delayed two hours until new batteries could be found for the bus. The excursion was most ably led by Graeme Rowe, a teacher from the Leongatha High School, who had prepared and distributed an excellent pamphlet on the geology and the area, accompanied by a comprehensive geological time scale and maps. He also acted as courier on the bus and pointed out the ancient shore line, the meanderings of the Tarwin River and how it drains the South Gippsland highlands; the lower Devonian Liptrap formation and the upper Ordovician or Silurian Bald Hills and Hoddle Range. We travelled the full length of Venus Bay along the old floor of the Bay. He explained how the

mesozoic bedrock was of mud stone formed from the erosion of granites and laid down some 130 million years ago. Above Cape Liptrap we searched for and found *Selaginella* and Clubmoss *(Lycopodium varium)* but the wind was too cold and strong for more than a short wandering through low growing *Meleleuca* with yellow blossoms. However, here we found *Platysace heterophylla* in flower and the leaves of *Orthoceras strictum* (the horned Orchid) and *Sowerbaea,* which also grows on Wilson's Promontory.

It was low tide when we reached Waratah, now called North Walkerville, and walked along the coastal rocks to Bird Rock (made of Waratah Limestone series with tunnels and a collapsed cave) then south, past the ruins of the old lime kilns constructed of brick and limestone and capped with yellow Pleistocene sediment. Ellen Lyndon also pointed out the beach where fossilized footprints of a large bird were found, estimated by the late Edmund Gill, former member of the F.N.C.V., to be approximately 2,400 years before present and mentioned in "The Victorian Naturalist".

We visited the Cape Liptrap lighthouse but the fierce gale prevented us from walking far enough out on the cliffs to obtain a good view of the folding of the rock strata to the north.

A cairn commemorating the settlement of Waratah was constructed of greenish serpentinised gabbro, a Plutonic rock, like the granite of Wilson's Promontory, it was once a hot liquid which cooled slowly underground, forming large crystals. The tide and the weather inhibited our further walk south, past Digger Island to Bell Point.

After dinner, Club Reports were given by members of the 12 Clubs represented.

Mr. Dan McInnes from the Melbourne F.N.C.V. told about the Day Group which had been in action for 14 years and met on the 3rd Thursday of each month, at a place accessible by public transport.

Irene Gibbs reported that the Albury-Wodonga F.N.C. was endeavouring to have the sewerage plant declared a refuge park for water birds.

Jane Priest of Benalla F.N.C. reported that members were concerned about lowering of the water level of Lake Mokoan.

The Immediate Past President of the V.F.N.C.A., Mr. Albert Perry, gave a brief report on the Creswick F.N.C. Ellen Lyndon of Leongatha reminded the meeting that both she and Eulalie Brewster were honorary members of the F.N.C.V. and felt that they belonged to all clubs, she gave a brief report of the Latrobe Valley and Gippsland Clubs - including Bairnsdale, Sale, Traralgon and Warragul.

Florence Hosking reported for Peninsula Club and displayed their new club badge depicting a yellow sun orchid.

Ringwood was represented by a relatively new member Ken Ward who told of the recent 25th anniversary of their club which was presided over by Mr. Jack Hyett, their founder President, and that 14 foundation members attended.

A report of the activities of the Stawell Club and of the Western Victorian Club Association was given by Win MacPhee. She was asked to convey to her club the sympathy of the assembled members, who learned of the illness of Ian McCann and Bob Humphries. She reported that the Arnhem Land Safari had been a great success and that they proposed a safari to W.A. next spring, also that Cliff Beauglehole's next study book will be launched soon at their Little Desert meeting.

Marie Allender reported for the F.N.C.V. Melbourne.

On Monday morning Mr. Peter Duck and his wife Jenny both local teachers and their 2 children, Catherine and Joshua, led us along the Bunurong coast - first, to note how the *Banksia integrifolia* were dying along the foreshore and how prolific was the growth of Sweet Bursaria, which was in flower and also in seed and how the N.Z. mirror bush coprosma had established itself amongst the coastal vegetation. At Cape Kruger and later at Cape Paterson we explored the rock pools and caves along the cliff face, and noted the lilac coloured *Lobelia alata* growing on the cliffs. We also discovered unusual marine algae including a cricket-ball sized codium or "sea spud".

After lunch at Cape Paterson, thanks and farewells were said and the bus began its journey back to Melbourne - stopping at Bass to view the worlds longest earth worms up to 3 metres (10 feet) long on display "live": The Springtime get-together of the V.F.N.C.A's is to be held on October 16, 17 and 18th at Waranga Basin Camp, near Rushworth.

Elizabeth Turner. M.D.

FNCV Reports

General Meeting,
Monday 12th October.

Dr. Jim Bowler spoke on 'Environmental changes and Human occupation during the last 60,000 years'. He said that today 75% of the Australian Continent is arid land but this was not always so. 60,000 years ago the climate wetter and warmer, therefore more vegetated. This was to change by the peak of the Ice Age, 20,000 years ago when it was colder and drier. He concentrated his talk on the Willandra Lakes area in South Western N.S.W., and also Northern Victoria. Before the Ice Age the Willandra lakes, which include Lake Mungo a freshwater system abundant with fish and other life both in and out of the water and ideal for human occupation as it has now been proved. Two separate peoples occupied the area, one with a high forehead, large brows and strong facial features, the other with a more rounded skull and less prominent facial features. At the onset of the Ice Age the land became drier. Strong prevailing winds from the west removed soil and sand causing Lunettes to form on the eastern side of the lakes. The first formed were domes of quartz sand which were later covered with higher clay domes. When the lakes began to dry up 25,000 years ago, water from the higher surrounding water table drained back into the lakes carrying salt with it, thus creating salt lakes in place of the original fresh water. Dr. Bowler said that radiometric readings prove human remains from Lake Mungo are about 36,000 years of age. He said that human remains from Kow-Swamp in Northern Victoria gave a reading of 11-12,000 years, but he pointed out that some anomalies occur in the present dating methods and the age of the Kow-Swamp remains may be much closer to the Lake Mungo remains than the present results show. He finally said that work begun by the late Edmund Gill on a site near Warrnambool may well prove to be the oldest evidence of human antiquity in Australia, far exceeding the Lake Mungo sites.

Exhibits

Mr. D. McInnes.

A number of exhibits under the microscope.

1. The Medusa of the jellyfish stage of the Hydroid, *Cdinonema haswellii.* A walking jellyfish with up to 20 or more branched tentacles.
2. The Medusa or jellyfish stage of the Hydroid, *Aequorea albida?.* A swimming bell shaped jellyfish with only two tentacles for a start. More will grow later.
3. Hydroid stage of *Obelia australis* showing gonotheca from which Medusae hatch.
4. The Medusa or jellyfish stage of the Hydroid *Obelia australis.* A swimming jellyfish that is turned inside out with many tentacles. The bell is flat like a saucer.

Mr. I. Bates.

Larvae of the Cup Moth.

Mr. A. Blackburn.

A number of Artifacts from New Guinea including Lime-bottles Spatulas, Belts, String bags, Stone-axes.

FNCV Club Reporter

The Club wishes to thank Christine Ashburner (*nee* Shankly) for her excellent service as Club Reporter. For several years Christine provided the Victorian Naturalist with her clear and concise reports of the Club's activities. Her labours are sorely missed. Ed.

Club members who are frequent attenders at meetings and activities are asked to consider taking on the position of Club Reporter. Please contact Jack Douglas or another Council member if you are interested.

Angahook-Lorne State Park Resource Inventory

The Department of Conservation, Forests and Lands has prepared a Resource Inventory for Angahook-Lorne State Park, listing the known natural and cultural values of the park. This will form the basis for the preparation of a Proposed Management Plan.

Copies can be obtained from the Information Centre, DCFL, 240 Victoria Pde., East Melbourne 3002 ($5, or $7 by mail)

Field Naturalists Club of Victoria

In which is incorporated the Microscopical Society of Victoria
Established 1880

Registered Office: FNCV, c/- National Herbarium, Birdwood Avenue, South Yarra, 3141.

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.
Members include beginners as well as experienced naturalists.

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available and other activities are indicated in reports set out in the several preceding pages of this magazine.

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