The Victorian Naturalist

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FIELD NATURALISTS CLUB OF VICTORIA

in which is incorporated
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N.C.V.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 February — At National Herbarium, The Domain, South Yarra, commencing 8 pm
Subject for evening — "A Naturalist in Northwest Australia" — Dr. J. Willis.

Wednesday, 12 March — Annual General Meeting and Presidential Address.

New Members —

Ordinary:
Mr John Alderson, 32 Longs Road, Lower Plenty 3093
Miss Cecily Allen, Flat 6, 77 Packington Street, Kew 3101
Mrs Nan B. Clark, Lot 2, Zig Zag Road, Belgrave Heights 3160 *(Geology & Marine)*
Mr Douglas Jinks, 11 Downes Street, Strathmore 3041
Mr Gary C. Lewis, 2/7 Sycamore Grove, Balaclava 3183 *(Mammal & Bird Photography)*
Miss Anne Munro, 6 Magdalen Street, Pascoe Vale South 3044 *(Botany)*
Mr Cameron McConchie, 158 Warrandyte Road, Ringwood 3134*(Botany & Conservation)*
Miss Isabella D. Philips, Flat 4, 70 Hawksburn Road, South Yarra 3141 *(Conservation & Botany)*
Mr Noel Schohnecht, 107 Scotsburn Avenue, South Oakleigh 3167
Miss L. H. Semmens, 2 Milfay Court, North Balwyn 3104 *(Botany)*
Mr Ian Starkey, 59 ROYAL Avenue, Springvale
Mr Leon Trembath, 70 Gove Street, Springvale 3171
Mr Brian Weavers, 8 Ashburton Road, Glen Iris 3146 *Mammal & ield Survey, Botany)*
Mr John T. Wright, 10 Mont Iris Avenue, Glen Iris 3145 *(Botany)*

Joint:
Mr & Mrs M. A. Marginson, Flat 6, 422 Cardigan Street, Carlton 3053.
Mr Gary T. Whipp & Mrs Margaret J. Whipp, McCaughey Court, Ormond College, Parkville, 3052 *(Mammal Survey Marine Biology)*

Country:
Mr & Mrs R. A. Chuck, Mt Buffalo National Park, Mt Buffalo 3745
Mr Glen J. Ingram, 17 Winston Street, Rochedale Qld. 4123
Mrs Alma O'Brien, 113 Carpenter Street, Bendigo 3550 *(Botany)*
Mrs Joan E. Sawyer, 3 Verner Avenue, Frankston 3199
Mr P. G. Sheehan, 9 Taylor Street, Wangaratta 3677

Junior:
Peter Broek, 4 Cromwell Court, Blackburn 3130 *(Victorian Naturalist)*

GROUP MEETINGS

(8 pm at National Herbarium unless stated otherwise)

Thursday, 13 February — Botany Group Meeting: Members' Night.

Wednesday, 19 February — Microscopical Group Meeting.

Thursday, 20 February — Conservation Group Meeting.

Thursday, 20 February — Day Group Meeting: Catch Lilydale train from Flinders St. 10.55 am — meet at Croydon Station 11.30 am. Visit to Warrien Rd. Park. Bring lunch.

Thursday, 27 February — Field Survey Group Meeting in Conference Room, National Museum at 8 p.m.

Monday, 3 March — Marine Biology and Entomology Group Meeting in Conference Room, National Museum at 8 pm.

Wednesday, 5 March — Geology Group Meeting.

Thursday, 6 March — Mammal Survey Group Meeting at Arthur Rylah Institute, 123 Brown St., Heidelberg at 8 pm.

Thursday, 13 March — Botany Group Meeting: Speaker — Mr. Allan Morrison.

F.N.C.V. EXCURSIONS

Saturday, 15 march — Botany Group is invited to join an excursion to the Loch Valley, arranged by N.P.P.S. Leader — Mr. F. J. C. Rogers. Meet in Noojee at 10.15 am.

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the victorian naturalist

Vol. 92, Nos. 1-2 6 February, 1975

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Assistant Editor: G. F. Douglas

Contents

The seminar on the Yarra Valley and Dandenong Ranges at the beginning of this month demonstrated clearly the growing concern among the public about planning. More than 500 people attended. After listening to eight speakers on planning needs in the area the assembly broke into a series of working groups, in which all who wished were able to contribute to the discussion. The main matters for consideration were the draft proposals of the Minister of Planning, Mr Alan Hunt, for the Upper Yarra Valley and Dandenong Ranges Regional Planning Authority. Mr Hunt chaired the seminar, and circulated around the working groups.

At the end of the day each group reported its ideas on the matters considered. The most impressive result was the unanimity achieved — with one exception the working groups wanted the proposed municipal representation reduced. There seemed to be an almost universal distrust of local government councillors among members of the general public. There was an equally strong desire expressed for the public to have the right to directly elect a proportion of their representatives on the planning authority. A majority of groups also sought an increase in the proposed representation of conservation interests on the authority, and their was a general desire to see the rural community given special representation.

Summing up at the end the Minister gave no precise undertakings on which he could be pinned down, but did say the views expressed would be carefully considered. If this results in even some of the changes in approach to planning the public so clearly indicated they wished to see we can probably look forward to greater consideration in future of the impact planning has on our natural environment.

An increasing population brings pressure for development to more areas of the State the need to control it to limit the damage done to our natural history heritage will grow. If this is to be done effectively naturalist clubs everywhere will have to play an active part as watchdogs, providers of information, and participants in planning.

Front Cover:

The Western Grey Kangaroo *(Macropus fuliginosus)* is found on Kangaroo Island as well as in parts of the South-eastern Section of the Mainland. It is difficult to separate from the Eastern Grey except by differences in breeding biology and blood characteristics *(A Guide to the Native Mammals of Australia* [8] W. D. L. Ride)

Observations on the Geology of Kangaroo Island

F.N.C.V. Excursion 1-8 September, 1974

by Frank Robbins

On the map of Kangaroo Island (Fig. 1), note the rough approximation of the 150 foot deep "contour" line around the island. It is therefore obvious that during the recent ice age, when the sea level dropped by about 250-300 feet (due to formation of large ice caps in the Northern Hemisphere and Antarctica), Kangaroo Island was part of Australia and all St. Vincent's Gulf and Spencer Gulf was dry land, hence the presence of many animals and plants common to the mainland today. The few species of animals and plants not found on the mainland could have easily evolved since the island was cut off. Also during the ice age when the sea was retreating southwards and westwards, large sandy beaches with abundant sea-shells were left stranded. The wild south-west winds ground up and carried the sand and shells (made of calcium carbonate or 'limestone') far inland forming sand dunes which formed dune limestone. Hence the abundance of limestone surface outcrops ('calcrete') which we noted so often along the southern coast. As we walked down the hill from the lighthouse to the Admiralty Arch, we had to avoid the sink holes in the calcrete surface down which water ran to unseen undergound caves. The stalactites near the roof of the Admiralty Arch were formed in this way.

In the not so distant past, the southern part of Kangaroo Island was uplifted and tiled southwards along the fault lines A B — C D marked on the map (C D-Cygnet Fault; A B-Snelling Fault). We climbed up the scarp of this Cygnet Fault four times on our trips from Kingscote to Flinders Chase, to Seal Bay and Vivonne Bay, to D'Estrees Bay and to American Bay. We noted that on top instead of the swamp land, we were on a plateau of the "ironstone rubble" of Ida Jackson's botany book or "buckshot gravel" or "ferricrete" or laterite of the geologist.

Wild flowers grew in profusion here. This laterite or ironstone pebbles or nodules is formed everywhere in the world, especially where there is a conspicuous variation in the rain and surface evaporation. Water and carbon dioxide penetrate downwards into the underlying rocks, decomposing and dissolving the iron in them. The water returns to the surface depositing its dissolved iron as little round brown nodules of hydrated iron oxide and carbonate as it evaporates.

The underlying rocks of Kangaroo Island are mostly sedimentary rocks of Cambrian Age (app. 600 million years old), but due to the tilting, there are exposures of the next oldest rocks (upper Precambrian or Upper Proterozoic) all along the southern edge (top edge) of the fault scarp. Of course, the "ironstone rubble" or laterite surface capping, hides these underlying rocks except along the streams which have cut through the cap. Also it is noteworthy that south of the faults the streams or drainage is southwards as would be expected, and north of the faults it is northwards, more or less. It is also significant that these northward draining streams have cut backwards by headward erosion through the fault scarp to its southern side. Thus the Playford Highway or road from Kingscote to the west (Cape Borda) road runs most of the way on the crest of the present watershed, thus avoiding

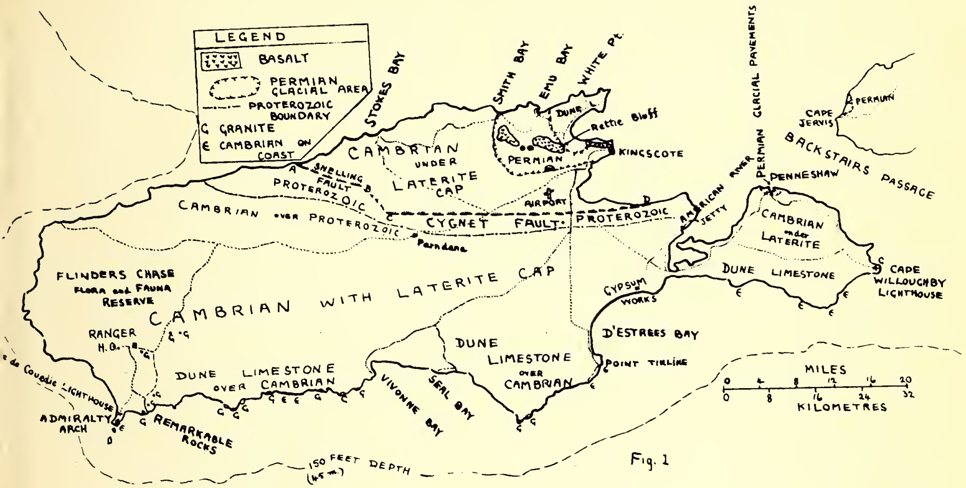


Figure 1

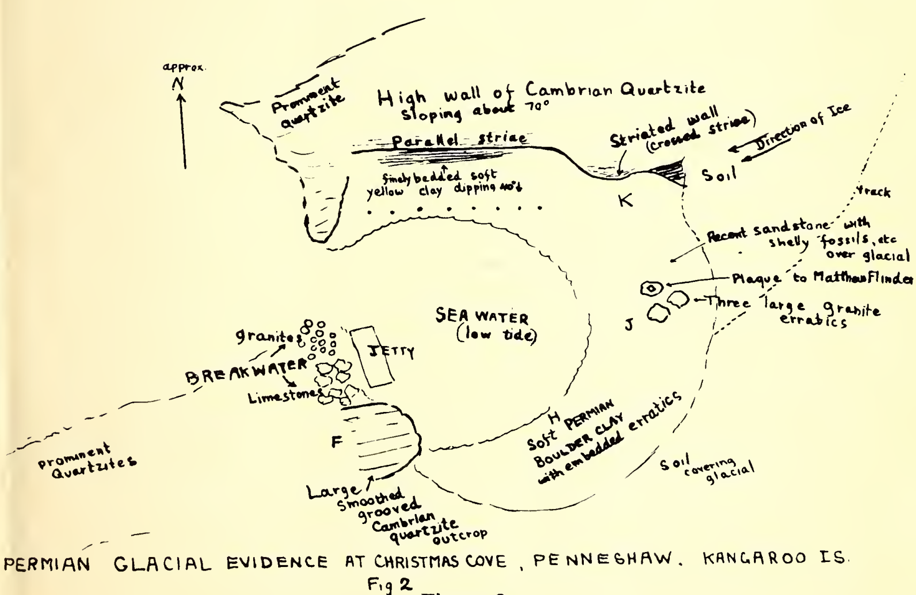


Figure 2

constant crossing up and down of the general N — S drainage pattern.

We saw the hard, dark grey Cambrian "quartzites" at the Admiralty Arch floor. Above the south-west dipping (about 30 deg.) floor towered the overlying dune limestone, belonging to the recent Pleistocene Ice Age. Percolating groundwater had dissolved and precipitated the limestone as large stalactites. Nearby two conspicuous islands resting on hard Cambrian "quartzite" were still resisting the onslaught of the waves, and along the sea-level here, one could observe the wonderful two sets of vertical joint planes (not at right angles) in the gently dipping resistant quartzites, thus forming parallelogram patterns. Dark coloured Cambrian "quartzites" were also seen on the shore-platform near Pt. Tinline on the D'Estrees Bay trip. Some of us clambered over these dipping "quartzites" to see the sea birds. The geology map shows several other exposures of the Kanmantoo Cambrian "quartzites" (more correctly schistose-quartzites), along the southern coast always below the more recent dune limestone and sands. The rugged tall cliffs all along this coast would have naturally been formed by the wave erosion since the last Ice Age as the sea-level gradually rose up over the wide sandy beach which must have stretched many miles further seaward.

Another strange feature of this southern coast is the outcropping of perhaps a score of granite areas. The most easterly one is at the Cape Willoughby lighthouse and the most westerly is at Kirkpatrick Pt., aptly called the Remarkable Rocks. Wonderful examples of xenoliths may be seen embedded in the granite here, and also a conspicuous dyke (aplitic) about 2 feet (½ metre) wide running right across the enormous granite mass. The xenoliths were obviously large chunks of Cambrian rock from the roof of the overlying Cambrian rock into which the liquid granite is supposed to have intruded at some time later than the Cambrian Age, possibly in the Ordovician Age. However, the main interest of our party was how to explain the enormous granite tors with their "hollowed out insides" and fantastic shapes resting on top of the main granite "bathylith". This often happens to granite bodies while below the surface covering of soil. The water plus carbon dioxide, seeps down the joint cracks (usually at right angles) and gradually decomposes the granite into quartz sand (quartz crystals) and white clay or Kaolin (from the felspar crystals). The further this "deep weathering" or "Kaolinization" proceeds, the more the rectangular granite blocks approach the spheroidal shape. However, the time will come when erosion will remove the surface cover and wash away the soft Kaolin and sand grains (Kaolinized granite) leaving the unweathered rounded tors sitting on top of unweathered granite. Of course, this kaolinization below ground level does not always proceed as simply as above, hence hollowed out tors and the weird shapes we saw at Remarkable Rocks.

We are now up to the Ordovician Age (400-500 million years ago). A most exciting event occurred about 250 million years ago in the Permian Period, when during the Permian Glacial Age, a glacier or river of ice moved across in a somewhat westerly direction from Cape Jervis or the Fleurieu Peninsula across Backstairs Passage at least to the northern edge of Kangaroo Island at Penneshaw, and from Kingscote to Smith Bay. This all happened at the same time as ice moved over Bacchus Marsh and over the glacial area near Bendigo at Derrinal and Lake Eppalock. The evidence for this glaciation is mostly below grass level; but at Smith Bay, granite erratics can be seen on the beach, and at Emu Bay where granite erratics may be seen resting on top of the short platform of Cambrian sedimentary rocks. At Penneshaw, glaciated rock pavements were identified in the little Boat Harbour of Christmas Cove. At Kingscote, the only evidence noticed was a blue clay just above high tide level along the cliffs below the Island Motor Inn section of the town. It was devoid of erratics or pebbles of any kind, and although the foreshore was searched at low tide level, no convincing evidence of erratics was found apart from a large piece of semitransparent quartz, and a red quartzite somewhat like the erratics of Derrinal. However, Prof. Howchin in 1899 did find sufficient erratics and evidence to conclude that this blue clay was glacial (Permian) in origin. This blue clay (glacial) was covered by up to 100 feet (30 metres) of much more recent rock including a flow of basalt (most recent) on top. A wonderfully clear contact between the basalt and the limestone rock beneath it was noticed on this cliff face.

At Penneshaw, the only known glacial pavements of Kangaroo Island are still fairly well preserved on the hard Cambrian "quartzites". On the diagram shown in Fig. 2, the quartzite near the boat jetty was well rounded and grooved and smoothed as if ice had moved up and over it from the east side where the small circular harbour about 200 yards across now is. No very clear glacial scratches were evident on the face, but were excavation below tide level possible, there probably would have been.

On moving round the harbour towards H and J, there were numerous small erratics (igneous) and a soft conglomerate containing these in situ, probably Permian glacial clay conglomerate. At K, there were three huge blocks of granite (one had a metal plate on it commemorating Matthew Flinders) and they were obviously the same granite type, most likely split from one boulder (unless man had put them close together, which seems improbable owing to their great weight). They were obviously erratics foreign to the Cambrian era there, and probably of Victor Harbour type. Near J, the glacial conglomerate was overlain by a thin layer of more recent sandy limestone rock with shells in it. However, the really good glaciated pavement began at K, where an almost vertical Cambrian quartzite rounded wall showed excellent scratches crossing each other. A vandal had added a few scratches (alphabetical to commemorate his existence). It seemed that ice had come downhill from the east, colliding with this projecting corner, moving around to the right where it followed a long wall of almost vertical quartzite, polishing and scratching it with almost parallel striae for a distance of almost 100 yards. Although subject to wave erosion, it was still reasonably well preserved for a few feet above the high tide level. The hardness of the quartzite no doubt had saved it, whereas our Derrinal sandstone does not keep its striae very long after exposure.

Also very interesting and puzzling was the soft well bedded slippery "mudstone" contacting the pavement wall and dipping at 40 deg. downwards towards the centre of the little harbour. I assumed it was no doubt glacial clay; varved in appearance, but the great angle of dip was puzzling. Usually, glacial beds of Permian Age are sub-horizontal because of tectonic stability since Permian times, and only show dips where slumping and minor subsequent movements, such as ice-shove have taken place. Also noted was what appeared to be a long basic dyke along the bedding just behind the glaciated wall.

There was insufficient time to visit the landslide in varved glacial clays further west, but some igneous rocks, obviously glacial erratics were found up on the hill behind the cemetery.

At Emu Bay, glacial evidence was found in several granite erratics resting on top of the brown Cambrian sedimentary short platform; and at White Point, where a hurried inspection was made of similar Cambrian sedimentary rocks overlain in one place by a Cambrian conglomerate (Pt. Marsden conglomerate).

Finally, a very interesting observation, seen between Smith Bay and Rettie Bluff, were several high flat-topped hills rising far above the surrounding country. These are the remains of the flat-topped basalt flow (late Cainozoic) which once flowed as a stream of basalt along the bottom of a late Cainozoic valley, probably all the way from Smith Bay to Kingscote (or the reverse). Since this buried valley is now hundreds of feet above the level of the surrounding country, it follows that the whole of this part of Kangaroo Island was probably much higher than the "flat tops" when the basalt flow occurred several million years ago, and that gradual erosion of many hundreds of feet of Kangaroo Island has occurred here since the eruption. Although similar high level basalt plains occur in Victoria in rather inaccessible places, this Kangaroo Island occurrence is the best, easily accessible example I have seen anywhere in Australia.

Rettie Bluff would be resting on glacial beds, but why did not the "flat-tops" erode away also? The answer is that basalt shrinks and cracks as it cools, and therefore if rain falls, it will percolate down the cracks formed, and run out at some other point. Therefore no streams may ever form on top, and the vegetation on top will hinder the run-off, if any. Gradually, the edges will be undermined where the water comes out and the basalt flow generally shrinks in size, forming isolated flat-topped hills exactly like those you see along the Loddon and Campaspe Valleys, both of which were filled with liquid basalt not so long ago.

The foregoing completes the geological description of Kangaroo Island, insofar as our bus trips took us.

Appendix 2

Continued from *Victorian Nat.* **91** (12) p 321.

FLORA

Pteridophyta
Cheilanthes tunuifolia
Pteridium esculentum

Gymnospermae
Callitris rhomboidea

Liliaceae
Dianella revoluta
Burchardia umbellata
Anguillaria dioica
Chamaescilla corymbosa
Bulbinopsis semibarbata
Xanthorrhoea tateana

Iridaceae
Orthrosanthus floribundus

Amaryllidaceae
Hypoxis glabella

Orchidaceae
Thelymitria leaves
Corybas leaves
Ancianthus caudatus
Acianthus reniformis
Leptoceras fimbriatus
Caladenia patersonii
Caladenia filamentosa
Caladenia latifolio
Caladenia deformis
Diuris longifolia
Pterostylis nana
Pterostylis barbata
Pteroetylis longifolia

Casuarinaceae
Casuarina stricta

Proteaceae
Petrophila multisecta
Isopogon ceratophyllus
Adenanthos sericeae
Adenanthos terminalis
Conospermum papens
Hakea meulleriana
Hakea vittata
Banksia marginata
Banksia ornata
Grevillea ilicifolia
Grevillea halmaturina
Grevillea pauciflora
Grevillea quinquenervis
Grevillea rogersii

Polygonaceae
Meuhlenbeckea adpressa

Santalaceae
Choretrum glomeratrum

Cheonpodiaceae
Atriplex cinerea
Rhagodia baccata
Salsola kali
Suaeda australis
Enchylaena tomentosa
Arthrocnemum halocnemoides

Phytolaccaeae
Gyrostemon australasicus

Aizoaceae
Carprobrotus rossei
Disphyma australe
Tetragonia amplexicoma

Ranunculaceae
Clematis microphylla

Lauraceae
Cassytha glabella
Cassytha melantha

Cruciferae
Cakile maritima

Droseraceae
Drosera glanduligera
Drosera whittakeri
Drosera pygmaea
Drosera planchonii
Drosera auriculata
Drosera peltata

Pittosporaceae
Pittosprum phyllyreoides
Bursaria spinosa
Billardiera scandens

Rosaceae
Acaena anserinifolia

Mimosacaeae
Acacia armata
Acacia acinacea
Acadia spinescens
Acacia dodonaeifolio
Acacia myrtifolio var augustifolia
Acacia pycnantha
Acacia farinosa
Acacia verticillata
Acacia longifolia var sophorae

Papilionaceae
Daviesia virgata
Daviesia ulificolia
Daviesia genistifolia
Daviesia brevifolia
Pultenea tenuifolia
Pultenea daphnades
Pultenea viscidula
Phyllota pleurandroides
Dillwynia hispida
Dillwynia sericea
Platylobium triangulare
Goodia latifolia
Lotus australis
Swainsona lessertifolia
Kennedya prostrata
Hardenbergia violacea

Geraniaceae
Geraniaceae

Geraniaceae
Geranium potentilloides
Erodium crinitum

Zygophyllaceae
Nitraria schoberi
Zygophyllum billardieri

Rutaceae
Zieria veronicea
Boronia edwardsii
Boronia coerulescens
Boronia filifolia
Carrea aemula
Correa pulchella
Correa reflexa
Asterolasia muricata
Eriostemon brevifolia
Phebalium hildebrandii
Geigera linearifolia

Tremandraceae
Tetratheca ericifolia
Tetratheca haelmaturina

Polygalaceae
Comesperma calymega

Euphorbiaceae
Adriana klotzchii
Beyeria leschenaultia
Bertya rotundifolia

Stackhousiaceae
Stackhousia monogyna

Rhamnaceae
Pomaderris halmaturina
Pomaderris obcordata
Spyridium thymifolius
Spyridium vexilliferum
Spyridium phyllicoides
Spyridium halmaturinum
Trymalium wayii

Sterculiaceae
Lasiopetalum discolor
Lasiopetalum behrii
Lasiopetalum bauri
Lasiopetalum schulzenii
Thomasia petalocalyx

Dilleniaceae
Hibbertia sericea
Hibbertia stricta
Hibbertia virgata
Hibbertia exutiacies
Hibbertia fasciculata

Frankeniaceae
Frankenia pauciflora

Violaceae
Viola hederaceae
Viola sieberiana
Hybanthus floribundus

Thymelaeaceae
Pimelea glauca
Pimelea stricta
Pimelea spathulata
Pimelea dichotoma
Pimelea flava
Pimelea serphyllifolia
Pimelea octophylla

Myrtaceae
Baeckea ramossissima
Baeckea crassifolia
Baeckea ericaea
Leptospermum juniperinum
Leptospermum myrsinoides
Kunzea pomifera
Callistemon macropunctatus
Melaleuca gibbosa
Melaleuca decussata
Melaleuca halmaturorum
Melaleuca lanceolata
Malaleuca uncinata
Melaleuca pubescens
Melaleuca acuminata
Eucalyptus conglomerata
Eucalyptus diversifolia
Eucalyptus baxteri
Eucalyptus cneorifolia
Eucalyptus cladocalyx
Eucalyptus cosmophylla
Eucalyptus camaldulensis
Eucalyptus conglobata
Eucalyptus rugosa
Eucalyptus viminalis var. *huberana*
Eucalyptus fasciculosa
Eucalyptus fecunda
Eucalyptus obliqua
Eucalyptus ovata
Eucalyptus remota
Darwinia micropetala
Thryptomene ericaea
Calytrix tetragona
Lhotzkya glaberrima

Haloragaceae
Loudonia behrii

Umbelliferae
Xanthosia dissecta

Epacridaceae
Astroloma humifusim
Astroloma conostephioides
Leucopogon costatus
Leucopogon concurvus
Leucopogon rufus
Acrotriche serrulata
Acrotriche patula
Acrotriche depressa
Brachyloma ericoides
Epacris impressa

Primulaceae
Samolus repens

Loganiaceae
Logania ovata
Logania linifolia
Logania spathulata

Convolvulaceae
Dichondra repens
Cuscuta glabella

Labiatae
Prostanthera spinosa
Prostanthera aspalathoides
Prostanthera chlorantha
Westringia grevillina

Solanaceae
A prickly solanum?

Scrophulariaceae
Euphrasia tetragona

Lentibularaceae
Polypompholyx tenella

Myoporaceae
Myoporum insulare
Myoporum viscosum
Myoporum montanum

Goodeniaceae
Goodenia ovata
Goodenia varia
Scaevola aemula
Scaevola linearis
Dampiera lanceolata

Compositae
Olearia axillaris
Olearia ciliata
Olearia rudis
Olearia ramulosa
Ixiolaena supina
Calocephalus brownii
Brachycome sp. on coast
Senecio lautus
Senecio odoratus

Urticaceae
Parietana debilis

FOOTNOTE : "Mary Doery discovered a small fungus at Bayles Bay. This was identified by Dr. J. Willis and proves to be the first record of *Xylaria readeri* outside Victoria. This fungus grows in association with the roots of sedge (e.g. Lepidosperma sp.) and was until this record considered to be endemic to Victoria."

Appendix 3

FAUNA

MAMMALS

1. Echidna (*Tachyglossus aculeata*)
A small juvenile sighted crossing dirt road, several miles past Pardana on way to Flinders Chase, Tuesday 3rd September, 1974

2. Kangaroo Island Kangaroo or Sooty Kangaroo *(Macropus giganteus fuliginosus)*
Sooty brown animal is an insular form of the Forester or Grey Kangaroo of the Mainland.

3. Kangaroo Island Wallaby (Dama) *(Protemnodon eugenii decres)*
An insular sub-species of the no longer common mainland species Tammar or Scrub Wallaby. Seen in the lights of coach after dark in Flinders Chase and "spotted" with torch later walking along road. Said by local people to be numerous and widespread.

4. Brushtail Possum *(Trichosurus vulpecula)*
Numerous over island (sighted as wallaby).

5. Koala *(Phascolarctus cinereus)*
Several, one with young seen near homestead at Flinders Chase. (An introduction from Victoria).

6. Short-nosed Bandicoot *(Isoodon obesulus)*
Known to be on island. Bandicoot diggings were observed, but the animal itself was not sighted.

7. Fur Seal *(Gypsophoca dorifera)*
Observed at Admirals Arch.

8. Hair Seal or Sea Lion *(Neophoca cinerea)*
In large numbers on beach, in sand dunes at Seal Bay.

REPTILES

1. Black Tiger Snake *(Notechis scutatus niger)*
2. Lace Monitor *(Varanus varius)*

NOTE FROM THE EDITOR

To those Contributors who have not received notification of their M/SS having been received, the Editor offers his apologies.

Due to personal time being at a premium, and a change in printing further taking toll of time, correspondence has lagged. However the notifications will be done as soon as possible.

A Nest Of The Bearded Dragon, *Amphibolurus b. barbatus*

by

J. Russell

At two p.m. on 14 October 1973 the writer observed a female of *Amphibolurus b. barbatus* nesting in the middle of a motor track on a sand hill at Patho, northern Victoria, 20 miles west of Echuca.

Close observation of the nesting procedure was avoided in the event that the female might be alarmed and abandon her nest. However, the position of the nest was determined and I returned to it at 11 a.m. the following day. The entrance to the nest was easily located; but it would not have been obvious without prior knowledge of its location, or some experience with finding nests.

The nest was similar to those of tortoises *(Chelodina expansa)* which nest in the same general area, inasmuch as the eggs were at about the same depth. It was evident however that the method of excavation was quite different from that of tortoises. Loose sand was removed from the entrance to a depth of three inches; this revealed a tunnel five inches long and two inches in diameter, at a slight downward angle. The tunnel was filled with loose sand and lead to a nest cavity three inches in diameter and four inches below the surface.

Thirty-three eggs with parchment-like shells were removed from the nest. Precise measurements of the eggs were not made but most of them were approximately one inch long and 5/8 inches wide, about ten of them being slightly smaller. Most of the eggs were of a regular spheroid shape, but some were packed tightly, had been dented, and had irregular shapes.

One egg was retained and the remainder replaced in the nest, which was left undisturbed until 6 January 1974. On that date the nest was opened again. One egg was removed and opened; the live embroy was judged (based on the writer's knowledge of *Chelodina expansa)* to be about 70 per cent developed or approximately six weeks away from hatching.

The nest was then left undisturbed until 17 February 1974. On that date the nest was reopened and one egg was broken in the process. This egg contained a lizard that was fully or nearly fully formed and I suspected that hatching was imminent. At first there were no signs of life in the young lizard removed from the egg; it was placed upside down on a spoon which was placed in the boot of a car. The next day I discovered that the lizard was alive but was unable to move about because fluid from the embryonic membrane had dried and adhered to the spoon. After a brief soaking in water the young lizard became vigorously active and swam about.

On the same day that the broken egg was removed, the nest was securely covered with a ten inch square of fine mesh bird wire. This was designed to discourage predators as well as contain any young which might hatch subsequently.

On 22 February a small funnel like depression could be seen under the wire and the snout of one small lizard could be seen in the depression. The wire was removed revealing 16 newly hatched lizards which were then placed in a cardboard box. Four of these hatchlings were very active and aggressive; they would gape widely in a threatening manner at the slightest movement on my part. One of these hatchlings after being placed in the box, would jump two to three inches with gaping mouth as each new lizard was placed in the box. Fifteen unhatched eggs remained in the nest; most of these had a deflated appearance. These were removed and placed in a separate container. One of the eggs was partially ruptured. A claw protruded from the egg and some movement within the egg could be discerned. After two days there was no more discernable activity in the unhatched eggs. All of them were then opened; eight were found to contain fully formed embryos and the remaining seven were addled.

Total incubation time for the clutch of eggs observed (14 October to 22 February) was 131 days.

The hatchlings varied in total length from 3½ to 4 inches. The eggs were not measured in the course of incubation but it was evident that they increased in size; this was evident on 6 January and even more so on 17 February. McPhee (1966) reported that 9 was the average number of eggs per clutch for this species and that maximum number was 27. Bustard recorded one clutch of 19 eggs and another of 31 eggs (revealed by dissection).

It therefore appears that the clutch herein reported is one of the largest on record for *Amphibolurus b. barbatus.*

I extend my thanks to Professor J. M. Legler (University of Utah and University of New England) for reading a preliminary draft of this manuscript and offering helpful comments.

Nature Notes from the Gold Coast

by

ALEX. N. BURNS.

September

For the past three months the weather has, for the most part, been fine and dry with quite chilly night temperatures, and as a result of these conditions, almost the opposite of those for the same period last year, insect and animal life has been very different.

The Scrub Turkeys are considerably later in finishing off their nesting mounds, and at the moment egg laying has just commenced in two large mounds under observation. Although conditions have been so dry, natural food has apparently been plentiful because the daily numbers of turkeys coming to be fed each evening has averaged less than usual.

The Currawongs and Crows which nest each year in the large white barked eucalypts at the bend of the road opposite the National Park are now actively engaged with their nesting problems; these birds too were later than usual this season. For the past three months a large gum tree in the garden has become the daily roosting place for no less than three Mopokes. Two of these roost together on a short dead branch about 20 feet from the ground; the other bird has several roosting places all within five or six feet of the other two. The camouflage presented by these birds is remarkable, especially in the case of the two which camp close together on the dead branch as they sit together touching the large main branch which is greyish white in colour.

The wild duck population at the large lagoon at the Currumbin bird sanctuary has throughout the dry weather, increased to well over 300 individuals and is still increasing. Coots and other water-frequenting birds also have become more plentiful. A Coot's nest with four chicks is at present under observation; this nest is about two feet from the water level in a dense clump of *Papyrus*. As one approaches, the chicks hop out of the nest and disappear very rapidly amongst the tangled mass of vegetation surrounding it; if one stays quite still the chicks soon wend their ways back through the tangle and into the nest.

During the colder weather the Koalas have resorted to the gums on the highest portion of the hill in the National Park. Lately one or two specimens have come to the trees bordering the road. The warmer weather seems to make them extend their range further down the hill.

Entomologically at the moment, things are fairly quiet; no doubt on account of the prolonged dry conditions. Many of the usual early season butterflies are absent. Normally at the end of September, large numbers of the common Australian Painted Lady (*Vanessa cardui kershawi* McCoy) appear, but less than half a dozen specimens have so far been observed. It is however interesting to note that eggs and larvae of the Australian Admiral (*Vanessa itea* Fab) have appeared in large numbers on the few plants of ordinary Stinging Nettle in the garden. Although plants of this garden weed have been allowed to remain every year, this is the first time that they have been favoured with eggs and larvae of this butterfly. The Australian Admiral is quite a rare species on the coast, but is abundant on Mt. Tamborine and the Springbrook Range. At these localities its larvae feed on a much softer and larger growing species of Nettle.

From mid-August and throughout September the Hibiscus bushes have had large numbers of nymphs of two beautifully coloured Pentatomid bugs, the species being the Cotton Bug (*Tectocoris lineola* Fabr.) and the Pagan Bug (*Chaerocoris paganus* Fabr.). The former in the adult stage are orange red with metallic greenish-black spots which vary from a number, to complete absence in individuals. The Pagan bug is also orange red with brilliant metallic deep blue markings. In the early nymphal stages both species are gregarious; young nymphs of the Pagan bug are deep blue and present a pretty sight on the hibiscus twigs.

Short-horned Grasshoppers (Acridiidae-Orthoptera) have been in evidence almost right through the colder months, and as I write many are already in the adult stage; possibly some of these have overwintered as adults. Hibiscus bushes seem to be one of their favourite foodplants, and it is necessary to spray them every few weeks to keep them looking nice. The large 2½ inch long grasshoppers can very soon consume a lot of leaves and spoil the appearance of the plants.

The Sea as Wrecker and Builder

by
EDMUND D. GILL

Erosion by the sea became the subject of a strange court case in England in the Middle Ages. In 1223 tidal waters eroded the walls of the Severn River estuary, on which Bristol stands. The Severn Estuary has enormous tides with great erosive power. In places the tidal range reaches 40 feet (12 m). The people who lived in the village of Awre near Newnham were upset because part of their fields was washed away, while at the same time people at Slimbridge further downstream on the other side of the estuary had their land extended. The Awre folk took their case to court, claiming that the build-up of soil at Slimbridge was legally their land.

The Slimbridge folk replied that the land in question long ago was eroded from their area and deposited upstream; now they were only getting their own land back. The judge found in their favour. Probably both arguments were wrong, and the judge was avoiding a frightening precedent!

Parcels of land are not moved as identifiable bodies of sediment, but this much is certain, the sea both wrecks the land and builds it up.

Lost Villages of Morcambe Bay, England

In his famous book on the coasts of England, Professor J. A. Steers devotes a section to the lost villages of Morcambe Bay in northwest England. These villages are well known from historical records. There were places called Herte, Fordebottle-in-Furness, Argameles and Arnoldsdale, but they exist no longer. In the literature, no reference to Fordebottle-in-Furness occurs after 1537. Professor Steers says, "It seems to have stood on low ground between Aldingham and Barrow. Herte Island was somewhere on the shore of Dalton parish and probably formed one of a group of islands near Piel. Both villages were definitely in existence at the end of the fourteenth century, but for centuries all record of them has disappeared. There was a severe storm on the coast on 12 December 1553, which is known to have damaged Walney Island considerably, and it is possible that the final disappearance of Herte coincided with it."

Professor Alan Wood of Aberystwyth refers to Medieval wells overwhelmed by the advance of the sea, so that the bottom sections of them are now found in shore platforms. Houses and villages associated with such wells must have been destroyed by the sea.

Coastal Retreat at Warrnambool, Victoria

The city of Warrnambool in Western Victoria, Australia, stands on ancient sand dunes built by Pleistocene onshore winds from coastal shell sand. The dunes are now cemented into hard rock. Since the sea came to its present level about 6000 years ago, the coast has retreated about a quarter of a kilometer. This can be worked out from the fact that a dune stranded by the sea retreating to the low level of the Last Glaciation has been attacked since the sea returned to its present level. The dune is lithified, and the sea has wrecked all the seaward-dipping section. Measurement shows that of the order of 250 m of dune has been eroded away, so the coast has been demolished at a mean rate of about 4 cm/yr.

The sea has not been so successful in its attack on other types of rock that make up the coast west of Melbourne. The felspathic sandstone of the Otway coast has been eroded back at about 0.9 cm/yr, while the accompanying siltstone has worn twice as fast (1.8 cm/yr) and so forms bays and not headlands. The most resistant rock type yet studied is a fresh basalt (dated 300,000 yr) at Port Fairy, which has remained unchanged in its overall geometry during the past 6000 years. Wear has taken place in channels and joint planes, and the basalt has been wave-quarried along joints, but Last Interglacial limestone remaining in cavities proves that the sea has not bitten deep enough to get past the sand left in cracks when the sea retreated. As it was lime sand, it has now been altered to solid limestone.

Coastal Recession at Shannon Point, U.S.A.

Shannon Point is a cliffed headland on Fidalgo Island, Washington. Dr. Maurice Schwartz of Western Washington State College has studied this area. It is composed of glacial rocks (Vashon drift), and maps are available from 1893 to show the rate at which the cliff has receded. In that time the sea has wrecked over 50 feet (15 m) of land, i.e. the cliff has retreated at about 0.66 feet a year (20 cm/yr), which is five times as fast as at Warrnambool!

The Sea as Builder

In England there was a Royal Commission on Coast Erosion that issued a report in 1911. It made the surprising statement that in about 35 years 6640 acres had been lost by marine attack in Britain, but 48,000 acres gained! These figures are of course in terms of area and not volume. However, this makes us realise that the sea gives as well as takes, builds as well as wrecks. Professor L. Dudley Stamp reminds us that "the coast is not a line fixed on a map, but a zone where there is constant daily interplay between natural forces."

In the past year much publicity has been given to the destructive attack of the sea on the Gold Coast of Queensland, because of the threat to property. But the other side of the story is that in other parts of Queensland the land is being built up. Extensive spits and dunes are being constructed, especially at the mouths of large rivers. Dr. David Hopley of the Captain Cook University of North Queensland has described ancient dunes and spits built in Queensland in times long past. Such can be found in many parts of Australia, because one of the functions of the sea is that of builder.

What Causes Progradation?

To prograde or build out the shore with beaches, sand ridges, dunes and spits required an adequate supply of sand. This comes mostly from rivers, but some comes from the sea's own breakdown of the land. Where no rivers reach the sea, as in the Great Australian Bight (where the land is arid, and what rain does fall disappears down limestone sinkholes), the sediments are mostly marine carbonate such as the skeletons of shells, foraminifera, bryozoa, coral and such like. In the Warrnambool/Port Fairy area of Western Victoria, river sediments of sand size are mostly trapped behind dunes, so that the beach sands have a high percentage of marine carbonate such as broken up mollusc shells.

Where there is a sufficient supply of sand, what causes the beaches to widen, and dunes to appear, so that the coast builds seawards? Two answers have been offered. The first says that as the amount of sand available from erosion increases with time, the sandpile gradually extends seaward. The second answer is that the change in the balance between erosion and deposition that results in progradation is a result of changes of sealevel. If the first answer were the whole answer (and it is indeed a factor), then outward coastal growth would be at a regular rate, but radiocarbon dating shows that progradation has not been regular but in phases.

Phases of Progradation

Southeast of Andersons Inlet in Eastern Victoria, in an area of ample sand supply, a sandy beach some 20 km long defines Venus Bay. Behind the beach for a considerable distance is a Pleistocene duneline now cemented. On the present coast only sand-dwelling molluscs are present, while on top of the dune-rock fossil cliffs are Aboriginal middens of rock-dwelling molluscs! Therefore when the Aborigines were collecting the shellfish, the sea reached the dune rock where their molluscs grew. In front of the cliff now there is a wide area of hummocky sand ridges and then the modern beach. Radiocarbon dating showed the midden shells to be 2800 years old, so only since then has all the progradation of the sand occurred.

A series of radiocarbon dates in the Warrnambool/Port Fairy district suggests that the dunes there built up between 5000 and 3000 years ago, then dune-building slowed down or ceased so that the soil formed on the dunes. Aboriginal middens in the soil commonly date round about 2800 years. Since then the modern beach and dune processes have been active. At present the dunes are being attacked, and this is attributed to a small current rise in sealevel. Earth movements would of course change the coast, but in the areas discussed no measurable movements are known for the period concerned. It is becoming apparent that progradation has occurred in phases, and it is now being investigated how these phases are related to changes in sealevel.

Thus the sea is both destroyer and builder. To understand its work is important for the protection and utilization of our coasts, for deciphering the Aborigines' relationships with the sea, and for many other purposes.

The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(continued from 91 (11))

by JAMES A. BAINES

* **Chrysanthemum.** Gk chrysos, gold; anthos, flower; the first species described by Linnaeus having flowers of golden hue. Victoria has 4 species, all introduced, Ox-eye Daisy, Portuguese Swamp Daisy, Feverfew and Tansy. (Feverfew means febrifuge, i.e. a chaser-away of fever, and Tansy is an aphetic form of athanasia, meaning immortality, therefore having affinities with Immortelle and Everlasting, common names of other composites.)

Chthonocephalus. Gk chthon (genitive chthonos), the earth; kephale, a head; because this is a tiny plant (one inch in diameter) with a rosette of daisy-like flowers very close to the ground. *C. pseudevax* is known, in keeping with the derivation of its generic name, as Groundheads.

* **Cicendia.** Recorded by Dioscorides as an ancient Tuscan name for some plant of the gentian family, and taken by Adanson in 1763 when naming the genus. (Gilbert-Carter says the name is meaningless, and made up by Adanson).

Craspedia. Gk kraspedon, a fringe; in allusion to the feathery pappus. Victoria has 4 species, including Common Billy-buttons, *C. glauca*, which was long known as *C. uniflora*.

Crassula. Lat crassus, thick, with the feminine diminutive added to the stem of the adjective, with the noun planta, plant, understood as precceding, i.e. a 'thick, fat or succulent plant'. The genus gives its name to the family Crassulaceae; these -aceae endings are really adjectival also, being short for, e.g. crassulaceous plants, plantae being understood; the same applies to the endings -

eae (tribe), -oideae (subfamily), -ineae (suborder) and -ales (order). All Victoria's 8 species are native, and the generic name serves as a common name for each one, with a descriptive adjective to differentiate them.

* **Crataegus.** Gk krataigos, hawthorn tree in Theophrastus, transliterated into Latin form; ultimately from kratos, strength, in allusion to the strength and hardness of the wood. * *C. menogyna,* Hawthorn, is our sole species (there are 200 species in the world); planted as hedges, it has often spread across paddocks, like Furze or Gorse, also much used in the early days for hedges.

Cratystylis. Gk kratys, strong; stylos, style; alluding to the rather thick and rigid style. *C. conocephala,* our only species, is Bluebush Daisy, a better name than Bluebush, the name used in S.A., since it is a composite, and the latter name is better kept for species of *Kochia* (in Chenopodiaceae), despite the remarkable superficial resemblance of the two genera.

* **Crepis.** Gk krepis, a plant name in Theophrastus (perhape the same word as krepis, shoe or boot, but if so the reason for this is not clear); in its Lat form, crepis, it was used by Pliny. Our 4 species, all introduced, are different kinds of Hawksbeard.

Cressa. Lat Cressa, Cretan; *C. cretica,* our species, although indigenous here, was named from specimens growing in Crete, as both generic and specific names indicate. It has no relationship to Cress (family Cruciferae), being in the family Convolvulaceae. Cress is an old English word from a root meaning creeper. The common name of *C. cretica* is Rosinweed.

Crinum. Gk krinon, lily. *C. flaccidum,* the largest of all native flowers of Victoria, is found in this State only in the extreme north-west on the flood-plain of the Murray River, hence its common name, Murray Lily but it is known as Darling Lily in N.S.W. from its frequent occurence along the Darling River. It is even known as Macquarie Crinum in the region of the Macquarie River, but S.A. uses the name Murray Lily. *C. flaccidum* was described and illustrated in *Curtis's Botanical Magazine* in 1820, and appeared in the same year as *Amaryllis australasica* in the river journal, *Edwards' Botanical Register* (it is in family Amaryllidaceae).

* **Crocosmia.** Gk krokos, saffron (derived from Semitic karkom); osme, smell; the dried flowers when placed in water have a strong smell of saffron, which is a yellow dye produced from the stigmas and part of the styles of *Crocus sativus,* Saffron Crocus. Our species of *Crocosmia,* * *C. aurea,* Golden Copper-tip, is often called *Montbretia,* now an invalid genus, and more correctly applicable, according to Willis, to a hybrid between *Tritonia crocosmiiflora* and *C. aurea.*

Crowea. Named by Smith after James Crowe (1750-1807), F.L.S., a surgeon who studied mosses, fungi and willows (he had a large collection of the lastnamed in a 'salicetum'). Born in Norwich, he wrote on Norfolk plants. Our species, *C. exalata,* Small Crowea, is very close to *Eriostemon* (see Willis, vol. II, p. 333). (Omitted from Part 1, so included here.)

Cryptandra. Gk kryptos, hidden; aner, andros, a man; the anthers are hidden within the hood-shaped petals. Victoria has 4 species, the most widespread being *C. amara* and *C. tomentosa.* The generic name doubles as a common name.

* **Cryptostemma.** Gk krypto,, to hide; stemma, a crown. The hairs of the seed-cases cover the scales of the pappus. Now *Arctotheca* (which see).

* **Cryptostylis.** Gk kryptos, hidden; stylos, the column. More remarkable than the 'hidden style' in this genus is the amazing method of pollination of *C. subulata* and *C. leptochila* by male ichneumonid wasps, which, driven by sex-urge, attempt to copulate with the flowers. All species are known as various kinds of Tongue-orchid (named from the prominent labellum).

Ctenopteris. Gk ktenos, comb; pteris, fern; the feathery fronds prompted the latter name from pteron, a wing. *C. heterophylla* is known as Gipsy Fern.

* **Cucumis.** The ancient Lat name of the cucumber. Our species, * *C. myriocarpus,* Paddy Melon or Gooseberry Cucumber, is a reminder that the early colonists gave confusing names to flora and fauna, and in some cases used the same name for species of flora *and* fauna. The small wallabies originally called paddy-melons but now pademelons (for differentiation) look not unlike melons when seen squatting in the rain forest (as the writer saw one in North Queensland). Other examples of this are: Rosella (birds) and Native Rosella (the Qld. flower *Hibiscus slendens);* Cunjevof (the ascidian *Pyura stolonifera*) and Conjevoi (the araceous plant with edible rhizome, *Alocasia macrorrhiza,* said to be an antidote to the Queensland stinging trees); Mountain Devil (the Moloch Lizard, *Moloch horridus)* and Mountain Devil (Honey Flower, *Lambertia formosa).*

Three New Species of Rainbow Skinks of the genus *Carlia* from Northern Queensland

JEANETTE COVACEVICH* and GLEN INGRAM*

While revising *Carlia* in eastern Australia the authors found three undescribed species from northern Queensland in the collection of the Queensland Museum. These are described here as *C. jarnoldae, C. dogare,* and *C. prava.* The genus *Carlia* Gray was resurrected and redefined by Mittleman (1952, pp.11-12). Although several of the species of *Carlia* occurring in eastern Australia are easily recognised, many are difficult to define taxonomically because differences between them are slight and there is overlap in variation of many of the features used in distinguishing the species. The characters most useful in delimiting the taxa are male breeding colour and pattern. These are distinct in life but fade with preservation and are, therefore, not always available.

Specimens on which the descriptions are based are housed either in the Queensland Museum (QM J) or the Western Australian Museum (WAM R).

Dr Glen Storr of the Western Australian Museum who has recently revised *Carlia* in Western Australia and the Northern Territory (Storr 1974, in press) has provided specimens for this work and given helpful advice.

Carlia jarnoldae sp. nov.
(Plate 1a)

Holotype: QM J20739, Wakooka Outstation, Starcke Station, north-eastern Queensland, 14 deg 33' S, 144 deg. 33' E, collected by J. Covacevich, C. Tanner and T. Tebble, 27 November, 1970.

Diagnosis: A moderately large *Carlia* with mid-dorsal scales hexagonally shaped, moderately tricarinate and regular in alignment; ear aperture smaller than palpebral disc, with small lobule anteriorly. Distinguished from *C. pectoralis* in having more numerous supraciliaries (usually 7 vs 5), longer axis of ear aperture usually horizontal, and in male breeding colour.

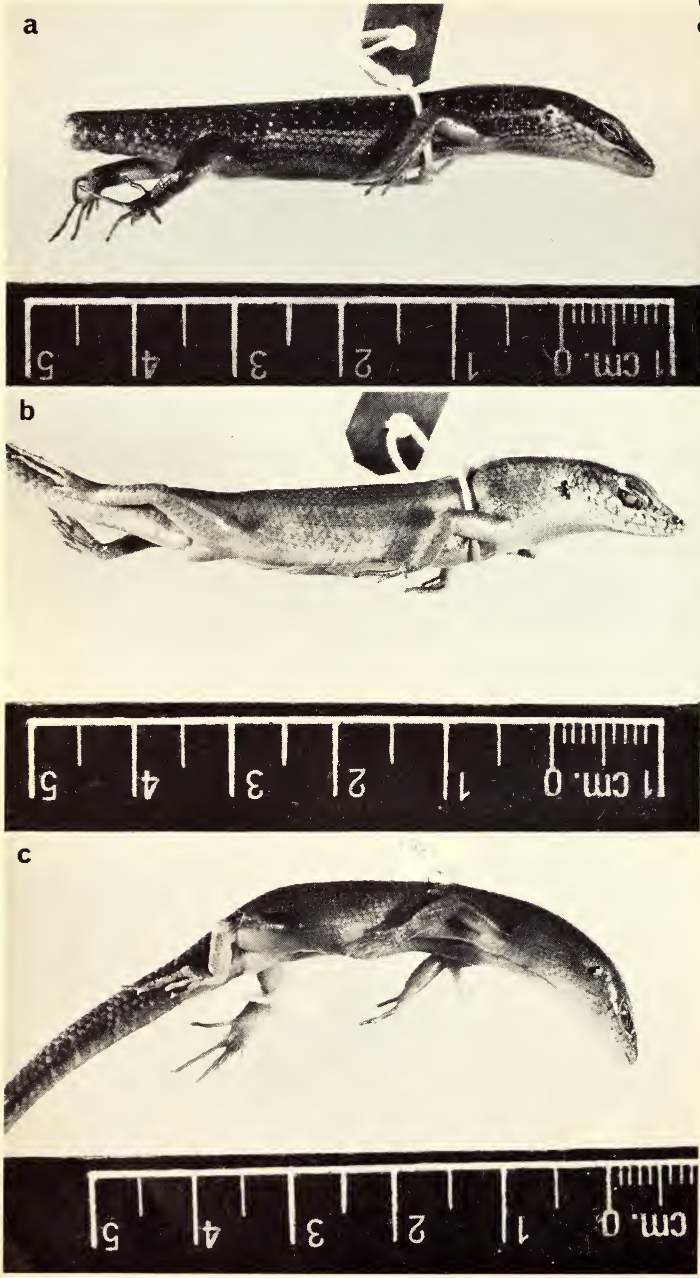
Distribution: North-eastern Queensland, from Rokeby Station, via Coen, on Cape York Peninsula, to near Herberton on the Atherton Tableland, and south to at least Hidden Valley, 40 km S. S. W. of Ingham (G. Maywald, pers. comm.).

Description: Snout-Vent length (mm): 28.5 - 47.9 (N=27, mean 39.0). Tail (%SVL): 142 - 174 (N=7, mean 155).

Prefrontals mostly separate but touch or form a medium suture in 12% of specimens. Supraciliaries usually 7, occasionally 6, rarely 8 (N=27, mean 6.8). Palebral disc large. Ear aperture smaller than palebral disc, longer axis horizontal, very rarely vertical, with a small pointed lobule anteriorly. Midbody scale rows 27 - 32 (N=27, mean 28.9); mid-dorsal scales moderately trikeeled, hexagonally shaped, and regularly aligned. Lamellae under fourth toe smooth, 22 - 28 (N=26, mean 26.7). Coloration varies between two extremes described below for the female and breeding male. Female, head bronze-brown, back and sides olive-grey, with a well defined white line edged in black from under eye, through ear aperture, back above foreleg and terminating just in front of hindleg; under surfaces white. In breeding male, 5-7 dark blue stripes on a brown background from neck to

* Queensland Museum

Plate 1:
Holotypes of three new species of *Carlia*.



a. *Carlia jarnoldae* (J20739)

b. *Carlia dogare* (J20557)

c. *Carlia prava* (J14101)

hind legs where they break up into spots. The stripes lie between two parallel lines formed by the outer keels of adjacent scales. A thick dark blue stripe flecked with white runs from behind ear to front of hindleg; below this blue stripe there is a red stripe which begins above foreleg and terminates in front of hindleg. A light line starts under eye, passes through, and includes ear, to above foreleg. Undersurface white.

Remarks: Carlia jarnoldae exhibits striking sexual dichromatism, a phenomenon typical of most Carlia. This species is named after Jennifer Arnold who, in her M.Sc. thesis (Arnold, 1966), first suspected it was an undescribed species. Mitchell (1953, p.86) included this species in *C. pectoralis*, but the latter differs from *C. jarnoldae* in having 1. a more robust shape; 2. fewer supraciliaries (usually 5); 3. the longer axis of the ear aperture vertical and in 4. male breeding colour *(C. pectoralis* breeding males are uniform grey-brown and have two red lateral stripes; the lower stripe may be broken up into spots); 5. female colouring *(C. pectoralis* females are similar to those of *C. jarnoldae* but usually have two rows of pale spots dorsally and a less well defined white lateral stripe which usually ends just posterior to the foreleg).

Paratypes: 5 - 6 km W. Rokeby Station Homestead (J23443-6, J23448, J23464); Melville Range (J20513); 3.2 km N. Wakooka Outstation (J20760-1, J20765); Wakooka Outstation (J20543, J20738); Isabella Falls, 32 km N. W. Cooktown (J17820); 16 km N. W. Cooktown (J17821); Mt. Molloy (J19407-8, J19411, R45610); Mt. Fraser (J23453, J23455); Chillagoe (J18036-7); Stannary Hills, near Herberton (J7782, J7784, J14031-3).

Carlia dogare sp. nov.
(Plate 1b)

Holotype: QM J20557, 5-6 km. N. mouth McIvor River, north-eastern Queensland, 15 deg. 8' S, 145 deg. 15' E, collected by C. Tanner, J. Covacevich and T. Tebble, 20 November, 1970.

Diagnosis: A moderately large *Carlia* with mid-dorsal scales hexagonally shaped, mostly bicarinate and regular in alignment. Toes long; lamellae under 4th toe average numerous (27-35). Distinguished from *C. vivax* in having larger ear aperture, more ear lobules (usually 2 vs 1), high lamellae count and in male breeding colour two orange lateral stripes *vs* diffuse pink sides) and female colour (faint laterodorsal, vertebral, and lateral pale lines *vs* strong white lateral line from nostril, under eye, through ear, to hind leg; laterodorsal line sometimes strongly defined).

Distribution: Known only from Cape Flattery south to the mouth of the McIvor River and on Lizard Island, north-eastern Queensland.

Description: Snout-vent length (mm): 31.9 - 49.6 (N=39, mean 42.1) Tail (%SVL): 148-217 (N=20, mean 178).

Prefrontals separated. Supraciliaries 5, rarely 4, 6, or 7 (N=39, mean 5.0). Palebral disc large. Ear opening usually smaller than palpebral disc, longer axis vertical, with 2 small rounded lobules anteriorly. Midbody scale rows 29-33 (N=39, mean 30.9), mid-dorsal scales hexagonally shaped usually bicarinate. Lamellae under fourth toe smooth, 27-35 (N=39, mean 31.6).

In female, head bronze-brown; pale line from nostril along upper labials and under eye; indistinct pale vertebral and dorsolateral lines enclose a series of pale spots with black anterior borders on a brown background from neck to tail; a pale lateral line; legs dorsally brown with white flecking; under surfaces white. In breeding male, uniform brown dorsally and laterally with a grey wash; two orange lateral stripes, the upper beginning above foreleg and finishing above hindleg, the lower from foreleg to just in front of hindleg.

Remarks: Carlia dogare lives in sandy areas. Its pale colouring (which would reflect heat) and long toes (which enable it to move swiftly over loose sand) are apparently adaptations for life in hot, sandy areas of coastal northern Queensland. This species' name is from the language of an Aboriginal tribe that lived in the Cape Flattery region; 'dogare' means 'in sandy country' (Roth, 1901, p. 13). Pronounced de'gari.

Paratypes: Lizard Island (J20436-42, J20444-6, J20451-55); 1-8 km N mouth McIvor River (J20507, J20545-6, J20548, J20556, J20558-63, J20617-9, J20621-6, J20652, R45612); Cape Flattery (J20749-50).

Carlia prava sp. nov.
(Plate 1c)

Holotype: QM J14101, Magnificent Creek, Kowanyama (Mitchell River Mission) 15 deg. 18' S, 141 deg. 44' E, collected by P. Graf, 19 October, 1965.

Diagnosis: A moderately large *Carlia* with mid-dorsal scales hexagonally shaped, usually strongly bikeeled, sometimes tending to be bicuspidate. Alignment of scales varies from regular to very irregular; laterally this can be so marked as to make scale counting difficult. Palpebral disc approximately equal to ear aperture, and occupies only about half of lower eyelid. Two large squarish lobules on anterior border of ear. Colour leaden grey.

Distribution: Known only from specimens from Kowanyama (formerly Mitchell River Mission), on the western coast of Cape York Peninsula.

Description: Snout-Vent length (mm): 36-4 - 53.2 (N=9, mean 45.2). Tail (%SVL): 206-213 (N=2).

Prefrontals separated. Supraciliaries 7. Palpebral disc small, occupies about half of lower eyelid. Ear aperture approximately equal to palpebral disc, longer axis vertical, with two large squarish lobules anteriorly. Midbody scale rows 32.36 (N=8, mean 34.2), mid-dorsal scales mostly strongly bikeeled, hexagonally shaped, sometimes tending to be bicuspid; alignment varies from regular to very irregular; laterally the keels can be obliquely aligned to horizontal axis of body so that the line of keels arcs upwards in the mid-lateral region. Lamellae under fourth toe smooth, 24-28 (N=9, mean 26.4).

All specimens uniform leaden grey dorsally and laterally, white ventrally. Head brown. One large male (J14096) has dark brown flecks dorsally, laterally, and along the edges of the lower labials and side of throat.

Paratypes: Magnificent Creek, Kowanyama (Mitchell River Mission) north-western Queensland (J14094-7, J14099-100, J14102-3, R45613).

Remarks: It is not known whether or not this species exhibits sexual dichromatism. The type series has been preserved for nine years and may have lost all trace of colour and pattern.

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Mittleman, M. B., 1952. A generic synopsis of the lizards of the subfamily Lygosominae. *Smith. Misc. Coll.* 117(17):1-35.

Roth, W. E., 1901. 'The structure of the Koko-Yimidir language' In north Queensland Ethnography: Bulletin 2. pp.1-35. (Home Secretary's Department: Brisbane).

Storr, G. 1974. The genus *Carlia* (Lacertilia, Scincidae) in Western Australia and Northern Territory. (in press).

Sunday, 16 February — Tortoise Head area, French Island. Leader: Mr I. Sault. This will be a combined train and ferry excursion. Take the Stoney Point train from Flinders Street at 9.28 a.m. which stops at Caulfield and Frankston and a few other stations which I have not checked. This connects with the Cowes Ferry and members should ask to be put ashore at Tankerton. The return ferry leaves Cowes at 6 p.m. connecting with the train which arrives in Melbourne at 8.46. Fare $3.70. Bring two meals and anything required for the day as I understand we will not be near any shops. Main objects for the day will be birds and marine biology.

Easter Friday 28 March — Monday March 31 — Port Fairy. The coach will leave at 9 a.m. bring a picnic lunch. Accommodation has been booked at Seacombe House for the party. Further details next month.

Tuesday, 12 August — 28 August. Darwin-Perth. The excursion mentioned in the December *Naturalist* has been abandoned though the firm may vary the itinerary if it is not possible to start from Darwin. Will those people who wish to join me on this trip please send $25.00 deposit to me by 17 February.

VICTORIAN FIELD NATURALISTS' ASSOCIATION

The Victorian F.N.A. is holding its Annual Meeting and Delegates' Conference at Geelong during the holiday weekend, Saturday 8 March to Monday 10 March, 1975.

Saturday — Commencing 1.30. Delegates Conference. Non-Delegates: Visit Queens Park.
Evening entertainment — Geelong F.N.C.

Sunday — Visit Ocean Grove Nature Reserve, followed by Barbeque Tea at Mr and Mrs Hunt's property.
For day visitors, bus leaves Batman Ave.: 9.30 a.m. $3.00; bring two meals.

Monday — Visit You Yangs: Boneseed Control Project.

Further details from Excursion Secretary.

BOTANY GROUP ANNUAL REPORT 1974

This has been an active year for the group with 10 meetings and 11 excursions. Average attendance of 25 at meetings was an increase over the previous year. Attendances of 36 and 31 at two meetings were higher than for many years. Active member participation by means of discussion and display of specimens added to the interest of most meetings.

Excursions were also well attended, particularly those which offered an opportunity for special study, such as the Lichen excursion led by Mr. Rex Filson and the Eucalypt excursion led by Miss Pat Carolan. We also had a weekend trip in September to assist the Seymour Rotary Club Conservation Group with a plant survey of the Puckapunyal Forest. It was hoped to hold a second weekend trip in November, but difficulty with transport forced cancellation of this. The year's excursion programme was planned in February by the excursion sub-committee and it seems evident that this early planning and the appointment of knowledgeable leaders are important factors in the success of excursions.

The "Flower of the Month" series was continued, and although printed notes were not always issued, members found it a worthwhile addition to the regular programme. It is hoped to keep the series going in 1975.

We were pleased to welcome several new members during the year and hope this trend will continue. Catering for the needs of new members without covering the same ground too frequently is not easy and we look to new comers to the group to express their interests so that they may be considered when programmes are planned.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1973-1974.

President:

Mr. P. KELLY

Hon. Secretary: Mr. R. H. RIORDAN, 15 Regent St., East Brighton, 3187. 92-8579

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Magazine Sales Officer: Mr. D. McINNES.

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Group Secretaries

Botany: Mrs. M. G. CORRICK, 7 Glenluss St., Balwyn 3103. Tel. 857-9937.

Day Group: Mrs. J. STRONG, 1160 Dandenong Rd., Murrumbeena (56-2271).

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56-2271).

Field Survey: c/0 National Herbarium, The Domain, South Yarra, 3141.

Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy Street, East Brighton (96-3268).

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
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Country subscribers, and retired persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
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All subscriptions should be made payable to the Field Naturalist Club of Victoria, and posted to the Subscription Secretary.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETING

Wednesday, 12 March — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m. Annual General Meeting.
Speaker — Mr. P. Kelly — Presidential Address.

Monday, 14 April — At National Herbarium, The Domain, South Yarra, commencing 8 p.m.
Speaker — Dr. J. V. Saunders.
Subject — *"The Occurrence and Structure of Precious Opal."*

New Members —

Ordinary:
Mr. R. A. Carter, Flat 1, 35 Donald St., Prahran, 3181.
Mr. Colin W. Douglas, 22 Mandowie Rd., Glen Waverley, 3150.
Mr. Bruce G. Draper, 25 Odenwald Rd., Eaglemont, 3084 *(Botany)*
Mr. Ian Gray, 147 Booran Road, Garnegie, 3162 *(Biology)*
Mrs. J. M. Greig, 15 Mulgrave St., Ashwood, 3147.
Mr. Geoffrey D. Shaw, 4/18 Chrystobel Cres., Hawthorn, 3122 *(Botany)*
Mr. Dale B. Stephenson, 39 View St., Mount Albert, 3127
Mr. Nigel H. Royce, 316 Tucker Road, East Bentleigh, 3204 *(General)*
Miss Aileen E. Webb, 4 David St., Box Hill South, 3128.

Country:
Miss Dorothy Vines, P.O. Box 3, Robinvale, 3549.

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Anthony Sokol, 7 Roma St., Bentleigh, 3204.

Joint:
Mr. Jack Caine, Mrs. Beris Caine, 25 Hardinge St., Beaumaris, 3193.
Mr. Allan S. Gardner, Mrs. Elma E. Gardner, David S. Gardner, 5 Edward Court, Ivanhoe, 3079.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 13 March — An address accompanied by colour slides: Mr. Alan Morrison.

Wednesday, 19 March — Microscopical Group Meeting at the Herbarium at 8 p.m.

Thursday, 20 March — Day Group Meeting. Studley Park — meet 11.30 a.m. at Johnston St. Bridge.

Thursday, 20 March — Conservation Group Meeting.

Thursday, 27 March — Field Survey Group Meeting in Conference Room, National Museum at 8 p.m. *"Frog Calls"*.

Wednesday, 2 April — Geology Group Meeting.

Thursday, 3 April — Mammal Survey Group Meeting in Arthur Rylah Institute, 123 Brown St., Heidelberg at 8 p.m.

Monday, 7 April — Marine Biology and Entomology Group Meeting in Conference Room, National Museum at 8 p.m.

Thursday, 10 April — Botany Group Meeting.

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the victorian naturalist

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Acting Editor: **G. M. Ward**
Assistant Editor: **G. F. Douglas**

Contents

Front Cover:

Female Eastern Pigmy Possum *Cercartetus nanus,* with pouch young, which was caught during Survey 4.

The Mid Murray Field Naturalists Trust must be congratulated with special pleasure by all naturalists on its being awarded the Victorian Conservation Prize for 1974. The citation on the award states, "The Trust has exercised a continueing activity in marshalling its small and widely dispersed membership in the conservation of fauna and flora within a difficult environment and in providing background information for the Land Conservation Council Study Group." Probably few people outside the Trust have known much about its work for L.C.C. However, many have been aware of the extensive work its members have done in studying their area, and in bringing numerous conservation issues to the attention of the general public, and various authorities. The Trust has also played a leading part in the activities of the Western Victorian Field Naturalists Clubs Association, and in setting up the Victorian Field Naturalists Clubs Association.

The winning of the award by this small group must silence criticism that it was unfair to judge large and small bodies under the same terms. This arose as a result of the award going in its first and second years to official bodies. These were the Natural Resources Conservation League in 1972, which was the first year this Neil Douglas Award was made, and to the Soil Conservation Authority in 1973. The victory of a small private group this year should give great encouragement to other small conservation and naturalists groups to enter for the 1975 award. It is to be hoped many groups will give consideration to this over the next three months, during which time documentation to support a nomination for the 1975 prize must be prepared. The award is given for outstanding and sustained work in the field of conservation over the five preceeding years.

Mammals of the Upper Lerderderg Valley

by

D. DEERSON*, R. DUNN*, D. SPITTALL*
and P. WILLIAMS*

Introduction

The Upper Lerderderg Valley, much of which is reserved forest, comprises some 28,000 hectares of bushland. Together with the Black Forest to the north-east, this provides an extensive refuge for wildlife. Since forestry is the principle industry, the amount of land cleared for agriculture is minimal.

To determine which mammal species occurred within the area six sample surveys were carried out by the Mammal Survey Group between 1968 and 1970. The results are presented in this paper and the names of members who took part in the surveys are given in the authors' acknowledgements.

Description of the area

Geology

The Blackwood and Lerderderg ranges which form the catchment area of the Lerderderg River are the result of extensive earth movements during the late Pliocene and early Pleistocene epochs.

The great block of Ordovician slates, sandstones and quartzites, of which these ranges are composed, was uplifted, creating a scarp to the east of the elevated area. This scarp is known as the Rowsley Fault. Its occurrence accelerated the process of erosion by the Lederderg River and its tributaries, resulting in the excavation of a deep valley running through the block from north-west to south-east (Hills, 1951, and Fenner, 1918).

The mean altitude of the area surveyed is 670 m. above sea level. The ridge to the north of the valley forms part of the Great Divide.

Rainfall

The mean annual rainfall for Blackwood (approximately in the centre of the valley), Trentham (on top of the Divide 9.6 km to the north), and for Ballan (16 km to the south-west) is given in Table I. Most of the area surveyed has a rainfall between 833 mm. and 980 mm.

Vegetation

The terrain provides a wide range of conditions, from well-drained slopes and ridges to the deep moist soils of the valley floors. Diverse plant communities have developed under these conditions. Stunted mallee-form eucalypts, stringybark forest with sparse understorey and ground cover, and tall riverine forest with its associated understoreys are represented.

The valley once supported a thriving gold mining industry, and the forests have long been exploited for timber. Today parts of the forest are intensively managed and this has resulted in the removal of many unsound and hollow trees. In some areas there was little evidence of management and in these places hollow tree branches and tangled ground cover provided shelter for small mammals. There was little evidence of recent servere damage by wildfire.

*Mammal Survey Group of Victoria, c/o Honorary Secretary, 8 Alphington St., Fairfield, Victoria, 3078.

TABLE 1

Thirty-year mean rainfall (in millimetres) with the number of days in each month on which more than 0.25 mm. of rain fell. (Derived from "Rainfall Statistics for Victoria", Commonwealth Bureau of Meteorology).

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Blackwood	41	70	47	87	86	97	108	98	98	90	77	56	956
	5	6	7	12	15	15	19	18	15	15	12	9	148
Trentham	49	73	52	92	103	129	137	134	110	105	83	64	1131
	7	7	9	13	15	17	18	18	15	15	12	9	155
Ballan	36	58	37	64	53	55	54	63	63	69	57	50	659
	6	7	7	11	13	13	14	15	13	13	11	9	132

Areas surveyed

The method adopted by the Mammal Survey Group in making sample surveys is to select areas which are representative of the different habitat types present and to subject these areas to surveys in which the mammal fauna is methodically examined. Appendix III gives a detailed description of the vegetation at the several survey sites and Appendix IV gives a history of forest management in the area. Figure I shows the location of the survey area and the areas shown stippled in Figure II are those which were surveyed in detail. The areas surveyed have been numbered, for convenience, from west to east, rather than in the order in which they were studied.

Survey 1 on Cooper's Road — March 1969

Survey 2 on Wild Dog Road — January 1969

Survey 3 on Tram Creek — February 1970

Survey 4 in Nolan's Gully — March 1970

Survey 5 on Hogan's Flat — June 1968

Survey 6 on Campaspe Road — August 1969

Survey 1 was carried out in an area used by the Forests Commission of Victoria for logging purposes. Located on high ground at an altitude of about 790 m., the drainage from this point was generally towards the south to Cooper's Creek and east to the Lerderderg River. There was little running water at the time of the survey but the area in general did not seem to be particularly dry and nearby dams contained water. Very few old trees were present and the forest consisted of uniformly tall, straight trees. Vegetation in the valley was markedly different from the rest of the survey area. On the high ground the trees were 20-30m. high with a mid-dense to dense canopy*, and the dominant species was Messmate *(Eucalyptus obliqua)*. The shrub layer was composed mainly of wattles and the ground cover consisted of Bracken *(Pteridium esculentum)*, Wiregrass *(Tetarrhena juncea)* and low-growing legumes. In the creek beds, gullies and swampy areas, Manna Gum, *(Eucalyptus viminalis)*, Swamp Gum *(E. ovata)* and Blackwood *(Acacia melanoxylon)* were the dominant trees, with a low thick shrub layer of tea-tree, wattles and tree ferns. The ground cover was dense, a mixture of Wiregrass,

* The definitions of physical structure of vegetation used in this paper are those of Wood and Williams (1966).

sedges and ferns. One creek bed in the west of the survey area had a low (6-7.5 m) dense canopy of Musk Daisy-Bush *(Olearia argophylla)* and Hazel Pomaderris *(Pomaderris aspera).* Ferns were present on the creek banks. Nettles, mosses and liverworts were common. Fallen logs were covered with mosses.

Survey 2 was conducted on the watershed between the Lerderderg and Coliban Rivers, north of Mount Wilson, at an altitude of 640 m. The dominant trees were very straight Messmate about 25 m. high, some Narrow-leaved Peppermint *(Eucalyptus radiata)* and Blackwood. There were tree ferns in the gullies.

Undergrowth consisted mainly of Wiregrass, Bracken, Prickly Moses *(Acacia verticillata)* and heaths. On the edges of the forest and the sides of the gullies there was a dense layer of Wiregrass. Cleared areas had a dense cover of Bracken. It was a well kept forest, free of unsound trees. Unfavourable weather and logging activity limited survey work in this area.

Survey 3 was centred at the junction of Tram Creek and the Lerderderg River at an altitude of 670 m. Messmate and peppermints were the dominant eucalypts with an open to mid-dense canopy at 20-30m. Blackwood, Manna Gum, Swamp Gum and Mountain Grey Gum *(Eucalyptus cypellocarpa)* were present in the valleys. The shrub layer on the hillsides was sparse and included wattles and Prickly Hakea *(Hakea sericea)* and in the valley, wattles and Blanket Leaf *(Bedfordia salicina).* Ground cover consisted of profuse Wiregrass and scattered Bracken. Near the river both the shrub layer and

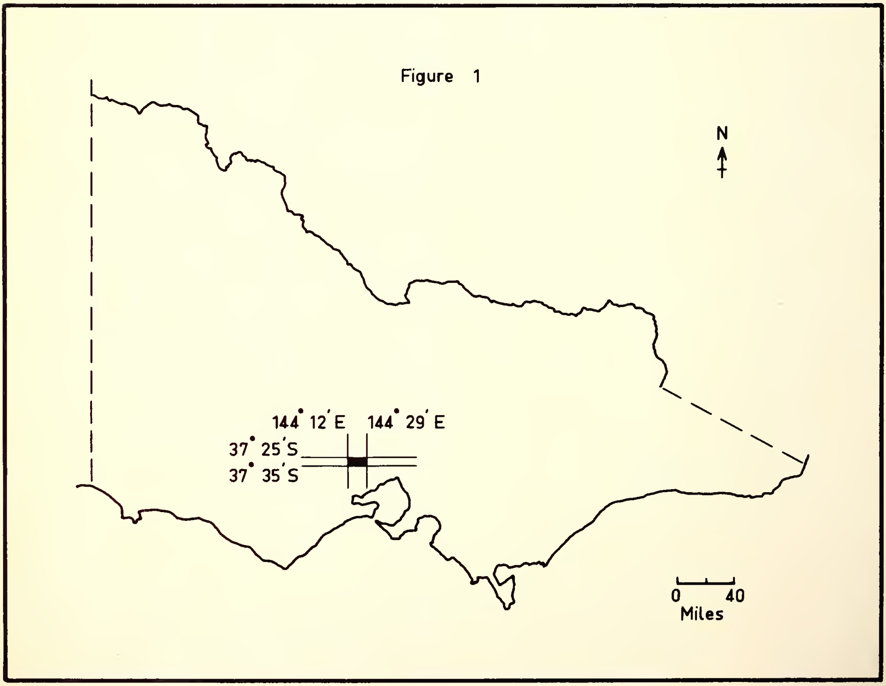

Fig. I — Location of the survey area.

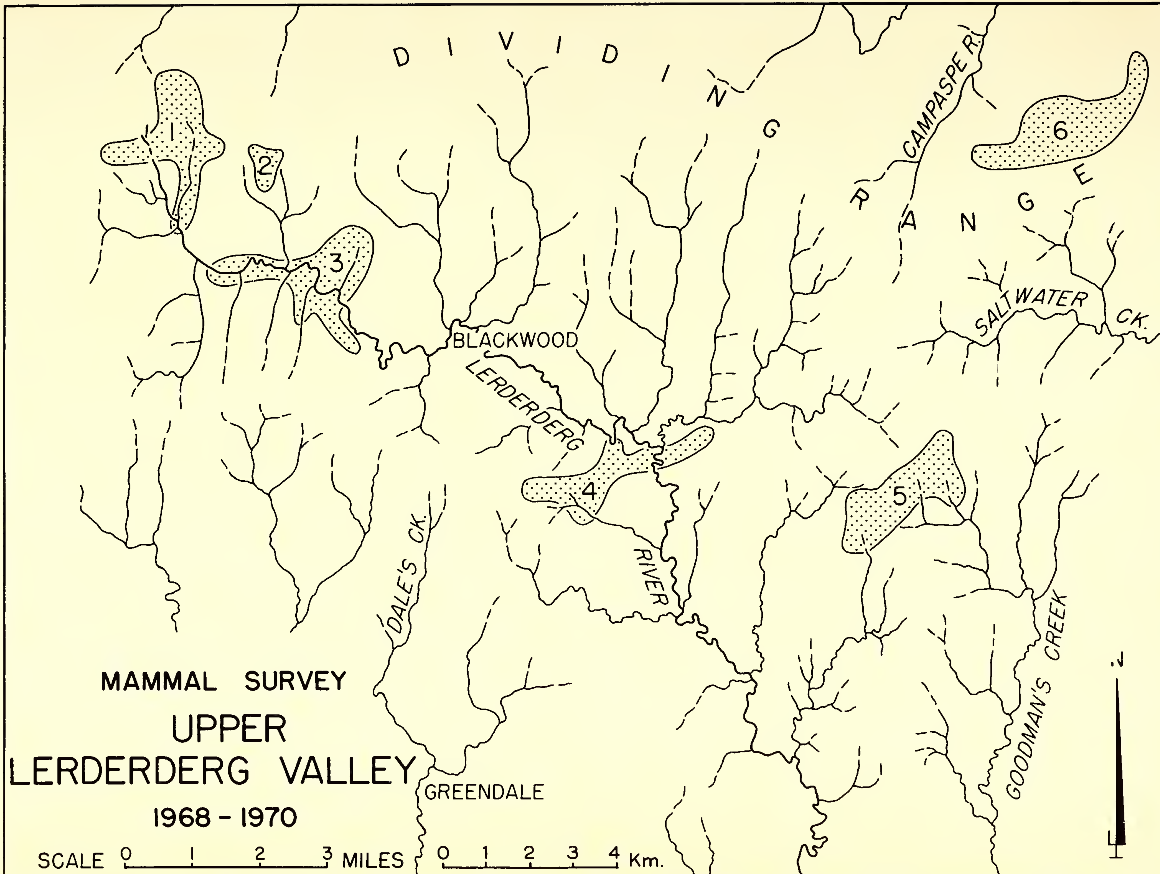

Fig. II — The stippled areas are those which were surveyed in detail. The numbers correspond with their description in the text and with Appendix I.

ground cover were denser than elsewhere. There were many rocky outcrops in the area.

Survey 4 was centred near the head of Nolan's Gully on a fairly flat area 3.2 km. south-east of Blackwood, at an altitude of 580m. The forest, which contained some unsound trees, had an open to mid-dense and uneven canopy of up to 20 m. It consisted mainly of Messmate and peppermints, with some Mountain Grey Gum and Manna Gum. The dense shrub layer consisted of eucalypt saplings, wattles, Silver Banksia *(Banksia marginata)* and Bracken. Ground cover was composed of dense tussock and Wiregrass with some areas of heaths. On a hillside of northerly aspect in the northern part of the survey area was a dense stand of mallee-form eucalypts consisting mainly of stunted peppermints with a belt of dense hakea and tea-tree. Along the river there was a narrow belt of Manna Gum growing to 40 m. with an understorey of tall shrubs.

Survey 5 was centred on a ridge between the Old River and Goodman's Creek at an altitude of 580 m., the site being chosen for its variety of forest types. The survey centre was in an open forest of Red Stringybark *(Eucalyptus macrorhyncha)*, peppermints and Mountain Grey Gum, up to 15 m. high. The understorey consisted of sapling eucalypts and there was a sparse but varied ground cover of tussock grass, heaths and sedges amidst forest litter. On the western slope of the ridge running down to the Old River was a stand of mallee-form eucalypts, mainly stunted Broad-leaved Peppermint *(E. dives)*, 3 — 4.5 m. high. This area also contained Austral Grass Tree *(Xanthorrhoea australis)* Prickly Hakea, grevilleas, leguminous shrubs and many heaths and grasses. In one of the gullies to the north of the survey area was a tall Messmate forest.

Survey 6 was conducted on the top of the Dividing Range at an altitude of 685 m., in part of the Black Forest. Drainage north and west was to the headwaters of the Campaspe River; south and east to Saltwater River and Gisborne Creek. The forest had an uneven mid-dense canopy about 25 m. in height, of Messmate, Candlebark *(Eucalyptus rubida)* and Narrow-leaved Peppermint in approximately equal proportions, with a few Blackwood. There were marked differences in the vegetation of the swamps and gullies and that of the remainder of the area. The shrub layer varied between 0.6 and 2.5 m. in height and consisted mainly of wattles growing amongst eucalypt saplings. Ground cover was of Wiregrass and Tussock Grass *(Poa australis)*, these being thick in patches. In the swamps and gullies Manna Gum, Swamp Gum and Brown Stringybark *(Eucalyptus baxteri)* predominated, with some Blackwood, all growing to a greater height than those in the drier areas. The shrub layer was of wattle and tea-tree, with a very dense ground cover of grasses, widespread Wiregrass and rushes, and some Bracken.

Methods

Trapping was carried out using wire mesh cage traps, 36 x 20 x 18 cm. baited with a mixture of peanut butter, rolled oats and honey. Night observations, carried out by means of portable spotlights, were made between dusk and about midnight. Skeletal and faecal material was collected, and other evidence such as diggings and footprints was recorded. The sex of some of the animals trapped was recorded.

Results

A systematic list of the nineteen native and four introduced mammal species recorded in this valley is given in Table II. An analysis of the results of all surveys conducted in the area is given in Appendix 1.

TABLE II

Systematic list of mammals recorded in the Upper Lerderderg Valley.

	Order **Marsupialia**
Family **Macropodidae:**	
Eastern Grey Kangaroo	*Macropus giganteus* Shaw, 1790.
Black Wallaby	*Wallabia bicolor* (Desmarest, 1804).
Family **Phalangeridae:**	
Bush-tailed Possum	*Trichosurus vulpecula* (Kerr, 1792).
Bobuck	*T. caninus* (Ogilby, 1836).
Family **Petauridae:**	
Common Ringtail	*Pseudocheirus peregrinus* (Boddaert, 1785).
Sugar Glider	*Petaurus breviceps* Waterhouse, 1839.
Yellow-bellied Glider	*P. australis* Shaw, 1791.
Greater Glider	*Schoinobates volans* (Kerr, 1792).
Family **Burramyidae:**	
Feathertail Glider	*Acrobates pygmaeus* (Shaw, 1793).
Eastern Pigmy Possum	*Cercartetus nanus* (Desmarest, 1818).
Family **Phascolarctidae:**	
Koala	*Phascolarctos cinereus* (Goldfuss, 1817).
Family **Vombatidae:**	
Common Wombat	*Vombatus ursinus* (Shaw, 1800).
Family **Dasyuridae:**	
Brown Antechinus	*Antechinus stuartii* Macleay, 1841.
Swainson's Antechinus	*A. swainsonii* (Waterhouse, 1840).
	Order **Rodentia**
Family **Muridae:**	
Southern Bush Rat	*Rattus fuscipes* (Waterhouse, 1839).
Eastern Swamp Rat	*R. lutreolus* (Gray, 1841).
Black Rat*	*R. rattus* (Linnaeus, 1746).
House Mouse*	*Mus musculus* (Linnaeus, 1746).
Eastern Water Rat	*Hydromys chrysogaster* Geoffroy, 1804.
	Order **Carnivora**
Family **Canidae:**	
Red Fox*	*Vulpes vulpes* (Linnaeus, 1746).
	Order **Lagomohpha**
Family **Leporidae:**	
Rabbit*	*Oryctolagus cuniculus* (Linnaeus, 1746).
	Order **Monotremata**
Family **Tachyglossidae:**	
Echidna	*Tachyglossus aculeatus* (Shaw, 1792).
Family **Ornithorhynchidae:**	
Platypus	*Ornithorhynchus anatinus* (Shaw, 1799).

*Introduced species.

The classification and nomenclature of species in this paper follows that of Ride, (1970).

The apparent abundance of native mammals is given in Table III where a comparison is made with data obtained from all other surveys carried out by the Mammal Survey Group between 1966 and 1972.

Detailed information of all surveys is held in the Group's files. Reference specimens which have been retained in the collection of the Fisheries and Wildlife Division, Victoria, are listed in Appendix II.

TABLE III

Apparent abundance of native species.

	Specimens caught per 100 trap-nights	Specimens seen per spotlight hour
Lerderderg Valley	21.50	0.60
Mean all surveys.* (to June 1972)	19.78	1.33

*This data is taken from the Group's records and includes that in both published and unphblished reports.

Notes on the species recorded

Eastern Grey Kangaroo, *Macropus giganteus.*
Two were seen by spotlight near a dam in Survey 1. Another was spotlit on Survey 5, drinking from a creek. Unidentified macropods were heard shortly after this sighting. In 1968, one was seen 14 km. from Trentham near Survey 5.

Black Wallaby, *Wallabia bicolor.*
This species was seen on Surveys 1, 3 and 6, four sightings by daylight and four by spotlight. It has been recorded on five other occasions from 1969 to 1973 in the Blackwood area.

Brush-tailed Possum, *Trichosurus vulpecula.*
Only one individual was recorded in this area, by spotlight in Survey 1, on Cooper's Road. This was an unusually low count for this species, which is frequently recorded on Group surveys elsewhere.

Bobuck, *Trichosurus caninus.*
One animal was seen by spotlight on Campaspe Road in Survey 6 in the Black Forest, 8 m. above ground in a eucalypt. This is the most westerly sighting of the species made by this Group.

Common Ringtail, Pseudocheirus peregrinus.
This was the most common arboreal species observed, a total of 40 animals being recorded in Messmate, stringybark, peppermint, Blackwood, Silver Wattle *(Acacia dealbata)* and other trees. All were spotlit except for one which was found during the day in its drey in a Musk Daisy-bush. The species was recorded from all surveys except Survey 2 where rain prevented good spotlighting.

Sugar Glider, *Petaurus breviceps.*
This species was not recorded in the area by the Group, but Heislers (pers. comm.) has reported sighting one by spotlight in the area covered by Survey 3.

Yellow-bellied Glider, *Petaurus australis.*
One was observed by spotlight near Tram Creek on Survey 3, 15 m. above ground in a eucalypt.

Greater Glider, *Schoinobates volans.*
Two of these were spotlit about 1.5 km. apart in Survey 3, near the sighting of *Petaurus australis.* They were about 20 m. above ground, one in peppermint, the other in Mountain Grey Gum. This is the most westerly sighting of this species in the Group's records. Another was spotlit during Survey 6, in a dead Messmate. This proved to be the nest tree, the animal being disturbed from its nest the following morning. Another animal was seen 11 km. north-east of Survey 6 in 1967.

Feathertail Glider, *Acrobates pygmaeus.*
Although not recorded in the area by the Group, timber-cutting in the area in recent years has revealed the presence of this species (Heislers, pers. comm.).

Eastern Pigmy Possum, *Cercartetus nanus* (cover photo).
A single animal was caught by hand on the ground in grass and Wiregrass at the roadside during Survey 4. The animal was a female with five young attached to the teats. This species has been recorded only occasionally by the Group.

Koala, *Phascolarctos cinereus.*
One Koala was observed by spotlight on Cooper's Road in Survey 1. This was the only one seen in this series of six surveys.

In the period between 1942 and 1957, over 300 Koalas, from Phillip, Quail, French and Chinaman Islands were released by the Fisheries and Wildlife Division in the surrounding districts, though none in the Lerderderg Valley itself. Records of the Division show that 26 were released in October 1942 at Daylesford, a further 36 in March and 32 in April 1944; 25 were released at Hepburn Springs in October 1942; 70 were released near Kyneton in March 1944; 69 at Trentham in March 1944 and a further 32 in April 1951; 25 at Toolern Vale in November 1943; 20 at Woodend in June 1957 and 6 at Macedon in May 1931. While these releases might have been responsible for quite large numbers being established in the hills around Riddell (Hampton .. Seebeck, 1970), no similar colonisation of the Lerderderg Valley was evident from these surveys.

Common Wombat, *Vombatus ursinus.*
No live Wombats were seen during the surveys. However, a Wombat mandible was found on Survey 2. Other evidence of the presence of Wombat in the Lerderderg Valley consisted of scats and burrows in Surveys 3 and 4. A fresh roadkill was recorded near Fingerpost Corner, approximately 3.5 km. north-east of Survey 6, in 1969.

Brown Antechinus, *Antechinus stuartii.*
This species was trapped in all surveys, the total number being almost 25% of all animals trapped. Ground cover was usually Wiregrass, Bracken, forest litter and fallen, hollow logs. The sex of animals trapped was recorded at three surveys: Survey 1 — March 1969 — 5 ♂, 1 ♀
Survey 4 — March 1970 — 6 ♂, 7 ♀
Survey 6 — August 1969 — 1 ♂, 1 ♀

Swainson's Antechinus, *Antechinus swainsonii.*
Two adults (one o , one) were trapped in Survey 4. They were caught in a habitat of Wiregrass, Bracken, forest litter, Sallow Wattle (*Acacia longifolia*) and hollow logs, in the dry creek bed of Nolan's Gully.

Southern Bush Rat, *Rattus fuscipes.*
Many animals, both juvenile and adult, were trapped. They were most commonly found in swampy habitat, but were caught also in Bracken and Wiregrass, and on bare ground. Bush Rats were trapped in all survey areas, and they numbered almost 75% of all animals caught. The sex was recorded at five surveys:

Survey 1 — March 1969 — 1 ♂	15 ♀	juveniles and adults.
Survey 2 — January 1969 — 1 ♂	6 ♀	
Survey 3 — February 1970 — —	15 ♀	juveniles and lactating females.
Survey 4 — March 1970 — 24 ♂	14 ♀	juveniles and adults.
Survey 6 — August 1969 — 5 ♂	12 ♀	

Eastern Swamp Rat, *Rattus lutreolus.*
This species was trapped at only one site, along Sardine Creek near Wild Dog Road in Survey 2. Two females were caught in an area of fairly dense Bracken and Wiregrass.

Eastern Water Rat, Hydromys chrysogaster.
Eastern Water Rat was recorded by the authors in the Survey 3 area in March, 1973, on the basis of footprints in the sand of the Lerderderg River near Tram Creek.

Black Rat, *Rattus rattus*, and
House Mouse, *Mus musculus.*
One Black Rat and two House Mice were caught in Survey 4 on the plateau between Nolan's Gully and Frechman's Road. This was some distance from human habitation.

Bats, *Chiroptera.*
Bats were heard and seen in Survey 1 and particularly in Survey 4, but idenitification of species was not possible. However, the Fisheries and Wildlife Division, Victoria, have records of two species within 25 km. of the area: — Little Bat, *Eptesicus pumilus* from Bacchus Marsh, and Lesser Long-eared Bat, *Nyctophilus geoffroyi* from Toolern Vale and from Bacchus Marsh.

Red Fox, *Vulpes vulpes.*
Two animals were seen, one by spotlight in Survey 1, the other during the day in Survey 6. Fox scats were found in Survey 3.

Rabbit, *Oryctolagus cuniculus.*
Sixteen Rabbits were seen by spotlight in Survey 1, and one was seen in Survey 6 during the day.

Echidna, *Tachyglossus aculeatus.*
An Echidna was recorded in Survey 6 during the day, and Echidna diggings were recorded in Survey 3.

Platypus, *Ornithorhynchus anatinus.*
A Platypus was seen near the Survey 2 area in March, 1969. It was observed during daylight, in a tributary of the Coliban River.

Discussion

The results of the surveys described in this paper show that a wide variety of native mammals survive in the Upper Lerderderg Valley. Nineteen native mammal species have been recorded here, this being the highest number found by the Group for completed surveys so far carried out. The Group has recorded a similar species association (including four species of Petauridae, two Phalangeridae, two Burramyidae and two Dasyuridae) elsewhere only in the north-eastern highlands (to be published).

The apparent abundance of terrestial mammals compares favourably with surveys in other areas (Seebeck, Frankenberg and Hampton, 1968; Hampton and Seebeck, 1970; Hampton,

1971) but all but one of the arboreal species were found in relatively low numbers. The dearth of trees with hollows, probably due to forest management (Hampton and Seebeck, 1970), might affect those species which favour tree nesting sites. It could be significant that the Common Ringtail, which is less dependent on tree hollows than other arboreal species for shelter, was abundant. A similar result was found in surveys carried out at Riddell (Hampton and Seebeck, 1970) where the forests were also under management.

Evidence of Kangaroos and Wallabies was found in all but the second survey area (where rain and logging hampered survey work) indicating that macropods were widely distributed. Introduced mammals (Black Rat, House Mouse, Fox and Rabbit) were present in small numbers. Their effect, if any, on populations of native mammals cannot be ascertained from the results of this survey.

In the 1920's, Fleay (1968) recorded Common Wombat, Greater Glider and the Common Ringtail in the Blackwood area, the latter being described as "moderately common". These species were again encountered in the Group's surveys.

Bandicoot was not recorded by the Group in the survey area, but in the 1920's and 1930's it was reported that bandicoots (species unknown) were fed by workers of the Yankee Mine at Yankee Creek, Trentham area (Heislers, pers. comm.).

The Lerderderg Valley is situated in a large tract of bush which contains a wide variety of habitats, and, combined with the contiguous Black Forest, forms an extensive wildlife refuge which should be adequate in size for the survival of the mammal species recorded. The forests of the area are worthy of preservation as they contain the remaining plant and animal associations indigenous to the area, the surrounding land having been cleared for agriculture. Similar mammal species have been recorded in the north-east highlands, but the flora differs considerably in those higher rainfall areas from that of the Lerderderg Valley.

Though the Common Wombat occurs in a small, restricted area on the Western border of Victoria (Land Conservation Council, 1972) it has not been recorded by the Group further west than the Lerderderg Valley. The Bobuck is not known to occur west of this area, nor the Greater Glider. The Eastern Pigmy Possum and the Feathertail Glider are seldom recorded by the Group. The preservation of all these species in the area is therefore of importance.

As the forests of the Lerderderg Valley have for many years been exploited for timber, the survival of such a variety of mammal species is notable. Any increase in the intensity of forest management would probably be deterimental to the animal population and, conversely, a decrease in forest management could well be beneficial. The presence of the Forests Commission in the area does, however, offer a degree of fire protection which may not otherwise be available.

There appear to be no demands for this forest other than the existing cropping of timber and as a water catchment. The Lerderderg Valley could, therefore, in the absence of despoliation remain a valuable and interesting wildlife refuge.

Summary

Six surveys were carried out in the Lerderderg Valley and the Black Forest between 1968 and 1970. Nineteen native and four introduced species were recorded. Comparison of the results obtained is made with Group surveys in other areas and the importance of these results is discussed. Appendices on forest management and vegetation in the Lerderderg Valley are included.

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Appendix I

Details of survey effort and analysis of trapping and spotlighting results.

Survey	1	2	3	4	5	6	Total Number
Site	Cooper's Rd.	Wild Dog Road	Tram Creek	Nolan's Gully	Hogan's Flat	Campaspe Road	
Date	Mar. 1969	Jan. 1969	Feb. 1970	Mar. 1970	Jun. 1968	Aug. 1969	
Number of trap-nights	180	52	83	159	74	76	624

Number of spotlight-hours	16.6	0.3	21.5	19.4	17.0	16.5	91.3
(a) Number of animals caught per 100 trap-nights.							
Antechinus stuartii	3.3	1.9	1.2	8.2	9.5	2.6	30
A. swainsonii				1.3			2
Rattus fuscipes	10.0	13.4	18.1	24.7	8.1	22.4	102
R. lutreolus		3.9		0.6			2
R. rattus				0.6			2
Mus musculus				1.3			1
(b) Number of animals seen per spotlight-hour.							
Macropus giganteus	0.12				0.06		3
Wallabia bicolor	0.12					0.12	4
Trichosurus vulpecula	0.06						1
T. caninus						0.06	1
Pseudocheirus peregrinus	0.79		0.84	0.21	0.06	0.24	40
Petaurus australis			0.05				1
Schoinobates volans			0.18			0.06	3
Cercartetus nanus				0.05			1
Phascolarctos cinereus	0.06						1
Vulpes vulpes	0.06						1
Oryctolagus cuniculus	0.96						16
(c) Number of animals seen in daylight.							
Wallabia bicolor	2		1			1	4
Pseudocheirus peregrinus	1						1
Vulpes vulpes						1	1
Oryctolagus cuniculus						1	1
Tachyglossus aculeatus						1	1
Ornithorhynchus anatinus	1						1
(d) Species recorded from faeces, diggings, and skeletal remains.							
Vombatus ursinus		*	*	*			
Vulpes vulpes			*				
Tachyglossus aculeatus			*				

Appendix II

Reference specimens collected by the Group from the Lerderderg Valley and retained in the collection of the Fisheries and Wildlife Division of Victoria.

Species	Survey No.	Reg. No.	Sex	Specimen
Wallabia bicolor	4	5013	—	Tibia
Cercartetus nanus	4	P 843	♀	Skull and skeleton
Vombatus ursinus	2	—	—	Mandible
Antechinus stuartii	1	D 883	♂	Skin and skull
	1	D 884	♀	Skin and skull
	2	D 864	♂	Skull
	3	D 986	♂	In spirits
	4	D 990	♂	Skull
	4	D 991	♀	In spirits
	5	D 789	♂	In spirits
	5	D 790	♀	Skin and skull
	6	D 953	♀	In spirits
	6	D 954	♂	Skull

Antechinus swainsonii	4	D 988	♀	Skin and skull
	4	D 989	♂	Skin and skull
Rattus fuscipes	2	R 3728	♀	Skull
	2	R 3729	♀	Skull
	2	R 3730	♀	Skull
	3	R 4056	♀	Skull
	3	R 4106	♀	Skin
	4	R 4109	♂	Skull
	4	R 4110	♀	Skull
	5	R 3457	♀	Skull
	5	R 3458	♀	Skull
	6	R 4035	♀	Skull
	6	R 4036	♂	Skull
Rattus lutreolus	2	R 3731	♀	Skull
	2	R 3732	♀	Skull
Mus musculus	4	R 4111	♂	Gonads
	4	R 4112	♀	In spirits

Appendix III — Vegetation

Names in heavy type denote the dominant species in each community. Commonly occurring species only are given.

SURVEY 1 Plateau.

Canopy **Eucalyptus obliqua,** *E. radiata.*
Shrub Layer *Acacia mucronata, A. verticillata.*
Ground Cover **Tetrarrhena juncea,** *Pultanaea muelleri, P. gunnii, Daveria ulicifolia, Leptospermum juniperinum, Goodenia ovata, Pimelia* sp., *Dianella tasmanica, Poa* sp., *Gahnia sieberiana, Clematis aristata, Viola hederacea, Pteridium esculentum, Dillwynia glaberrima, Lomandra longifolia.*

Creek Beds and Gullies.

Canopy **Eucalyptus viminalis,** *E. ovata, Acacia melanoxylon.*
Shrub Layer **Leptospermum juniperinum,** *Acacia mucronata, A. verticillata, Dicksonia antarctica, Olearia argophylla, Pomaderris aspera.*
Ground Cover **Tetrarrhena juncea,** *Lepidosperma laterale, Gahnia sieberiana, Juncus australis, Todea barbara, Blechnum* sp.

SURVEY 2

Canopy **Eucalyptus obliqua,** *E. radiata, Acacia melanoxylon.*
Shrub Layer **Acacia verticillata,** tree ferns.
Ground Cover **Pteridium esculentum,** *Tetrarrhena juncea, Epacris impressa, Acrotriche serrulata, A. prostrata.*

SURVEY 3

Canopy **Eucalyptus obliqua,** *E. radiata, E. dives, E. ovata, Acacia melanoxylon, A. dealbata; Eucalyptus cypellocarpa,* and *E. viminalis* in the valleys.
Shrub Layer *Hakea sericea, Pomderris aspera, Acacia stricta, A. mucronota* with *A. verticillata, Bedfordia salicina, Cassinia aculeats, Banksia marginata, Dicksonia antarctica* and *Grevillea alpina* in the valleys.
Ground Cover **Tetrarrhena juncea,** *Pteridium esculentum, Blechnum nudum, Lepidosperma laterale, Lomandra longifolia, Culcita dubia, Rubus fruticosis, Sonchus* sp., *Olearia argophylla, O. lirata, Prostanthera lasianthos.*

Survey 4

Canopy	**Eucalyptus obliqua,** *E. dives, E. radiata, E. cypellocarpa, E. viminalis.*
Shrub Layer	*Acacia mucronata, Banksia marginata, Leptospermum juniperinum.*
Ground Cover	*Tetrarrhena juncea, Pultenaea muelleri, P. gunnii, Dillwynia glaberrima, Poa australis, Epacris impressa, Acrotriche serrulata, Lomandra longifolia, Platylobium obtuseangulum, Hakea* sp., *Pteridium esculentum.*

River Frontage

Acacia dealbata, Pomaderris aspera, Olearia argophylla, O. lirata, Prostanthera lasianthos, Poa australis.

Survey 5. Plateau

Canopy	**Eucalyptus macrorhyncha,** *E. dives, E. radiata, E. cypellocarpa.*
Shrub Layer	*Eucalyptus* saplings only.
Ground Cover	*Poa australis, Acrotriche serrulata, Astroloma humifusum, Epacris impressa, Platylobium obtuseangulum, Correa reflexa, Dillwynia glaberrima.*

West-facing Slope

Canopy	**Eucalyptus dives**
Shrub Layer	*Xanthorrhea australis, Hakea sericea, Leptospermum myrsinoides, Acacia oxycedrus, Banksia marginata, Grevillea alpina.*
Ground Cover	*Brachyloma daphnoides, Poa australis, Monotoca scoparia, Epacris impressa, Pultenaes pedunculata, Leucopogon* spp., *Hibbertia fasciculata, Platylobium obtuseangulum, Oxylobium procumbens, Calorophus laterifloris, Lepidosperma tortussum, L. laterale.*

Valleys

Canopy	**Eucalyptus obliqua**
Shrub Layer	Tree Ferns, *Bedfordia salicina.*

North-east Slopes

Canopy	**Eucalyptus obliqua**
Shrub Layer	*Acacia mucronata, Hakea sericea.*
Ground Cover	*Pultenaea gunnii, P. muelleri, Dillwynia glaberrima, Poa australis, Acrotriche serrulata.*

Survey 6. Plateau

Canopy	*Eucalyptus dives, E. viminalis,* **E. obliqua, E. rubida,** *E. radiata.*
Shrub Layer	*Acacia mucronata, Pultanaea gunnii, P. muelleri, Dillwynia glaberrima.*
Ground Cover	**Tetrarrhena juncea,** *Lomandra* spp., *Acrotriche serrulata, Epacris impressa, Poa australis, Viola hederacea, Goodenia geniculata, Pteridium esculentum.*

Swampy Areas

Canopy	*Eucalyptus viminalis, E. ovata, E. baxteri, Acacia melanoxylon.*
Shrub Layer	*Acacia verticillata, Leptospermum juniperinum, L. lanigerum.*
Ground Cover	*Tetrarrhena juncea, Pteridium esculentum, Lepidodperma laterale, Gahnia sieberiana, Lomandra longifolia, Poa ensiformis, Calorophus laterifloris.*

Appendix IV

by Arnis Heislers. (Table compiled July 1971)

HISTORY OF FOREST MANAGEMENT

Survey Area	Section	Structural Form +	Management Stand Type +++	Fire History
(1) Cooper's Rd. (670 m alt.)	Plateau	Open Forest 25 m high	Trees*— Logs* — Regen.o Thinned 1 year ago	Absent 30 years
	Swampy flats, gullies	Open Forest 30 m high	Trees* — Logs* — Regen.o Thinned 1 year ago	
(2) Wild Dog Rd. (640 m alt.)	Hill slopes	Open Forest 25 m high	Trees*—Logs*—Regen.o Thinned 2 years ago	Absent 30 years
	Gullies	Open Forest 30 m high	Trees* — Logs* — Regen.o Thinned 2 years ago	
(3) Tram Creek (580 m alt.)	Hill slopes	Open Forest 30 m high	Trees*—Logs*—Regen.o Thinned patches — 1 year ago	Patchy ground fire—1 year ago
	Ridges	Open Forest 20 m high	Trees* — Logs* — Regen.o Select stems cut in past	
	Creek gullies	Tall Open Forest 40 m high	Trees*—Logs*—Regen.o Logging uncommon	Absent 30 years
(4) Nolan's Gully (610 m alt.)	Plateau	Open Forest 25 m high	Trees* — Logs* — Regen.*— Heavily logged in past	Crown fire in western half — 5 years ago
	'Dry' North Ridge	Shrubby Open Scrub 5 m high	Trees* Logs* Regen.o	Absent 20 years
	River Frontage	Tall Open Forest 40 m high	Trees* — Logs* Regen.o Access for logging difficult	
(5) Hogan's Flat (580 m alt.)	Plateau	Open Forest 15 m high	Trees* — Logs* Regen.o Logging uncommon	Crown fire 16 years ago
	Westerly Slopes	Shrubby Open Scrub 5 m high	Trees* Logs* Regen.o	
	N.E. Slopes	Open Forest 20 m high	Trees*—Logs*—Regen.o Select stems cut in past.	Only isolated patches burnt by ground fire since 1952

(6) Campaspe Road (686 m alt.)	Plateau	Open Forest 25 m high	Trees*— -o, Logs o Regen.*— -o Parts thinned for pulpwood — 2 years	Crown fire — 30 years ago and parts again 20 yrs. ago.
	Swampy Flats and Gullies	Open Forest 20 m high	Trees o Logs o Regen.o Logging uncommon	E. section by ground fire — 2 years ago.

Key:

\+ Classified according to height and density of tallest stratum as in Table 7 of "Vegetation" by R. L. Specht in "The Australian Environment" 1970 (ed. G. W. Leeper), C.S.I.R.O., Melbourne University Press, Melbourne. p.46.

+++ Forest stands reflect past forest management; the priority and intensity of management for timber have been greatest in accessible, fertile, well watered sites stocked with Messmate.

Current stand types include:

(a) Trees*— Logs*— Regen.o — High tree stocking, high log content, sparse regeneration.

(b) Trees o Logs*— Regen.* — Low tree stocking, high log content, dense regeneration.

(c) Trees*— Logs o Regen.o — High tree stocking, low log content, sparse regeneration.

(d) Trees o Logs o Regen.* — Low tree stocking, low log content, dense regeneration.

(e) Trees o Logs o Regen.o — Low tree stocking, low log content, sparse regeneration.

The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(continued from **91(9)**)

by JAMES A. BAINES.

***Cucurbita.** Lat name for a gourd. **C. maxima*, pumpkin, may sometimes be found spreading where rubbish has been dumped in the bush, but does not persist. It gives its generic name to the family Cucurbitaceae, to which belong our native species, *Melothria micrantha*, Mallee Cucumber, and *Sicyos angulata*, Star Cucumber. The curcurbita of the Romans was *Lagenaria leucantha*.

Culcita. Lat culcita, a mattress, bolster or pillow; this very hardy fern being used, like bracken, sometimes by bush campers for something soft to lie on. Our sole species, known variously as Common Ground-fern, False Bracken and Rainbow Fern, was formerly *Davallia dubia*, but *C. dubia* since 1922.

***Cupressus.** Lat name of **C. sempervirens*, Mediterranean Cypress, probably so-called from the island of Cyprus (Kupros in Gk), which gave us also the words cypress (a textile fabric originally brought to England from Cyprus) and copper (or cuprum, element sign Cu), which was originally Cyprian metal (from Cyprus). **C. macrocarpa*, Monterey Cypress, is very familiar in our rural areas as a tall-growing windbreak hedge. The genus gives its name to family Cupressaceae, to which belongs *Callitris*, the genus of our native cypress pines.

Cuphonotus. Gk kyphos, humped, sloped, curved; notos, back; the pod-valves being rounded on the back. our sole species, *C. antipodus*, was described by F. Mueller in 1855 (before he became Baron von Mueller) as *Capsella antipoda*, but was assigned to the new genus *Cuphonotus* set up by O. E. Schulz in 1933 by J. N. Black. The common name is Southern Shepherd's Purse, or Cuphonotus.

Cuscuta. Medieval Lat name for Dodder (from Arabic keshut). Victoria has 4 species, Common Dodder and Large Dodder (introduced), and two native, *C. australis* (Australian Dodder) and *C. tasmanica* (Golden Dodder).

Cyathea. Gk kyatheion, a little cup (from kyathos, cup); in allusion to the spore-cases (cup-like indusium). Our 4 species are known respectively as the Rough, Slender, Prickly and Skirted Tree-ferns.

Cyathochaeta. Gk kyathos, cup; chaite, long-flowing hair, mane (hence New Lat chaeta, bristle, cf. seta). Our species, *C. diandra*, is Sheath Rush.

Cyathodes. Gk kyathodes, cup-like; in allusion to the cup-shaped, toothed disc. We share our single species with Tasmania and New Zealand; it is *C. juniperina* (Crimson Berry), and is in family Epacridaceae.

Cyclosorus. Gk kyklos, a circle; soros, a vessel for holding anything (hence, in botany, sorus); from the shape of the sori (cf. *Cyclophorus*, the Japanese fern genus to which *Pyrrosia rupestris* was referred by Ewart, as *C. serpens)*. Our two species of *Cyclosorus* are Lime Fern and Binung or Soft Shield-fern.

***Cymbalaria.** Gk kymbalon, Lat cymbalum, cymbal; referring to the leaf shape of some species — even ancient Egyptian cymbals were similar in shape to our own modern percussion instruments of this type. **C. muralis* is Ivy-leaf Toadflax.

Cymbonotus. Gk kymbe, boat; notos, back; alluding to the convex back of the achenes. *C. lawsonianus* is Austral Bear's-ear, and the more widespread *C. preissianus* is also known as Bear's-ear.

Cymbopogon. Gk kymbe, boat; pogon, beard; in allusion to the form of the spikelets. *C. refractus* is Barb-wire Grass or Turpentine Grass, and our other species is extremely rare.

Cymodocea. Black says Kymodoke was the name of a sea-nymph, but there is no reference to her in Marindin's 'Classical Dictionary'. The roots could be Gk kyma, a wave, swelling, also a sprout or bud; doche, a receptacle. *C. antarctica* is a submarine plant known as Sea Nymph. It is a flowering plant of family Zannichelliaceae.

***Cynara.** Gk kinara, artichoke *(C. scolymus)* (apparently in confusion with kynara, which was probably the dog-rose). The generic name should have been spelt Cinara, the name (derived from the Gk) is classical Latin. Our only species, **C. cardunculus* (the specific name means little thistle) is variously known as Spanish Artichoke, Wild Artichoke or Cardoon; it overran many acres of the Jackson's Creek and Maribyrnong River valleys.

Cynodon. Gk kyon (genitive kynos), dog; odous (genitive odontos), tooth; hence kynodon, dog's-tooth; from the tooth-like buds of the rhizome. The French name of this grass, chiendent, is directly cognate. *C. dactylon*, Couch Grass, is probably native, being a cosmopolitan weed, as names like Bermuda Grass, Doob (India) and Kweek (South Africa) remind us. Our other species is Transvaal Couch (also known as Florida Grass).

Cynoglossum. Gk kynoglosson, name of a plant in Dioscorides, from kynos, dog; glossa, tongue; alluding to the texture of the leaves. Our 3 species are all native, and known by the names of Forest, Sweet and Australian Hound's-tongue.

***Cynosurus.** Gk kynos, dog; oura, tail; from the form of the panicle. Both our species are introduced grasses, known as Crested Dog's-tail and Rough Dog's-tail respectively, the dog's-tail being a literal translation of the generic name.

Cyperus. Lat form of Gk kypeiros, name of some kind of sedge; the diphthong -ei- indicates that all the printed sources are correct in placing the accent on the second syllable — in Victoria it is usual to accept the first syllable, but some make the vowel short (as in sip) and others long (as in sipe). Victoria has 24 species, all native except one, and most known as Flat-sedges. *C. rotundus*, Nut Grass, is a noxious week, and *C. brevifolíus* is called Globe Kyllinga from its former generic name. The genus gives its name to family Cyperaceae.

Cyrtostylis. Gk kyrtos, arched, curved; stylos, a style, stake, pillar; because of the arched style. *C. reniformis* was described by R. Brown in 1818, but Schlechter placed this Mosquito Orchid in *Acianthus* in 1906.

Cystopteris. Gk kystis, a bladder; pteris, fern. Our species, *C. filix-fragilis*, Brittle Bladder-fern, is the most widespread of all ferns ('from Greenland to Kerguelen'), despite the specific name, which means 'fragile fern'.

***Cytisus.** Gk kytisos, name of a leguminous fodder-plant, believed to be *Medicago arborea*, Tree Medick. **C. multiflorus*, our sole species, is White Spanish Broom. (Spanish Broom is *Spartium junceum).*

***Dactylis.** Gk daktylos, a finger; from the shape of the panicle. Daktylos also came to mean toe (like Lat digitus), and a metrical foot (hence dactylic metre in prosody). **D. glomerata* is the introduced grass, Cocksfoot.

Dactyloctenium. Gk daktylos, finger; ktenion, a little comb; the spikes are digitate and comb-like. *D. radulans*, not surprisingly, is Finger Grass.

Damasonium. Gk damazo, to subdue, because one species was said to overcome poison, hence Lat damasonium, in Pliny, a synonym for alisma. *D. minus*, our species, is Star-fruit, so-named because the carpels are united at the base and radiating like wheel-spokes. The genus is in family Alismataceae. (No link with damson plums, which were called in medieval Latin 'prunum Damascenum', plum from Damascus, botanically now *Prunus insititia.)*

***Datura.** From dhatura, the Hindi name of *D. metel*, the specific name of which is from mathil, the Arabic name of the plant, and of *D. fastuosa*. Victoria has 3 species, all known as thorn-apples, including **D. stramonium*, Common Thorn-apple, which is called Jimson-weed in U.S.A. (originally Jamestown-weed).

Daucus. Lat daucus in classical authors was said to be the name for both parsnip and carrot, but the Gk word from which it was derived, daukon, was used by Theophrastus for some other plant, probably another umbelliferous species. **D. carota*, Carrot, is naturalized in some areas; its specific name is New Lat for a now invalid generic name. Our other species, *D. glochidiatus*, Austral Carrot, is native (the specific name means 'barbed on both sides').

Dendrobium. Gk dendron, tree; bios, life; because most species are epiphytes perching on trees but not deriving nutrition therefrom, i.e. life *on* trees but not *from* them. Victoria's two species perch on rocks instead of trees, mainly granite and porphyry but occasionally sandstone, and are confined to East Gippsland. *D. striolatum* is Streaked Rock Orchid, and *D. speciosum* is simply Rock Orchid in Vic., King Orchid in Qld., and, erroneously, Rock Lily in N.S.W. There are more than 900 species in the world, of which Australia has up to 70 (mainly in the tropical N.E. of Qld).

Dendrophthoe. Gk dendron, tree; phthoe, corruption; hence a good name for tree parasites such as our species, *D. vitellina* Long-flower Mistletoe, which is restricted to far East Gippsland. The word *vitellina* means 'with the colour of egg-yolk'. Found on *Angophora floribunda*, this mistletoe is itself parasitized by Golden Mistletoe, *Notothixos subaureus*.

Desmodium. Gk desmodion, little chain (diminutive of desmos, chain, bundle, tie, band); alluding to the long, slender racemes of flowers. Our two species, both native, are called Large and Slender Tick-trefoil respectively.

Dianella. Diminutive of Diana, goddess of the chase. The name Diana contains the Latin root dies, day, because this Roman goddes was also goddess of light and of the moon; later the attributes of the Gk goddess Artemis were added to these. Three of our 4 species are known as Flax-lilies, and the fourth, *D. caerulea*, is Paroo Lily (from the Paroo River, a tributary of the Darling).

***Dianthus.** Gk dios, of Zeus (king of the gods); anthos, flower; the word being diosanthos in Theophrastus). Our species is **D. armeria*, Deptford Pink. The name Deptford (in London's dockland) suggests an immigrant plant, but it is native in Britain.

Dichantium. Gk dikha, apart, different; anthos, flower; alluding to the barren sessile spikelets at base of raceme. Our sole species, *D. sericeum*, is Silky Blue-grass.

Dichelachne. Gk dikhelos, cloven-footed (from dikha, as in previous entry); akhne, a glume; the flowering glume being 2-lobed. Our 2 species are both known as Plume-grass.

Dichondra. Gk di-, two; khondros, a grain; alluding to the 2 carpels. Our sole species is *D. repens*, Kidney-weed, a creeping perennial with reniform (kidney-shaped) leaves, hence the common name; *repens* means creeping.

Dichopogon. Gk dikhos, double; pogon, beard; the anthers have 2 beard-like appendages. Our 2 species are both known as Chocolate Lilies, though the perfume is more akin to vanilla, hence the name Vanilla Lily used in S.A., but that name is used in Vic. for our 2 species of *Arthropodium*, closely related to *Dichopogon* in the family Liliaceae.

Didiscus. Gk dis, twice; diskos, quoit, discus, disc; in allusion to the shape of the fruit. Our 4 species of this superseded genus are now in *Trachymene*.

***Digitalis.** From Lat digitus, a finger; the flowers being like the fingers of a glove. **D. purpurea* is Foxglove, i.e. a fox's glove, a fanciful name. Norwegians call the flower a fox-bell, and Germans call in Fingerhut, i.e. finger-stall, which recalls Charles Barrett's name Fingerstall Gum for the Bushy Yata, *Eucalyptus lehmanni*, or thimble (literally finger-protector). Digitalis, the drug used for alleviating heart ailments, is prepared from the leaves of the foxglove plant.

Digitaria. From Lat digitus, finger; from the radiating spikes. Victoria has 2 introduced species, both known as Summer Grass or Crab Grass, and 4 native species, two of which are Umbrella Grass.

Diplachne. Gk diploos, double; akhne, a glume; the flowering glume is 2-lobed (cf. *Dichelachne*, above). *D. fusca* is Brown Beetle-grass.

Diplarrena. Gk diploos, double; arren, male; refering to the two fertile stamens. *D. moraea* is Butterfly Flag; it is called White Iris in Tasmania, and is in family Iridaceae.

Diplaspis. Gk diploos, double; aspis, shield. *D. hydrocotyle* is an alpine umbellifer, known in Tasmania as Snow Pennywort; Willis gives the Victorian vernacular name as Still Diplaspis. It is also in the N.S.W. alpine areas.

Victor Henry Miller

Our oldest member, a man with a wealth of knowledge, Mr. Victor Henry Miller, died on July 4, 1974. He was born on November 8, 1875 at 84 High Street St. Kilda, and has lived in that suburb all his live. He saw the aborigines dancing around the Corroboree Tree at St. Kilda Junction and when the Junction was re-modelled he persuaded the M.M.B.W. to save the tree.

He joined the Field Naturalists Club of Victoria in 1923, serving on the Committee, then as Vice President and was elected unopposed as President in 1933. During his year as President, the *Victorian Naturalist* was enriched with coloured illustrations. For his many gifts he was nominated for life membership, an honour he did not accept.

His interests make an impressive list — Council Member and twice President of the Bird Observers' Club; President and Trustee of the Victorian Horticultural Society; Life Member of the Royal Horticultural Society and Trustee of the Society's fine building in Victoria Street, Melbourne.

He was one of the founders of The Entomological Club of Victoria and an office bearer for some years. He was a foundation member and, for a time, President of the Leach MNemorial Club.

When he resigned from the Commitee of the Royal Historical Society he had served a longer term on that Committee than any other member.

Victor Miller was a member of the Victoria Advisory Council for Fauna and Fauna and Flora from its beginning until it went into recess after twenty years.

Victorian Non-Marine Molluscs — No. 14

by

BRIANJ. SMITH*

The Victorian non-marine mollusc fauna is dominated by one family, the Endodontidae, making up nearly three quarters of the species and specimens of terrestrial snails of the region. This is a highly complex group of very small to minute snails with one exception.

Mulathena fordei (Brazier, 1871).

Shell helicoid, subglobose, with lateral keel sometimes with short spines on the keel, no unbilicus, thin fragile, transparent, olive green in colour. Shell reaches 8 - 12 mm in diameter with no

*Curator of Invertebrates, National Museum of Victoria

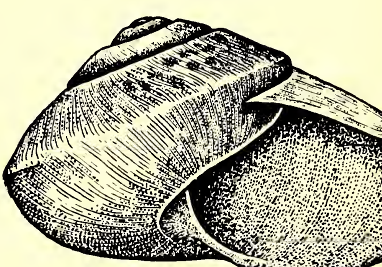
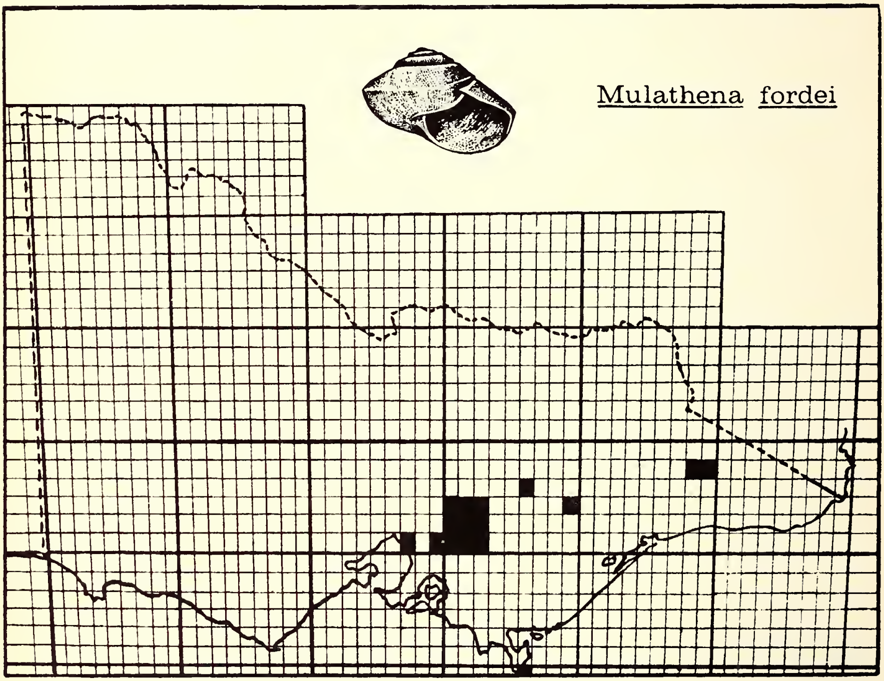


Plate 1.

regular microsculpture. Animal mid to dark olive green, delicate, with black pigment blotches on the mantle, often visible through the shell. The shell shape and sculpture can vary and especially the presence or absence of the peripheral spines; also some forms bear colour bands on the shell. Several specific names have been proposed for these varieties but they are probably not valid.

The species is found in damp areas of wet sclerophyll forest or temperate rain forest and in Victoria appears to be confined to the forest areas of the Great Dividing Range east of Melbourne. Recent new records (as shown on the map) have extended the range almost to the N.S.W. border in the Ranges of East Gippsland. The same species also appears to occur in similar habitats in southern Tasmania. Further work is needed to properly establish its distribution and to establish the status of the species.



Notice to Contributors

It is important that material submitted for publication should preferably be typewritten on foolscap or quarto sheets at double spacing, and with a 2.5-3 cm (1″) margin on the left. No underlining of words should appear unless absolutely necessary. Where dates occur, the day should precede the month, e.g. 15 May 1972 **not** May 15 1972.

Field Naturalists Club of Victoria

F.N.C.V. EXCURSIONS AND CAMPS

Excursions:

Saturday, 8 March to Monday 10, March — The Annual Meeting and Delegates Conference of the Victorian Field Naturalists Association will be held at Geelong on Labour Day weekend. Saturday, 8 March, meet at 1.30 p.m. at McPhillimy Hall, La Trobe Terrace, near Gordon Tech. and Geelong Railway Station. The Delegates Conference will start at 2 p.m. and for non-Delegates there will be a visit to the Botanic Gardens and Queens Park. The Geelong Field Naturalists Club will provide the evening's entertainment at 8 p.m. It is hoped as many members as possible will attend by private cars.
There will be a day excursion by coach on Sunday to enable all members to participate. The coach will leave Batman Avenue at 9.30 a.m. sharp and will not return until late evening. The day will be spent in the Ocean Grove Nature Reserve then the party will proceed to the property of Mr. and Mrs. J. Hunt at Paraparup for the evening meal and evening entertainment in the woolshed. Bring two meals. B.B.Q. if desired and it is not a total fire ban day. Fare $3.00.
On Monday there will be a visit to the G.F.N.C. Boneseed Control Project at Top Saddle in the You Yangs leaving Geelong at 9.30 a.m. and it is hoped members will join in by private cars. This excursion will replace the usual monthly excursion in March.

Saturday, 15 March — Botany Group is invited to join an excursion to the Loch Valley arranged by N.P.P.S., leader Mr. F. J. C. Rogers. Meet in Noojee 10.15 a.m.

Sunday, 13 April — Geology Group. Castle Hill, Lancefield. Meet at 11.00 a.m. at Macedonia House, corner of Kilmore and Lancefield Roads, Lancefield.

Sunday, 20 April — Visit to Kinglake including F.N.C.V. property. Coach leaves Batman Ave., at 9.30 a.m. — Fare $2.50, bring one meal.

12-28 August — This excursion to Western Australia has **NOT** been abandoned as was inadvertently stated in the previous issue of the *Victorian Naturalist*. Please contact Excursion Secretary as soon as possible regarding deposit and details.

CAMPS:

8, 9, 10 March — Field Survey Group.

AUDITORS' REPORT TO THE MEMBERS OF THE FIELD NATURALISTS CLUB OF VICTORIA

In our opinion:

(a) the attached balance sheet and profit and loss account are properly drawn up in accordance with the provisions of the Companies Act, 1961 of Victoria as amended and so as to give a true and fair view of:
   (i) the state of affairs of the Club at 31 December 1973 and of the results of the Club for the year ended on that date; and
   (ii) the other matters required by Section 162 of that Act to be dealt with in the accounts:

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

DANBY, BLAND & Co.,
Chartered Accountants.
R. M. BLAND, Partner.

Melbourne, 25th February, 1975.

The members of the Executive Council submit herewith balance sheet as at 31 December 1974 and income and expenditure account for the year ended on that date, and report as follows —

1. The Net Deficit of the Club for the year ended 31 December 1974 was $826 which deducted from the Surplus brought forward at 1 January 1974 of $8,666, together with a transfer of $7 from Club Improvement Account, results in a surplus to be carried forward to next year amounting to $7,847.
2. The members of the Executive Council took reasonable steps to ascertain before the income and expenditure account and balance sheet were made out, that all known bad debts were written off and adequate provision was made for doubtful debts.
3. The members of the Executive Council took reasonable steps, before the profit and loss account and balance sheet were made out, to ascertain that the current assets, other than debtors, were shown in the accounting records of the company at a value equal to or below the value that would be expected to be realised in the ordinary course of business.
4. At the date of this report, the members of the Executive Council are not aware of any circumstances which would render the values attributable to the current assets in the accounts misleading.
5. No charge on the assets has arisen, since the end of the financial year to the date of this report, to secure the liabilities of another person. no contingent liability has arisen since the end of the financial year to the date of this report.
6. No contingent or other liability has become enforceable or is likely to become enforceable within the period of twelve months after the end of the financial year which in the opinion of the members of the Executive Council will or may affect the ability of the club to meet its obligations as and when they fall due.
7. At the date of this report the members of the Executive Council are not aware of any circumstances not otherwise dealt with in the report or accounts which would render any amount stated in the accounts misleading.
8. The results of the club's operations during the financial year, in the opinion of the members of the Executive Council, were not affected by any item transaction or event of a material and unusual nature.
9. Since 31 December 1974, and to the date of this report, in the opinion of the members of the Executive Council, no item transaction or event of a material and unusual nature, which would affect substantially the results of the club's operations for the next succeeding financial year, has occurred.
10. No member of the Executive Council, since the end of the previous financial year, has received or become entitled to receive a benefit by reason of a contract made by the club with the member or with a firm of which he is a member or with a company in which he has a substantial financial interest.
11. 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.
12. The names of the members of the Executive Council in office at the date of this report are as follows:

Mr P. Kelly
Mr J. Willis
Mr M. Coulthard
Mr R. Riordan
Mrs M. Corrick
Mr H. Bishop
Mr I. Cameron
Mr G. Ward
Mr G. Douglas
Mr J. Martindale
Mrs M. Hampton
Miss M. Allender
Mr R. Gibson
Mt T. Sault
Mr B. Smith
Mr R. Kent
Mr B. Callanan

This report is made in accordance with a resolution of the Executive Council dated the 25th day of February 1975.

H. Bishop
R. H. Riordan

FIELD NATURALISTS CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31 DECEMBER, 1974

Receipts

Year 1973	Receipts		
	Subscriptions Received —		
$97	Arreas	89	
6,015	Current	6,049	
164	Supporting	288	
6,276			6,426
275	Sales of "Victorian Naturalist"		276
50	Advertising in "Victorian Naturalist"		45
	Interest Received —		
	Library Fund	5	
	Bank Account	92	
	Commonwealth Bonds	132	
	Bonds — M. Wright Legacy	344	
	Bonds — C. M. Walker Legacy	67	
759			640
	Premium on redemption of Commonwealth		
72	Bonds		
33	Sundry Income		39
4	Deficit for year		826
$7,469			$8,252

Notes: 1. Auditors' Remuneration of $60, relates to Auditing services

Payments

Year 1973	Payments		
	"Victorian Naturalist" —		
$5,020	Printing	6,599	
1,006	Illustrating	1,019	
577	Despatching	959	
15	Editorial	12	
		8,589	
	Less Grants —		
	Ingram Trust —		
(605)	applied for (see Note 3)	(2,045)	
	Treasury —		
	1973 Grant (balance)	(450)	
(1,050)	1974 Grant	(1,000)	
4,963			5,094
	Working Expenses —		
183	Postage & Telephone	222	
135	Printing & Stationery	257	
40	Rent of room for Storage	40	
264	General Expenses	79	
	Affiliation Fees, Subscriptions		
83	and Donations	139	
16	Preston Junior Club Rent	22	
	Natural History Medallion		
98	Expenses	121	
1,027	Typing & Clerical Assistance	1,511	
50	Auditors' Remuneration	60	
	Rent of Hall, Library &		
349	Museum Room	363	
195	Rent of Office Space	260	
66	Insurance	84	
2,506			3,158
318	Mammal Survey Group Expenses	318	
(318)	Less Ingram Trust Grant	(318)	—
$7,469			$8,252

Notes: 1. Auditors' Remuneration of $60, 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 Executive Council.

3. Application has been made to the Trustees of the M. A. Ingram Trust, for a grant of $2,045, towards costs of "The Victorian Naturalist" incurred during the year 1974. As at the date of this report the application has not been dealt with by the Trustees. In the event that the amount applied for is not granted in full, the reduction below the amount applied for will be written off against Surplus Account in 1975.

FIELD NATURALISTS CLUB OF VICTORIA

BALANCE SHEET AT 31 DECEMBER, 1974

LIABILITIES

Year 1973			
	Current Liabilities —		
$508	Subscriptions paid in advance	570	
827	Sundry Creditors	238	
450	Treasury Grant — Victorian Naturalist — in hand	—	
336	M. A. Ingram Trust Grant in hand	18	
2,121			826

ASSETS

Year 1973			
	Current Assets —		
2,646	Cash at Bank	189	
2,000	Commonwealth Bonds at cost	2,000	
717	Sundry Debtors	2,115	
	Stocks on hand at cost —		
26	Badges	122	
58	Microscope Project	58	
521	Books for Sale	598	
424	Flower Books	90	
6,392			5,172
	Fixed Assets at cost —		
	Library Furniture and Equipment	6,068	
6,061	less written off	—	6,068
	Land — Cosstick		
141	Reserve, Maryborough	141	
6,202			6,209

1973		1974	
	Special Funds and Accounts —		
3,462	Building Fund	3,646	
6,480	Publication Fund	6,996	
100	Library Fund	100	
124	Club Improvement Account	511	
200	Excursion Account	200	
5,217	Estate M. Wright Legacy	5,217	
300	P. E. Morris Gift Account	300	
200	Estate Miss I. F. Knox Legacy	200	
1,450	Estate C. M. Walker Legacy	1,466	
20	Estate R. S. Chisholm	20	
597	Wilfred C. Woollard Fund	633	
519	D. E. McInnes Fund	554	
123	Microscope Project A/c.	143	
3,192	Flower Book Account	3,599	
13	Trailer Account	13	
52	N. A. Wakefield Memorial Fund	52	
22,049			23,650
	Surplus of Assets over Liabilities —		
	Balance at 1.1.74	8,666	
	Transfer from Club Improvement Account	7	
	Deficit for year	(826)	
8,666			7,847
$32,836			$32,323

1973		1974	
	Investment of Funds —		
	Library Fund —		
100	Commonwealth Bonds at Cost	100	
	Legacy Estate M. Wright — Commonwealth		
5,200	Bonds at Cost	5,200	
	Legacy C. M. Walker — Commonwealth		
1,000	Bonds at Cost	1,000	
	Wilfred C. Wollard Fund —		
500	M.M.B.W. Debenture at Cost	500	
	Flower Book Account — Commonwealth		
3,000	Bonds at Cost	3,000	
	D. E. McInnes Fund — Esanda Ltd.		
500	Debenture at Cost	500	
10,300			10,300
	Building Fund —		
2,100	Commonwealth Bonds at cost	1,700	
1,000	S.E.C. Inscribed Stock at cost	1,000	
—	A.N.Z. Bank — Term Deposit	400	
362	Cash at Bank	546	
3,462			3,646
	Publications Fund —		
3,800	Commonwealth Bonds at cost	3,800	
	Book Stocks at cost —		
738	Birds of the Dandenongs	624	
258	Victorian Toadstools	67	
137	Wyperfeld National Park	34	
80	Wilsons Promontory National Park	73	
761	Sundry Debtors	683	
706	Cash at Bank	1,715	
6,480			6,996
32,836			32,323

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31 December 1973	$3,462
Interest on Investment and Bank Account	184
Amount of Fund at 31 December 1974	$3,646

PUBLICATIONS FUND

Amount of Fund at 31 December 1973		6,480
Interest on Investment & Bank Account		299
Surplus for the year from —		
Victorian Toadstools & Mushrooms	128	
Vegetation of Wyperfeld National Park	89	
Wild Flowers of Wilson's Promontery National Park	31	
Birds of the Dandenongs (Loss)	(31)	217
Amount of Fund at 31 December 1974		$6,996

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31 December 1973		124
Booksales Account Profit		354
Share of Profit from 1974 Nature Show		40
		518
Loss—		
Amount written off Books and Equipment Account —		
Purchase of Library Books transferred to Surplus Account	7	7
Amount of Fund at 31 December 1974		$511

STATEMENT BY THE MEMBERS OF THE EXECUTIVE COUNCIL

In the opinion of the members of the Executive Council of The Field Naturalists Club of Victoria, the accompanying Balance Sheet is drawn up so as to give a true and fair view of the state of affairs of the Club as at 31 December 1974, and the accompanying Statement of Income and Expenditure is drawn up so as to give a true and fair view of the deficit of the Club for the year ended 31 December 1974.
Signed in accordance with a resolution of the Executive Council on 25th February 1975.

P. Kelly President
H. Bishop Treasurer

STATEMENT BY THE PRINCIPAL ACCOUNTING OFFICER

I, DANIEL E. McINNES, being the officer in charge of the preparation of the accompanying accounts of The Field Naturalists Club of Victoria for the year ended 31 December 1974 state that, to the best of my knowledge and belief, such accounts give a true and fair view of the matters required by Section 162 of the Companies Act 1961, to be dealt with in the accounts.

D. McInnes

Signed at Melbourne on the 25th February 1975.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1973-1974.

President:

Mr. P. KELLY

Hon. Secretary: Mr. R. H. RIORDAN, 15 Regent St., East Brighton, 3187. 92-8579

Treasurer: H. BISHOP, Address Correspondence to National Herbarium, The Domain, South Yarra.

Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145

Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. J. MARTINDALE c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3151 (52-2749).

Magazine Sales Officer: Mr. D. McINNES.

Archives Officer: Mr. CALLANAN, 29 Reynards Street, Coburg, 3058. Tel. 36-0587

Group Secretaries

Botany: Miss E. JONES, 6 West Crt., Glen Waverley, 3150 (560-2280)

Day Group: Mrs. J. STRONG, 1160 Dandenong Rd., Murrumbeena (56-2271).

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56-2271).

Field Survey: c/o National Herbarium, The Domain, South Yarra, 3141.

Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy Street, East Brighton (96-3268).

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 preceeding pages of this magazine.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country subscribers, and retired persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual magazines	$0.75

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

JENKIN, BUXTON & CO. PTY. LTD., PRINTERS, WEST MELBOURNE

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ol. 92, No. 4 APRIL, 1975

F.N.C.V.

Published by the

FIELD NATURALISTS CLUB OF VICTORIA

in which is incorporated the Microscopical Society of Victoria

75c

*Registered in Australia for transmission by post as a periodical.
Category "B"*

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 April — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

Subject of the Evening — "The Occurrence and Structure of Precious Opal": Dr. J. V. Saunders.

New Members—

Life Membership:

Miss Sarah C. Troughton, 18 Saville House, Port Elizabeth, South Africa.

Ordinary:

Mr. Graeme Ambrose, 93 Patterson Road, Moorabbin, 3189. *Zoology.*
Mr. James W. Usher, 11/113 Eskdale Road, Caulfield, 3161. *Botany.*

Joint:

Mrs. J. A. Milne, 1/278 Brunswick Road, Brunswick, 3056.

Monday, 12 May — "Catchment and Catchment Management": Speaker from S.C.A.

GROUP MEETINGS

(8 p.m. at the National Herbarium unless stated otherwise)

Wednesday, 16 April — Microscopical Group Meeting.

Thursday, 17 April—Day Group: Visit to Warrandyte. Bus leaves Cnr. Russell Street and Flinders Street, 10.40 a.m. Meet at bridge over Yarra River in Warrandyte at 11.30 a.m. Bring lunch.

Thursday, 24 April — Field Survey Group Meeting in Conference Room, National Museum, at 8 p.m. "Reptiles of S.E. Aust.; Ecology and Conservation," Mr. P. Rawlinson.

Thursday, 1 May — Mammal Survey Group Meeting at Arthur Rylah Institute, 123 Brown Street, Heidelberg, at 8 p.m.

Monday, 5 May — Marine Biology and Entomology Group Meeting in Conference Room, National Museum, at 8 p.m.

Wednesday, 7 May — Geology Group Meeting.

Thursday, 8 May — Botany Group Meeting.

EXCURSIONS

Sunday, 18 May — Yarra Bend National Park. The Club has offered to assist in the attempt to control Boneseed in this area and part of the day will be spent clearing as much of this weed as we can. Bring gardening gloves, as young plants are easily pulled out by hand and all members can help with this. The coach will leave Batman Avenue at 9.30 a.m. — fare $1.50 — bring one meal. It is planned to make our first stop at the Pioneer Monument and to lunch at the Boatshed picnic area where we hope all members who cannot go for the day, but can spare an hour or two will join the working bee for as long as possible.

the victorian naturalist

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Acting Editor: G. M. Ward
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Front Cover:

"Gertie", the Red-capped Dotterel, nesting on Somers Beach. This particular dotterel was kept under observation for a number of years, and became quite tame.
Photo: A. J. Reid.

As in great things, so in small, and just as the energy crisis has forced various nations to face realistically their diminished status, so likewise, it seems, inflation is about to force the F.N.C.V. to re-assess its place in the scheme of things. Once a leading light in the State's scientific community, and probably the State's first effective conservation body, the Club has been overtaken by events and although on the basis of its past glories it has enjoyed a high prestige, it has now been forced to take on a much lesser role, in the wake of Government sponsored, academically oriented conservation bodies.

Activities have declined steadily — vide The Nature Show and the complete lack of support for the Conservation Group which, regrettably, has had to be disbanded—as has the number of members willing to play any active role in the Club, so that the work of running it has fallen on a slowly shrinking group of old hands. Despite the extremely disheartening effect of members' total lack of response or enthusiasm on this group, the Club may have continued successfully if inflation, in the form of steeply rising costs for "The Victorian Naturalist" had not brought matters to a head.

The Club is also facing a management crisis, and must replace both the Editor, and Secretary and his Assistant. The former, having honourably completed ten years' service, has requested his release and the latter, from pressure of business, simply cannot devote the necessary time to Club affairs.

It seems, therefore, that failing the discovery of additional sources of finance, or a sudden surge of active new members, the Club must now accept the realities of its changed circumstances. It would appear to be inevitable that in order to live within its means, the Club will have to further reduce the cost of "The Victorian Naturalist", abandon any pretence of playing an active role in conservation matters, and severely discourage outside correspondence.

ROGER RIORDAN,
Retiring Hon. Secretary.

Victorian Ornithological Research Group Westernport Report No. 1

Part 3

The Birds of the Somers, Sandy Point, Hastings Districts, Westernport Bay, Victoria, Australia.

by WILLIAM A. DAVIS AND ALAN J. REID

Continued from Vol. 91, Page 264.

Swans, geese and ducks (Family Anatidae) were the subject of a status study at the tidal flats and Coolart. The results indicated the value of Coolart as a haven for ducks during the hunting season. Each year a build-up in numbers occurred on the eve of the duck opening, the birds staying for several months before dispersing. Figure 1 illustrates this point.

36. *Cereopsis novaehollandiae*, Cape Barren Goose.

Several tame birds were kept in semi-captivity by Mr. Luxton at Coolart during the years preceding the survey. These were unfortunately taken by a fox one evening when Mr. Luxton forgot to return them to their enclosure. The only free occurrence was on 21st April 1964 when a number of observers at the education camp saw a Cape Barren Goose fly overhead. On two occasions flocks were observed outside the survey area in paddocks along Stumpy Gully Road, H.5, 7.

37. *Cygnus atratus*, Black Swan.

This species will be considered in two parts, the Naval Base tidal flats and Coolart. A completely different pattern evolved at each habitat as the survey progresssed. This is illustrated in Figure 2.

(a) Naval Base Tidal Flats.

The vast mud flats of Westernport are renowned for their large swan population at certain times of the year. The species featured prominently in the early natural history of the region, as mentioned in Part 1 under "Early Ornithological Records". Swan counts indicated a most regular flock and dispersion pattern almost exactly repeated each year. Peaks of over 400 were recorded for February, March and April. The birds commenced to disperse during May and June. By end of July numbers dropped to only 6 to 10 and remained low through to October. November, December and January saw a gradual build-up to the February peak. Several pairs consistently nested on the fresh water lagoon and along Hanns Inlet usually between August and October. Cygnets were seen on numerous occasions. On 15th September, 1962, a Swamp Harrier was seen to harass a pair with seven cygnets approximately two weeks old. He finally succeeded in taking one.

(b) Coolart Lagoon.

The species gradually built up in numbers as the survey progressed, reaching over 300 by May 1966. It appeared the lagoon was a haven for non-breeding birds as the largest counts were invariably recorded during the breeding season (refer Figure 2). At least six pairs nested each year from August to November. The swans were always the first species to commence breeding and were consistently successful with large clutches. Mortality appeared minimal and there was no evidence of double brooding, H.1, 2, 3A, 5 and 8.

37a. *Tadorna tadornoides*, Chestnut-breasted Shelduck.

In contrast to the preceding species, a reverse pattern was evident. A most regular situation existed at Coolart

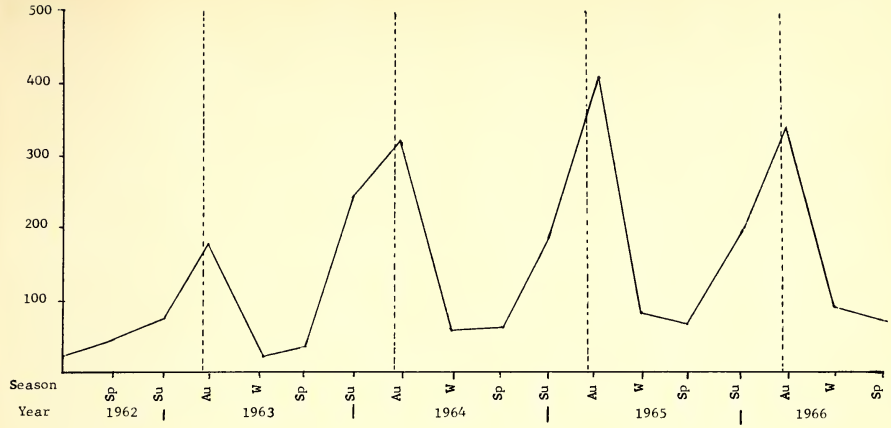

FIGURE 1. Total Anatidae (excluding Cygnus).
Coolart Lagoon. Average count per season.
Vertical -------- Duck opening.

FIGURE 2. Black Swan. Average count per season.
———— Naval Base Mud Flats.
---------- Coolart Lagoon.

	HASTINGS			COLAC PLAY GROUNDS			COLAC SQUARE		
Period	Adult	Immature	Total	Adult	Immature	Total	Adult	Immature	Total
Dec. to Aug.	28	6	34	41	13	54	48	7	55
Sept. to Nov.	14	14	28	43	5	48	32	1	33

TABLE 1. Silver Gull. Group comparisons - average for 3 feeding groups.

where as at the tidal flats it was completely random. The species was noted on the flats in pairs only during February, March, July and October. March 1964 saw an irruption when over 200 were seen in a tight flock. A week later approximately 300 were noted along the Somers seashore (probably the same flock). There were no records outside these four months.

At Coolart the species was completely absent from June to September. Isolated pairs were recorded from October to early February. Mid-February saw a sudden influx to a peak of 60 to 80, the birds staying until May when a quite sudden dispersion took place, H.1, 2, 3A and 5.

38. *Anas superciliosa*, Grey (Black) Duck.

Spasmodic occurrence on tidal flats. Forty were seen during April and May 1963 and in February 1965. Ten observed March 1965. At Coolart there was a regular pattern of recordings during all months except September and October. November to January — 4 to 10 rising to a peak of 60 during February. Between 40 and 60 remained from March to April. A steady decline to zero by August. Species noted breeding on at least two occasions. On 28th December, 1964, a pair seen with four half-grown ducklings. During December 1966 — three juveniles observed, H.2, 3A and 5.

39. *Anas platyrhynchos*, Mallard.

This introduced species occurred on several dams on Hope Campbell's Western Park property adjoining Sandy Point. Several seen at Coolart March 1966 may have strayed from Western Park. On 20th January 1963 — eight Mallard black duck hybrids were banded and released (these were bred in captivity by Davis when he was an aviculturist). They were never seen again nor were any bands recovered.

40. *Anas castanea*, Chestnut Teal.

Rarely noted from the tidal flats. Two to six seen October 1962, November 1964, January and February 1965. Coolart is well known for its resident Chestnut Teal population, six to ten pairs always present. Population increased to over 100 January to April each year. Many breeding records. Prior to 1965 juveniles seen on four occasions during September. Mr. Bill Barrett, then with the Fisheries and Wildlife Department, placed 20 duck nesting boxes around the lagoon early in 1965. The Chestnut Teal used these boxes regularly and it was common to see pairs with flotillas of young during the spring months, H.2, 3A and 5.

41. *Anas gibberifrons*, Grey Teal.

Recorded Hanns Inlet, six pairs November 1963, November 1964. Influx over 100 Hanns Inlet January, February 1965. Coolart, similar pattern to Grey Duck and Chestnut Teal. Several resident pairs noted with young October 1963, November 1964. Large influx January, February each year, counts of over 180 on some trips; dispersion during May. There was no evidence suggesting this species had used the duck nest boxes, H.2 and 5.

42. *Anas rhynchotis*, Blue-winged Shoveler.

In complete contrast, the occurrence of the attractive Shoveler followed no regular pattern. First listed 30th September 1962—one bird; September 1963—two pairs; lone female remained until March 1964 when she was joined by four others, all birds remained until June 1964. A further bird observed August 1965 remaining until November. Three seen 3rd May 1967, H.5.

43. *Malacorhynchus membranaceus*, Pink-eared Duck.

Rare visitor, Coolart. Odd records exist prior to 1959. First noted during survey January 1964 — two males; September 1965 — one bird; August 1966 — lone male, H.5.

44. *Aythya australis*,
White-eyed Duck.

Recorded twice Hanns Inlet — four pairs January 1963; three pairs January 1964. Coolart, no records between March and June except for one occurrence of 45 on 16th May 1965. Ten to twenty frequent lagoon July to February each year. Influx of 50 September, October, November 1965. Young noted on seven occasions. Hardheads breed later than other anatidae, H.2 and 5.

45. *Chenonetta jubata*, Maned Goose (Wood Duck).

Occasional visitor, Coolart. One bird took up residence October 1962 to March 1963; six to ten December 1963 until April 1964; one bird April 1965; twenty — May 1965; twelve — June 1967. One record away from Coolart 9th February 1964, forty grazing on adjoining farm, H.5 and 6.

46. *Oxyura australis*,
Blue-billed Duck.

Coolart may well be the closest point to Melbourne where this rare duck regularly occurs. Prior to the survey, Mr. Luxton noted the species arriving October each year, breeding, then departing end of March, usually one or two pairs. This pattern was confirmed during the early survey years 1961, 1962 and 1963. During 1964 the birds appeared earlier and in greater numbers. July saw four arriving; by November ten were present. On one occasion six males in full nuptual plumage were noted together. Evidence of two pairs having bred was obtained during December 1964. The birds have remained in permanent residence since 1965. Records range from four to ten each visit. Three young Blue-bills noted on 7th February 1966. Because of its rarity the presence of the Blue-billed Duck at Coolart is of great importance and has become a most attractive feature of the lagoon, H.5.

47. *Biziura lobato*, Musk Duck.

First recorded Coolart 2nd February 1964 — lone female; 9th February 1964 — four Hanns Inlet; June 1964 — one Hanns Inlet; January to June 1965 — four consistently seen Hanns Inlet, H.2 and 5.

48. *Elanus notatus*, Black-shouldered Kite.

Rare visitor seen twice during December 1962— one bird open forest Naval Depot, H.3.

49. *Halliastur sphenurus*,
Whistling Kite (eagle).

Common, noted most habitats, usually two to six per trip. 28th December 1962 — nine observed feeding on carrion on sand spit Sandy Point; 21st July 1963 pair noted performing intricate courtship flights over Sandy Point, H.2, 3, 4 and 5.

50. *Accipiter fasciatus*,
Brown (Australian) Goshawk.

Two to four noted most trips Sandy Point bushland. Occasional visitor Coolart, H.3 and 5.

51. *Accipiter cirrhocephalus*,
Collared Sparrowhawk.

The identification of this rare species is difficult. On 31st March 1963 the writers, whilst carrying out a routine survey run through Sandy Point, observed a small bird of prey perched on a banksia a considerable distance away. It appeared about the size of a Little Falcon. A cautious approach to within 30 ft. was effected and it became apparent the species was not Genus falco, but in fact a small Goshawk type. It was slatish brown above and lightly rufous barred below. A quite distinct brownish collar was evident, approximate length 12 inches. On flushing the tail appeared more squarish than the well known Goshawk. Its small size and colouration convinced the writers the bird was a juvenile male Sparrowhawk, H.3.

Plate 1.

Inspecting duck nesting boxes at Coolart. October 1964.

Photo — A. J. Reid.

52. *Hieraaetus morphnoides*,
Little Eagle.

Reasonably common. Noted Hanns Inlet, Sandy Point and Coolart. Twenty-one sightings over all months, H.2, 3 and 5.

53. *Aquila audax*,
Wedge-tailed Eagle.

Disturbingly few records, single bird education camp bushland January 1961; single bird Hanns Inlet 9th May 1963; 7th March 1965 pair circled over Somers for several hours; 18th February 1967 one found shot Merricks Beach. This species must now be considered rare in the Westernport region, H.2 and 4.

54. *Haliaeetus leucogaster*,
White-breasted Sea-Eagle.

The occurrence of a pair of Sea Eagles on French Island has been known for some time. The pair frequently visits in and around Hanns Inlet and Sandy Point. Observed

Plate 2.

Coot with young. Coolart 1963.

Photo — A. J. Reid.

singly or as a pair all months. On 8th September 1964 noted feeding on a dead sheep along South Beach Road, Somers, H.2 and 3.

55. *Circus assimilis*, Spotted Harrier.

This beautifully marked very rare species was noted at Coolart by Reid during December 1965. The lower breast and abdomen was rufous spotted White, upper greyish. Colourful appearance in flight, H.5.

56. *Circus aproximans*,
Swamp Harrier.

Several pairs reside within survey area, seen most trips. The Swamp Harrier often buzzed the Ibis rookery at Coolart during the breeding season, but was not observed taking young, H.3, 4 and 5.

57. *Falco berigora*,
Brown Falcon (Hawk).

Occasionally noted open forest Naval Depot, H.3.

58. *Falco longipennis*, Little Falcon.

Noted on 14 occasions during survey covering most months, Sandy Point bushland. Twice seen at Coolart, H.3 and 5.

59. *Falco peregrinus*,
Peregrine Falcon.

Sixteen records from Hanns Inlet, the tidal flats and Sandy Point bushland. For Coolart occurrence, refer part 2 under White Ibis avian predation, H.3 and 5.

60. *Falco cenchroides*,
Nankeen Kestrel.

Noted most survey trips. Resident, invariably observed singly hovering over paddocks, H.6.

61. *Coturnix pectoralis*,
Stubble-Quail.

Regular migrant arriving Coolart lower paddocks September departing May. Many flushed, often heard calling. Mr. Luxton reported a nest December 1962, H.6.

62. *Coturnix ypsilophorus*,
Swamp (Brown) Quail.

Rare. Two birds flushed open forest Naval Depot January 1964; one bird flushed salt marsh Sandy Point — 10th March 1974, H.2, 3.

63. *Turnix varia*, Painted Quail.

Migrant, first noted October 1963, open forest, Naval Depot. Nest found December that year. Birds left end of February 1964. Recorded September to April 1966 same area, H.3B.

64. *Rallus pectoralis*,
Lewin Water-Rail.

Rare. Lone bird flushed Samphire flats Sandy Point 23rd December 1963. One found dead at foot of education camp fire tower; 24th July 1967, H.3, 4.

65. *Rallus philippensis*,
Banded Landrail.

Reported at Coolart by Mr. Luxton during 1958, also at the Somers Camp 1959; two birds Hanns Inlet February 1964; one bird Sandy Point bushland May 1964, H.2, 3D and 5.

66. *Porzana fluminea*, Spotted Crake.

Occurs in Naval Base sewerage farm reed beds.

67. *Porzana tabuensis*,
Spotless Crake.

Fairly common along Hanns Inlet in mangroves and samphire swamps, often flushed, H.2.

68. *Gallinula tenebrosa*,
Dusky Moorhen.

Resident breeding species Coolart. Average population 60. Nests found October to January each year, H.5.

69. *Porphyrio porphyrio*, Purple
Gallinule (Eastern Swamp Hen).

Recorded from Hanns Inlet fresh water swamp. Resident breeder, Coolart. Average population 50. Nests found September to December, H.3(a), 5.

70. *Fulica atra*, Coot.

Gradual increase from 40 to over 120, Coolart, during survey period. Breeds September to February each year, H.5.

71. *Rostratula benghalensis*, Painted-Snipe.

During 1964 many sightings of this rare species were made close to Melbourne particularly from Braeside sewerage works. On Sunday 24th May 1964 while carrying out a sweep through the vast samphire marsh along Hanns Inlet, Davis flushed a bird whose description was as follows — Rose rather Quail like, flew with rapid wing beats but laboured flight almost rail like. Legs trailed, tail shortish, blackish-brown head, back appeared dark greenish, a glimpse of the bill indicated it to be long and greeny yellow in colour, the upper breast brownish, the trailing legs had a greenish appearance. In spite of considerable effort the bird was not flushed a second time. Subsequent visits to the area also failed to locate the species.

After considerable discussion with observers familiar with the Painted-Snipe, it was concluded that the flushed bird was a female. The only other bird that could be confused with the Snipe would be the Banded Land-rail which has similar head colouring but different bill and leg colour, also a shorter stouter bill; the under parts are heavily barred. The flushed bird showed no under barring at all. According to well known ornithologist, V. T. Love (who has studied the species in Victoria and examined records from other States) "the bird seems to have a preference for areas covered with the samphire plant" (Page 1788 Australian Wildlife Heritage), H2.

72. *Haematopus ostralegus*, Pied Oyster-Catcher.

Consistent records of up to four birds all months Somers seashore and Sandy Point tidal flats, H.1, 2.

73. *Haematopus fuliginosus*, Sooty Oyster-Catcher.

Very rare. Single record one bird Somers seashore, May 1961, H.1.

74. *Vanellus miles novahollandiae*, Spur-winged Plover.

Common resident species. Nests found each year July and August. On one occasion a nest was found with three eggs, one of which had commenced to hatch. The young bird was observed for several hours chipping around the egg. The other eggs were also close to hatching and the birds inside could be heard chirping. Average clutches noted were from two to four eggs invariably laid with the tapered ends towards the centre.

On 18th August 1963 three nests were found in a triangle approximately 50 yards apart at Somers Camp. Nests were also found on the beach apparently in association with Red-capped Dotterels. During the nesting months average counts per trip were six to twelve birds always in pairs. The species flocks during the months December to March. Average count during this period 60 birds. Nests recorded at Coolart, Hanns Inlet and the open paddocks, H.1, 2, 3, 4, 5 and 6.

75. *Vanellus tricolor*, Banded Plover.

Recorded three occasions during survey, the first under somewhat unusual circumstances. During January 1962 Davis was skin diving off the rocks at Somers. He surfaced only 4 ft. from a rocky island to find a pair of Banded Plover resting only 6 ft. from his face. The birds were not alarmed, probably mistaking Davis for a seal or penguin. Single bird seen at Hastings January 1963; one bird Hanns Inlet 23rd June 1963, H.2, 3.

76. *Pluvlis dominica fulva*, Eastern Golden Plover.

Very rare. Single bird along Hanns Inlet 15th September 1963, H.2.

77. *Charadrius rubricollis*,
Hooded Dotterel.

The consistent breeding occurrence of this species is interesting when one considers it is normally recognised as preferring ocean beaches. Nests found during October and November each year, Sandy Point. On only one occasion were young observed. On 22nd December 1963 four almost fully grown young birds were seen with their parents. The black hood was absent, upper plumage dark fawn, under whitish, white nape marks, legs and bill coloured dark grey, white wing stripe. On several occasions nests were found within 10 ft. of Red-capped Dotterel's nests. The species was consistently absent from the area during April and May each year, returning June. Average count six birds per trip. Largest count twelve birds in a tight flock January 1964 Sandy Point, H.2.

78. *Charadrius alexandrinus*,
Red-capped Dotterel.

Common resident breeding species Somers Beach, Sandy Point and Hanns Inlet. The species formed the basis for a special study at the Somers education camp carried out by Reid. Breeding records for the months of August, October, November and January. Population throughout the survey period was reasonably consistent at twelve to fifteen birds. Occasional influxes occurred. Thirty were noted July 1963 and again in May 1965. On Sunday 30th September 1962 the full mating display was witnessed by Davis. A complete description was published in "The Emu" (Vol. 63 — Page 332). Mortality appeared very high. Of forty-two eggs laid during 1965-1966 seasons only five reached the hatching stage, ten were washed away by high tides, eight were destroyed or stolen by humans and the remaining nineteen were destroyed or fell to unknown predators. Several pairs nested in almost identical sites from year to year. An extensive banding study was carried out at the education camp from 1958 to 1966 by Reid and continued until 1971 by Neil Wetherall. One banded female was present for a period of five years and nested regularly at the same site. She had three separate partners during this time. Reid conducted behaviour studies of the banded birds and descriptions of distraction displays are given in "Survival" 1972 No. 1, P4-5 (published by the Gould League of Victoria), H.1, 2.

79. *Charadrius bicinctus*,
Double-banded Dotterel.

Regular winter migrant from New Zealand. First birds noted end February each year, numbers increasing to a peak of 60 by June. Birds depart abruptly end August and are completely absent until following February. Birds often noticed in breeding plumage towards the end of July, Sandy Point and Somers Beach, H.1, 2.

80. *Charadrius mongolus*,
Mongolian Sand-Dotterel.

Recent addition. Four seen at Sandy Point on Sunday, 10th March, 1974, by a V.O.R.G. survey team, H.2.

81. *Charadrius melanops*,
Black-fronted Dotterel.

Resident breeding pair at Coolart. Single record from Hanns Inlet 17th March 1963. The Coolart pair nested each year usually two to three attempts. Diverse sites were chosen varying from freshly ploughed paddocks adjoining the lagoon to the wood heap and tennis court at the education camp. As with the Red-capped Dotterel, time after time nests and eggs mysteriously disappeared. Over the survey period evidence of success was noted on two occasions only. January 1961 two immature birds at Coolart. These eventually became adults and left approximately four months after hatching. February 1964 two birds were reared to maturity. Occasionally the resident pair were joined by other adult birds for short periods, H.2, 5.

82. *Charadrius cinctus*,
Red-kneed Dotterel.

Rare. Single bird Coolart March 1966, seen again May 1967, a pair March 1968, H.5.

83. *Arenaria interpres*, Turnstone.

Recorded recently by Richard Lyons, B.O.C. survey team at Sandy Point. Six on 9th February, one each on 6th July and 15th September 1974, H.2.

84. *Numenius madagascariensis*,
Eastern Curlew.

As mentioned under early ornithological records, Westernport is well known for its Curlews. The species was regularly recorded from the Naval Base mud flats all months except May, June, July when the birds were absent on migration. Peak counts of up to 40 noted January and February. On 19th April 1964, twelve were observed coming into full breeding plumage. They appeared much brighter in colour with very distinct markings and a greenish tinge to the plumage. Often during September, October and April huge flocks in excess of 1,000 birds were seen in open V formation flying towards French Island, H.2.

85. *Numenius phaeopus*, Whimbrel.

Very rare. Noted only at Hastings on 9th February 1964, thirty seen, H.2.

86. *Tringa brevipes*,
Grey-tailed Tattler.

Listed also at Hastings on two occasions, H.2.

87. *Tringa nebularia*, Greenshank.

Forty consistently noted Hanns Inlet all months except May to August. Often seen on fresh water lagoon during high tide in company with other waders. Largest count was 60 in a tight flock 21st February 1965 Hanns Inlet. Wader expert, F. T. H. Smith, described Hanns Inlet as the best habitat for consistently observing Greenshanks near Melbourne, H.2, 3(a).

88. *Tringahypoleucos*,
Common Sandpiper.

During September 1962 a single bird spent three weeks at Coolart. It was observed on four occasions. During this period an influx of the species was reported from many wader haunts around Melbourne, H.5.

89. *Calidris ferruginea*,
Curlew Sandpiper.

Spasmodic records, Somers seashore, Naval Base mud flats, Hanns Inlet fresh water lagoon. Single records for March, September, October and November. Large groups of up to 60 were sometimes seen during April and May. One wintering record, single bird 28th June 1964 Sandy Point. On 26th February 1969, a single bird noted at Coolart. On 24th March 1963 single bird in full breeding plumage Hanns Inlet, H.1, 2, 3(a), 5.

90. *Calidris ruficollis*,
Red-necked Stint.

The common wader of the survey. Consistent records, 200 to 400 Spring, Summer and Autumn. During 1963 absent May, June, July and August. During late March and April many often recorded in various stages of breeding plumage. During April large flocks observed in apparent pre-migration flights, actively feeding, then rapidly flying in tight wheeling formations, then feeding again. This pattern would continue for several weeks before the flocks departed, H.1, 2.

91. *Calidris acuminata*,
Sharp-tailed Sandpiper.

In spite of extensive samphire swamps in the Hanns Inlet area (normally considered an excellent habitat type for the species) there were few records. February 1964 — forty Hastings. Single birds — Hanns Inlet — March 1964 and March 1965, H.2.

92. *Gallinago hardwickii*,
Japanese Snipe.

Numerous early records, grassy fringes, Coolart. During 1962 and 1963, three to four birds consistently flushed December, January and February. January 1964 a single bird flushed. No further records at Coolart. Single birds Hanns Inlet January 1964 and February 1965, then no records.

As with the preceding species the lack of records from the vast areas of suitable habitat is hard to understand. Also the fact it has apparently disappeared from Coolart where, if anything, habitat suitability has improved, H.2, 5.

93. *Himantopus himantopus*,
Black-winged Stilt.

During October 1967 a pair spent several days at Coolart, H.5.

94. *Stercorarius skua*,
Great (Southern) Skua.

Recorded Winter 1959, single bird Somers Beach, H.1.

95. *Stercorarius parasiticus*,
Arctic Skua.

Occasional visitor. Noted attacking gulls, Somers, late December 1962. Single bird, Crib Point, January 1963. Further records single birds, Sandy Point February, March, April and November 1964, January and April 1965, H.2.

96. *Larus novaehollandiae*,
Silver Gull.

Very common resident species. Peak population Naval Base tidal flats 800 plus December to May. Dispersion for breeding June to November average count 100. Banded birds often seen. No breeding in survey area.

Band reading at Hastings waterfront by Reid over a number of years revealed the diverse origins of the feeding group there. Birds were present from Port Lincoln, South Australia, Lake Tyrrol and Waranga Basin, Northern Victoria, Wright and Sister Islands, Tasmania, and the Colac and Fishermens Bend nesting colonies.

A dominant gull banded as a runner by Marc Gottsch (V.O.R.G.) at Waranga was seen at Hastings on scores of occasions by many observers over a three-year period. It was first seen there at the age of six months. Only two other gulls were recorded as being present for more than two weeks.

A high percentage of immature gulls were present between September and November each year and the evidence is clear from Table 1 that immature gulls are forced from the favoured feeding places to less competitive sites. On a yearly basis only 10% of the gulls in the prime feeding area in the Colac square were immature, 22% at the less favoured playground area and in typical coastal areas such as Hastings, Geelong, Frankston and the Yarra mouth the average was 34%, H.1, 2, 3, 4, 5, 6.

97. *Larus dominicanus*,
Dominican Gull.

Very rare, recorded Somers Beach September 1960 and August 1964, H.1.

98. *Larus pacificus*, Pacific Gull.

Exact reverse of Silver Gull. Peak counts of 40 to 80 June, July, August and September. Minimum six to ten December and January. The ratio of mature to immature birds was graphed. Results indicated approximately half immature, half mature. High counts recorded usually during rough weather in winter, H.1, 2.

99. *Chlidonias hybrida*,
Whiskered (Marsh)Tern.

Two recent records, 10th October 1968 Tulum Creek, 8th February 1970 Somers Beach, H.1.

100. *Gelochelidon nilotica*,
Gull-billed Tern.

Very rare. On 19th January 1964

single bird observed at close range flying over mud flats Hanns Inlet, H.2.

101. *Hydroprogne tschegrava*, Caspian Tern.

Occasional visitor Somers Beach — September 1962, March 1963, August October and November 1964 (six birds during October 1964), H.2.

102. *Sterna paradisea*, Arctic Tern.

Accidental. Beach washed specimen collected Somers October 1960 was second Victorian record ("The Emu", Vol. 64, Part 1, P.38).

103. *Sterna striata*, White-fronted Tern.

Very rare. Beach washed specimen, Sandy Point — 27th June 1965, H.1.

104. *Sterna bergii*, Crested Tern.

Common, recorded every survey trip from all beach and tidal flat locations. Average count 30, largest count 80, H.1, 2.

105. *Sterna nereis*, Fairy Tern.

Occasional visitor, noted four trips —October 1962, October 1963—four birds. August 1964 and January 1965 — six birds, H.1, 2.

To be Continued.

The Origin of Generic Names of the Victorian Flora

Part 2 – Latin, Greek and Miscellaneous

[continued from 92 (3)]

by James A. Baines

***Diplotaxis.** Gk diploos, double; taxis, putting in order, arrangement; from the bi-seriate seeds. **D. tenuifolia*, Sand Rocket, and **D. muralis*, Wall Rocket, are the two species naturalized in Victoria.

Dipodium. Gk dis, double; podion, little foot; referring to the two stalks, or false caudicles, of the pollinary apparatus. Victoria's sole species is *D. punctatum*, Hyacinth Orchid.

***Dipsacus.** The Gk name, dipsakos (from dipsa, thirst), in Dioscorides of **D. fullonum*, Wild Teasel, which is naturalized here, but subspecies *D. f. sativus*, Fullers' Teasel, the heads of which were formerly used in 'fulling' (putting a nap on woollen cloth), is not. The word dipsakos meant also a kind of dropsy, and, as a plant-name, had reference to the accumulation of water in the connate leaf bases. The generic name is the basis of the family name Dipsacaceae.

Discaria. Gk diskos, a disc; the flower of these spiny shrubs has a large fleshy disc. Victoria's species is *D. pubescens*, Australian Anchor Plant. New Zealand's sole species, *D. toumatou*, is more fearsome-looking, and is called Wild Irishman (as well as two Maori names).

Disphyma. Gk dis, twice; phyma, a swelling, tumor, tubercle. Our species, *D. australe*, Rounded Noon-flower, was formerly known as *Mesembryanthemum australe*, Round-leaved Pigface.

Distichlis. Gk di, dis, 2; stichos, a row or line; the leaves are strongly distichous (arranged in two opposite rows), as the specific name of our species implies, *D. distichophylla*, Australian Salt Grass.

Diuris. Gk di-, 2; oura, tail; the long lateral sepals having the appearance of two tails, prompting a common name sometimes used, Double-tails. Our nine

(continued on page 79)

Descriptions of the Larvae of Four Species of Lucanidae (Stag Beetle)

by

JOHN ALDERSON*

Introduction

Systematic observations of the feeding behaviour of Lyrebirds and other animals in their natural environment led the author to examine the various forms of forest-floor fauna consumed by such animals. Among the fauna were several specimens of mature Coleoptera (beetles) and Coleoptera larvae which were collected. In this paper descriptions of the larvae of four species, *Lamprima varians* Germer., *Lissapterus howittanus* Westw., *Lissotes furcicornis* Westw., and *Syndesus cornutus* Fab. are given. The descriptions are based on characters after Hayes (1928), Böving (1930), and Peterson (1951). A shadograph was used to examine specimens soon after the final instar moult and specimens with similar characters were placed into corresponding groups. Ten specimens of each group were killed with Peterson's "KAA" and preserved in 90% alcohol; several specimens were allowed to complete their life-cycles. Each of the live specimens was placed in a glass container with material from the collection site. The containers were then covered with black plastic film to exclude light and at regular intervals the plasic was removed to allow maintenance and inspection of larval development. Many differences in the general shape and colour of all species were noticed and an account of these together with the life histories and habits of adults is in preparation. The species selected to represent the family on Plate I is *Lissapterus howittanus*.

General description of mature larvae

The four species are C-shaped, near-white, variable in body length within species on the dorsal aspect. *Lamprima varians* Germer., ranges from 53 to 70 mm, *Lissapterus howittanus* Westw., from 50 to 92 mm, *Lissotes furcicornis* Westw., from 35 to 44 mm, and *Syndesus cornutus* Fab., from 25 to 44 mm. Both *Lissapterus howittanus* and *Lissotes furcicornis* were found to be somewhat thicker posteriorly between abdominal segments 5-9 and *Lamprima varians* and *Syndesus cornutus* are tapered, more elongate in shape. Each species has 10 abdominal segments, with C-shaped cribriform spiracles visible on the prothorax and abdominal segments 1-8. The anal segment has a vertical anal opening and lobes on the caudal aspect (Fig. 1). The head (Figs. 2 and 2a), orange to pale yellow, slightly smaller than the prothorax, with a few setae, and distinct epicranial suture surrounding the frons. Clypeus short, wider than long, brown on the upper half and creamy white on the lower half. Labrum brown, V-shaped, rounded and setaceous on the apical margin. Antennae are distinct, geniculate, three-segmented, situated near the base of the mandibles (Fig. 3) which are black, asymmetrical, with the left mandible having a molar and four distinct terminal teeth on the mesal aspect. Each

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maxilla (Fig. 4) consists of a two-segmented cardo, stipes, palpifer and a four-segmented palpus, galea and lacinia. The galea and lacinia each terminate with a strong pigmented spur. The labial palpi are two-segmented. The three thoracic segments each carry a pair of four-segmented setaceous legs, subequal in size (Fig. 5). Stridulating organs are present on the first and second segments of the mesothoracic and metathoracic legs respectively. Numerous short, stout setae (resembling asperites) and fewer longer setae occur transversely, on the dorsa of abdominal segments 1-6 and caudolateral portions of the 9th. *Lamprima varians* has fewer longer setae and more numerous asperite-like setae on the dorsal and lateral surface of all segments. *Lissotes furcicornis* has ocelli at the side of antennae.

Different characters were found in the epipharynges (underside of labrum); antennae; tarsungulus (terminal segment of legs); anal segments; and stridulatory organs.

Epipharynges

In the four species the epipharynges are roughly wedge-shaped, setaceous and rounded on the apical margin with a broad shallow callus (sometimes lightly pigmented) situated on the middle of the distal sensory area. Paria usually covered with setae which become fewer and smaller, laterally. The laetorma and dexiotorma are fused, with an annulus of very small, truncated, asperite-like spines, extending from the torma to the distal sensory area. Pedium slightly concave, with a mesal anterior projection situated on the torma, extending into the spinose annulus. The proximal sensory area consists of a medial sense cone conjoined to the torma, basally, immediately behind the anterior projection and another sense cone proximad to this with a chitinized plate on each side. A pternotorma is present.

(a) *Lamprima varians* (Fig. 6). Mesal anterior projection is short and broad. Distal sensory area has an anterior, transverse, medial row of six truncated spines and an inner row consisting of 3-4 asperites. Pternotorma short.

(b) *Lissapterus howittanus* (Fig. 7). More rounded at the apex than the other three species with the lateral-anterior portion of the margin angulate and the mesal aspect of the lateral margin pointed. Mesal anterior projection extends to about the middle of the annulus. Distal sensory area has a transverse anterior row of six fine, long, spines and two additional rows proximad to these, each consisting of two spines. A dense patch of asperites occurs on the anterior portion of the spinose annulus. Pternotorma deep-keeled.

(c) *Lissotes furcicornis* (Fig. 8). Mesal anterior projection extends to about the middle of the annulus. Distal sensory area consists of a patch of eight asperites which appear to be in pairs, irregularly placed, extending basally. Proximal to these is a transverse row of four asperites immediately anterior to the spinose annulus. Some 3-7 setae occur on the lateral margin of the epipharynx. Pternotorma shallow.

(d) *Syndesus cornutus* (Fig. 9). Mesal anterior projection extends to about the middle of the annulus. Distal sensory area has an anterior transverse row of four strong pointed spines and four asperites on anterior portion of the annulus. Pternotorma moderately keeled. Some three setae occur on the lateral margin of the epipharynx.

Antennae

Antennae are three-segmented. First segment long, narrow basally, swollen distally with a few setae. Second segment clavate, with or without setae and sensory spots. Terminal segment small, cylindrical, pointed apically, with one seta on the apex and one on each side.

(a) *Lamprima varians* (Fig. 10). Some four setae occur on the first segment. Second segment somewhat upcurved and pointed apically below the terminal segment; devoid of setae and sensory spots.

(b) *Lissapterus howittanus* (Fig. 11). Some 4-5 setae occur on the first segment and 14-16 sensory spots on the third segment. Terminal segment with four setae; one seta on the dorsal aspect and one on each side. Fourth seta situated medially, apically.

(c) *Lissotes furcicornis* (Fig. 12). Generally more setaceous, having some 12 setae on the first segment and numerous, fine, bristle-like setae on the third segment.

(d) *Syndesus cornutus* (Fig. 13). First segment with 4-5 setae. Second segment devoid of setae and sensory spots.

TARSUNGULUS

(a) *Lamprima varians* (Fig. 14). Legs without distal claw, terminal segment somewhat bulbous, densely covered with setae.

(b) *Lissapterus howittanus* (Fig. 15). Legs terminate with a slightly curved, elongate, blunt claw; one seta situated ventrally behind the apex and another seta situated laterally forward of the middle of the claw.

(c) *Lissotes furcicornis* (Fig. 16). Legs terminate with a moderately curved, pointed claw, broad basally; one seta present on each side near the base.

(d) *Syndesus cornutus* (Figs. 17-18). Legs terminate with a somewhat elongate tubercle which has a small cusp at the middle, apically and one seta on each side of the cusp.

ANAL SEGMENTS

(a) *Lamprima varians* (Fig. 19). Anal pads which together are cordiform, with numerous short fine bristles on the upper surface, decreasing in number on the lower surface. Dorsal anal lobe small and devoid of setae. Raster with very short septula, with a patch of short, fine setae situated ventrally on each side of anal pads.

(b) *Lissapterus howittanus (Fig.* 20). Anal pads ovate and inflated (slightly concave on inner margin on odd specimens). Ventral and lobes with a patch of short, stout, downward-directed setae. Dorsal anal lobe small, devoid of setae. Raster with a long, straight, open septula, extending into the campus, with a dense patch of short, stout, compressed setae on each side, extrorse, set at about 45° angle.

(c) *Lissotes furcicornis* (Fig. 21). Anal pads ovate. Ventral anal lobe with a patch of somewhat short, stout, setae, extrose. Dorsal anal lobe slightly inflated. Septula wide, inverted V-shaped for about half the length of the segment. Upper half in region of campus, somewhat V-shaped.

(d) *Syndesus cornutus* (Fig. 22). Tri-lobed, with lobes distinctly inflated. Anal pads ovate. Dorsal anal lobe with distinct almost ovate pad. Ventral anal lobes devoid of setae. Raster with numerous, short, introrse setae and narrow septula extending to, and closed, just beyond the middle of the segment.

STRIDULATORY ORGANS

These are not described but are illustrated in Figures 23-26.

Acknowledgements

For assistance in field work, collecting material and never-ending patience, I am indebted to my wife; special thanks to Miss Sue Beattie who, in addition to field work, had the difficult task of searching literature and assisting with laboratory procedures. Thanks also to Messrs. C. Robbins and F. Douglas for their assistance in col-

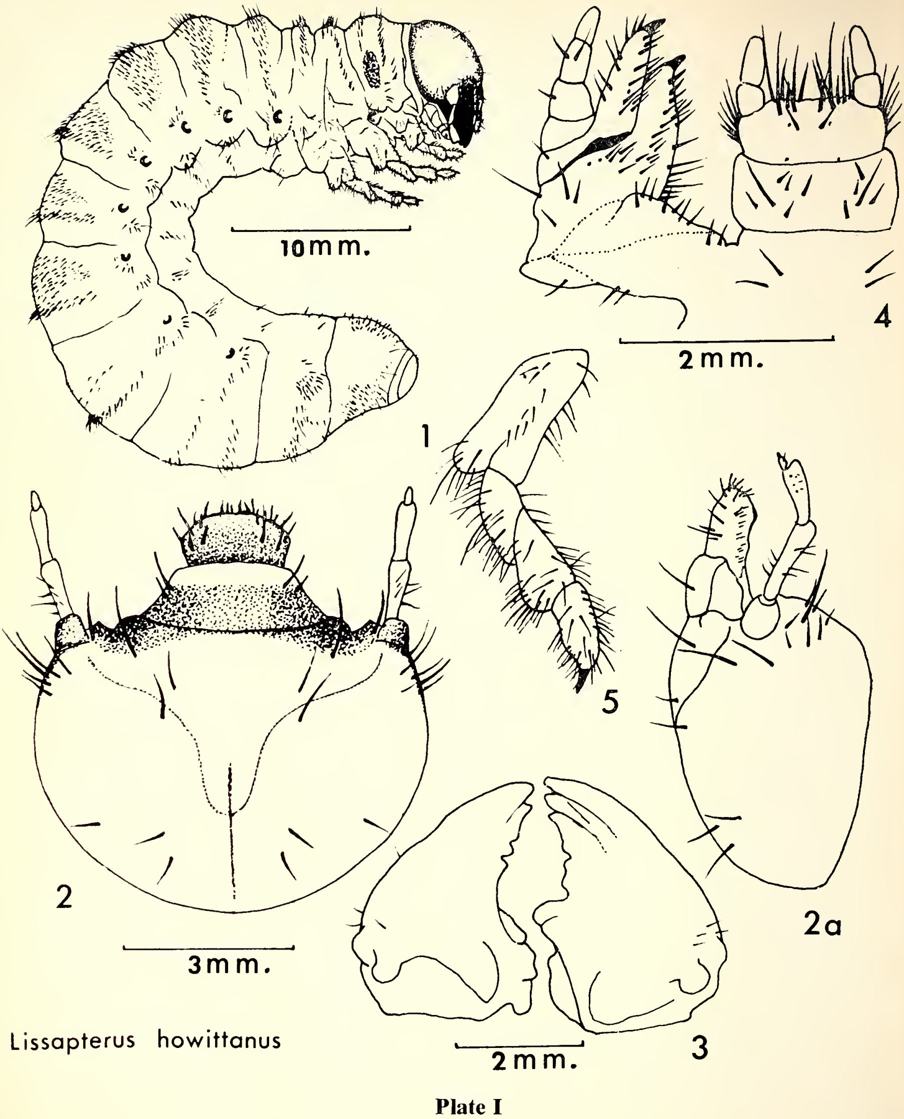


Plate I

Mature larvae of *Lissapterus howittanus.*

Fig.

1. Lateral view of larvae.

2. & 2a. Head — dorsal and lateral view.

3. Mandibles — lateral view.

4. Right maxilla and labium ventral view.

5. Leg.

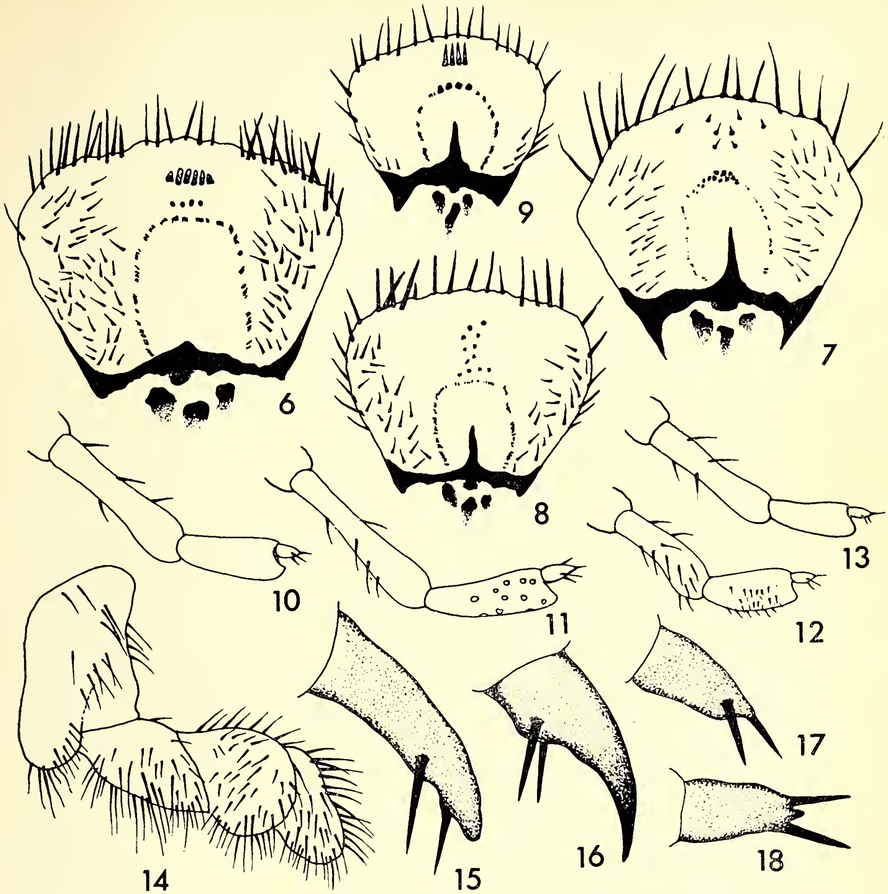


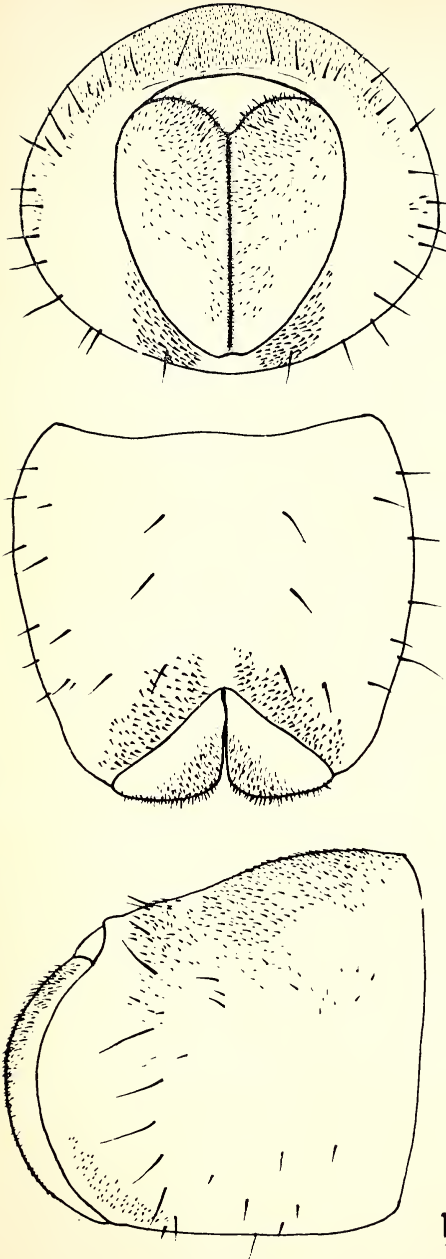
Plate II

Fig.	Epipharynges.		
6.	*Lamprima varians.*	7.	*Lissapterus howittanus.*
8.	*Lissotes furcicornis.*	9.	*Syndesus cornutus.*

Fig.	Antennae.		
10.	*Lamprima varians.*	11.	*Lissapterus howittanus.*
12.	*Lissotes furcicornis.*	13.	*Syndesus cornutus.*

Fig. Tarsungulus.

14. Leg of *Lamprima varians.*
15. Claw of *Lissapterus howittanus* — lateral view.
16. Claw of *Lissotes furcicornis* — lateral view.
17-18. Segment of *Syndesus cornutus* — lateral and dorsal view.



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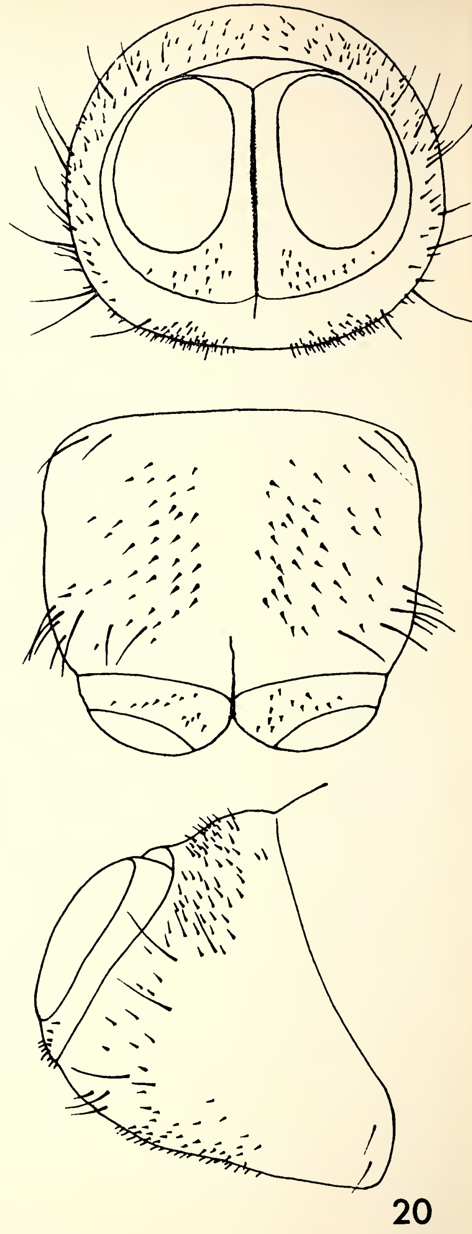

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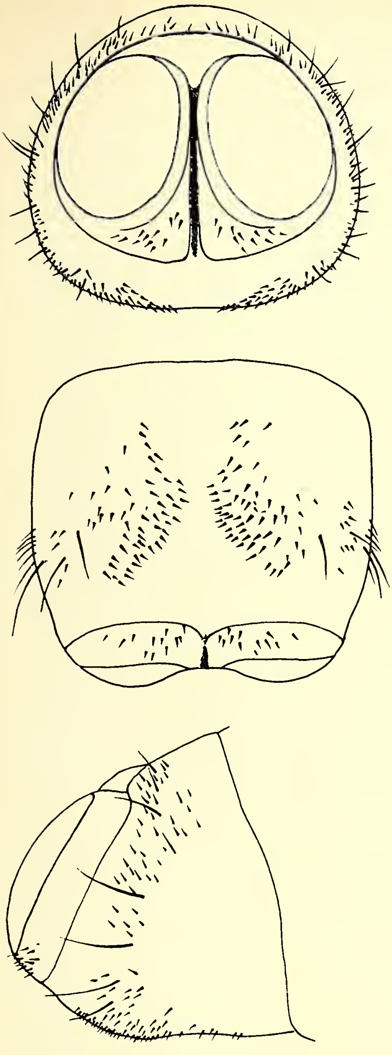
Plates III & IV



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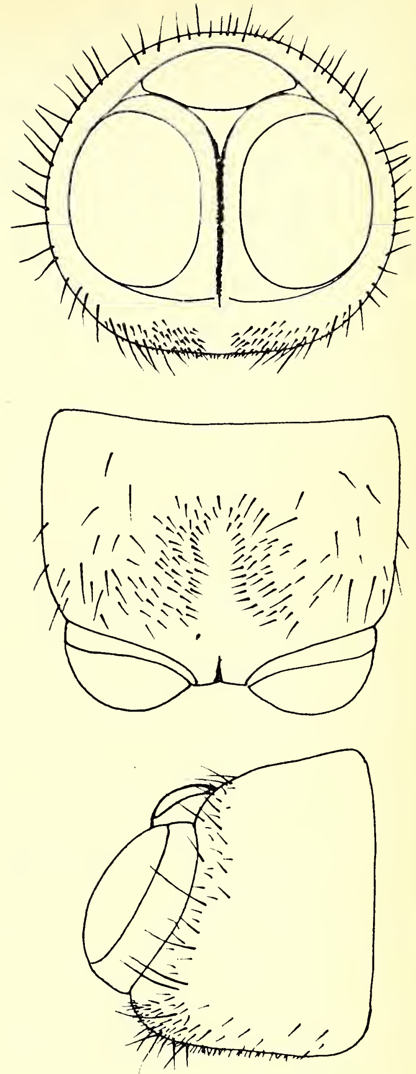

22

Anal segments — posterior, ventral and lateral views respectively.

Fig.

19. *Lamprima varians.*

20. *Lissapterus howittanus.*

21. *Lissotes furcicornis.*

22. *Syndesus cornutus.*

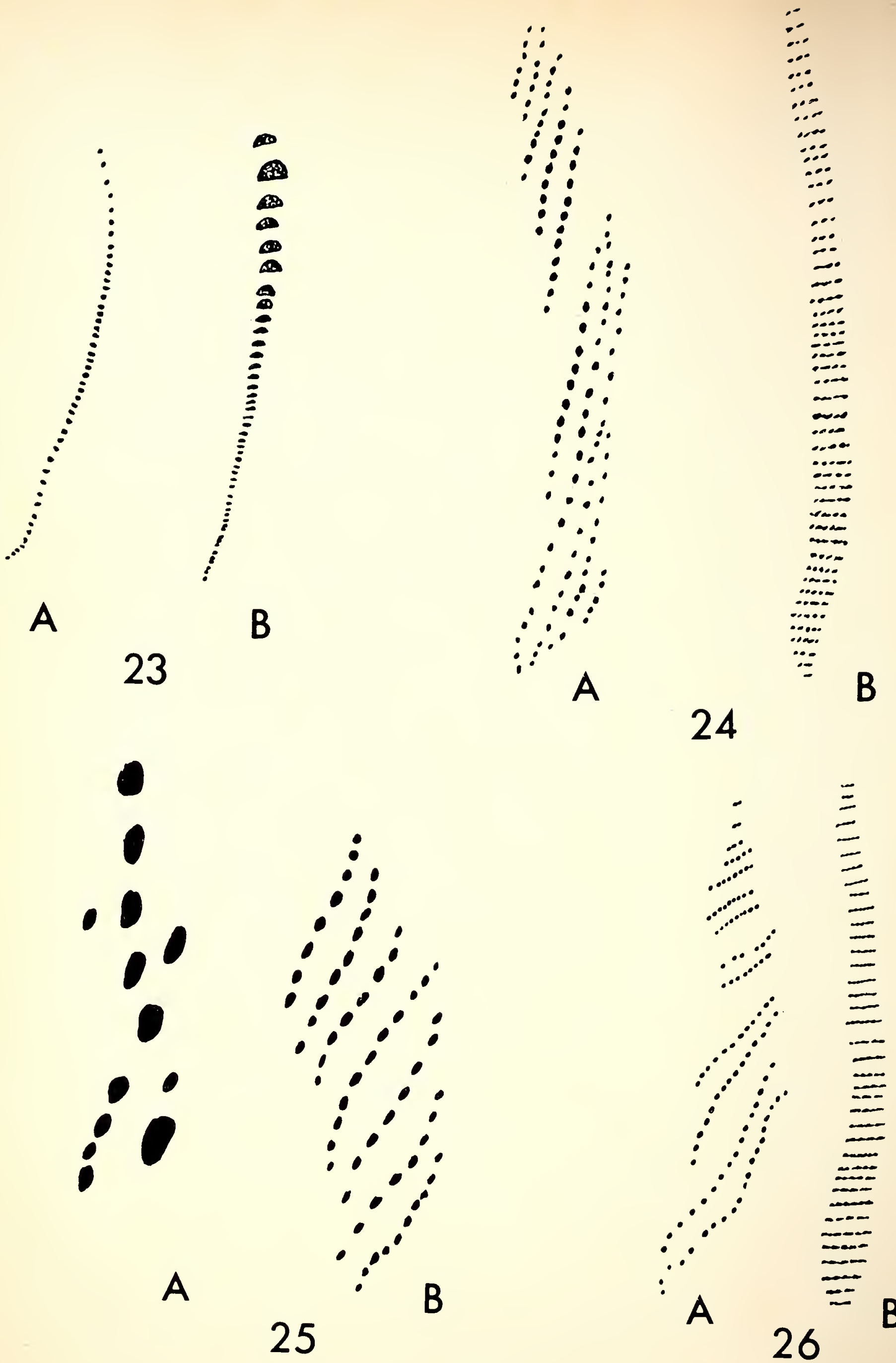

Plate V

Stridulatory organs — mesothoracic and metathoracic legs respectively.

23. *Lamprima varians.*
24. *Lissapterus howittanus.*
25. *Lissotes furcicornis.*
26. *Syndesus cornutus.*

lecting material. I am grateful to members of the Fisheries Division's staff, Drs. D. Evans and Z. Abedi, for reading the draft, Mr. J. Cooper, photographer, and Messrs. J. Bacher, K. H. Beinssen and J. Seebeck for their encouragement and the use of equipment. Drs. E. B. Britton, B. P. Moore (C.S.I.R.O.), Mr. G. Monteith (Queensland University), and the staff of the Entomological Division, Melbourne Museum.

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(Continued from page 70)

species often have common names with zoological twist, such as *D. maculata* (Leopard Orchid), *D. sulphurea* (Tiger Orchid), *D. pedunculata* (Snake Orchid or Golden Moths), and *D. longifolia* (Donkey Orchid in W.A., but Wallflower Orchid in Victoria). The generic name is used as a common name sometimes, with a qualifying adjective, such as *D. punctata* (Purple Diuris, White Diuris or Long Double-tails).

***Dolichos.** Gk dolichos, long; used by the Greeks for long-podded beans, hence transferred to these climbing plants closely related to beans. Our species, **D. lignosus*, is not native, nevertheless it is known in America as Australia-pea Dolichos; it is Common Dolichos here.

Drabastrum. Draba, name of a cruciferous genus (from Gk drabe, the classical name for *Cardaria draba*); -aster, -astrum, Lat suffix for a diminutive, often used in a pejorative or derogatory way (cf. poetaster, a poor poet). *D. alpestre*, our species, is Mountain Cress.

Drimys. Gk drimys, acrid, pungent; from the taste of the bark and the peppery leaves. Our species, *D. lanceolata*, Mountain Pepper, was once *Winterania* and is now *Tasmannia.* It is in family Winteraceae.

Drosera. Named by Linnaeus from Gk droseros, dewy (drosos, dew); referring to the clear, shining, dew-like drops of secretion on the leaf-glands. Adanson's name for the genus was *Ros-solis* (literally dew of sun, i.e. sundew). Victoria has nine species, all native, known as various kinds of sundew.

To be continued

Field Naturalists Club of Victoria

Established 1880

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F.N.C.V.

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Category "B"

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 May — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

Subject of the Evening — "Catchment and Catchment Management":
Speaker from Soil Conservation Authority.

New Members —

Ordinary:

Mrs. Wendy Bedggood, Flat 3, 1 Bevan Street, Balwyn, 3103. *Botany.*
Miss Monica Behrend, 9 Cremorne Street, Balwyn, 3103. *Mammals and Insects.*
Mrs. Margaret Cooper, 6 Allee Street, Brighton, 3186. *Botany.*
Mr. Neil W. Hunt, 119 Hickford Street, Reservoir, 3073.
Miss Lindsay Ivory, 48 Grey Street, East Melbourne, 3002.
Miss Monica Lundie, 15/8 Hepburn Street, Hawthorn, 3122.
Mr. R. F. Parsons, Dept. of Botany, La Trobe University, Bundoora, 3083. *Botany.*
Miss Louise Piper, Flat 8, 11 Yonga Road, Balwyn, 3103.

Joint:

Mr. Daryl K. Evans, Mrs. Ruth Evans, 166 Head Street, Elsternwick, 3185.
Miss P. Newton, Miss E. Pollard, P.O. Box 92, Mt. Waverley, 3149. *Botany and Conservation.*

Country:

Mr. Robert Eager, Evans Grove, Wandin North, 3139.
Mr. John C. Llewelyn, 5 Ellis Street, Bendigo, 3550.

Monday, 9 June — "Ants and Plants in the Chihuahuan Desert": Dr. S. Ettershanck.

GROUP MEETINGS

(8 p.m. at the National Herbarium unless stated otherwise)

Wednesday, 14 May — Microscopical Group Meeting.

Thursday, 15 May — Day Group.

Thursday, 22 May — Field Survey Group Meeting in Conference Room, National Museum at 8.00 p.m.

Monday, 2 June — Marine Biology and Entomology Group Meeting in Conference Room, National Museum at 8 p.m.

Wednesday, 4 June — Geology Group meeting.

Thursday, 5 June — Mammal Survey Group Meeting at Arthur Rylah Institute, 123 Brown Street, Heidelberg at 8 p.m.

Thursday, 12 June — Botany Group Meeting. Subject—"Fungi": Mr. Bruce Fuhrer.

EXCURSIONS

Sunday, 18 May — Yarra Bend National Park. The Club has offered to assist in the attempt to control Boneseed in this area and part of the day will be spent clearing as much of this weed as we can. Bring gardening gloves, as young plants are easily pulled out by hand and all members can help with this. The coach will leave Batman Avenue at 9.30 a.m. — fare $1.50 — bring one meal. It is planned to make our first stop at the Pioneer Monument and to lunch at the Boatshed picnic area where we hope all members who cannot go for the day, but can spare an hour or two will join the working bee for as long as possible.

the victorian naturalist

Vol. 92, No. 5 — 7 May, 1975

Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

Contents

Front Cover:

The Broad-toothed Rat ("Mastacomys fuscus"). See leading article.

There has over the last month been a dramatic change in the F.N.C.V., under the leadership of President Peter Kelly, a new team is showing plenty of drive and determination in getting "On with the Job".

We have a new Hon. Secretary, a new Assistant Secretary and an Hon. Typist, Miss Joyce Annear, who is also acting as Duplicating Officer.

The Treasurer reports that membership has been maintained and is in fact on the increase; many overdue subscriptions are being paid up from Members given up as lost to the Club.

Council has stopped subscribing to several organisations that have doubtful value to the F.N.C.V.

"The Victorian Naturalist":—A new Editor, Mr. Fred Rogers, Past-President of the S.G.A.P., author of "Victorian Wattles" and with many years of editorial experience in Natural History, will guide "The Naturalist" and maintain the standards members appreciate.

Offers to help as assistants to the Editor have been received. The cost and structure of "The Naturalist" will be under review in an endeavour to give Members the best service without financial loss to the Club in 1975.

Activities:—All Members should be aware that the seven Groups of the F.N.C.V. with their own meetings and outings plus the parent body activities give a total of about 140 events that Members can attend. Any Member is welcome to come to any Group Meeting or Excursion.

Council is at full strength, strengthened by new Members willing to serve.

Service to the Public, Members and other Clubs:—Many hours of time is given answering queries by the Secretary, Librarian, Magazine Sales Officer, Archives Officer and Group Secretaries, and this service will continue.

I hope to serve the Club well in the future and I need the co-operation of all Members and that means You. What about it?

At your service,

GARNET JOHNSON,
Hon. Sec.

Studies of *Antechinus swainsonii* and Other Small Mammals in an Area of Sherbrooke Forest Park

by

G. F. Reed* and R. L. Wallis*

Summary

A trapping program in part of Sherbrooke Forest Park has shown *Rattus fuscipes, Antechinus swainsonii* and *Antechinus stuartii* to be common but *Mastacomys fuscus* to have apparently died out. The *R. fuscipes* population level remained stable throughout the study, yet in both *Antechinus* species the males died after the breeding season. Mating in these marsupials probably occurs in the first half of August and by mid-September all adult males have died. Lactating *A. swainsonii* have district, small home ranges (ORL about 30 m).

Introduction

Trapping programs in 1971 and 1972 under the direction of N. A. Wakefield established the presence of small populations of the broad-toothed rat (*Mastacomys fuscus*) in Sherbrooke Forest Park (Brugman, 1971; Gallagher, 1972). One such population was moved late in 1972 before that area was sprayed to eradicate blackberries. One of the aims of this project was to determine whether this population had survived in its new and former locations.

The unusual life history of the Brown Marsupial-mouse (*Antechinus stuartii*) is well documented (Woolley, 1966; Wood, 1970; Woollard, 1971). Males die within weeks of mating but females may live for two years in the field. Little has been reported on the population and home range size, breeding season and fecundity of the Dusky Antechinus (*A. swainsonii*). The results of a preliminary study designed to investigate these aspects are also presented.

Materials and Methods

The study area was located approximately one km east of Belgrave, off Coles Ridge Road, in Sherbrooke Forest Park (see fig. 1). Mountain ash (*Eucalyptus regnans*) predominates with an understorey of prickly currant bush (*Coprosma quadrifida*), blackberry (*Rubus fruticosus*), wire grass (*Tetrarrhena juncea*) and bracken (*Pteridium esculentum*).

Elliot aluminium type B (32 x 9 x 9 cm) and Gordon wire mesh traps (36 x 13 x 13 cm) were baited with a mixture of rolled oats, honey and peanut butter. Initially three traps were set together at points 25 m apart in a series of lines (fig. 1). Later a grid of three parallel lines 10 m apart was used, with three traps set at points every 20 m on the lines (fig. 4). Trapping occurred once or twice weekly from July to October, 1973 (see table 1). Traps were set at dusk and cleared early the next morning. Animals captured were marked with a non-poisonous paint on the feet or their toes were clipped. Scars were also used for identification. Animals were weighed in the field in a plastic bag suspended from a 200 g. wt. spring balance.

Observed range length (ORL) (Stickel, 1954) was used as an index of home range size. Centres of acti-

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vity were also determined by the method of Hayne (1949). Population size estimates were based on the "known to be alive" value (Wood, 1970) based solely on animals which were regularly trapped on the grid.

Results

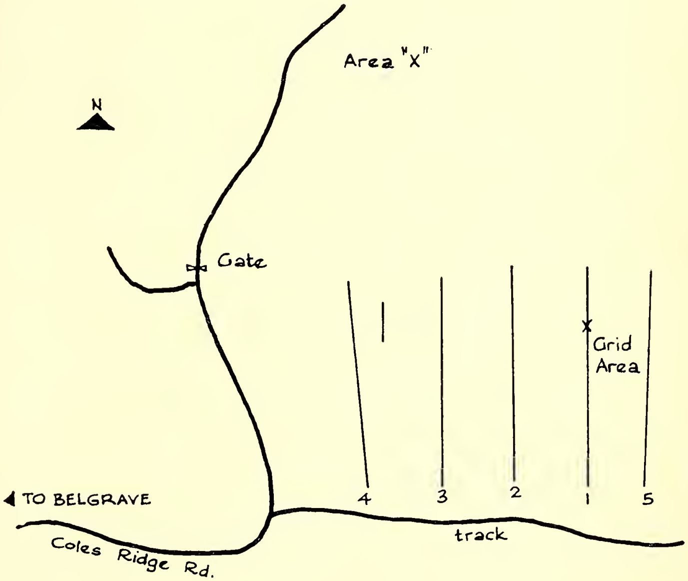
One *Mastacomys fuscus* was captured at point 5, line 1, which is within the area of the colony trapped in 1971-72. The animal bore the mark of a previous trapping program and hence must have been at least 12 months old. Repeated saturation trapping near this capture point failed to retake this and other *M. fuscus.*

Table 1 lists the results of the year's trapping, indicating the trapping success rate total number of animals caught (100 traps) and the percentage each species constituted each time. The trapping success rate is plotted against time of year in fig. 2.

Pouched young of *A. stuartii* were first noticed on 19/9/73 and *A. swainsonii* on 13/9/73. No males of either species of *Antechinus* were trapped after the first week in September. Trapping dates were such that the earliest date for the male die-off could in fact have been the last week of August. The sex ratio of trapped *A. swainsonii* changes with time (fig. 3). At the time of breeding the proportion of males in the trapped samples is high (max. 0.85 males/ female) consistent with their increased activity at this time. Then follows a decline in the sex ratio so that by September the population consisted entirely of females.

A preliminary analysis of home range of lactating female *A swain-*

Figure 1.



Non-scale diagram of the study area. Point marked on line 1 is the site of the *M. fuscus* capture.

Figure 2. Trapping success rate as a percentage plotted against time of year.

TABLE 1

Trapping success rates and proportion each species represented in each trapping session. For trapping sites, see Fig. 1.

DATE	TRAPPING SITE	PERCENTAGE TAKE AS			TRAPPING SUCCESS RATE (no./100 traps)
		A. stuartii	*A. swainsonii*	*R. fuscipes*	
20/7/73	Line 1*	70	20	0	53
23/7/73	Line 2	53	27	20	71
27/7/73	Line 3	32	48	20	76
31/7/73	Line 4	5	57	38	65
2/8/73	Line 5	33	40	27	73
13/9/73	Line 1	25	42	33	42
19/9/73	Grid	18	44	38	42
26/9/73	Grid	15	40	45	38
3/10/73	Grid	15	40	45	38
10/10/73	Grid**	0	66	33	8
28/8/73	Area "X"	0	0	100	10
5/9/73	Gate	34	41	25	24

* One M. fuscus caught.

** Traps set only for six hours since it was erroneously thought that young *A. stuartii* were no longer attached to the teat continually and hence should not be separated from their lactating mothers for too long a time.

sonii was obtained for the months September and October. Five females occurred on the grid at this time. The females had distinct and relatively small home ranges (see fig. 4 and table 2). When the limited data for ORL in table 2 are plotted against number of captures, there is a pronounced levelling in the graph at an ORL of about 30 m. The recorded range in ORL was 45 - 10 m.

TABLE 2

Mean observed range length (ORL) of *A. swainsonii* females which were trapped more than once on the grid.

Number of Captures	Mean Orl (metres)	Sample Size
1	—	—
2	—	—
3	21	2
4	—	—
5	23	3

Three animals moved from their previously determined home ranges to other points on the grid were all retrapped the next day in their original home ranges. These animals were moved a distance greater than their ORL to ensure that they were not merely placed on the edge of their home range. Once such animal was retrapped with patches of fur missing.

The total mass of each of these female *A. swainsonii* together with pouched young was recorded at each capture and the results are presented in fig. 5. Estimates of body length of young and the combined mass of female and young show that females carry young at different developmental stages. Thus animal 101 had young of about 20 mm length and a total mass of 70 g on 3/10/73, while on the same day, animal 100 weighed 52 g and her young were only 15 mm long.

All lactating *A. swainsonii* females carried eight young.

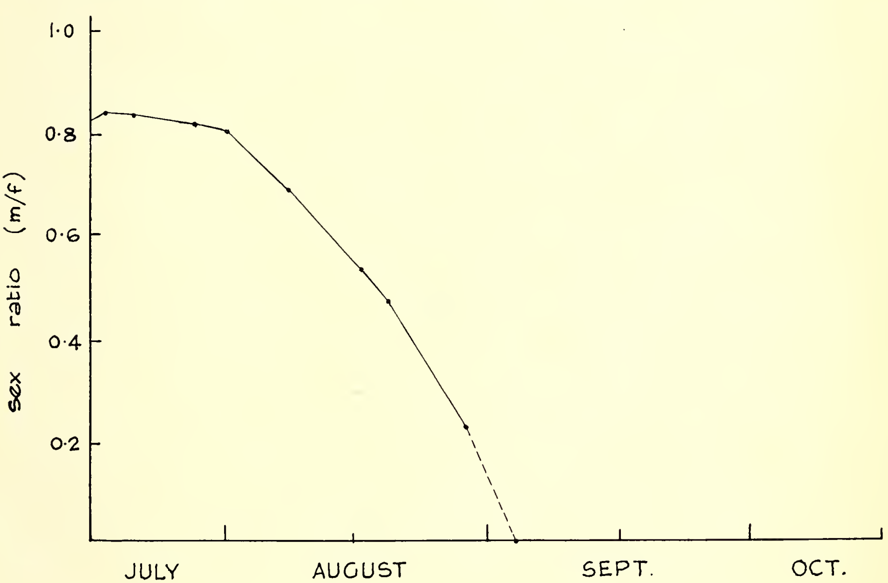


Figure 3. Sex ratios of trapped *A. swainsonii* showing the marked decline in numbers of males during August.

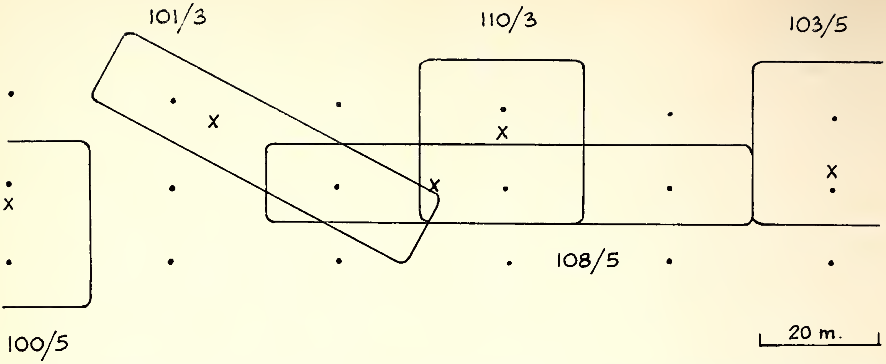
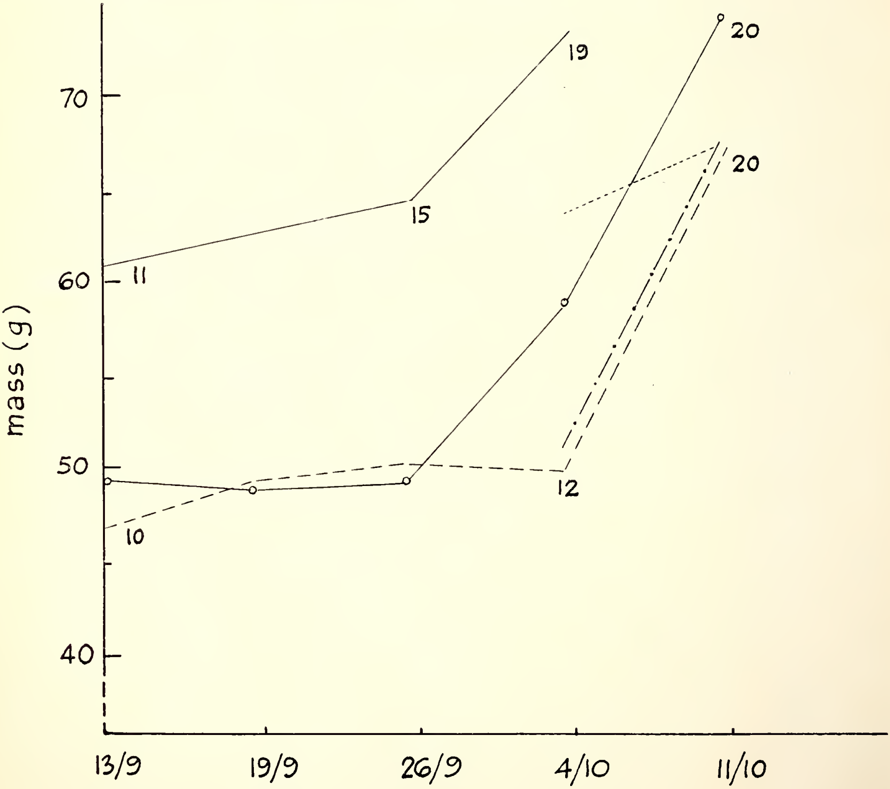


Figure 4. Trapping grid. Home ranges indicated by continuous lines, dots are trap sites. (3 traps per site). Crosses mark calculated centres of activity. 100/5 means animal number 100 was trapped 5 times.



——— animal 101; o——o animal 103; . . . . . . animal 108; — — — — — animal 100; —.—.—.— animal 110.

Figure 5. Variation in mass of five *A. swainsonii* plus pouch young with time. Numbers on graph represent mean length of pouch young in mm.
Only some such values are given to avoid confusion.

Discussion

The capture of only one broad-toothed rat suggests that the population moved in 1972 prior to blackberry spraying, may have perished. Only 10 animals were moved originally and these may have succumbed from increased predation by foxes as a result of reduced ground cover from spraying. Fox scats from other areas in the Park which had not been sprayed contained *M. fuscus* fur (J. Lloyd, pers. comm.)

The population of *Rattus fuscipes* remained fairly constant throughout the study period. This is in accord with Robinson's (1973) finding that the population size of *R. fuscupes* on a nearby Sherbrooke grid varied very little over spring and autumn. In contrast, population sizes of *A. stuartii* and *A. swainsonii* varied quite markedly. An increased activity in the breeding season for male *A. stuartii* has been observed elsewhere, but the season differs according to locality; thus Wood (1970) found *A. stuartii* breeding in mid-September in south-west Queensland, while in south-east Australia breeding occurs in early August (Horner and Taylor, 1959; Wakefield and Warneke, 1967). If gestation periods of both marsupial mice are 30 days (based on values for *A. stuartii* from Marlow, 1961 and Woolley, 1966), then the mating seasons for both species in Sherbrooke Forest Park also appear to occur in the first half of August. Being a larger animal, however, it is possible that the gestation period for *A. swainsonii* exceeds 30 days. Births of *A. swainsonii* may occur a week earlier than *A. stuartii* but the data supporting this inference are few. The male die-off in both species occurred at the end of August and therefore preceded the die-off in the Queensland population of *A. stuartii* by one month (Wood, 1970). The calculated life spans of males of both species of *Antechinus* is 50 weeks.

Lactating *A. swainsonii* have fairly distinct home ranges with little overlap. When removed from these home ranges these animals returned within 24 hours suggesting a preference for a particular home range. Fur missing from one animal may have been the result of a territorial conflict. Furthermore, transient females were never trapped more than once in an area occupied by an animal which had been trapped there several times.

The greatest rates of increase of mass of mothers and pouch young occurred within seven days for the five animals studied on the grid. This suggests a range in conception of *A. swainsonii* of about one week.

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The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

[continued from 92 (4)]

by James A. Baines

Drymophila. Gk drymos, a forest, wood or coppice; philos, loving; because it is a shade-loving perennial distributed in moist forest-land. Our species, *D. cyanocarpa*, is known as Turquoise Berry, from the bright blue colour of the fruit, to which it owes also its specific name ('blue-fruited').

Dryopoa. Gk drys (genitive dryos), a tree; this grass thrives among forest trees and can grow up to 15 feet tall; prefixed to the generic name Poa (Gk for grass). Our species, which is monotypic, is *D. dives*, Giant Mountain Grass, placed in *Festuca* by Mueller, *Glyceria* by Bentham, and finally in *Dryopoa* by Sydney botanist Joyce Vickery, erecting a new genus for it.

Dryopteris. Gk drys, tree, especially the oak; pteris, fern; because it was the name in Dioscorides of a fern growing on oak-trees. *D. dentata* cited by Ewart is now *Cyclosorus parasiticus, and two species of Lastreopsis* were *formerly in Dryopteris*, Creeping and Shiny Shield-ferns respectively.

Dysphania. Gk dysphanes, scarcely visible (from dys-, difficult, bad; phanos, light); referring to the very small flowers. *D. myriocephala* is Pigweed.

***Ecballium.** Gk ekballein, to cast out (ballo, I throw); referring to the violent ejection of the seeds in a squirt of fluid when mature. **E. elaterium* is Squirting Cucumber, the specific name being Lat for 'shooting with elastic filament' (when spreading seeds).

***Echinochloa.** Gk echinos, hedgehog (cf. Lat echinatus, prickly); chloe, grass; alluding to the often bristly spikelets. Both our species are introduced, **E. crus-galli*, Barnyard Grass or Cockspur Grass (the specific name being Lat crus, leg; galli, of rooster), and **E. colonum*, Awnless Barnyard Grass or Shama Millet.

Echinopogon. Gk echinos, hedgehog; pogon, beard; alluding to the bristly head. Our two species, both native, are known as Hedgehog Grass.

***Echium.** Gk name in Dioscorides of a plant used for the bite of the adder (echis). Both our species are introduced, **E. lycopsis*, Paterson's Curse or Salvation Jane, a widespread weed, and **E. vulgare*, Viper's Bugloss, found only in the P grid (bugloss means ox-

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MISCELLANEOUS

tongue, so-called from the shape of the leaves).

Eclipta. Said to be derived from a supposed resemblance of the flower-head to an eclipse of the sun. Our sole species is *E. platyglossa*, Yellow Twin-heads.

Elachanthus. Gk elachys, small; anthos, flower. Our species, *E. pusillus*, with no common name other than Elachanth, is a small annual whose minuteness is indicated also by its specific name, which means tiny or puny.

Elaeocarpus. Gk elaia, olive; karpos, fruit; from the appearance of the olive-like fruit. Our two species, *E. reticulatus* (syn. *E. cyaneus*), Blue Olive-berry, Blueberry Ash or Fringe Bells, and *E. holopetalus*, Black Oliveberry, represent a large genus of 350 species (mostly tropical) (Elaeocarpaceae).

Elatine. Gk elatine, plant-name in Dioscorides, possibly of *Kickxia spuria* (Blunt-leaved Fluellen or Hairy Toad-flax), a scrophulariaceous introduction here. The adjective elatinos means 'of the fir-tree' (elate), the modern genus being named because of the resemblance of one species to a seedling conifer. Our species, *E. gratioloides*, is known as Waterwort. The generic name was used in forming Elatinaceae, the family to which it belongs.

Eleocharis. Gk helos, heleos, a marsh; chairo, I delight in; later botanists corrected the name to *Heleocharis*, but R. Brown's spelling was restored in 1938. The Gk aspirate was shown by a diacritic mark above the initial vowel, but in transliteration into English spelling the letter h is used. Another example of this is *Homalanthus* (*Omalanthus*); also, in the Victorian flora, *Helichrysum* (*Elichrysum*). This State has 7 species of *Eleocharis*, all known as various kinds of Spike-rush.

***Eleusine.** From Eleusis, a city in Attica, Greece, where Demeter (the Roman Ceres), goddess of cereals and harvests, was worshipped. The species naturalized in Victoria is **E. tristachya,* American Crow's-foot Grass; **E. coracana,* Indian Millet or Korakan, has appeared only rarely in both Victoria and South Australia.

***Elodea.** Gk helodes, marshy, bred in marshes; another example of the omission of the aspirate. **E. densa,* Dense Waterweed, is our naturalized species, with **E. canadensis,* Canadian Ditchmoss, not fully established. The generic name should be accented on the second syllable.

***Elymus.** Gk elymos, name of a kind of grain in Hippocrates, millet; also a case for carrying arrows, a quiver. **E. arenarius,* Lyme Grass, and **E. multicaulis*, Siberian Wild Rye, are our 2 species.

Elytrophorus. Gk elytron, a sheath (cf. elytra, wing-covers of beetles); phoros, bearing; alluding to the glumes. *E. spicatus,* Spike Grass, is very rare in Victoria, with record from Wimmera only.

***Emex.** New Lat emex, an artificially coined name, from ex-, e-, out, from; *Rumex,* the genus for docks and sorrel, to which it is closely akin in family Polygonaceae (Necker, 1791). **E. australis,* Three-cornered Jack, is also known as Spiny Emex, and Double Gee.

Enchylaena. Gk enchylos, juicy; laina, cloak (from chlaine; Lat form laena, as in *Diplolaena*). *E. tomentosa* is Barrier Saltbush or Ruby Saltbush.

Enneapogon. Gk ennea, nine; pogon, beard; alluding to the 9 plumose awns of the flowering glume. *E. nigricans,* Nigger-heads or Pappus Grass, is called Purple-top in N.S.W., and *E. avenaceus* has the curious common name of Bottle-washers.

Entolasia. Gk entos, within, inside; lasios, hairy, woolly, shaggy; the ligule is a collar of short white hairs, and the fertile lemma is densely pubescent to villous. *E. marginata,* Bordered Panic, has a common name that is a literal translation of its former name, *Panicum marginatum.*

Epacris. Gk epi, upon; akris, a summit, hilltop; from the habitat of some species, including the plants studied by Cavanilles when he named the genus in 1797. Victoria's floral emblem, *E. impressa,* Common Heath, was named by Labillardière in 1805, the pink form, rather than the red or the white, being officially adopted as the State flower. We have 8 species, all known as different kinds of heath. The genus gives its name to family Epacridaceae.

Epaltes. Gk epalthes, healing; the root of an Indian species, *E. divaricata,* being used as a tonic, according to Black (although it is not included in J. F. Dastur's 'Medicinal Plants of India and Pakistan', which deals with 235 species). Victoria has 3 species, all known as Nut-heads and confined to the north-west; 2 of the species have orbicular involucres and achene clusters, doubtless prompting the common name of these small composites.

Epilobium. Gk epi, upon; lobos, pod; the flower rests on the narrow pod-like capsule. Victoria has 9 species, all native except the North American **E. adenocaulon,* and all known as different kinds of Willow-herb.

Eragrostis. *Gk eros, love*; agrostis, grass. The common name is Love Grass, but the reason for the name is obscure. Two introduced species are Mexican Love Grass and Stink Grass (or Black Grass), and Victoria has 9 native species as well.

Erechtites. Gk erechthites, the name of the groundsel (from erechtho, to rend). 8 of Victoria's 27 species of *Senecio* were formerly placed in this genus, all of them known as Groundsel, a word that was groundswell in Holland's translation of Pilny, but was really from an Anglo-Saxon word meaning 'swallower of pus' (gundswelge), from its supposed healing qualities.

Eremophila. Gk eremophiles, desert-loving (from eremos, solitary, cf. the English words eremite and hermit; philos, loving). Victoria has 11 species, all known as different kinds of Emu Bush, and growing in the arid N.W. and north of the State. They belong to family Myoporaceae.

***Erica.** Gk ereike, Lat erice, classical name of heath. **E. baccans,* Berry-flower Heath, and **E. lusitanica,* Spanish Heath, are our representatives. The adjective lusitanica means from Portugal (old name, Lusitania). The family Ericaceae is represented among our native flora only by *Gaultheria,* being replaced in the Australian region by Epacridaceae, with *Wittsteinia* a kind of bridge between the two families.

Erigeron. Gk erigeron, the name in Theophrastus of a plant, probably *Senecio vulgaris,* from eri, early geron, old man; alluding either to the early appearance of the white pappus, or to the bald receptacles after seeding. We have a native species, *E. pappocroma,* Violet Fleabane, and an introduced species, **E. mucronatus,* Bony-tip Fleabane. The name fleabane was given because the plants gave off an odour said to have the power of driving away fleas.

To be Continued.

Vegetation in the S.E. Suburbs of Melbourne, Australia

by

P. Bridgewater

1. Clayton South

Although much of the original vegetation of the south and east suburbs has been cleared, or allowed to degenerate, small 'islands' remain. These 'islands' form the basis of a network of propagule reservoirs (for plants) and habitats (for animals). This paper is the first of a series of occasional articles intended to document the vegetation of some of these sites, particularly those threatened by development.

Clayton lies in the belt of land associated with the tertiary (Sandringham) sand deposits around Port Phillip Bay. Much of the area was covered by heathland vegetation, as noted by Sutton (1911, 1912) and described by Patton (1933) as the Cheltenham Flora. Much of the original Heathland has disappeared due to urbanisation, sand mining and market gardening. A small area still exists however, west of the spring valley golf course, bounded by Westhall Road and Osborne Avenue.

Part of this area has previously been used as a market garden, and the whole area is popular with trail bikes. These two circumstances combine to aid the distribution and establishment of introduced species. Despite this, much of the original vegetation variation is still clear.

There are three main vegetation zones from a physiognomic viewpoint:

1. an area of dry heathland, with an overstorey of *Eucalyptus viminalis* var. *racemosa* (Coastal Manna Gum).

2. a crescent shaped area of wet heathland about 33 feet wide and 660 feet long, with a tall shrub layer (to 17 ft) of *Melaleuca squarrosa* (Scented Paper-Bark) and *Leptospermum juniperinum*, (Prickly Tea-Tree) and an overstorey of *E. ovata* (Swamp Gum) and *E. cephalocarpa* (Mealy Stringybark), and,

3. an area with a dense growth of *Melaleuca ericifolia* (Swamp Paper-Bark) (to 17 ft) and an absence of *Eucalyptus* spp.

Table 1 shows the results of 11 vegetation samples taken in the least disturbed sites of the dry heathland. Each sample was taken in an area approximately 270 sq ft. Values in the table are those for cover-abundance quoted in Bridgewater (1971).

The table shows two distinct plant communities:

a) recognised by the dominance of *Leptospermum myrsinoides* (Silky Tea-Tree) and

b) recognised by the dominance of *L. laevigatum* (Coast Tea-Tree).

Besides these two dominant species, each of these communities has a number of additional species which help to characterise them. These species are enclosed in the 'boxes' of the table. Both communities are linked by three species—*E. viminalis, Lepidosperma concavum* and *Pteridium esculentum.*

The *L. myrsinoides* plant community shows two clear sub-divisions—one defined by the presence of *Acacia oxycedrus, Correa reflexa* and *Lophocolea semiteres* (a ground dwelling leafy liverwort), and the second defined by the presence of *Casuarina paludosa* and *Platysace heterophylla*. There are indications of a third sub-community, defined by the presence of *Leptospermum glabrescens* (sample 6).

TABLE 1

Sample Number	7	1	8	9	2	5	3	10	11	4	6
Acacia oxycedrus					+	+			+		
Correa reflexa					2	2					
Lophocolea semiteres					2	2					
Casuarina paludosa								+	2	2	
Platysace heterophylla								+	+	1	
Hovea heterophylla									+	+	
Hypolaena fastigiata									2	1	
Leptospermum glabrescens									+		2
Banksia marginata					1	+	3		1	2	
Rubus fruiticosus agg.					+	+	+		1		2
Amperea xiphoclada					1		1	+	2	2	
Riccinocarpos pinifolius			2		2	2	1	2	2	2	2
Bossiaea cinerea					2	1		2		+	2
Billardiera scandens						+	+	+	+	+	
Leptospermum myrsinoides				2	3	3	3	3	3	3	3
L. juniperinum			+	+							
*Stellaria media**		1	+	1							
*Holcus mollis**		1	+	+							
Leptospermum laevigatum	4	2	2	3	+		1				
Eucalyptus viminalis		2	2	+	+		3	+	+	+	2
Pteridium esculentum	+	+	4	1	1	1	1		+	1	1
Lepidosperma concavum	+	2	1	+	1	3	1	4	3	3	3
Pterostylis parviflora	2				2						
Gahnia radula		+								1	
Epacris impressa		+				+			+	1	
Platylobium obtusangulum		+							+		
*Pinus nigra**		+				2			+		2
Lomandra filiforme			+			1					
Thuidium furfurosum				2		2					
Poa australia					+			+			
Monotoca scoparia						+	+				
*Pittosporum undulatum**					+		+	+	+		
Hypericum graminefolium		+									
Cassinia aculeata		2									
Agrostis tenuis		3									
Themeda australis		+									
Viola hederacea		2									
Stypandra caespitosa		+									
Acacia longifolia var. sophorae		+									
Senecio sp.			+								
*Ulex europaeus**				1							
Goodia latifolia				2							
Opercularia varia						+					
Hibbertia fasiculata						+					
Olearis ramulosa						1					
*Erica lusitanica**									+		
Xanthorrhoea minor									1		
Haloragis teucroides										2	

* indicates species not native in this area.

Species not recorded in the samples but noted in the vegetation: *Campylopus introflexus, Hibbertia acicularis, Lomandra longifolia, Acacia armata, Clematis aristata.*

All the vegetation units described above are closely related, in the first instance, to the topography of the area. The area slopes from a high point in the west, to the lowest point where the *Melaleuca ericifolia* zone occurs. The *L. laevigatum* community, of the dry heathland zone, occurs at the highest points in the area, with least humic material in the soil. The *Acacia oxycedrus, Casuarina paludosa* and *Leptospermum glabrescens* variants of the *L. myrsinoides* community occur increasingly downslope of this community, until merging with the *Malaleuca ericifolia* zone.

The wet heathland is so disturbed and small in extent that no vegetation samples were taken. Where it is intact the ground vegetation is a dense mixture of *Calerophus lateriflorus, Lepidosperma longitudinale* and *Gahnia radula.* An open area exists between this vegetation and the *Melaleuca ericifola* zone. Species concentrated in this area include *Olearia ramulosa, Viminaria juncea, Hakea nodosa, Xyris gracilis, Patersonia longiscapa, Villarsia reniformis, Lepyrodia mulleri, Baumea juncea* and *Themeda australis.*

Of the three zones described, the *Melaleuca ericifolia* zone is clearly the most disturbed. There are few native species present—and abundant introduced grasses e.g. *Paspalidium dilatatum, Anthoxanthum odoratum* and *Holcus lanatus.* There is some evidence that the state of the area has resulted from clearing operations, and is not a particularly good representation of the former vegetation. Much of the dense *Melaleuca* thickets are invaded by blackberry (*Rubus fruticosus* agg.)

At the lowest point in this whole area is a small bog, with a number of introduced species, but also a few species surviving from pre-settlement swamp conditions e.g. *Eleocharis acuta, Juncus pallidus* and *Coryzandra cymbaria.*

Although the area is degenerate, with many species seeding from adjacent plantings (e.g. *Pinus nigra, Pittosporum undulatum*) the vegetation variation does fit with other heathland reserves around the bays (e.g. Cranbourne Botanic Gardens annexe) (P. Gullan, pers. comm.) and provides an interesting record for a vegetation system now much diminished. Such records may be helpful in considering conservation of areas or a replanting program that may be undertaken by local government or industrial concerns.

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ERRATA

In the issue for April 1975, two corrections should be made in the article commencing p 71.

See p 74: Plate I: Fig. 3:—for "Mandibles—lateral view" read:—"Mandibles—ventral view".

See p 78: Plate V:

No. 25 should read—*Syndesus cornutus*

No. 26 should read—*Lissotes furcicornis.*

Field Naturalists Club of Victoria

Report of Annual General Meeting, Wednesday, 12 March, 1975.

The meeting was held on the Wednesday following the Moomba week-end, and this has the effect of dampening the attendance at the meeting as many Members go away for the holiday period; perhaps the Annual Meeting would be better held in the month of May.

After the Minutes of the previous Annual Meeting were approved, Mrs. Corrick read a report from the Executive Council giving the activities of the Club for 1974, and events of interest to the Club. This was followed by the Secretary's Report.

The Annual Balance and Statement of Receipts and Expenditure, as printed in the March "Victorian Naturalist", was adopted.

The Special Motion set out in the December "Victorian Naturalist" was amended, the amendment was "That all of paragraph 2 in section B of the Resolution referring to Article 20 shall be deleted."

The amended motion was then carried.

NOMINATIONS FOR COUNCIL 1975

Nominations received did not exceed vacancies and all were declared elected.

President: Mr. P. Kelly.

Vice-President: Mrs. M. Corrick.

Council:

Dr. J. H. Willis, Dr. B. Smith, Miss M. Allender, Mr. T. Sault, Mr. R. Gibson, Mr. B. Callanan, Mr. B. Burbage, Miss W. Clarke, Mr. Riordan.

Office-bearers elected were:

Hon. Sec.: Mr. Garnet Johnson.
Hon. Asst. Sec.: Miss M. Lester.
Hon. Librarian: Mr. J. Martindale.
Hon. Asst. Librarian: Mr. B. Burbage.
Hon. Excursion Sec.: Miss M. Allender.
Hon. Editor: Mr. Fred J. C. Rogers.
Hon. Programme Sec.: Mr. R. Kent.
Treasurer and Subscription Secretary: D. E. McInnes.
Hon. Asst. Treasurer: Mr. H. Bishop.

The President thanked retiring Councillors and Office-bearers for their services during the year.

The Presidential Address, "Colour in Insects", was given by Mr. Kelly, and was illustrated with many beautiful and very striking colour slides.

Mr. Kelly gave a report on the Annual Meeting of The Victorian Field Naturalists' Club's Association held on 8 March.

Mr. J. Baines reported on the Excursion to the Ocean Grove Nature Reserve by the V.F.N.C.A. on Sunday, 9 March.

Mrs. Corrick suggested that an effort should be made to keep written reports of monthly general excursions for future reference.

General Meeting

14 April

Speaker for the evening was Dr. J. V. Sanders of C.S.I.R.O. His subject, "The Occurrence and Structure of Precious Opals", was illustrated by colour slides. At the close of the talk the meeting was open to questions, after which the Speaker was thanked by the President.

New Secretary: The President introduced the new Secretary, Mr. Garnet Johnson.

Correspondence: The Secretary spoke of the letter sent in support of Mr. Jack Wheeler's nomination for the Natural History Medallion.

Exhibits and *Nature Notes*: Buried limpets and red-flowered eucalypt (*E. leucoxylon?*) by Mrs. Bishop: book on history of cement works behind Fossil Beach, Mornington, was displayed and spoken about by Mr. McInnes; Mr. Johnson spoke of a platypus rescued from a narrow water-filled hole; Mr. Sault reported that the Eastern and Crimson Rosellas are now protected; Mr. Ros Garnet spoke of the tongue orchid (*Cryptostylis* sp.) in his glasshouse and said that as soon as the orchid came into flower the pollinating wasps arrived, and have continued to arrive over the past four months whenever flowers appeared.

Honorary Life Member: In appreciaation of his ten-year service as Editor of "The Victorian Naturalist", it was moved by Mr. J. Baines, seconded by Mr. Ian Morrison, and carried, that Mr. Grif Ward should be given honorary life membership. Mr. Ward is retiring from the office of Editor in a few months time.

Next Meeting: Mr. Mitchell, or other person, from the Soil Conservation Authority, will speak on "Catchments and Catchment Management".

ANNUAL REPORT OF COUNCIL—1974.

Although the Club has again offered a full programme of activities during 1974, the year has been an exceptionally difficult one for Council, largely, but not wholly due to financial problems caused by the high inflation rate. This aspect is discussed in the Treasurer's report.

Actual membership numbers remain about the same as in 1973, although about forty resignations were received in December. These have been offset by a pleasing number of new membership applications. Various reasons were given for the resignations; and rising subscription rates was not the only cause — whatever the reason, loss of members is to be regretted, as a steadily rising membership would greatly assist our finances, and it is perhaps surprising that the increasing community interest in natural history is not reflected in Club membership numbers.

Reports from Group representatives indicate that, with one exception, the year has been a successful and active one. It appears that the Group programmes offer the best opportunities for the Club to foster an interest in the serious study of natural history. The Field Survey and Mammal Survey Groups are very popular with younger members — they offer plenty of outdoor activity and both are doing very worthwhile field work. Stimulating but less strenuous programmes are offered by Botany Group, Microscopical Group, Marine Biology and Entomology Group and Geology Group. We now have four affiliated suburban junior groups and Council is particularly grateful to the leaders of Junior Groups for their dedicated work.

The Conservation Group, officially launched in April 1974, has not lived up to expectations and has now been disbanded due to lack of interest. Although the majority of members would profess to be "Conservationists", it appears that, apart from one or two dedicated workers, there was no-one willing and able to put the necessary time into the preparation of reports and submissions. However, the Club is well represented on the Conservation Council of Victoria, and as this body was formed specifically to speak with a united and authoritative voice on behalf of its many member groups, it seems more realistic for our Club to rely on the C.C.V. to handle conservation matters on our behalf.

Further areas of concern to Council are the declining attendances at General Meetings and the reluctance of members to share in the work of running the Club. Too often an enthusiastic officer-bearer is left to carry an excessive work load which eventually forces him to retire completely. A more sympathetic response by general members to appeals for help could well lengthen the period of service which some of our staunchest councillors are willing to give. A regular turnover of Council membership is essential to a Club's vitality, but at the same time we must guard against losing the benefits of the experience and wisdom of the older or longer-serving members. One member has already offered to take on the duties of Minute Secretary and until the appointment of a new General Secretary, we are urgently in need of volunteers to assist in handling correspondence.

Work on the installation of library space at the rear of the Herbarium Hall is expected to commence at the end of March. Our thanks go to Dr. Churchill for enabling us to continue to operate from the Herbarium when his staff are themselves so short of space. We hope to get our books properly shelved and the library functioning smoothly as soon as construction work is completed. The moving and sorting of the book stock will be another occasion calling for help from members.

The 1974 Natural History Medallion was awarded to Mr. Vincent Serventy. Twenty-seven nominations were received, the highest number since the inception of the award. The medallion was presented in early December in Perth at the fiftieth anniversary of Meeting of the Naturalists' Club of Western Australia.

General Club excursions during the year continued to be popular and well-attended. A report of the Kangaroo Island trip has been published and a report of the Christmas trip to Fall's Creek has been received. However it appears that reports of the monthly trips are no longer made and it seems that these must now be regarded as purely social occasions.

Problems associated with rising costs of publication and distribution of *The Victorian Naturalist* continue to cause concern, and are referred to in more detail in the Treasurer's Report. We were able to put out the full number of issues in 1974 and are grateful to our retiring Editor for the way he coped with the various economy measures we were forced to adopt.

At the October Meeting Honorary Membership was conferred on Miss Ivy Dixon in recognition of forty years' continuous financial membership. Miss Dixon was present and spoke briefly at the meeting and it was with regret that we heard of her death less than two months later. Two other deaths which occurred during the year were those of Mr. Vic. Miller, oldest surviving member and a past-president, and Miss Kathleen Hall. Shortly before the onset of her last illness, Miss Hall had finished the mammoth task of indexing the complete *Victorian Naturalist.* Typing of the card index is now proceeding steadily and Council intends eventually to publish it.

During the year the Club publication, "Ferns of Victoria and Tasmania", by N. A. Wakefield, was revised and nomenclature brought up to date by Dr. J. H. Willis. It is hoped to republish this but Council has been deterred by the rising costs of printing and binding, and unwilling to invest a large sum in what may be a slow-selling item, although requests for copies of the book are still quite frequently received. Efforts to find an organization willing to share in the publication have so far been fruitless and it appears that the book must for the present remain out of print.

Over the years the Club has received many legacies. In 1974 we gratefully acknowledge the receipt of $200 from the Estate of Mr. Vic. Miller, $200 from the Estate of Miss Ivy Dixon and also $200 and a ten-acre block of land at Kinglake from the Estate of Mr. K. Frahm. Also we have great pleasure in acknowledging a donation of $100 from Mr. H. B. Wilson towards the cost of publishing *The Victorian Naturalist.*

Several additions to the Club archives have also been made during the year, and we are grateful to those members who have donated material.

In spite of the difficulties of the past year, we look forward with optimism to the future of the Club as a forum catering for a wide spectrum of natural history activities.

M. Corrick.

28th February, 1975.

Geology Group

Annual Report 1974-75

Chairman — Mr. Graeme Love.

Acting Secretary — T. Sault.

The average attendance at the eleven meetings held was 14 members with visitors.

The speakers who contributed all came from within the Group, with two exceptions. These were Mr. Merv. Lia from the Preston Historical Society, who spoke on the Aboriginal Ceremonial Ground at Bundoora, and Mr. John Dawes who spoke on the Life and Times of Renowned Geologist, E. J. Dunn. Other speakers and their subjects were: Messrs. Dodds, Myers and Sault (Australia's Oldest Rocks); G. Love and T. Sault (History and Discovery of Gold in Victoria); D. McInnes (Basaltic Rocks); Mrs. Costermans, R. Dodds and T. Sault (Geological Features Along the Great Dividing Range); R. Dodds (Geological Pioneers of England and Scotland); G. Love (Asbestos); D. McInnes (Phosphate); N. Wigmore (Lava Caves and Blisters).

Several new features were introduced during the latter part of 1974, and they have proved to be successful.

The first was a monthly newsletter compiled by the Chairman, Mr. Graeme Love. This gives members the opportunity to put on paper any new discoveries, theories, happenings, or queries in relation to geology. Other features (Mineral of the Month), and (Geological Feature of the Month), began successfully and it is proposed that these will

Apart from publishing *The Victorian Naturalist*, it has played no significant part in the important events of the past decade.

Although in the recent survey of members it became clear that the majority would prefer to severely downgrade *The Victorian Naturalist* rather than pay for it at its present cost, Council decided, despite the disastrous failure of the switch to offset in an attempt to reduce costs, to continue monthly publication in the hope of finding additional sources of financial support.

F.N.C.V. Excursion to Alexandra

A group of 36 members, which included four members from the Bendigo Club, spent a week in residence at Spargo's Ski Lodge and Motel, Falls Creek, and the final night in a motel at Alexandra.

On the outward journey, the lunch stop was spent at Nillahcootie Reservoir north of Mansfield — the route being via Yarra Glen, Yea, Benalla, Myrtleford, Bright, Tawonga Gap and Mt. Beauty. Day and half-day trips in the coach, with some walking included:—

1. The Falls Creek area.
2. The "Castle" of basalt columns.

3. Mt. McKay, 6,045 feet above sea level.
4. Pretty Valley.
5. The Quarries of basalt formation.
6. Mt. Nelse, and the area on the track to this peak of 6,181 feet.
7. Howman's Gap area.
8. Strawberry Saddle and Buckety Plain on the Omeo Road.
9. Fainter River and Falls, and Bogong Village.
10. McKay Creek Power Station.
11. Bundarrah River, for a dig in the banks where there is a brown coal deposit. Specimens of lignite, petrified wood, and fern leaves were found.

Thus altitudes from 2,250 feet to approximately 6,181 feet were traversed. Using various references including the S.E.C. Upper Kiewa Water Supply Catchment Plant List (Oct. '67), approximately 150 flowering plants were identified.

Plants of special habitats could be mentioned:—

At Pretty Valley — *Boronia algida* (Alpine Boronia).

At Fainter River — *Pterostylis obtusa*, which is unusual in this area of Victoria, and *Eriostemon myoporoides* (Long-leaf Waxflower) above Fainter Falls.

At Strawberry Saddle—Two specimens of the Gasteromycete, *Aseroe rubra* (Red Starfish Fungus). The fetid smell from the fruiting body attracts flies, and both fungus and flies were most photogenic.

Differences between *Asterolasia trymalioides* (Downy Star Bush) and *Phebalium phyllicifolium* (Mountain Phebalium) were mastered. We enjoyed the sweet perfume of *Grevillea alpina, Caladenia lyallii, Stackhousia pulvinaris* flowers, and the aromatic leaves of *Prostanthera cuneata* (Alpina Mint Bush) on which few flowers had opened. There were hundreds of leaves of a *Prasophyllum* species, probably *P. alpinum* (Bogong Leek Orchid) but no plants with flowers were found. *Bossiaea foliosa* (Leafy Bossiaea) was common at the Falls Creek level, and its profusion of yellow honey-scented flowers filled the air with perfume. Of unique interest were the unisexual flowers of *Drimys xerophila* (Alpine pepper), *Astelia alpina* (Alpine Astelia), *Aciphylla glacialis* (Snow Aciphyll) and *Coprosma hirtella* (Rough Coprosma).

Owing to the late season, cattle had only reached the valleys, so we were fortunate to see, in some places, acres of native plants in flower, undisturbed by the cattle, over the Bogong High Plains. Because of the late season, there was more *Hovea longifolia* var. *montata* (Alpina Hovea) in flower, from the 4,500 foot level and above, and in places large iced snow drifts enhanced the alpine scene. *Podocarpus alpina* (Mountain Plume Pine) showed immature green seeds.

A number of swift-flying Macleay's Swallow Tail Butterflies were admired over the Bogong High Plains vegetation.

Twenty-eight different species of birds were identified in the Falls Creek and Bogong High Plains area. *Eucalyptus pauciflora* (Snow Gum) bear heavy blossoms, and these, together with the flowers of *Grevillea victoriae* (Royal Grevillea) attracted nectar-feeding birds.

We were grateful to Mr. Ian Morrison who gave three showings of his excellent Kodachromes of Alpina Flora to the F.N.C. party, and to guests and staff at Spargo's Lodge.

In a week of fine weather, we were most fortunate to be able to spend every day observing plant and animal life; and to use cameras under favourable conditions.

Compiled by Miss Mary Doery,
11th February, 1975.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1975-1976.

President:

Mr. P. KELLY, 260 The Boulevard, East Ivanhoe, 3079.

Hon. Secretary: Mr. GARNET JOHNSON, 20 Sydare Ave., Chadstone, 3148. 56 3227.

Treasurer — Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145.

Acting Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3151. (52 2749.)

Magazine Sales Officer: Mr. D. E. McINNES.

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

Botany: Miss E. JONES, 6 West Crt., Glen Waverley, 3150. (560 2280.)

Day Group: Mrs. J. STRONG, 1160 Dandenong Rd., Murrumbeena. (56 2271.)

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena, 3163. (56 2271.)

Field Survey: R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126.

Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$0.75

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 June — At National Herbarium, The Domain, South Yarra, commencing 8 p.m.

Presentation of Honorary Membership Certificate to Mr. Grif Ward for his contribution to the Club as Honorary Editor of "The Victorian Naturalist".

Speaker — Dr. G. Ettershanck.

Subject — "Ants and Plants in the Chihuahuan Desert."

New Members —

Ordinary:

Miss Barbara M. Reeckman, 191 Amess Street, North Carlton, 3054. *Mammals.*
Mrs. Linde Brush, 60 Milton Street, Elwood, 3184. *General.*

Monday, 14 July — Speaker — Mr. Howard Jarman.

Subject — "Victorian Parrots."

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 18 June — Microscopical Group Meeting.

Thursday, 19 June — Day Group Meeting.

Thursday, 26 June — Field Survey Group Meeting in Conference Room, National Museum, at 8 p.m.

Thursday, 3 July — Mammal Survey Group Meeting at Arthur Rylah Institute, 123 Brown Street, Heidelberg, at 8 p.m.

Monday, 7 July — Marine Biology and Entomological Group Meeting in Conference Room, National Museum, at 8 p.m.

Wednesday, 9 July — Geology Group Meeting.

Thursday, 10 July — Botany Group Meeting. Subject — "Ferns": Madge Lester.

EXCURSIONS

Sunday, 15 June — The You Yangs. Coach leaves Batman Avenue — 9.30 a.m. Fare: $3.00 — bring one meal.

Friday, 17-24 October — Grampians and Nhill. Departure time 9.00 a.m. Friday, Saturday, Sunday nights: Hall's Gap. Proceeding to Nhill for Monday, Tuesday, Wednesday and Thursday nights. Return Friday. Further details next issue.

CAMPS

12, 13 July — F.S.G. Single-Site Survey Camp in the Daylesford area.

14, 15, 16 June (Queen's Birthday Long Week-end) — Field Survey Group Single-Site Survey at Mount Arapiles. Details are available from Robin Sandell (tel. 83 8009).

the victorian naturalist

Vol. 92, No. 6 — 4 June, 1975

Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

Contents

Roadsides have long been recognised as valuable places for many aspects of nature study. Late last year a forum held on "Roadsides and Conservation" showed that bodies responsible for looking after and planning our roads are becoming increasingly aware of the importance, and need to consider the roadside environment. Growing official recognition is being given to the value of the aesthetic qualities of our roadsides. On a more limited scale their importance as corridors for wildlife, and survival sites of many once widespread plant communities is beginning to be understood beyond the ranks of naturalists.

Unfortunately many people, services, and interests compete to use our roadsides, and in the face of numerous conflicting pressures speedy adoption of positive measures to protect them cannot be expected. More is needed to achieve this than pious expressions of concern at occasional meetings between various authorities and conservation interests. Nor will provision of budgets for landscaping and tree planting overcome the problems of roadside conservation.

It is therefore pleasing that at the conclusion of the forum a working committee was established to pursue ideas presented at it, and seek ways to have them adopted and implemented. This committee has met, and is getting down to the job. It is possible implementation of roadside conservation practices will prove to be the hardest part of the task. The pressure for immediate economy in carrying out work programmes, regardless of long term consequences, will always be strong. Even when official regard has been given to long term consequences there remains to be overcome the natural inclination of many working on these jobs to do them the easiest, and least troublesome way. There is further the problem of training site supervisors and other field staff of the various authorities to understand the natural environment, and the effect on it of their actions. Probably acts of stupid official vandalism along our roads will never completely cease, but the increased willingness of authorities to consider conservation issues gives hope of improvement. All naturalists should wish this working committee success.

The Distribution of Anuran Amphibians in Victoria

BY A. J. BROOK*

INTRODUCTION

Until 1960, the distribution of the Anura within Victoria was little known (Moore 1961). Since then a considerable amount of data have been accumulated by M. J. Littlejohn, A. A. Martin and G. F. Watson at the University of Melbourne. They have published articles containing distributional data in the form of species location lists or small maps of unspecified precision. (Littlejohn 1961, 1965, 1966, 1969; Littlejohn, Loftus-Hills, Martin and Watson 1972; Littlejohn and Martin 1964, 1967; Littlejohn, Martin and Rawlinson 1963; Littlejohn, Watson and Loftus-Hills 1970; Martin 1972; Martin and Littlejohn 1966; Watson, Loftus-Hills and Littlejohn 1971.) However, many of the details of distribution remained unpublished. The author has processed all these data collected by the Melbourne University team, and surveyed areas lacking data. The analysed data are presented in the form of grid maps, which combine a specified degree of precision with economy of space. The main area under study is south-eastern Australia south of 32° south latitude. At present only the distributions within Victoria are relatively complete, and these are presented as preliminary results.

METHODS AND MATERIALS

Species Identification and Nomenclature

Species identification and nomenclature is based on Parker 1940; Copland 1957; Main 1957; Moore 1961; Littlejohn 1958, 1963, 1965; Martin and Littlejohn 1966; Littlejohn and Martin 1964, 1967; Tyler 1971; Watson, Loftus-Hills and Littlejohn 1971; Littlejohn, Loftus-Hills, Martin and Watson 1972; Martin 1972; and Blake 1973.

The check list for Victorian amphibia (see Table 1) is based on Littlejohn (1971), and the taxonomic revisions by Tyler (1971); Watson, Loftus-Hills and Littlejohn (1971); Martin (1972); and Blake (1973).

Data Collection and Processing

Data were collected from the field notes of Dr. M. J. Littlejohn, Dr. A. A. Martin, G. F. Watson and A. J. Brook. These were supplemented from the preserved collection catalogues of the Department of Zoology at the University of Melbourne (now in the National Museum of Victoria). Literature references were used if these extended the distributions.

A negative plotting technique was used for the common chorus-calling species and involved road transects during optimum breeding conditions, with sampling at least every 1.6 km. A plotting transect proceeded during the same night from active choruses of a particular species, into an area in which no calls of that species were heard, and then back again into active choruses.

When there was uncertainty regarding into which grid a record should be placed (e.g. on a grid line), the information was assigned to that grid closest to the known distribution, so that the plotted distribution was conservatively biased.

* Department of Zoology, University of Melbourne, Parkville, Victoria 3052.

TABLE 1

Check list of Victorian amphibia and index to the species distribution maps.

Map grid and Presentation

The grid system is the same as used by Smith and Plant (1973) for non-marine molluscs. The basic units of the system are 1° x 1° 30′ major grids subdivided into 10′ x 10′ minor grids. For convenience, the author uses a third unit, a 30′ x 30′ grid or nanogrid (contains nine minor grids). In the maps, thick lines enclose each major grid, which is in turn subdivided by thin lines which enclose nanogrids. Symbols present data for each minor grid.

Several forms of data are plotted on the maps. Positive plots represent specimen records and/or voice records if the voice is species-specific. Although not species-specific, voice records have been plotted for the *Pseudophryne* complex, and a boundary indicated only by voice records needs verification by collection of specimens. A probable plot indicates that the species has a high probability of occurring in the grid, based on the known distribution and the apparent suitability of the habitat. Literature records are indicated when these are extensions of distributions obtained by the Melbourne University workers. Negative plots indicate a high probability of absence, based on the technique previously described. A question mark indicates a lack of evidence and a need for further work in the area.

Reference Maps

The basic reference maps were the 1 : 250,000 topographic series (old edition), produced by the Division of National Mapping, Department of Minerals and Energy. Each map was used as a major grid, and hand-ruled into minor grids. The world aeronautical charts (ICAO 1; 1,000,000, obtainable from the Department of Civil Aviation) were used as accurate low resolution reference maps. Broadbent's road map of Victoria and Southern New South Wales (No. 400) may be used to interpret the distribution maps as the locality reference code is based on the same nanogrids (see Figure 1).

Species Density Analysis

The species density is defined as the number of species which occur within the grid. The sextagrid (formed from six minor grids) was chosen for the species-density analysis, because this grid size offered the highest resolution for which gaps in sampling seemed unlikely to prove significant. The species density analysis is shown in

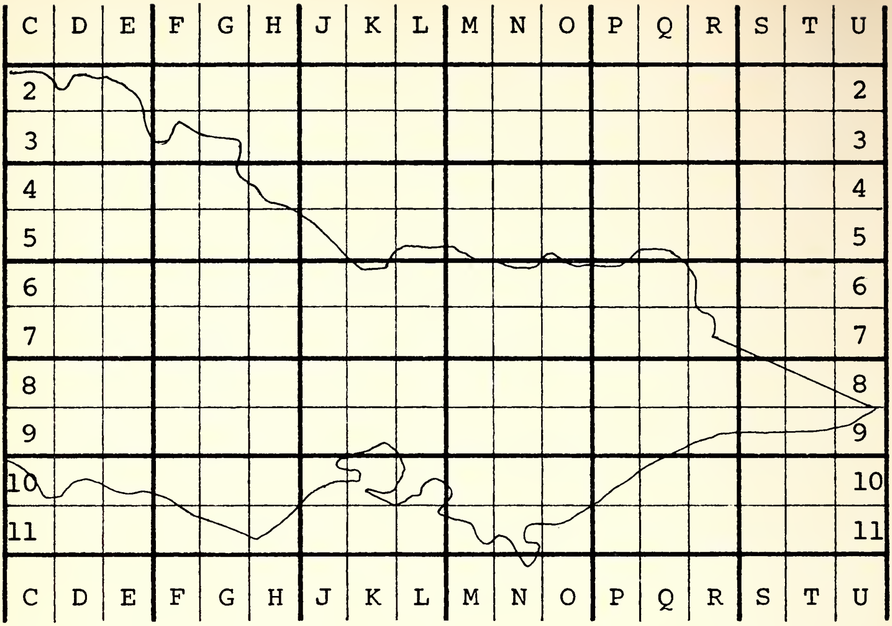


Figure 1. Nanogrid indexing system based on Broadbent's road map of Victoria and southern New South Wales (No. 400).

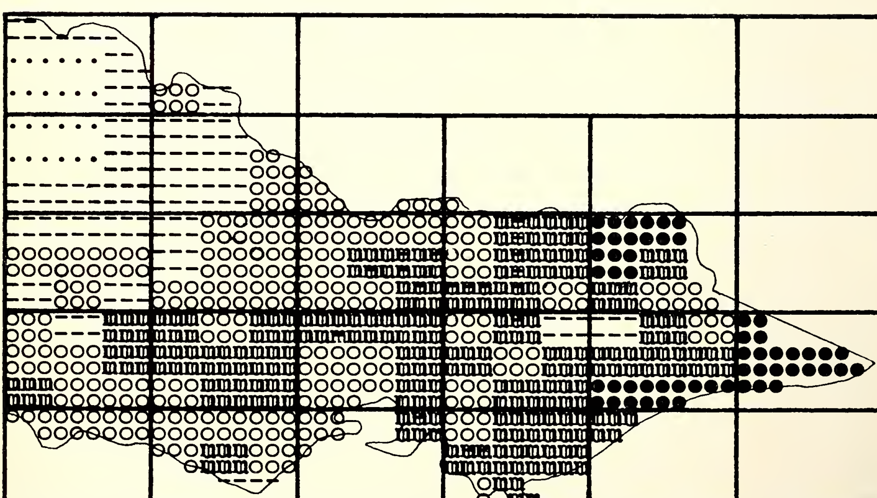


Figure 2. Sextagrid species-density analysis.

Key to species density

... 1-3 --- 4-6 ooo 7-9 mmm 10-12 ●●● 13-15.

Discussion

Littlejohn (1967) has discussed the zoogeography of the Anura of south-eastern Australia, particularly with respect to the patterns and origins of species distributions. Further discussion of this type must wait extension and completion of the grid maps for south-eastern Australia.

The species-density analysis (Figure 2) reflects the probable interaction between rainfall, temperature and topography in influencing anuran species density.

Rainfall and temperature directly influence the availability of water, which is critical for anuran reproduction and survival. If the orographic effect of the Great Dividing Range is ignored, then the pattern of rainfall can be described by the interaction of two gradients. Firstly, there is an average annual rainfall gradient, with a low rainfall in the north and an increase toward the south (Bureau of Meteorology, 1969). Secondly, there is a change in the seasonal distribution of the rainfall (Bureau of Meteorology, 1972). In the west, approximately 60% of precipitation occurs during the period from May to October, and this proportion decreases toward the east until in Gippsland the distribution is almost uniform (Land Conservation Council of Victoria, 1972, 1974). The temperature pattern can be reduced to a summer gradient with high temperatures in the north and cooler temperatures in the south; there is little temperature difference across the state in winter (Bureau of Meteorology, 1972).

We may now consider the effect that these rainfall and temperature gradients might have on anuran distributions. Few frog species are adapted to the arid conditions produced by low rainfall and high temperatures, while more species can survive in moist temperate conditions (Darlington, 1957). Consequently a species density gradient from low in the north to high in the south would be expected, and is observed. Only one species, *Neobatrachus centralis,* is found in the arid Sunset Country, although several species penetrate into this area along the moist corridor provided by the Murray River (Littlejohn, 1967). The seasonal change from a pronounced winter maximum rainfall in the west to near uniform rainfall in the east, results in an increase in a potential breeding season from predominantly between May and October in the west, to the entire year in the east. Consequently an increasing species density gradient from west to east would be expected, and is observed. Apparently only those species which can breed under cool conditions can survive in the west, while in the east both cool-breeding and warm-breeding species can survive (Brook, unpublished data).

The mountains of the Great Dividing Range impose a significant effect on the basic north-south, east-west species density gradients. Not only do they alter climatic patterns, but their dissected slopes provide a great diversity of habitats, which in a relatively small area may range from cleared-valley floors to alpine plateaus. With an increase in habitat diversity within a grid, greater species density would be expected, and is observed in the South Gippsland Highlands, the northern edge of the Otway Ranges and the Great Dividing Range. However with increasing altitude the temperatures become lower, and a decrease in species number would be expected (Darlington, 1957). In particular, an extensive alpine plateau carries a relatively uniform habitat with a limited growth period and breeding season to which few frog species are apparently adapted (Littlejohn, 1961 and 1967). Along the centre of the eastern half of the Great Dividing Range, some grids contain only alpine plateaus dissected by relatively cold high altitude valleys, and the species density is low.

Acknowledgements

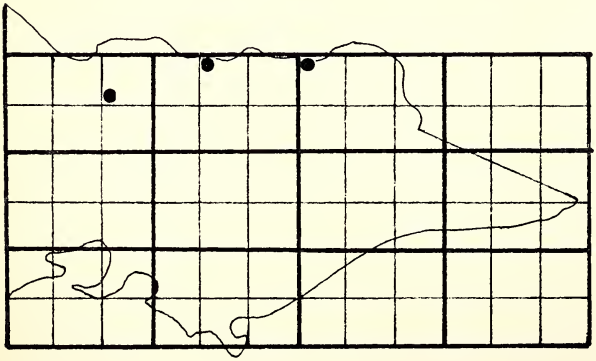
The author wishes to thank the members of the Field Survey Group of the F.N.C.V. for assistance during field work. Most of the distributional data were obtained as a consequence of research projects supported by the Nuffield Foundation, the Australian Research Grants Committee (grant No. 66116172) and the Australian Biological Resources Study Interim Council. The author is indebted to Dr. M. J. Littlejohn, Dr. A. A. Martin and G. F. Watson for permitting access to their field notes and for valuable assistance. Dr. Littlejohn read and criticized the manuscript.

RESULTS

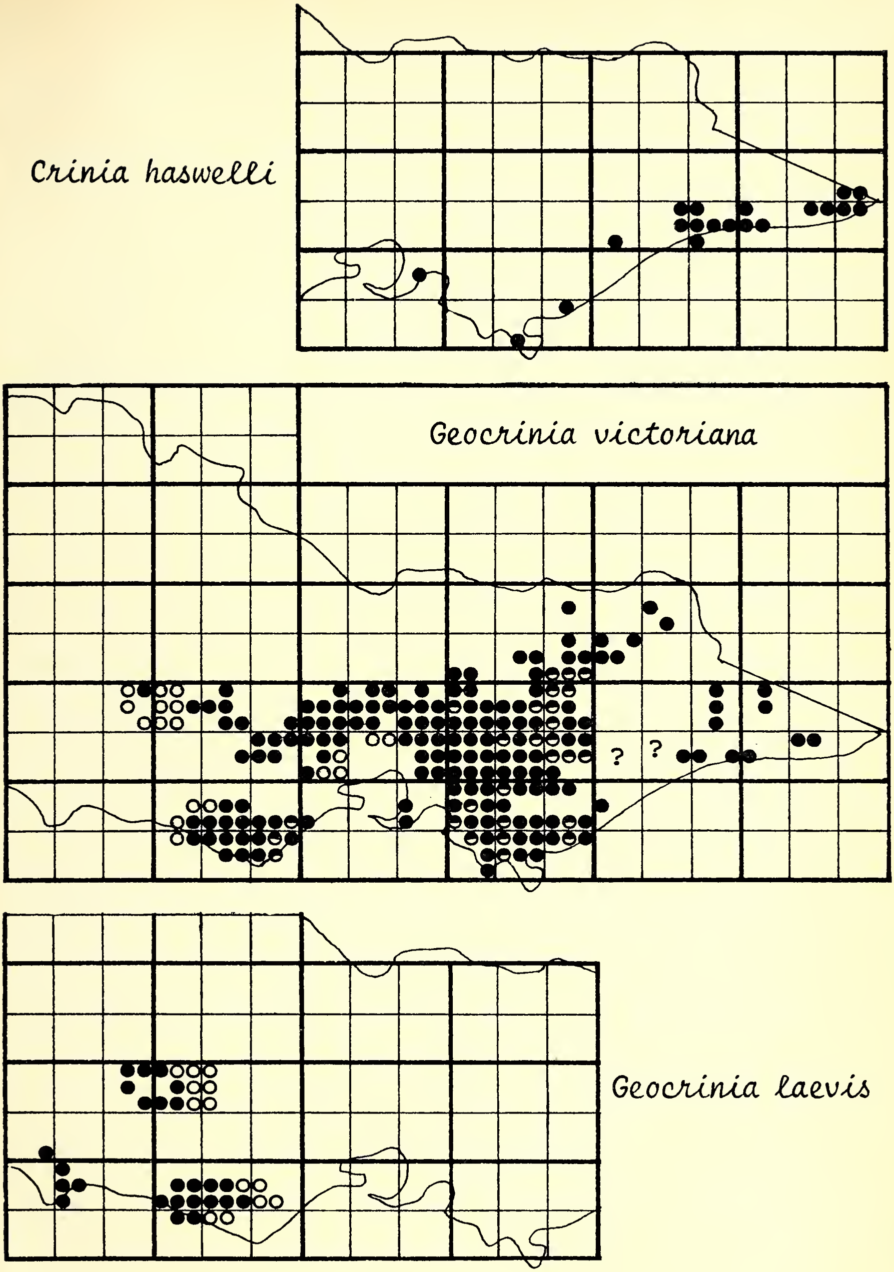
Distribution Maps

Distribution maps for 31 species and four subspecies of anuran amphibians known to occur in Victoria follow.

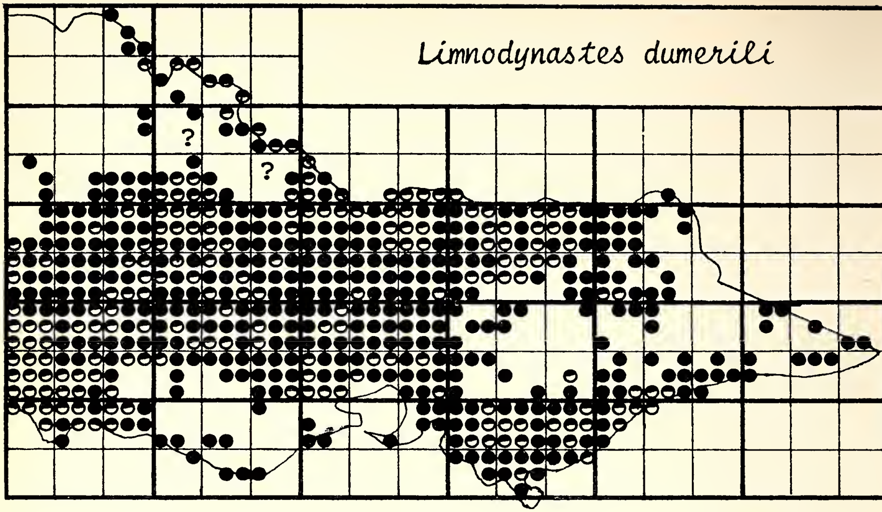
Limnodynastes interioris

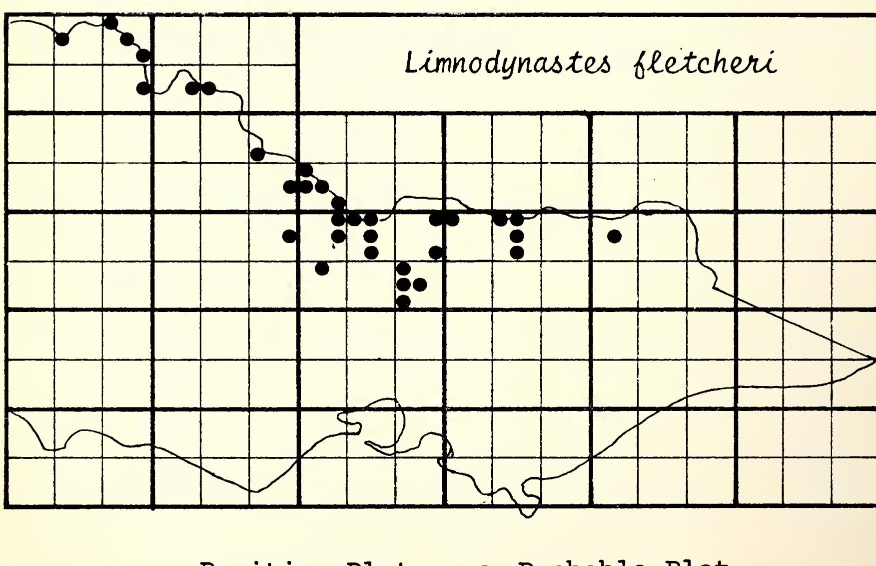


• Positive Plot

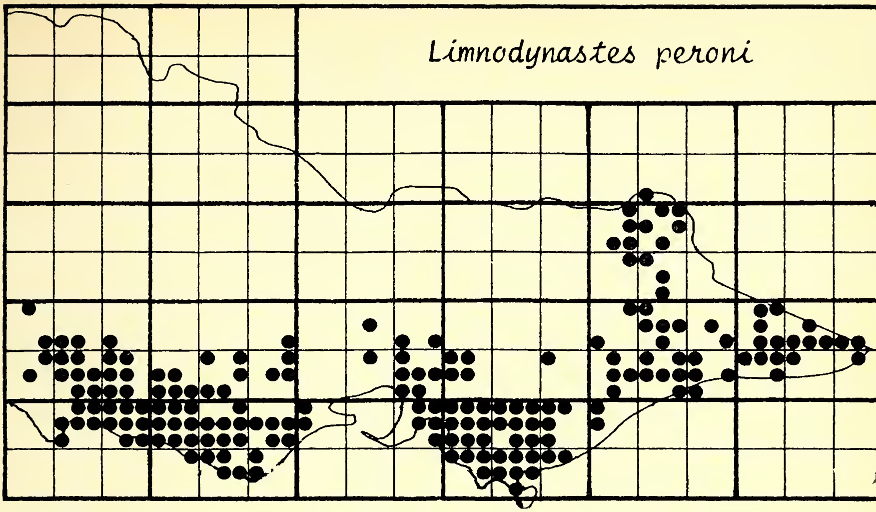


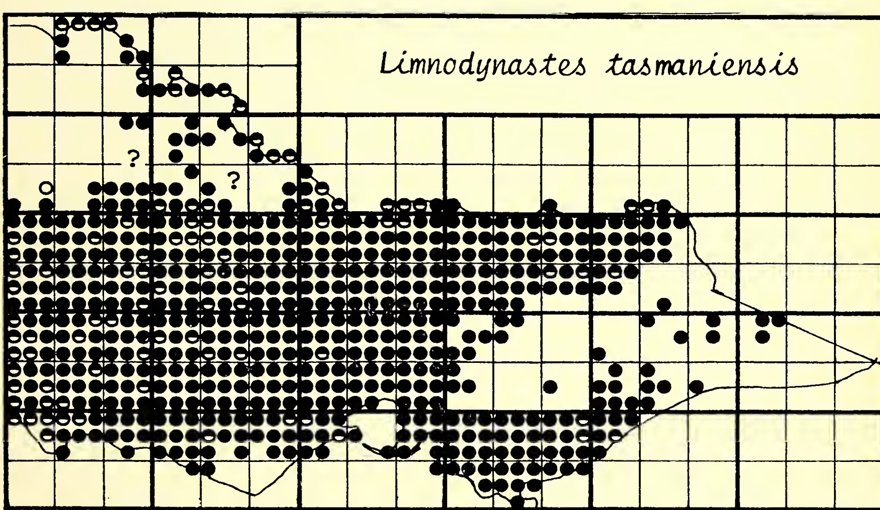
● Positive Plot   ○ Negative Plot   ◒ Probable Plot



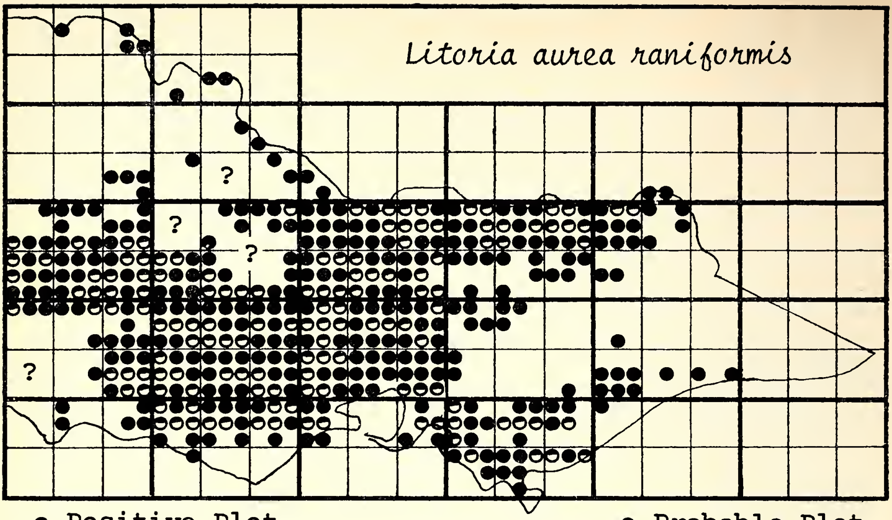


● Positive Plot ◒ Probable Plot



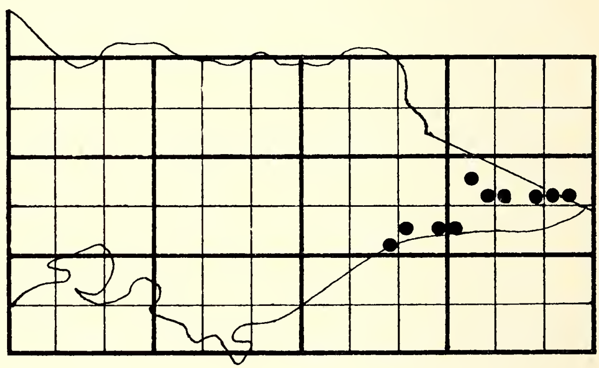


● Positive plot   o Negative plot   ⊖ Probable plot



● Positive Plot ⊖ Probable Plot

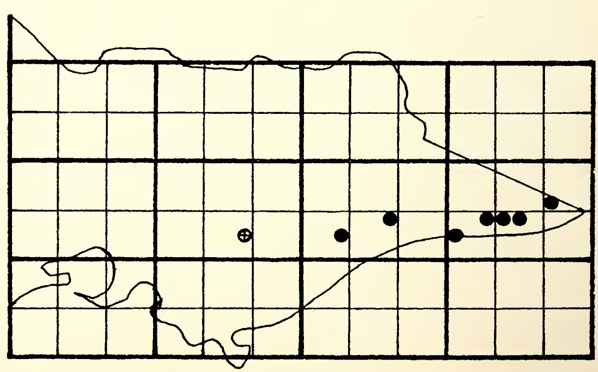
Litoria aurea aurea

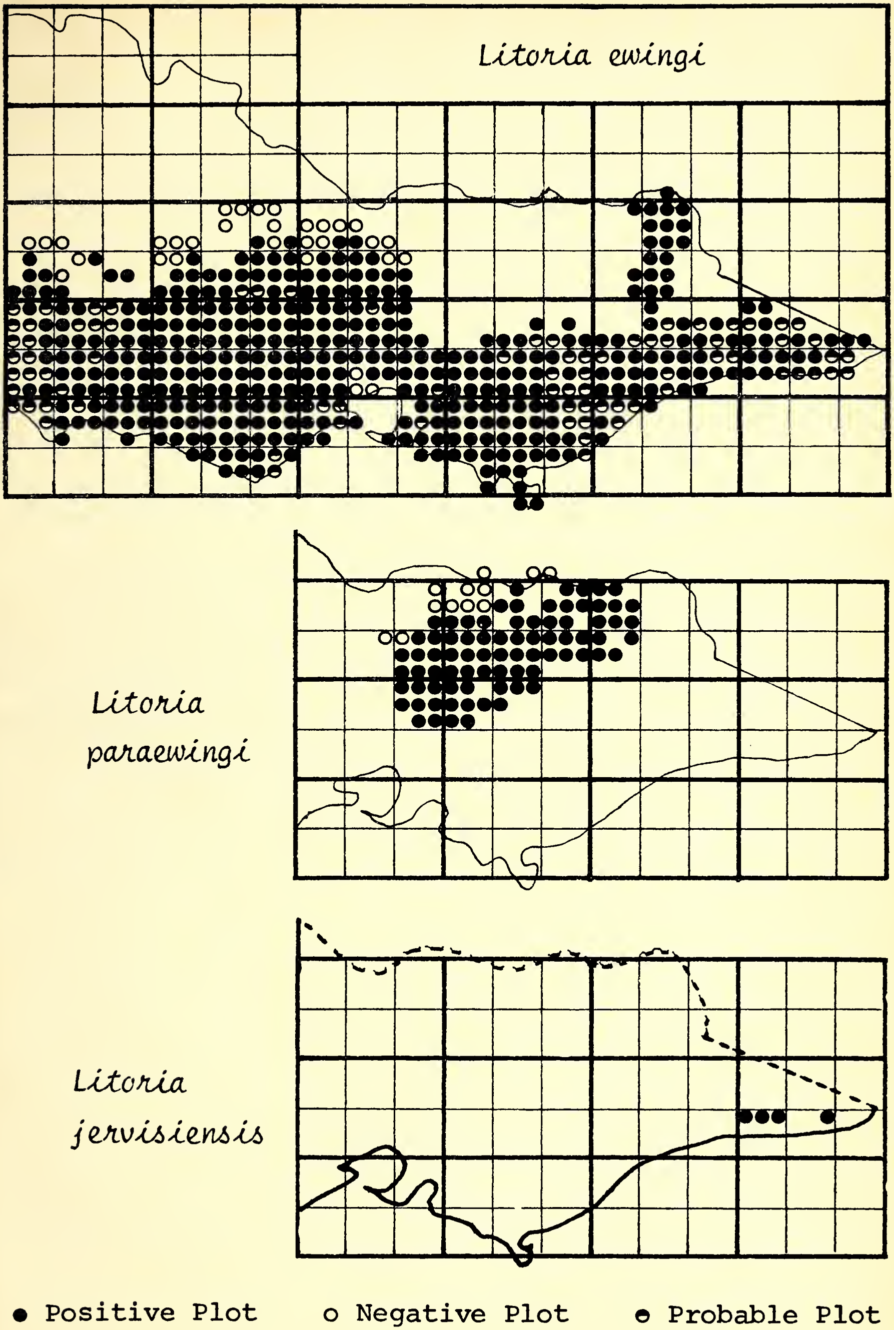


Litoria citropa

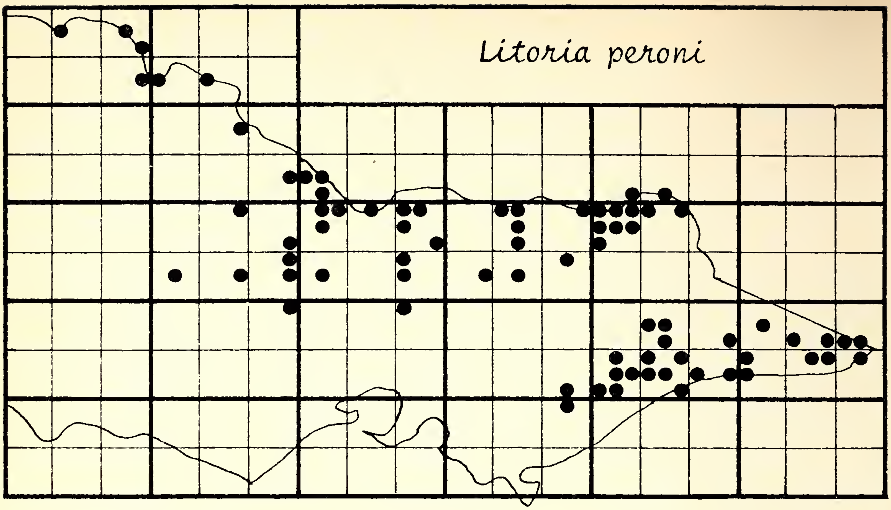
● Positive Plot

⊕ Literature

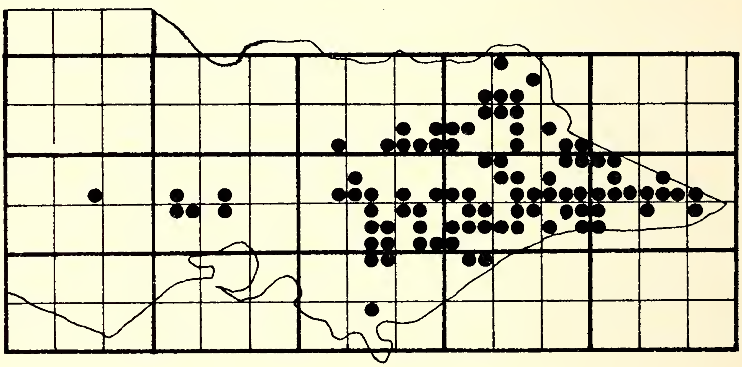




Litoria ewingi
Litoria paraewingi
Litoria jervisiensis
● Positive Plot
o Negative Plot
● Probable Plot



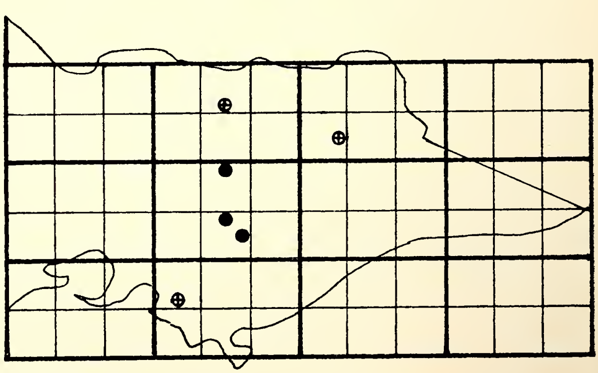
Litoria lesueuri



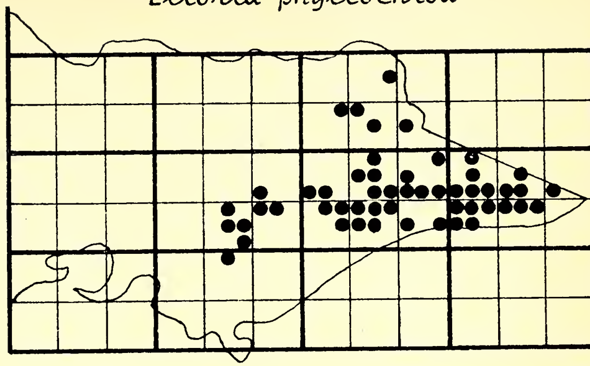
Litoria maculata

● Positive Plot

⊕ Literature



Litoria phyllochroa

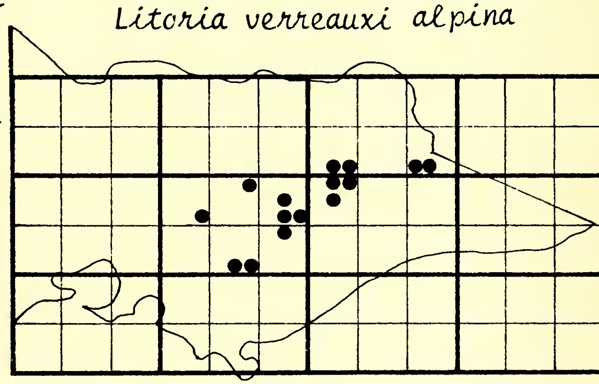


● Positive Plot

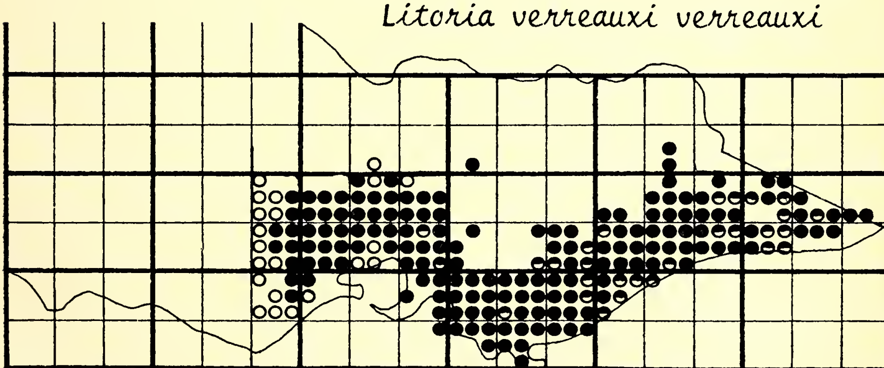
◓ Probable Plot

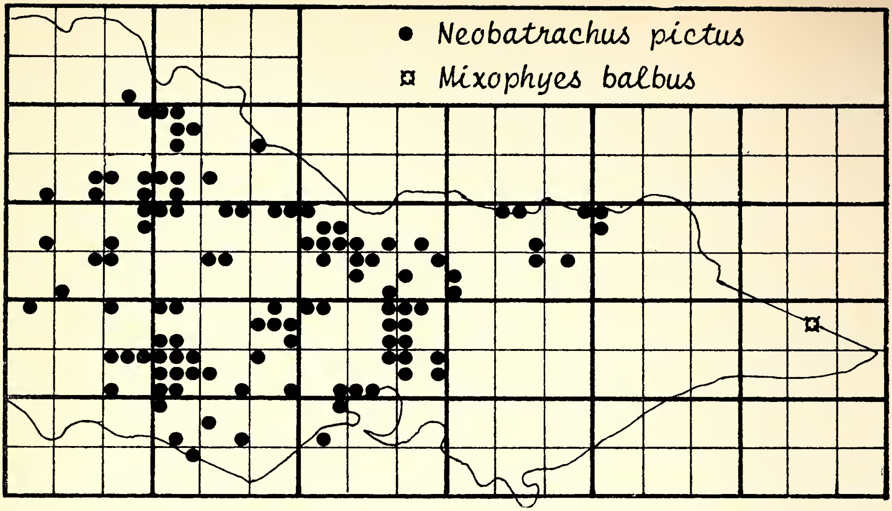
○ Negative Plot

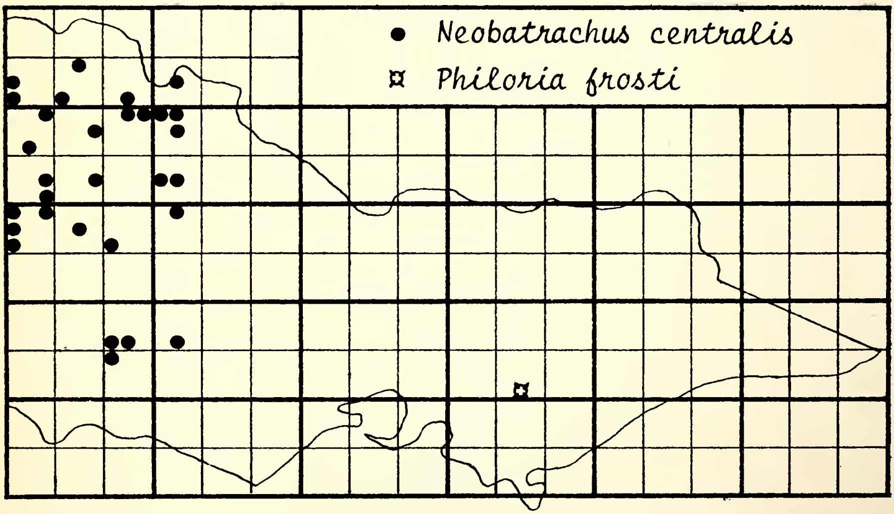
Litoria verreauxi alpina



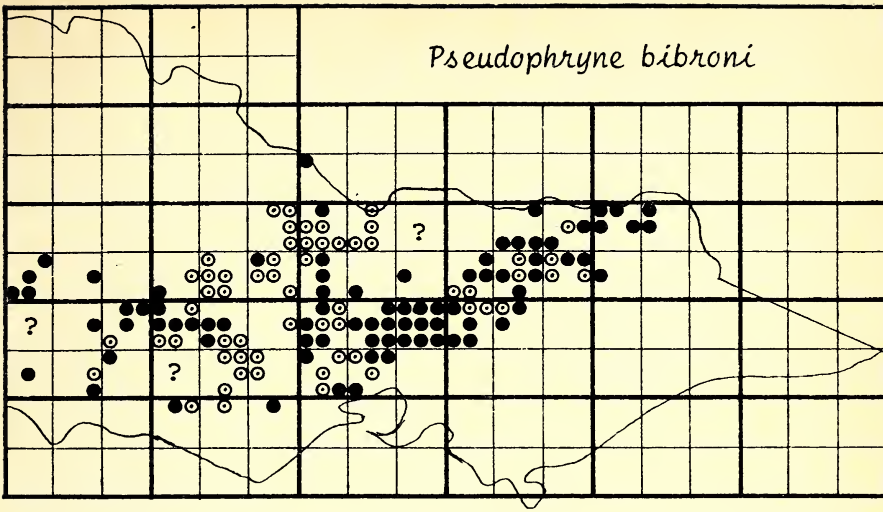
Litoria verreauxi verreauxi

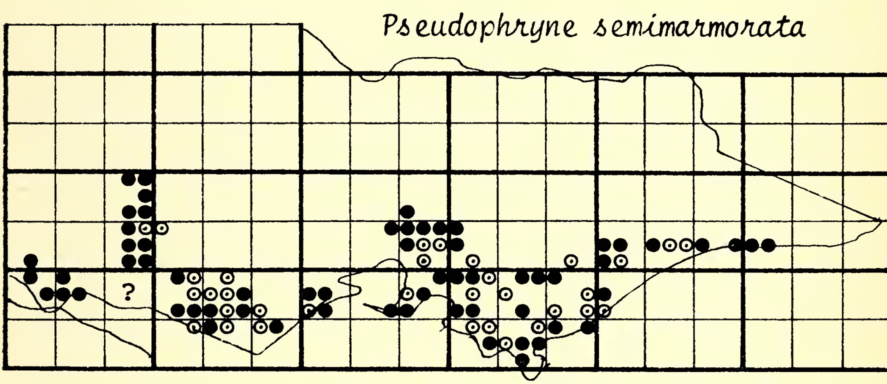


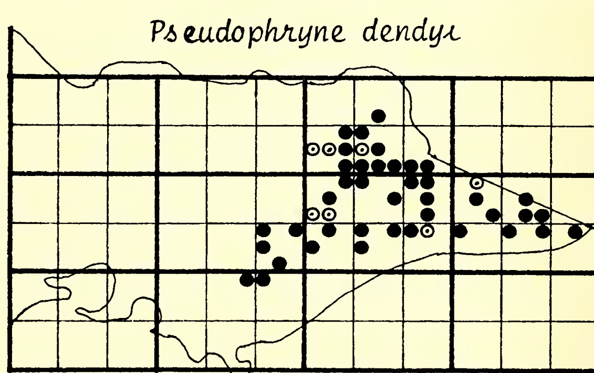




All symbols represent positive plots

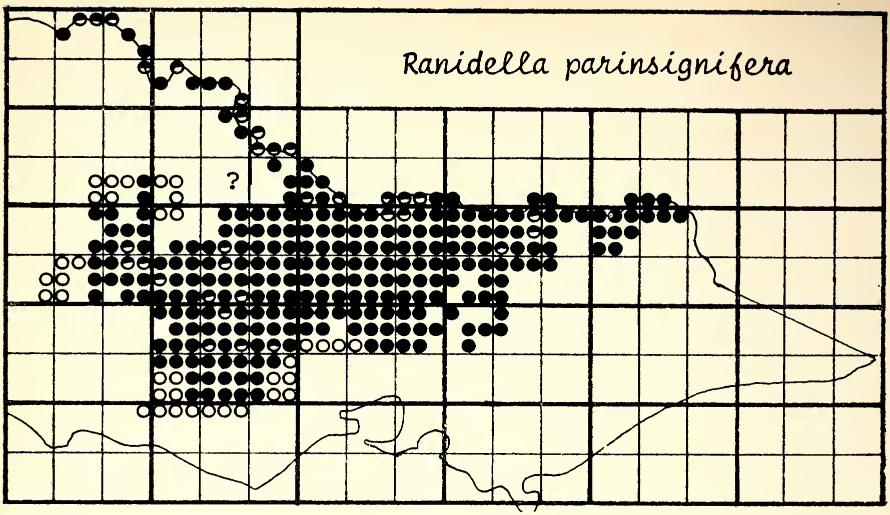


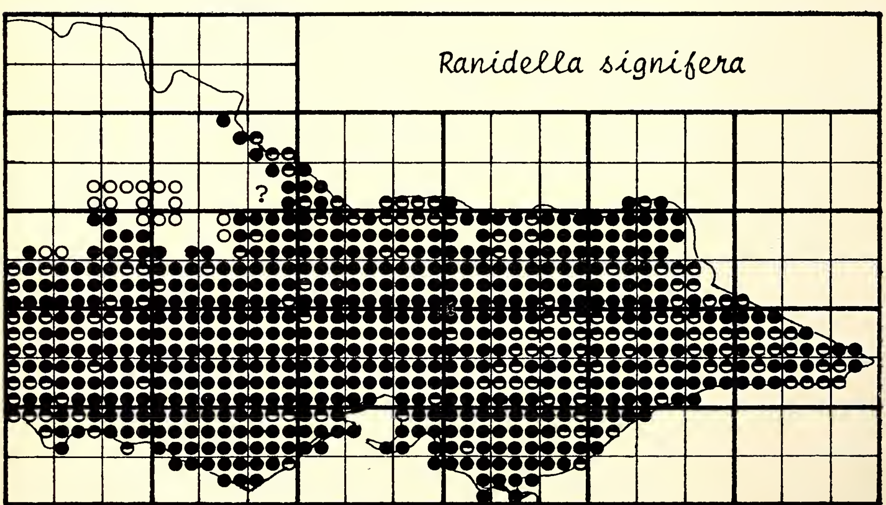




● Specimen Record

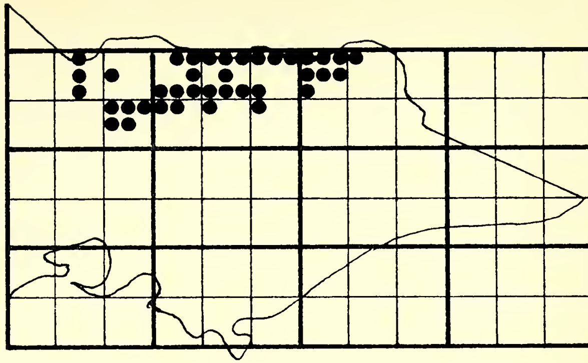
⊙ Voice Record



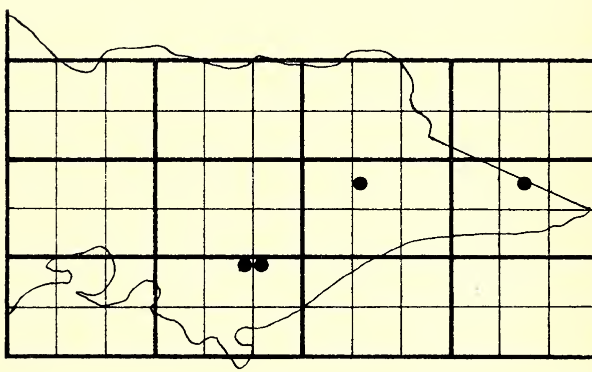


● Positive Plot   o Negative Plot   ⊖ Probable Plot

Ranidella sloanei

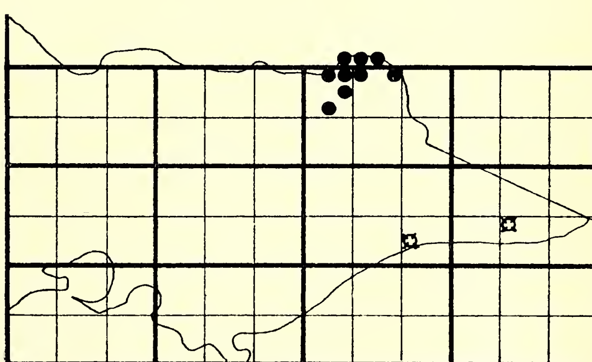


Heleioporus australiacus



● *Uperoleia rugosa*

Uperoleia marmorata



All symbols represent positive plots.

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Victorian Ornithological Research Group
Westernport Report No. 1
Part 4

The Birds of the Somers, Sandy Point, Hastings Districts, Westernport Bay, Victoria, Australia.

by William A. Davis and Alan J. Reid

Continued from Vol. 92, p. 70.

106. *Phaps chalcoptera,* Common Bronzewing.
Common resident noted most bushland areas and roadside fringes, H.3, 4, 7.

107. *Phaps elegans,* Brush Bronzewing.
Restricted to Sandy Point bushland. Noted all survey trips 4-12 birds. Excellent views obtained while driving slowly down Sandy Point track. On 4 November 1963 partial mating display observed. Hen bird appeared on track closely followed by cock with head held low to the ground, feathers fluffed. He followed her approximately 1 ft. behind gently cooing for several minutes. Both birds then disappeared into bush.

108. *Columbia livia,* Rock Dove.
The introduced common pigeon. Occasionally noted in flocks. H.6.

109. *Streptopelia chinensis,* Spotted Turtle Dove.
Introduced. Common resident most areas. H3, 4, 5, 6, 7.

110. *Calyptorhynchus funereus,* Yellow-tailed Black Cockatoo.
Very rare. 20 February 1966 a small flock observed along Coolart Drive. H.5.

111. *Callocephalon fimbriatum,* Gang-Gang Cockatoo.
Mr. Luxton remembered approximately 80 along Coolart Drive after disastrous 1939 bushfires. During December 1966 — 3 birds seen at Coolart. H.5.

112. *Cacatua galerita,* White Cockatoo.
June 1962, small flock noted twice in Coolart paddocks. 6 October 1963 single bird Coolart (possibly escapee). H.5.

113. *Cacatua roseicapilla,* Galah.
Rare visitor. November 1960 flock of 8 Somers, 6 October 1963 flock of 6 Coolart, September 1965 pair education camp bushland, 23 April 1967 flock of 5 Somers Camp, 22 May 1970 large flock Somers. H.4, 5.

114. *Trichoglossus moluccanus,* Rainbow Lorikeet.
Rare visitor. Pair Sandy Point October 1963. Pair Coolart November 1963. Small flock education camp bushland 4 November 1965. H.3, 4, 5.

115. *Glossopsitta concinna,* Musk-Lorikeet.
Strictly seasonal. Flocks, sometimes large, often seen Sandy Point bushland and Somers foreshore scrub from February to late April. Occurrence coincides with flowering Eucalypts and Banksias. H. 3, 4.

116. *Glossopsitta porphyrocephala,* Purple-crowned Lorikeet.
Very rare. Small flock Hastings 30 April 1962. H.4.

117. *Glossopsitta pusilla,* Little Lorikeet.
Irruption during February, March and April 1964 Sandy Point bushland, large flocks observed. H.3.

118. *Platycercus elegans.* Crimson Rosella.
Surprisingly rare. Single bird Sandy Point 4 November 1962. Pair open forest Naval Depot 6 October 1963. Lone bird Sandy Point bushland 12 July 1964. H.3.

119. *Platycercus eximius,* Eastern Rosella.
The common resident breeding parrot of the district. Noted every trip, from 6 to 20 seen. During Spring often observed squabbling over nest sites. 4 August 1963 — 4 seen feeding on sea rocket seeds (Cakile maritima) in sand dunes, Sandy Point. H.1, 3, 4, 5, 6, 7.

120. *Psephotus haematonotus,* Red-backed Parrot.
Very rare visitor. Six noted feeding Coolart paddocks 21 April 1963. H.5.

121. *Neophema chrysostomus,* Blue-winged Parrot.
Noted Somers camp prior to 1962. Occasional visitor to Sandy Point. Listed October and November 1963 — 2 birds. 4 — March 1964. Single bird November 1964. H.3, 4.

122. *Lathamus discolor,* Swift Parrot.
Very rare. Two flew over education camp Easter 1962. Large flock feeding in Banksias with Lorikeets 19 April 1964, Sandy Point. H.3, 4.

123. *Melopsittacus undulatus,* Budgerigar.
Single birds occasionally seen probably aviary escapees.

124. *Cuculus pallidus,* Pallid Cuckoo.
Very common prior to 1961. Phillip Brooke (B.O.C.) noted the species as common arriving Spring, Hanns Inlet 1949 to 1952. During the systematic survey a positive decline recorded, see table 1. Species now classed as very rare at Somers. Decline could possibly be due to pesticides. H.3, 4.

125. *Cacomantis pyrrhophanus,* Fan-tailed Cuckoo.
The common cuckoo of the survey. Absent March to June each year. July to February 4 to 20 consistently noted Sandy Point bushland. Occasionally visits Coolart and education camp. Late Spring each year many immature birds seen. Young birds have variety of loud calls not usually used by adults. H.3, 4, 5.

126. *Chrysococcyx osculans,* Black-eared Cuckoo.
Very rare vagrant. October 1961 lone bird seen several times at Hastings and again at Naval Depot golf course October 1966. H.4.

127. *Chrysococcyx basalis,* Horsefield Bronze-Cuckoo.
Regular migrant arriving September each year departing January. Two to 4 seen and heard most trips during those months — Sandy Point bushland and Somers foreshore scrub. H.3, 4.

128. *Chrysococcyx lucidus,* Golden Bronze-Cuckoo.
Common regular migrant arriving September, lingering longer than preceding species to early April. Four to 8 seen each trip. Recorded breeding 3 occasions, Sandy Point bushland. Flying young were observed being fed by foster parents which included Blue Wrens, White-browed Scrub-Wrens and Brown Thornbills. H.3, 4, 5.

129. *Tyto alba,* Barn Owl.

Seven sightings during survey. First recorded Somers Camp 7 November 1962. Dead birds found 3 occasions on roads. Appears resident as records cover all seasons. H.4, 7.

130. *Ninox novaeseelandiae,* Boobook Owl.

The common resident owl of the district. Often heard and seen at night. Occasionally flushed during day Somers and Sandy Point. One found dead Coolart Lagoon path, 6 December 1967. H.3, 4, 5.

131. *Ninox connivens,* Barking Owl.

Very rare vagrant. Recorded on night of 25 September 1965 at Somers camp. H.4.

132. *Podargus strigoides,* Tawny Frogmouth.

December 1961, 6 perched together Sandy Point track. Seven other sightings either single birds or pairs (5 Somers, 2 Sandy Point bushland). H.3, 4.

133. *Hirundapus caudacutus,* Spine-tailed Swift.

Listed each year during February and March. Average flock 100 birds. Largest 400 on 21 February 1965 over Somers on a hot, thundery day. Flocks recorded Sandy Point, Coolart, Somers. On some occasions sweeping very low over tidal flats. H1, 2, 3, 4, 5, 6.

134. *Apus pacificus,* Fork-tailed Swift.

Extremely rare. Identified once only with large flock of spine-tails over Somers 21 February 1965. A single bird seen by several observers. H.6.

135. *Ceyx azurea,* Azure Kingfisher.

Rare visitor to Tulum Creek. First listed September 1959. Occasionally seen 1970 to 1973 by education camp personnel. H.4.

136. *Dacelo novaeguinae,* Laughing Kookaburra.

Recorded every trip from Sandy Point bushland, Coolart and education camp, 1-4 birds. Nested regularly Somers camp, adopted nesting boxes. H.3, 4, 5, 7.

137. *Halcyon sanctus,* Sacred Kingfisher.

Recorded Tulum Creek and Coolart prior to 1961. Nest found Sandy Point 2 December 1962. Pair Somers May 1963. Single bird Sandy Point November 1964, pair open forest Naval Depot February 1965. H.3, 4, 5.

138. *Merops ornatus,* Australian Bee-Eater (Rainbow Bird).

Very rare vagrant. Residents at Somers reported a pair during 1965. H.4.

139. *Mirafra javanica,* Horsefield Bushlark.

Rare vagrant. Four listed October 1964 Sandy Point. Six Coolart April 1966. H.3, 5.

140. *Alauda arvensis,* Skylark.

Introduced. Breeding resident. Noted all trips. Large population open forest Naval Base. At times over 100 present. H.3, 4, 5, 6, 7.

141. *Hirundo tahitica,* Pacific (Welcome) Swallow.

Very common breeding species. From 20 to 200 each trip. Breeds August to February education camp. H1, 2, 3, 4, 5, 6, 7, 8.

(To be continued)

The Origin of Generic Names of the Victorian Flora
Part 2 – Latin, Greek and Miscellaneous

[continued from 92 (5)]

by James A. Baines

Eriochilus. Gk erion, wool; cheilos, lip; from the glandular-villous labellum. *E. cucullatus,* Parson's Bands, is our sole species, the specific name meaning hooded, and the common name due to the resemblance of the two long white lateral sepals to the pendent strips of neckband formerly worn by non-conformist clergymen.

Eriochlamys. Gk erion, wool; chlamys, cloak; because nearly all parts of the flower are woolly-tomentose. The genus has only 2 species, of which Victoria has one, *E. behrii,* Woolly Mantle, the specific name of which honours Hermann Behr, who in the very early years of South Australian settlement lived for a time in the Barossa Valley, and collected insects and plant specimens. He later lived in California, wrote on American West Coast plants, and even wrote some exotic fiction. His works are mostly in German.

Eriochloa. Gk erion, wool; chloe, grass; the spikelets being appressedly silky-hairy. Our species, *E. pseudo-acrotricha,* Early Spring Grass, is also known as Plain Grass.

Eriostemon. Gk erion, wool; stemon, a stamen; from the woolliness of the stamens. Victoria has 6 species, all known as different kinds of Waxflower. Overseas sources recommend that *Eriostemon* and *Callistemon* be pronounced with the accent on the penultimate syllable (as in steam), but in Victoria the accent is almost invariably placed on the preceding vowel.

Erodium. Gk erodios, heron; because the carpels resemble the head and beak of a heron. Victoria has 6 species, of which only one, *E. crinitum,* Blue Heron's-bill, is native. All are known as different kinds of heron's-bill.

*__Erophila.__ Gk er, spring (the season); philos, loving. **E. verna,* Whitlow Grass, has a generic name meaning spring-lover, a specific name meaning flowering in spring, and a common name doubly misleading, as is does *not* cure the finger swellings called whitlows (as formerly believed), and it is not a grass, being in family Cruciferae, not Gramineae. It was previously in the genus *Draba.*

*__Eruca.__ Lat name for *E. sativa,* Rocket Salad. Our species, from Europe, is **E. vesicaria,* Bladder Eruca, which, according to O. Polunin, in "Flowers of Europe", is cultivated as a salad plant and vegetable, and for the medicinal oil obtained from its seeds.

Eryngium. Gk name (eryggion) for *E. campestre,* Field Eryngo, —gg— in Gk being pronounced like —ng— in English, hence the spelling. Our 3 species all native, are *E. vesiculosum,* Prickfoot, *E. rostratum,* Blue Devil, and *E. plantagineum.* Plantain Eryngo or Long Eryngium. Eryngo was an aphrodisiac formerly obtained from the root of Sea Holly, *E. maritimum.*

*__Erysimum.__ Gk erysimon, the name for Hedge Mustard or Blister-cress, the latter name given because some species are said to produce blisters. Our sole species is **E. repandum,* Treacle Mustard.

***Erythraea.** Gk erythros, red. Superseded name for species of *Centaurium*. Like *Erythrina*, Coral Tree, the name was given for the flower colour.

Eucalyptus. Gk eu, well; kalyptos, covered; alluding to the cap or lid (operculum) that covers the stamens in the bud. This appropriate name was given by a French botanist, Charles Louis L'Héritier de Brutelle, born in Paris, 1746. He was in England, 1786-7, studying the botanical collections at Kew, and in 1788 (significant date for Australia) he published in Paris an illustrated folio entitled "Sertum Anglicum" ("An English Garland"), in which *Eucalyptus obliqua* (to be known popularly later as Messmate Stringy-bark) was described. He was at one time a councillor of the Taxation Court, later a judge in the Civil Tribunal of the Seine, and also a member of the Academy of Sciences. His first position was Master of Waters and Forests (which gave him his taste for botany) and his last was Commandant of the National Guard of Paris. He was assassinated at his front door, for reasons that have never been cleared up, in 1800. His visit to London, at Buffon's request, was to seek Sir Joseph Banks's help in preventing Dombey's collections from falling into the hands of Spain as a result of the intrigues of the ambassador of that country. He wrote many other botanical works. Victoria has 78 species of eucalypts, known as different kinds of gums, boxes, stringybarks, peppermints, ironbarks and mallees, and one bloodwood, *E. gummifera*, Red Bloodwood, which is confined to far East Gippsland. The total number of species for Australia (plus New Guinea and Mindanao) is about 600, according to Nancy Burbridge's "Dictionary of Australian Plant Genera". Pryor and Johnson proposed (1971) 7 sub-genera for *Eucalyptus*.

Eucarya. Gk eu, well; karyon, nut; alluding to the comparatively large stone or endocarp. The name, given by Major (later Sir) Thomas Mitchell, was replaced when its species, like those of R. Brown's *Fusanus*, were included in *Santalum*, L. They are known as Quandongs and Sandalwoods.

Eucryphia. Gk eu, well; kryphios, covered or hidden; the sepals, cohering at the tips, form a cap. Our species, *E. moorei*, Eastern Leatherwood, is found in Victoria only in the Howe Range.

To be Continued.

Field Naturalists Club of Victoria

General Meeting

Monday, May 12

Speaker for the evening was Mr. D. McKinnon from the Soil Conservation Authority. He spoke on "Catchments and Catchment Management" and showed slides of the varying catchment situations in Victoria. Mr. McKinnon opened our eyes to some of the complexities and problems of the job, and answered many questions.

Correspondence. The Secretary announced that 46 communications had been received during the month that were important to the Club; they were displayed at the back of the hall. And he drew our attention to the Club's recommendations to the L.C.C. Melbourne Area Report also displayed on that table.

Nature Exhibits. New publications, "The Little Desert" and "Field Guide to Banksias", were spoken about by Mr. McInnes. Mr. Johnson exhibited some photos of rock carvings under water at Lake Wartook and asked if they were Aboriginal work. Mr. Sault exhibited a specimen of Twiggy Daisy Bush (*Olearia ramulosa*) from Crib Point which bears blue flowers as well as normal white flowers, and asked if that is unusual. Two microscope exhibits showed the saw of a Sawfly and some Aphids feeding; the latter exhibit also revealed a tiny fungus(?) with a slender white stalk bearing a scarlet ball at the top.

Club Publications. "Ferns of Victoria and Tasmania" has been brought up-to-date by Dr. Willis and is being reprinted. Members were asked if anyone could supply photos to replace the two missing blocks of Brittle Bladder Fern and Black-stem Maidenhair. "Victorian Toadstools and Mushrooms" is fast running out but will not be reprinted.

Library. The Club Library is now situated behind a lockable section at the back of the main hall. The President thanked the Herbarium for erecting the partition and thanked Herbarium staff for putting up the shelves and putting in the books. A letter has been sent to the Herbarium expressing our appreciation. The library is available for use.

Boneseed Eradication Excursion to Yarra Bend National Park and Studley Park 18 May, 1975

We fortunately had a fine and mostly sunny day for this exercise, attended by 23 members.

Tom Sault estimated that 50,000 to 60,000 plants were pulled by this group, comprising all stages from seedlings two inches high to bushes six feet high. The organisers, Marie Allender and Ian Cameron from Botany Group, were well satisfied with the day's work, and wish to express thanks on behalf of the Club to those who took part in the group effort. It has been suggested that the Club revisit the areas cleared this year at a future date to check on the effectiveness of the method adopted. It would appear that complete clearance of boneseed from within the Park is a distinct possibility.

IAN CAMERON.

Treasurer's Report for 1974

In presenting this report, the Council wishes to draw members' attention to the increase in costs of running the Club, producing the *Naturalist*, and to the financial loss we would have incurred if we had not received grants from the Ingram Trust, and the Treasury.

In 1973 the Club finished the year with a deficit of $4. In 1974, the deficit was $826. This deficit, although considerable, would have been $4,321 if we had not received the grants mentioned.

Our receipts for the year (which are mainly from subscriptions) amounted to $7,426, and our total expenses were $11,747, a deficit of $4,321. With the receipt of the grants, the deficit was reduced to $826.

The main increase in costs can be attributed to the following:—

Printing and despatching the *Naturalist*	up $1,971
Typing and Clerical Assistance	up $514
Printing (General) and Stationery	up $122

Full details are listed in the Statement of Receipts and Expenditure.

The Club is in a sound financial position, with assets of $32,323, and with liabilities of $24,476, the surplus of assets over liabilities amounts to $7,847.

At this point it is advisable that an explanation of the funds and their use (listed under Assets) be made.

1. *Current Assets* — $5,172.

This covers cash and bonds in the No. 1 General Account, and the value of books for sale. All general expenses are paid from this account.

2. *Investment of Funds* — $10,300.

The items listed in this group cover legacies from past members; Funds established in the names of members (past and present) for their work in the Club; and Bonds covering sales of the club publication, "Flowers and Plants of Victoria". These funds are not used for general expenses.

3. *Building Fund* — $3,646.

This Fund was established many years ago, with a view to obtaining our own premises.

4. *Publication Fund* — $6,996.

This Fund covers proceeds from the sale of books published by the Club. The funds are for use in reprinting Club publications, and for new publications.

During 1974 it was clear that expenses had to be reduced or income increased if the Club was to continue without incurring excessive losses.

As members' subscriptions are the Club's main source of income, Council reluctantly decided to increase subscriptions; and it is expected that the increase will offset the loss incurred in 1974.

The two main items of expenditure are printing the *Naturalist*, and typing and clerical costs incurred in secretarial work.

The first item is constantly under review by the Council for ways of reducing costs, and it is expected that typing and clerical costs will be reduced now that some members have volunteered to assist with the clerical work.

It is hoped that the Club will finish 1975 in a more favourable financial position than 1974.

H. H. BISHOP, *Treasurer.*

F.N.C.V Extraordinary Meeting

To be held at the National Herbarium, The Domain, South Yarra, on 14 July 1975 at 8 p.m.

Business:— As the wording of the Special Resolution referring to the Alteration of the Articles as notified in the December Victorian Naturalist 1974, and moved at the Annual General Meeting in March 1975, does not conform to the requirements of the Companies Office, it will be necessary to rescind that part of the Special Resolution and move a new Special Resolution in the form that was given the Minister's consent.

First Motion:— That all of Section B in the Special Resolution referring to the amendment of the Articles of Association of the Club passed at the Annual General Meeting in March 1975 shall be rescinded.

Second Motion:— Special Resolution. That the Articles of Association of the Club be amended as follows:

(i) Article 6 (c) to be amended to read: "Junior Members shall be persons under the age of eighteen years or full-time students under the age of twenty-five years at the beginning of the Club's Financial Year in respect of which their annual subscription shall from time to time become payable. They shall be entitled to the same rights and privileges as ordinary members except that they shall not be entitled to vote or to receive the Club's publications."

(ii) Article 29 — to be amended to read: "The members shall at each Annual General Meeting elect as hereinafter provided out of their own body the Members of Council. Council shall consist of the President, Vice-President, Immediate Past President (who shall hold office till the next Annual General Meeting only), and ten other Members. The Meeting shall also elect the following Office-Bearers, namely Secretary, Treasurer, Editor, Librarian, Excursion Secretary and other Office-Bearers as determined by Council. These Office-Bearers may be honorary, or may receive such remuneration as Council considers proper, and need not necessarily be members of the Club. Members of Council may hold any position, but shall not receive any remuneration. The Secretary and Treasurer shall, and other Officers may, attend Council Meetings, but shall not be eligible to vote on any motion unless they are members of Council. In the event of any of the foregoing offices or places not being filled or of any vacancy occurring therein between two Annual General Meetings the vacancy may be filled by the Council and the person so appointed may hold office until the next subsequent Annual General Meeting. Subject to the general control of the Club the management of the business and affairs of the Club shall be vested in the Council."

(iii) Article 30 — to be amended to read: "All Members of the Council shall retire annually but shall be eligible for re-election. Candidates for office shall be nominated (either orally or in writing) by two financial members of the Club entitled to vote, not later than two months prior to the Annual General Meeting. If no nomination has been received for any position, nominations for that position may be accepted at or before the Annual General Meeting. An unsuccessful candidate for the office of President may stand for the office of Vice-President and an unsuccessful candidate for either office may stand for election to the residual Council without a new nomination being lodged. All contested elections shall be determined by ballot."

(iv) Article 32 — to be amended to read: "The Council may meet together adjourn and otherwise regulate its meetings as the Members thereof shall from time to time think fit but as far as practicable procedure at Meetings of Council shall follow the same pattern as at General Meetings of the Club. At all Meetings of the Council seven members personally present shall form a quorum.

(v) Article 40 — to be deleted.

(vi) Article 63 — to be amended to read: "All cheques on the Bank Account of the Club shall be signed by any two of the following: The Treasurer, the Secretary and the President or other Officer duly appointed by Council, provided that at least one signatory must be a financial member of the Club.

(vii) By renumbering Articles 41 to 80 inclusive as Articles 40 to 79 respectively.

GARNET JOHNSON, Hon. Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1975-1976.

President:

Mr. P. KELLY, 260 The Boulevard, East Ivanhoe, 3079.

Hon. Secretary: Mr. GARNET JOHNSON, 20 Sydare Ave., Chadstone, 3148. 56 3227.

Treasurer — Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145.

Acting Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3151. (52 2749.)

Magazine Sales Officer: Mr. D. E. McINNES.

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

Botany: Miss E. JONES, 6 West Crt., Glen Waverley, 3150. (560 2280.)

Day Group: Mrs. J. STRONG, 1160 Dandenong Rd., Murrumbeena. (56 2271.)

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena, 3163. (56 2271.)

Field Survey: R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126. (83 8009)

Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$0.75

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

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N.C.V.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 July — Extraordinary General Meeting at National Herbarium, The Domain, South Yarra, 8.00 p.m.

Business — As notice given in Victorian Naturalist, June, 1975.

(i) To rescind part of Special Resolution carried at Annual General Meeting, 1975.

(ii) Special Resolution to amend Articles of Association.

General Meeting, 8.15 p.m.

Speaker — Mr. Howard Jarman.

Subject — "Victorian Parrots".

New Members —

Ordinary:

Mrs. Rita Ferguson, 5 Mossman Drive, Heidelberg 3084,
Mrs. Rosaleen Love, 3 Vincent Street, Glen Iris 3146. *Botany, Geology, Marine.*
Mr. W. J. Massey, 41 Hawdon Street, Heidelberg 3084.
Mr. T. Bruce Muir, 52 Liston Street, Burwood 3125. *Botany.*

Joint:

Mr. Paul G. Smith, Mrs. Maureen Smith, 7 Atunga Court, Cheltenham East 3192. *Botany and Conservation.*

Country:

Mr. Barry R. Clugston, P.O. Box 83, Alexandra 3714.

Monday, 11 August —

Speakers — Mr. Ray Gibson and Mr. Stephen Morton (Mammal Survey Group).

Subject — "Small Mammals in Victoria".

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 16 July — Microscopical Group Meeting.

Thursday, 17 July — Day Group Meeting. "Exhibition Gardens and Old Melbourne Gaol". Meet at Exhibition Gardens Entrance in Nicholson St., opp. Gertrude St., 11.30 a.m. Visit Melbourne Gaol, 1.30 p.m.

Thursday, 24 July — Field Survey Group Meeting in Conference Room, National Museum, at 8 p.m. Subject—"Australian Territorial Molluscs": Dr. Brian Smith.

Monday, 4 August — Marine Biology and Entomology Group Meeting at 8 p.m. in Conference Room, National Museum. Subject — "Marine Molluscs of Australia; the Animals and their Shells": Dr. Brian Smith.

Wednesday, 6 August — Geology Group Meeting.

Thursday, 7 August — Mammal Survey Group (F.N.C.V.) Meeting at 8 p.m. in Arthur Rylah Institute, 123 Brown Street, Heidelberg.

EXCURSIONS

Sunday, 20 July — Blackwood. The coach will leave Batman Avenue at 9.30 a.m.. Fare: $3.60. Bring one meal.

Friday, 17 October - Friday, 24 October — Grampians and Nhill. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation, at 9 a.m. for Hall's Gap, where the Western Victorian Field Naturalists Association are spending the week-end. Bring a picnic lunch. The party will remain at Hall's Gap until Monday, then proceed to Nhill, which will be the base for trips for the rest of the week.

Motel accommodation has been booked on a dinner, bed and breakfast basis, and this should be paid for individually. The coach fare of $45 should be paid to the Excursion Secretary by the 22nd September, cheques to be made out to Excursion Trust.

the victorian naturalist

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Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

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The Sugar Glider photographed by John Willis, exemplifies (in a loose sense) the expression "Cheeky Possum".

It is quite obvious that the eastern region of Melbourne presents a vastly different landscape from the western region. This situation was always recognised, but the contrast today is much more dramatic than it was in the mid 19th century. Much of this present picture is due to the type of development which has taken place over many years.

In 1972, the Western Region Commission began operations, based on the realization of the potential for environmental improvement of the area. It represents the interests of nine municipalities in the western area of Melbourne; namely Altona, Essendon, Keilor, Footscray, Sunshine, Williamstown, Bacchus Marsh, Melton and Werribee. The Australian Government has recognized the Region under the provisions of the Grants Commission Act.

In a major effort to improve the general environment of the western region, two important studies relating to vegetation in the area have been carried out. The CSIRO has compiled a report which brings together information about the vegetation, soils, and other environmental factors of the region.

The Royal Botanic Gardens has produced general descriptions and information on 600 species of trees and shrubs suitable for planting in the western region.

Both of the studies were funded under the Australian Government's Area Improvement Program. The latter report, from the Royal Botanic Gardens, should be published towards the end of the year.

Any person desiring further information should be able to obtain it from the Western Region Commission, Cnr. Mt. Alexander Rd. and Homer St, Moonee Ponds. Ph. 37 8111.

The Shaping of the Nepean Peninsula Victoria, Australia

by

E. C. F. Bird*

The Nepean Peninsula (Fig. 1) consists largely of hummocky dune terrain, some of the dunes being active and mobile while others are stable beneath a cover of scrub, woodland, or grassland. The crests of the dunes are generally between 50 and 100 feet above sea level, but some rise higher, with summits locally exceeding 200 feet in the Sorrento district. There are no surface streams or lakes, for the dune sands are highly permeable and rainwater quickly percolates into the ground.

Beneath the superficial dunes are sandstones formed by the consolidation and cementation of older dune formations; they are well exposed in the rugged cliffs and broad shore platforms that border the ocean coast of the Peninsula (Plates 1 and 2). Inland, Tootgarook Swamp is a corridor of lowland, now largely drained and reclaimed as pastureland, bordered by bold dune topography on its western side and more subdued hummocky country to the east, on the lower slopes of the Arthur's Seat range. Arthur's Seat is an area of ancient crystalline and volcanic rocks, and the country south and east, descending to the rocky coast between Cape Schanck and Flinders, is developed on thick basaltic lavas, weathered at the surface to the dark brown clays which sustain rich green pastures and orchards.

The story is a complicated one, and it will be necessary first to mention some basic geological concepts (Keble, 1950). Geological time is divided into a succession of periods from the Cambrian, which began about 600 million years ago, through to the Holocene (or Recent), which covers the past 10,000 years. The ancient rocks which outcrop in Arthur's Seat were formed during Devonian times, about 400 million years ago, whereas the basalts of Cape Schanck date from a phase of volcanic activity in Eocene times, between 40 and 50 million years ago. The dune sandstones of the Nepean Peninsula are of Pleistocene age, deposited within the past million years or so: they include fossil remains of kangaroo species now extinct (Gregory, 1901). The superficial dunes are generally of Holocene age, and some of the processes of erosion and deposition which have shaped them are still active, notably along the ocean coastline.

Within the past million years there have been many changes in the natural environment of south-eastern Australia. Sea level has risen and fallen relative to the land in response to variations in the Earth's climate: during the colder phases of the Pleistocene epoch, when more of the Earth's water was locked up in polar and mountain glaciers, ocean levels were lowered, and during relatively mild episodes they rose again. Although there was little if any glaciation in Victoria, the Pleistocene epoch

*Dr. Bird, Reader in Geography, University of Melbourne.

here included phases of both warmer and cooler climate than that now experienced; at times it was wetter, and at times drier than at present; there were phases when the winds were stronger and more consistently westerly than they are now, and phases when the wind regime was weaker and more varied in direction. In attempting to reconstruct the geological history of an area such as the Nepean Peninsula it is necessary to be aware of these past variations in sea level and climate.

The prelude to the formation of the Nepean Peninsula was a period of intermittent warping and fracturing of the Earth's crust in this part of Victoria spanning several million years. Mornington Peninsula to the east and the Bellarine Peninsula to the west were uplifted as a result of these movements, and the intervening area of crustal depression became the Port Phillip basin; a structural feature called a sunkland. Selwyn Fault runs through the eastern side of the Nepean Peninsula (Fig. 1), which thus lies

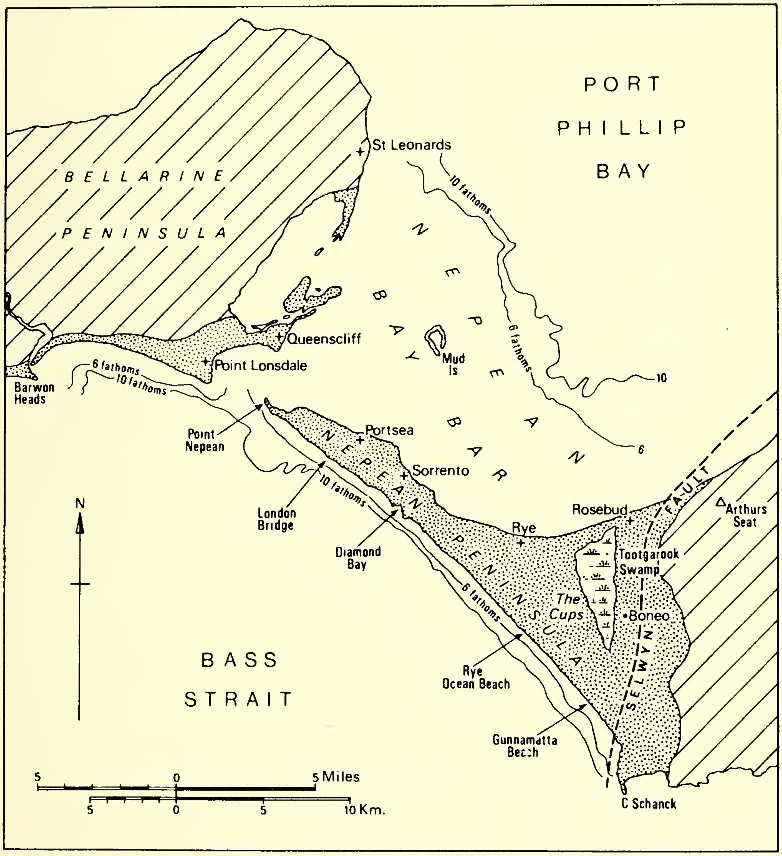

Figure 1
Nepean Peninsula.

Plate 1

Air view of Koreen Point, showing cliffs, dunes, beaches and shore platforms.

within the area of downwarping. During the past million years these crustal movements have continued, and indeed there are still earthquakes in the Port Phillip region, some of which have been traced to movements along faults. The Mornington earthquake of 1932 was due to a displacement along Selwyn Fault, the alignment of which passes from Frankston to McCrae and thence southward through the Nepean Peninsula to emerge on the ocean shore just west of Cape Schanck.

During Pleistocene times the sunkland created by these crustal movements became a marine embayment on the site of Port Phillip Bay at stages of relatively high sea level, and drained out as a coastal lowland when sea level fell. As the sea withdrew, the ancestral Yarra River extended its course, and was joined by

Plate 2

Dune bedding on the shore near Pearse's Beach.

tributaries from the bordering uplands, and probably from King Island and northern Tasmania as well, before it entered the lowered ocean somewhere south of Cape Otway, on the west coast of an isthmus of land that extended across what is now Bass Strait. When sea level rose again the Bassian isthmus was submerged, isolating Tasmania from mainland Australia, and the Port Phillip embayment was revived. Its configuration differed at each stage, depending on the level attained by the rising sea, and on intervening changes due to continuing crustal deformation and the modification of the land surface by erosion and deposition processes. Rivers gradually carved out valleys and built up flood-plains and deltas; rainwash smoothed hill slopes; waves trimmed back the land margin to form cliffs in some sectors, and built up beaches in others; tidal currents scoured the floor of the Port Phillip embayment when sea level was high, and winds winnowed sand from its drying surface to build dune formations when sea level was low.

The most remarkable effect of all this geomorphological activity was the progressive development of a broad embankment built up by deposition across the mouth of the Port Phillip embayment. Part of this embankment now stands above sea level, in the form of the Nepean Peninsula and the similar dune and sandstone terrain around Point Lonsdale and Queenscliff, west of the present entrance to Port Phillip Bay. The intervening sector is the shallowly submerged Nepean Bay Bar, the limits of which are indicated by the 6 and 10 fathom contours in Fig. 1. Its inner margin is a slope, facing north-eastwards, and extending from St. Leonards across to Rosebud, and its outer flank is the sloping ocean floor off the gently-curved coastline between Barwon Heads and Cape Schanck. With the sea at its present level, the Nepean Bay Bar is traversed by deeper channels maintained by tidal scour, but at stages of low sea level it must have emerged as a coastal ridge, through which the Yarra maintained an outlet, probably in the form of a narrow, steep-sided river gorge. The pattern of sea floor contours off the present entrance to Port Phillip Bay suggests a possible route for such a gorge, leading out on to a gently undulating coastal plain at low sea level stages.

The Nepean Peninsula is thus part of a larger formation, all of which has been deposited by wind or sea, and much of our knowledge of its internal structure comes from the record of rocks encountered in the deep borehole put down near Sorrento in 1910. This borehole went through more than 400 feet of Pleistocene dune sandstones similar to those exposed in the ocean cliffs of the Nepean Peninsula, but with intervening layers of marine sediment, including shelly sands and clays of the kind which are now accumulating on the floor of Port Phillip Bay. The dune sandstones must have developed above sea level, and the layers of marine sediment were deposited when pre-existing dunes had been submerged by the sea. Below 400 feet the borehole entered older rock formations on the downwarped floor of the former Port Phillip embayment.

Alternations of dune sandstone and marine sediment in the Pleistocene rocks of the Sorrento bore can be explained as the result of the oscillations of sea level mentioned previously, with the complication that this area, between the Bellarine Fault and Selwyn Fault, has also been subject to intermittent crustal subsidence as the Pleistocene rocks accumulated. Twenty thousands years ago the sea was at a low level, probably at least 300 feet lower than it is now, and at this stage the Yarra must have flowed through the broad embankment by way of a gorge that now lies submerged between the Port Phillip Heads. The subsequent rise of the sea to its present level, attained about 6000 years ago (with perhaps a short interval when it stood 5 to 10 feet higher than at present), submerged the Port Phillip basin to produce its modern outlines, and led to the establishment of tidal channels athwart the Nepean Bay Bar. The dunes and dune sandstones of the Nepean Peninsula persist as a land area above the level so far attained by the sea in Holocene times. Ocean waves are now trimming back the southern margins of the Nepean Peninsula, carving the Pleistocene dune sandstones into a coastal topography of rugged cliffs and broad shore platforms, and in several sectors onshore winds are moving dunes inland from beaches and eroding clifftop areas.

A vast quantity of sand has been deposited to form the Nepean Bay Bar and the bordering Nepean and Point Lonsdale Peninsulas. It is a mixture of calcareous (lime-bearing) sand, derived originally from the shelly organisms that live in coastal waters south of Australia, and quartz sand washed into the sea by rivers and eroded from coastal rock outcrops by wave scour; other minerals are present only in minor proportions. Calcareous sand is usually dominant, ranging from about 50% to more than 95% calcium carbonate in samples taken from the dunes and dune sandstones of the Nepean Peninsula.

During episodes of falling sea level, beaches built by wave action are left stranded as beach ridges on the emerging land. Sand from these may be eroded and piled up as dunes by wind action, but the extent to which this happens depends on how quickly and how effectively the stranded sand deposits are colonised and stabilised by vegetation. This in turn depends on climatic factors, especially humidity and wind strength. Under wet conditions a luxuriant vegetation is likely to develop quickly and impede wind erosion, but if the climate is relatively dry, vegetation colonisation may be sufficiently slow and incomplete for wind action to generate dune formations. As the phases of falling sea level coincided with cooling episodes of the Pleistocene epoch, it is probable that the climate of Victoria became wetter and windier, like that of the area south of Tasmania today. There were certainly dunes at one time on the Bassian Isthmus (detailed soundings of Bass Strait have located drowned dune formations near Flinders Island), but it is not clear how far dune formations initiated at low sea level stages contributed to the depositional structure built across the southern part of the Port Phillip embayment.

When sea level rises, waves erode and re-distribute sandy deposits that were stranded during the preceding emergence. If the sea rises rapidly, some of the beaches and dunes may be quickly submerged, and persist as features on the sea floor. If the sea rises more gradually, wave attack trims back the margins of sandy deposits, removing vegetation and thus enabling onshore winds to excavate blowouts in the exposed sand. These can then develop and grow into parabolic dunes of the kind now seen near Point Hicks in East Gippsland, or into broader transgressive dunes, as behind Discovery Bay in western Victoria and in the Cape Howe district. This dune mobilisation, in advance of a rising sea, is the most likely explanation of the embankment built across the southern part of the

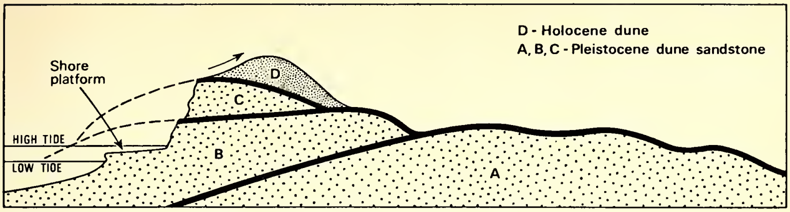

Figure 2

Port Phillip embayment. As the sea advanced, successive dunes were piled one upon another, in the manner shown in Fig. 2.

This is the structure revealed in the rock outcrops along the cliffs of the ocean shore of the Nepean Peninsula (Plate 3). There are sections of dune sandstone, sometimes with steeply-inclined thin seams of biscuit rock, formed on the slopes of an active, advancing dune. Each dune sandstone formation is capped by an undulating layer of brown or white calcareous sandstone, with relics of ancient brown or red soils formed during intervening phases of topographic stability. Branching tubular structures associated with these layers are found where calcareous sandstone has hardened around the roots, or more rarely the stems and branches, of plants that grew in these ancient soils; they commemorate the vegetation cover that once stabilised the underlying dune.

The dune sands are highly permeable, and rain water falling on the surface percolates downward through them. Rain water is weakly acid, due to the presence of dissolved atmospheric carbon dioxide, and as it seeps through the dunes it dissolves out part

Plate 3

Dune structures in cliff, Jubilee Point.

of the calcium carbonate from the calcareous sand. The stalactites and curtains of dripstone in Angel Cave, near Cape Schanck, are evidence that rainwater percolating through calcareous sand becomes saturated with calcium carbonate, which is precipitated as the water drips from the roof of the cave. Within a dune, precipitation takes place a few feet below the surface, and accumulation of precipitated carbonate binds the sand grains together as a firm calcareous sandstone. In some layers the originally calcareous sand has been so enriched by carbonate precipitation as to form a sandy limestone — the rock layers that were quarried for the local lime-burning industry in the nineteenth century. The tubular structures have developed where carbonate precipitation from saturated water has cemented the dune sands in the vicinity of plant roots.

The ancient soils are sandy, but also contain varying proportions of brown clay, thought to have arrived as surface accessions of wind-blown dust, accumulating in the soil. In some sections the palaeosols are several feet thick, and must represent a phase of topographic stability lasting for perhaps thousands of years. The rock sequence in the ocean cliffs, however, is indicative of recurrent instability. Over each ancient soil is another mass of dune sand, representing the arrival of a younger dune which advanced to bury the vegetation, the soil, and the calcareous sandstone layers of the previous dune landscape. The younger dune, in turn, became stabilised, and developed a soil and vegetation cover; and then yet another dune spilled across it. The cliff sections at Diamond Bay show several such superimposed dune formations, and the process is still going on at the top of the cliffs, where dunes are locally spilling inland over the vegetation that stabilised the preceding dune topography. Blowouts in the younger, unconsolidated dunes here expose dark-coloured buried soils, and organic matter extracted from the lowest of these gave a radiocarbon age of about 5350 years, indicating that the unconsolidated dune capping is of Holocene age, in contrast with the underlying dune sandstones which date from the Pleistocene (Bird 1972).

Traced laterally in the cliffs, the soil layers vary in thickness, and rise and fall as they mark out the contours of the ancient dunes. They also branch and re-unite in a manner which shows that parts of the ancient dune landscape remained stable while other parts developed blowouts, from which dunes spilled down-wind. At other stages there was widespread burial of the dune landscape by the arrival of a new and massive advancing dune, probably developed in front of a rising sea, or during a phase of more arid climate. The record is one of great complexity, and many of the details have still to be worked out.

In the landscape of the Nepean Peninsula it is possible to distinguish the extent of some of these phases of dune deposition. An early phase is represented by the dunes of quartzose sand, bearing heathy woodland, on the slopes of Arthur's Seat south of McCrae. The subdued hummocky terrain east of the road from Rosebud to Boneo consists of calcareous dune sandstones overlain by a brown clayey soil; they pass beneath Tootgarook Swamp (from which the higher parts locally protrude as isolated hillocks) and are probably equivalent to the dune rocks exposed in the ocean cliffs, as well as at White Cliffs, The Sisters, and west of Sorrento on the shores of Port Phillip Bay. They are overlain by younger dune sands and soft sandstones extending inland to the western edge of Tootgarook Swamp; their limits are clearly marked by the slope that runs south-south-east from Tootgarook, converging on the highway that ascends from Boneo to the Cape Schanck road. The pattern is well displayed in the view from the crest of the Cape Schanck ridge: the younger, steeper dunes (including the area of intricate hillocks and hollows known as The Cups—Plate 4) west of Tootgarook Swamp represent the last major transgression by dunes on to the Nepean Peninsula; the older, more subdued topography east of the Boneo road dates from a much earlier phase of calcareous dune deposition, and the intervening wedge of Tootgarook Swamp was a low-lying area submerged by the sea during the last few thousand years, then cut off by the Holocene beach ridges built along the Bay shore between Rye and Rosebud to form a shallow lagoon which became choked with swamp vegetation. There is no evidence to support Keble's (1950) suggestion that this was once a 'tideway' leading to an old outlet from Port Phillip Bay near Gunnamatta Beach: it was simply a depression between the older and the younger dune topography of the Nepean Peninsula.

The extent of active, mobile dunes on the Nepean Peninsula at the present time is due, at least in part, to the impact of man's activities. Under the present relatively mild and humid climate, one would expect the dune topography here to have become stable beneath a natural vegetation mantle, the only blowouts and spilling dunes being those immediately atop eroding ocean cliffs. It is possible that the natural vegetation was weakened by the effects of fires set by the Aborigines, whose ancient kitchen-middens are found at various points along the shore, for example on the cliffs near Jubilee Point, west of Diamond Bay. These middens originated as feasting sites, where shellfish collected from adjacent shores were cooked and eaten. They persist as layers or mounds of broken shell waste, mixed with charcoal from the

Plate 4

Stable dune landscape near Boneo.

fire. It is likely that man-made bushfires resulted from these activities, and that dune instability ensued.

The impact of modern man has been more severe. Much of the natural vegetation (evidently she-oak woodland with a seaward fringe of tea-tree scrub, similar to that on the Yanakie Isthmus, near Wilson's Promontory, at the present time) was cleared, burned, and modified by grazing; introduced animals included sheep, cattle, horses and rabbits. After 1839, limeburners cut areas of woodland to provide the fuel for the kilns in which they burned the locally-quarried limestone. In the eighteen-fifties there were sheep and cattle on the pastoral holdings of Tootgarook, Boneo and Cape Schanck, and much of the extensive dune erosion near Gunnamatta Beach probably dates from this phase. By the turn of the century, holidaymakers were visiting Sorrento and Portsea, and the trampling of dune vegetation increased. Latterly, motor vehicles, including trail bikes and dune buggies, have damaged dune vegetation and accentuated erosion, especially near Gunnamatta. On the cliffed sector between London Bridge and Rye Ocean Beach the damage done by people trampling vegetation and scrambling over the dunes is considerable; it is much more extensive than on the similar coastal fringe within the Commonwealth reserve at Point Nepean, where access by the public has been more limited: dense scrub vegetation extends to the cliff-top near Point Nepean, and there can be little doubt that the sector south-east from London Bridge was formerly in a similar stable condition. Restoration of this topography is a major challenge to conservationists.

Features of shorelines bordering the Nepean Peninsula have been shaped largely during the 6000 years since the sea reached its present level. On the ocean shore, the dune sandstones have been cut back by storm wave attack to produce steep, rugged cliffs. The more resistant rocks, notably the hardened calcareous sandstone layers, persist as ledges and promontories, while the less consolidated dune sands have been excavated as coves and embayments, often containing sandy beaches. South-east from Rye Ocean Beach the rocky sectors become intermittent, and there are long stretches of sandy beach backed by dunes that are partly stabilised by grasses and scrub, and partly active and mobile. Sandstone cliffs reappear south-east of Gunnamatta, and extend to the cove where Selwyn Fault emerges, with high cliffs of black layered basaltic lava on its eastern side, flanking Cape Schanck.

Subjected to wave attack, dune sandstones disintegrate to sand, and pebbles and boulders are derived from the more resistant layers. Storm waves use these rock fragments as ammunition in pounding and scouring the cliff base, and occasionally rocks collapse on undermined sectors. In addition, there are stacks and pinnacles of intricately weathered dune rock, which owe their form to corrosion by rain water and sea spray, and to the scraping, drilling and plucking effects of the various marine organisms, notably barnacles and mussels, which live on their pitted and honeycombed surfaces. Storm wave erosion can be spectacular, but these quieter forms of continuous physical, chemical and biological erosion on the foreshore are just as effective in sculpturing landforms.

The shore platforms which front the cliffed ocean coast between Rye Ocean Beach and Point Nepean are unusual in being almost horizontal (Plate 5): they stand at a level which is exposed at low tide and submerged at high tide. Shore platforms on

Plate 5

Cliff and shore platform, Jubilee Point.

stormy coasts usually slope seaward between high and low tide mark, but here the weathering processes, notably corrosion, are effective only down to about mid-tide level, and immediately below this level the sandstones have been rendered more resistant by internal precipitation of calcium carbonates. The outcome is the development of an almost flat platform, which is being undermined and dissected by storm waves at its scalloped outer edge. It is noteworthy that beaches are best developed, and cliff recession most rapid, on sectors where the shore platform is narrow, or absent altogether. In these sectors storm waves reach the back of the shore, instead of dissipating their energy in breaking across the platform.

Wave action is less vigorous on the Port Phillip Bay shore. Active cliffing is limited, and instead of shore platforms, there are irregular rocky outcrops, and extensive sandy shoals offshore, partly exposed at low tide. At one point near The Sisters the cliffs expose relics of a beach deposit about five feet above present high tide level. This commemorates a phase, possibly in Holocene times, when the waters of Port Phillip Bay stood higher than they do now. Between Sorrento and Rosebud the Bay Shore is low and sandy, backed by successively-formed beach ridges carrying scrub and Banksia woodland. The development of this sandy barrier cut off Tootgarook Swamp from the open waters of Port Phillip Bay.

The shaping of the Nepean Peninsula has been a long and complicated process. Changes still continue, especially on the stormy ocean coast and in sectors where the dunes are mobile, but the main outlines of the topography have not altered greatly in the seventeen decades since the first settlers arrived at Sullivan's Bay.

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Some Common Venomous and Dangerous Animals of the Seashore

by

R. J. Plant*

Unlike Queensland, Victoria has few dangerous marine invertebrates living in coastal waters. However, there are several species of animals likely to be found by the beachcomber or fossicker which can inflict painful stings or potentially serious bites. This article describes a few of the more common species and lists some methods of avoiding them and suggests treatment for any bites or stings received.

All animals have a method of defence and a means of catching food. In some cases, venom serves both of these purposes. The size of the animal makes no difference, for some tiny creatures are capable of nasty stings. Unfortunately, ignorance is usually the cause of people being bitten or stung, as in most cases, the victims have picked up or tried to harm the animal. Few animals openly attack, and most will try to hide or escape.

Jellyfish are notorious as animals capable of inflicting painful stings. In the waters of Northern Australia, the Sea Wasp, a small box jelly, has been the administrator of many fatal stings. Although there are no comparable species in southern waters, several species have been reported as causing painful stings. Jellies have long feeding tentacles which trail beneath the bell. These bear batteries of stinging cells, or nematocysts, with which they paralyze their prey, and it is these cells which inflict painful stings when they come in contact with a human being.

If you are stung, or if someone else is stung by a jelly, quickly remove any tentacles adhering to the skin by rubbing the area with sand, clothing, seaweed or anything else that may be handy. Removing these tentacles is a very important step for as long as they remain they will continue to discharge venom. Alcohol, methylated spirits, suntan lotion, oil or any similar solution should then be applied to prevent further stinging. Medical treatment is advised if the sting is serious.

It is important to remember that jellyfish washed up on the beach can still sting, and even if they appear to be dead, the stinging cells are active for a considerable time. It is best to avoid beached specimens and discourage children from handling them.

A common jellyfish, the "Brown Blubber", *Catostylus,* is often encountered in shallow water (Diagram 1). This species has a brown to cream bell about 30 cm across that may be tinged with red, yellow or blue, with a light coloured cross on top and eight short thick tentacles below. It can cause a nasty sting, particularly during its breeding season — spring and early summer.

A common relation of the jellyfish found on ocean beaches is the "Portuguese Man O' War" or "Bluebottle", *Physalia* (Diagram 2). This animal floats on the surface of the sea by means of a gas-filled bag about 5 cm in length and a delicate blue in

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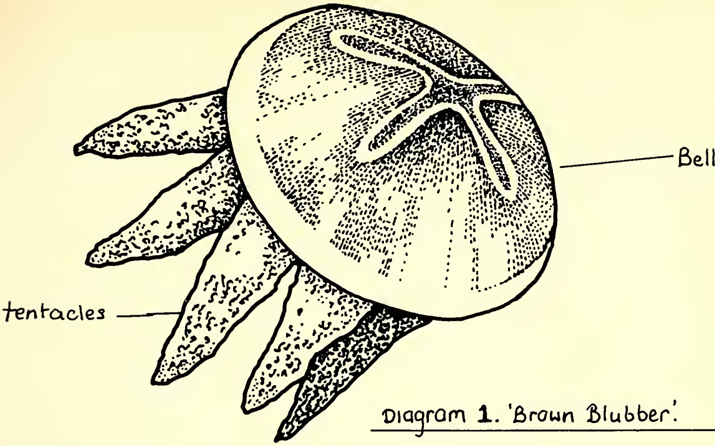

Diagram 1. 'Brown Blubber'.

Catostylus

colour. Beneath this float are found the feeding organs of the animal and the long stinging tentacles which can stretch to many times the animal's length. These act as food gathering organs, catching and killing small fish by stinging them. The stinging cells are therefore very powerful and can give human beings painful and serious wounds. The "Man O' War" is often washed onto our coasts in great numbers and is a hazard to swimmers. Many appear on the beaches and can still be dangerous even when the animal appears dehydrated and harmless.

There are many jellyfish found around Victoria, so it is wise to assume that they all sting and it is best to leave them all alone.

Of all the shells found along the coast, few are considered poisonous, and most species in this group are dangerous only if eaten. However, one group of shells with a bad reputation is the Cone Shells (Diagram 3). Some tropical cones have caused fatalities and although Victorian species are not as dangerous, care should be taken with them. Cones do not actually bite, but inject a tiny barb into their prey, and venom is forced into the victim through the hollow barb when the incision is made. Each barb is a specially adapted tooth, used once and then replaced. This sting can be very painful and medical attention should be sought if a serious case occurs. Cones should only be picked up by the large back-end part of the shell, and never touched if the animal has not retreated into its shell. Care should be taken in picking up cone shells that appear to be dead—they may be alive.

A small animal featured fairly regularly in the news is the "Blue-ringed Octopus" (Diagram 4). These little creatures have earned a bad name due to their deadly venom which has caused some fatalities. Again, ignorance has been the major reason for the deaths, the last reported case being that of a man picking up an octopus and placing it on his arm.

Octopods normally live under rocks or in crevices in rockpools, but they are also quite common hiding in old tin cans and jars in the water. They are rarely seen as they are shy creatures, but with people picking around reefs, their habitat is often disturbed. If you encounter an octopus, do not

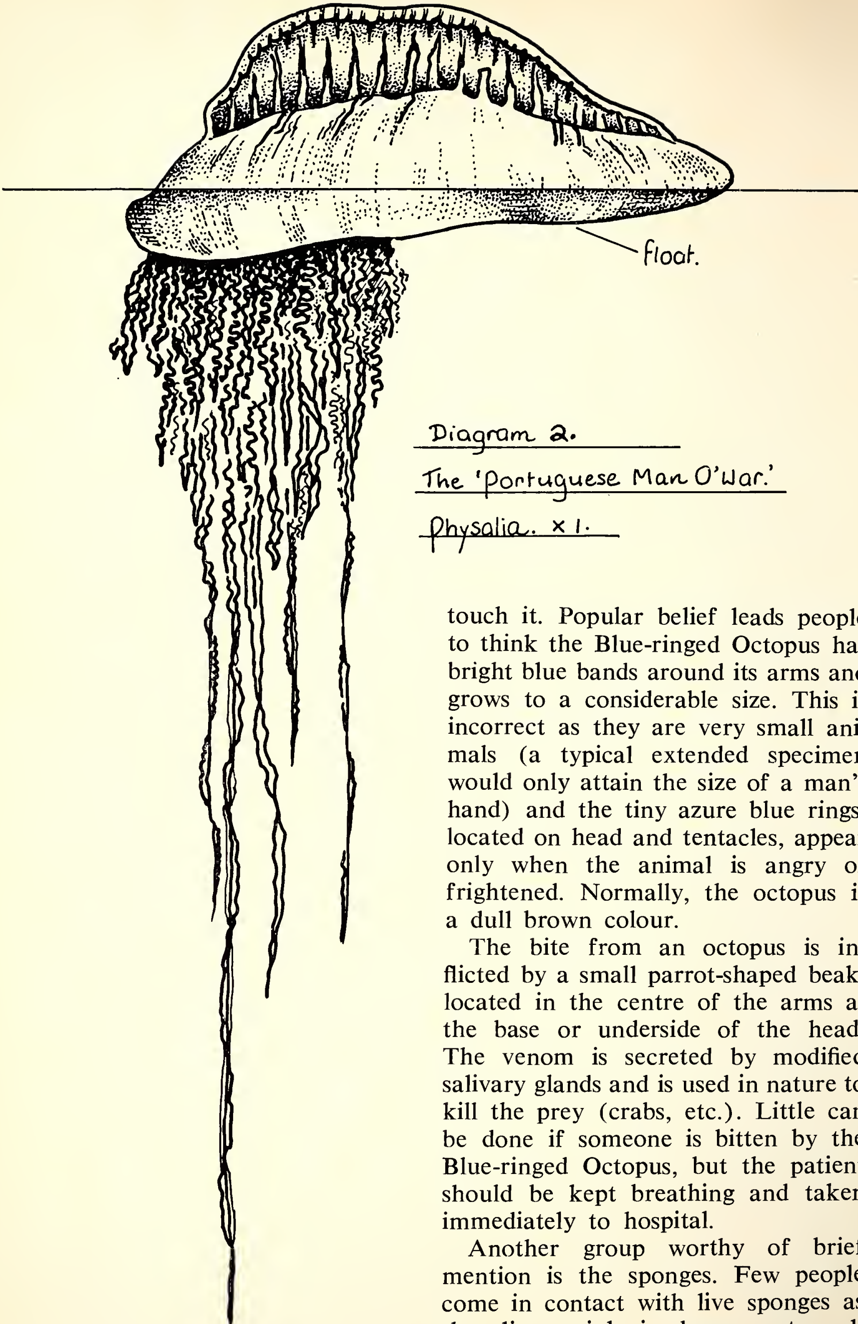

Diagram 2.
The 'Portuguese Man O'War.'
Physalia. x 1.

touch it. Popular belief leads people to think the Blue-ringed Octopus has bright blue bands around its arms and grows to a considerable size. This is incorrect as they are very small animals (a typical extended specimen would only attain the size of a man's hand) and the tiny azure blue rings, located on head and tentacles, appear only when the animal is angry or frightened. Normally, the octopus is a dull brown colour.

The bite from an octopus is inflicted by a small parrot-shaped beak, located in the centre of the arms at the base or underside of the head. The venom is secreted by modified salivary glands and is used in nature to kill the prey (crabs, etc.). Little can be done if someone is bitten by the Blue-ringed Octopus, but the patient should be kept breathing and taken immediately to hospital.

Another group worthy of brief mention is the sponges. Few people come in contact with live sponges as they live mainly in deeper water, al-

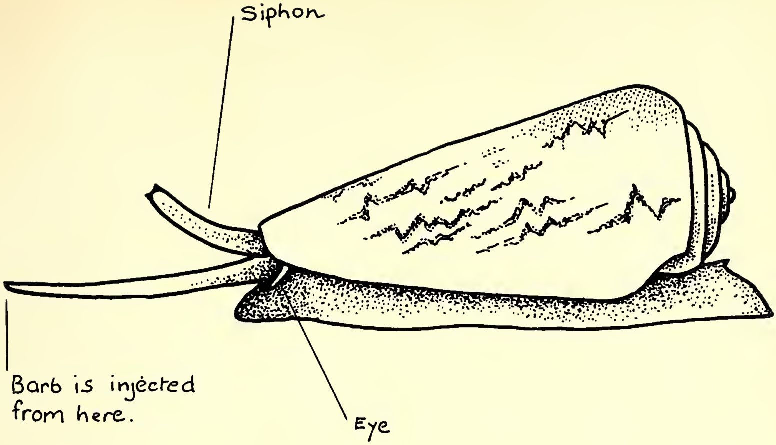

Diagram 3. Cone shell with animal out.

though after heavy seas they may be washed in and found stranded in rock-pools.

Sponges can be described as a mass of cells with a skeleton made up of many tiny needle-shaped structures called spicules (Diagram 5). Sponges are only harmful when handled or come into contact with the skin, when a bad rash can result from forcing some of these tiny glass-like spicules into the skin. Live sponges should only be handled with gloves and an antiseptic applied if direct contact is made.

An animal which affects people in a similar way to the sponge is the Bristle Worm (Diagram 6). This worm has many groups of tiny glass-like bristles called setae which form

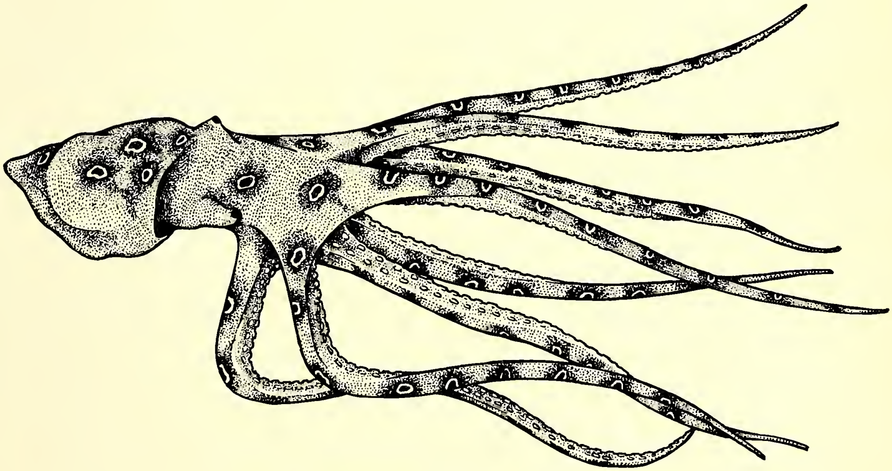

Diagram 4. 'Blue-ringed Octopus'. x 2.

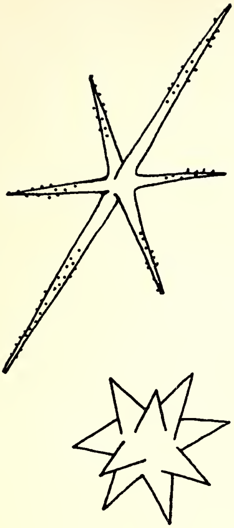

Diagram 5. Sponge spicules. magnified many times.

a fringe along the sides of the animal. When picked up, the setae stick into the fingers, break off and sting until removed; which can take a while for they are hard to see and extract.

The "Beach-worm" has very strong jaws to capture its prey and although the worm has no venom, the bite can be very painful, and these animals can move surprisingly fast when disturbed.

The sea-urchins must be included in this article, not because they bite or sting, but due to the danger of treading on them. Sharp spines cover the body of a sea-urchin as a protection, and these spines can be very painful when forced into the skin. Infection often follows if the spine is not removed quickly and great care should be taken to extract all of the spine. Unfortunately, they are often difficult to remove, and one would advise seeing a doctor rather than risk leaving small pieces in the wound.

To sum up, the following steps should be observed by the beach-goer:

1. Never walk on rocks in bare feet.
2. Do not put hands into dark crevices.
3. If you are unsure whether an animal is dangerous or not, *do not touch it.*
4. Do not disturb or harm animals unnecessarily.
5. If you move a rock, replace it in the position you found it.

Acknowledgement

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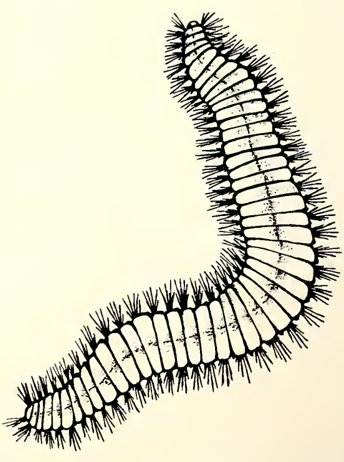

Diagram 6. BRISTLE WORM x 2

The Origin of Generic Names of the Victorian Flora
Part 2 – Latin, Greek and Miscellaneous

[continued from 92 (6)]

by James A. Baines

Eulalia. Gk eu, well; lalia, speaking, talking; named by Kunth for an unknown reason. (Black gives the meaning of lalia as "address or appearance", because it is a handsome grass, but the Greek dictionary gives only the "speech" meaning. Eulalia and Eulalie are girls' names.) Our sole species is *E. fulva,* Silky Browntop or Sugar Grass.

Euphrasia. Gk euphrasia, delight, mirth. Our 4 species, all native, are known as different kinds of Eyebright.

Eupomatia. Gk eu, well; pomatos, genitive of poma, a cover; the meaning therefore being the same as that of *Eucalyptus.* This genus has only 2 species, and has family Eupomatiaceae to itself. N.E. Victoria's species is *E. laurina,* known by the aboriginal name Bolwarra.

Eustrephus. Gk eu, well; strepho, to twist; because of the twining habit of some forms of this polymorphic monotypic genus. Willis describes *E. latifolius,* Wombat Berry or Orange-vine, as a "much-branched climber with weak, flexuose but non-twining stems".

Eutaxia. Gk eu, well; taxis, arrangement, setting in order, in a line or row; referring to the regular arrangement of the leaves. (Eutaxia is Gk for good order or discipline; according to Smith & Stearn it means modesty.) Our species, *E. microphylla,* has no common name other than Eutaxia.

Exocarpos. Gk exo, outside; karpos, fruit; the succulent pedicel resembles a pericarp below the nut. Victoria has 6 species, all known as different kinds of Wild Cherry or Ballart; as early forms of the latter aboriginal name include Ballot, it is obvious that the accent should fall on the first syllable. The commonest species is *E. cupressiformis,* Cherry Ballart.

Festuca. Lat for a grass stalk or straw; by transference, it came to mean also the rod with which slaves were touched in the ceremony of manumission (emancipation). Victoria has 7 species, all known as different kinds of fescue, a word that came into English through French festu from festuca.

Ficus. Lat name for *F. carica,* Edible Fig. The English word fig has descended through French figue from Lat. ficus. **F. macrophylla,* Moreton Bay Fig, is an introduced tree in Victoria, but is indigenous to coastal N.S.W. and Queensland. Victoria has a native species, *F. Coronata,* Sandpaper Fig, in far East Gippsland, where the Mediterranean **F. carica* sometimes persists; *carica* meaning 'from Caria' (in Asia Minor).

Fimbristylis. Lat fimbria, fringe; stilus (later spelt stylus), a style or column; the whole style being often fringed or ciliate. Stilus was also the pointed iron or bone instrument used by the Romans on their tablets for writing, from which came our English word style for manner of writing. Victoria has 3 species, all known as different kinds of Fringe-rush.

***Foeniculum.** Lat feniculum, fennel (related to fenum, hay). Our species is **F. vulgare,* Common Fennel, one of 5 European species. Fennel is the same word in an English dress.

***Fumaria.** Spanish and Medieval Lat name of Fumitory, which itself is from Lat fumus terrae, smoke of the earth (hence French fume-terre and German Erdrauch, "earth-smoke"); arising from the ground like smoke, as some species are said to give off a smoky smell, and the juice, like smoke, brings tears to the eyes. The writer had always assumed the name came from the appearance of the flowers, the tips of which seem to be smokily alight.

***Galaxia.** Gk galaxaios, milky (cf. Galaxy, the Milky Way). This South African iridaceous plant, **G. fugacissima,* is naturalized nowhere else in Australia except the Bendigo district of Victoria.

***Galenia.** Named by L. after Galen, a Greek physician born in Asia Minor, who settled in Rome, 164 A.D., adopting the Roman name Claudius Galenus; his works (100 of which are still extant) were accepted as authoritative for many centuries in Greek, Roman and Arabic medical practice. Victoria has 2 introduced species, both known as Galenia; they are in family Portulacaceae. (Omitted from Part 1, so included here.)

Galium. Gk galion, the name of *G. verum,* Lady's Bedstraw, Fleaweed or Cheese Renning, from gala, milk, because that plant was used to curdle milk. Victoria has 4 introduced species (including Cleavers and Small Goosegrass) and 6 native species (all known as different kinds of Bedstraw).

***Gasoul.** An 'odd-man-out' among generic names, lacking the usual form of such appellations, this genus was founded in 1763 by Adanson, who appears to have invented the name. It has the appearance of a French word, but it appears nowhere in dictionaries of French words, surnames or place names. (Even anagrams have been used occasionally to form generic names, for example, *Dacelo* (the kookaburra), an anagram of Alcedo (Lat for kingfisher), **G. crystallinum,* Common Ice-plant, and **G. aitonis,* Angled Ice-plant, were formerly classified in *Mesembryanthemum.*

***Gastridium.** Diminutive of Gk gaster, abdomen; the spikelets being swollen at the base like a distended stomach, an idea conveyed also in the specific name of **G. ventricosum,* with which our species, **G. phleoides,* Nit-grass, was for long confused. The common name was given because of the resemblance of the small flowers to nits (the eggs of lice).

Gastrodia. Gk gastrodes, pot-bellied; alluding to the shape of the flower. Our species, *G. sesamoides,* Cinnamon Bells, is also known as Potato Orchid, because the underground, tuberous rhizomes resemble small Jerusalen artichokes; it is called Native Potato in Tasmania.

Geitonoplesium. Gk geiton, neighbour; plesion, near. Our species, *G. cymosum,* was described in 1810 by Brown as *Luzuriaga cymosa,* but A. Cunningham established the genus *Geitonoplesium* for it in 1832, doubtless because it was close to, but not congeneric with, *Luzuriaga.* The accepted common name is Scrambling Lily, the other name, Shepherd's Joy, being quite unsuitable for a plant of the near-coastal jungles of East Gippsland.

***Genista.** The Latin name for the broom plant from which the Royal Plantagenets of England took their name (planta genista, through French genet). Our introduced species are Montpellier Broom and Flax-leaf Broom.

Geococcus. Gk ge, earth; kokkos, fruit; alluding to the small, hard pods, which are turned downwards so as to imbed themselves more or less in the soil. *G. pusillus* is Earth Cress, in family Cruciferae.

Geranium. Gk geranion, the classical name for the crane's-bill, from geranos, crane; alluding to the long beak of the carpels. Victoria has 2 introduced species and 7 native species, all known as different kinds of crane's-bill. (The geranium of florists is a *Pelargonium,* from Gk pelargos, stork; i.e. it is a stork's-bill.)

Geum. The classical Lat name for *G. urbanum,* Wood Avens or Herb Bennet, the Australian form, native, being of more robust habit and with larger flowers, and referable to variety *strictum.* Avens is pronounced with a short a; herb bennet is 'herba benedicta', a blessed plant (for exorcism).

***Gladiolus.** Diminutive of Lat gladius, sword; the leaves being like little swords. (Gladiators originally fought with swords.) The Lat plural gladioli is often erroneously used as a singular, which jars the ear just as much as the common solecism 'a fungi'. Our 2 species, introduced from South Africa, are both widespread weeds, **G. tristis,* Evening-flower or Avon-flower Gladiolus, having even been proclaimed a noxious weed in two shires. Sword Lily is an appropriate common name, not much used.

***Glaucium.** Gk glaukos, greyish-green; from the glaucous colour of the leaves.

***G. flavum** is Horned Poppy, in family Papaveraceae. (Glaukion was the word used by Dioscorides for the juice of *G. corniculatum.*)

Glinus. Gk glinos, a plant with sweet sap, probably a maple, applied to it by Theophrastus in the spelling gleinos. Our two species, Hairy and Slender Carpet-weed respectively, were formerly by some placed in the genus *Mollugo.* The whole of the plant is hairy, hence the name Carpet-weed.

Glossodia. Gk glossodes, tongue-shaped (from glossa, the Attic form of glotta, tongue); alluding to the shape of the labellum. *G. major* and *G. minor* are both known as Waxlip Orchids, the former also as Parson-in-the-Pulpit, a name better kept for *Arum maculatum,* Cuckoo Pint or Lords-and-Ladies.

Glossogyne. Gk glossa, tongue; gyne, woman, female, hence pistil; alluding to the long filiform appendage of the style-branches. *G. tenuifolia* was described as a species of *Bidens* by Labillardiere in 1825, but Cassini put it in a new genus *Glossogyne* only two years later. It is a composite with no common name other than the generic one.

Glossotigma. Gk glossa, tongue; stigma, a point, spot or pricked mark, hence stigma; alluding to the shape of that organ, the style being dilated upwards into an oblong stigma usually longer than the style proper and curved at the summit. Our 3 species are all known as different kinds of Mud-mat; they belong to family Scrophulariaceae.

Glyceria. Gk glykeros, sweet; alluding to the herbage and seeds of *G. fluitans,* now *G. australis,* Manna Grass or Australian Sweet-grass. Our other species is **G. maxima,* Reed Sweet-grass, an introduction from Europe or temperate Asia.

Glycine. Gk glykys, sweet. *G. clandestina,* Twining Glycine, is called Lovers' Twine in N.S.W., as indicative of a clandestine trysting place (but the Lat adjective *clandestina* means in botany 'bearing hidden, invisible flowers'). The specific name of *G. tabacina,* Variable Glycine, means 'with the colour of tobacco'. We have 4 species altogether.

Glycyrrhiza. Gk glykys, sweet; rhiza, root; hence glycyrrhiza, Lat name of **G. glabra,* from the rhizome of which liquorice is obtained. The word liquorice (more correctly licorice, there being no connexion with Lat liquor, fluid) is the same word as glycyrrhiza, initial g having been lost by metathesis. *G. *glabra* is introduced, but *G. acanthocarpa* is native.

Gnaphalium. Gk gnaphalion (from gnaphallon, felt), name of a downy plant with soft white leaves used for stuffing cushions. Victoria has 3 introduced species and 9 native species, all known as different kinds of Cudweed, a name first used about 1548 because the plants were given to cattle that had 'lost their cud' (the word quid for chewing tobacco is another form of 'cud').

Gnaphalodes. Gk, like Gnaphalium. A. Gray's *G. uliginosum* remained a valid name from 1852 until 1963, when Hj. Eichler transferred the species to *Actinobole;* it is known as Flannel Cudweed.

Gnephosis. No satisfactory explanation of this name has been found. It is possible that Cassini, who founded the genus in 1820, derived it from Gk gnophos, darkness, gloom, changing the first o to e for euphony. Our 2 species have no common name, so this awkwardly spelt, hard to pronounce name, with no known meaning, has to be used as a common name too!

***Gomphocarpus.** Gk gomphos, a club, a bolt, a bond or fastening; karpos, fruit; from the appearance of the pod (which much more resembles a swan, hence the common name Swan Plant for **G. fruticosus,* which is now *Asclepias fruticosa*). The Broad-leaf Cotton-bush was also formerly *Gomphocarpus.*

Gompholobium. Gk gomphos, club; lobos, pod; alluding to the hard, club-shaped pod. Victoria has 4 species of this genus, all known as different kinds of Wedge-pea. *G. huegelii,* Common or Pale Wedge-pea, was given the name Karralla in recent years, but since this Aboriginal word was not applied by the blacks to this plant it seems dubious to use it merely because it may have meant 'yellow'. Karalta meant green or blue in the language of the tribe near Adelaide; karralla is missing from all Aboriginal word lists in the possession of this writer.

Grammitis. Gk grammatos (genitive of gramma, a letter, that which is written or drawn, from grapho, to write or draw); referring to the arrangement of the spore masses in a line. Victoria has 2 species of these Finger Ferns.

Gratiola. Diminutive of gratia, short for Lat gratia Dei, grace of God, a name given in the Middle Ages to *G. officinalis.* Austral Brooklime, our native species, is still *G. peruviana,* although it is not certain that it is conspecific with the South American plant. Brooklime is the common name in England for *Veronica beccabunga;* the word has nothing to do with the word lime in its botanical or chemical meanings.

Gymnogramme. Gk for 'naked writing'; superseded name for *Anogramma* (q.v.).

Gymnoschoenus. Gk gymnos, naked; schoinos, a rush or reed; alluding to the long naked stems. *G. spaerocephalus* is Button-grass or Button Bog-rush.

***Gynandriris.** Gk gynandros, bisexual (literally female-male); iris, flag; the stamens and style are more or less united. **G. setifolia* is Thread Iris.

Gynatrix. Gk gyne, woman; -atrix, feminine suffix (cf. aviatrix). Classified first in *Sida,* then in *Plagianthus, G. pulchella* is known as Hemp Bush.

Gypsophila. Gk gypsis, gypsum; philos, lover; some species prefer limy soils. *G. australis* is Austral Chalkwort.

Gyrostemon. Gk. gyros, a circle; stemon, stamen; alluding to the arrangement of the stamens. *G. australasicus,* Wheel-fruit, is well named.

To be Continued.

Field Naturalists Club of Victoria

General Meeting

Monday 9 June

Speaker for the evening was Dr. G. Ettershanck, of Monash University. Dr. Ettershanck spoke on "Ants and Plants of Deserts in Southern U.S.A.", and showed slides of desert areas in which he had worked. As Dr. Beadnell said when thanking him, some of the distant photos were reminiscent of our own deserts and it was only on closer view that one realised how very different the plants are from our own. The speaker declared that American deserts have greater diversity of plants than Australian deserts.

Honorary Life Membership to Retiring Editor. President Mr. Peter Kelly spoke of the 10-year service of Mr. Griffin Ward in the demanding and time-consuming job as Editor of *The Victorian Naturalist,* and presented Mr. Ward with a certificate of Life Membership in appreciation. Mr. Ward responded that in general he had enjoyed his time as editor, apologised for any errors or upsets he might have caused, and said how happy he was that Mr. Fred Rogers had taken over the job.

Gould books. Among sundry correspondence mentioned by the Secretary, members were particularly interested to hear that the Victorian Government now possesses 43 of the 45 Gould volumes and they are on exhibit at the National Museum.

Nature exhibits. Galls of genus Apiomorpha, about 1 in. long by $\frac{3}{8}$ in. diametre. One sliced lengthwise revealed a fat larva, $\frac{3}{8}$ in. long. Empty scales of lerp insects, family Psyllidae, on eucalypt leaves. To the naked eye they were rather dirty-looking, biscuit coloured lumps about $\frac{1}{8}$ in. across, but the microscope revealed these scales to be whitish and lacey like delicate shells. During its immature stages, the lerp insect lives beneath the scale sucking up sap and adding to the size of its shelter as necessary. Eggs and larvae of two species of leaf-skeletonising insects: Eggs of the Seedling gum moth *Nola metallopa* (?) were tightly packed rows of minute round dots which the microscope showed to be more like heavy-rimmed saucers; they were hatching into brown hairy larvae, but the adult larvae were darker, speckled white, and with two very black eyes. Eggs of the Blue-gum leaf moth *Mnesampala privata* were flattened ovals in flat clumps, and larvae were emerging from the end of the eggs; they were a greyish yellow colour. Tailed Emperor (*Polyura pyrrhus sempronius*), a handsome butterfly 3 in. across, black and white with touches of brilliant blue. It is rare so far south as Victoria and this one was taken on a hot, north wind day in May at Box Hill North.

Trust Fund for Natural History Medallion. A fund is to be opened to finance the increasing costs of this award. Donations will be welcome.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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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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August, 1975

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 11 August — At National Herbarium, The Domain, South Yarra, 8.00 p.m. Speakers — Mr. Ray Gibson and Mr. Stephen Morton (Mammal Survey Group). Subject — "Small Mammals in Victoria".

New Members —

Ordinary:

Mr. George S. G. Dohrmann, 140 Cardigan Road, Mooroolbark 3138.
Mr. Paul Taylor, 36 Coburg Street, Coburg 3058.

Monday, 8 September —

Speaker — Mr. Edmund D. Gill.

Subject — "The Story of the Yarra and its Delta".

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 13 August — Microscopical Group Meeting.

Thursday, 14 August — Botany Group Meeting. Subject — Alpine Flowers and Ecology.

Thursday, 21 August — Day Group. Meteorological Bureau and Fitzroy Gardens. (Limit of 25; book with Mr. McInnes.) Meet at Tea Rooms, Fitzroy Gardens, 11.30 a.m. or 1.00 p.m. at Corner Spring Street and Latrobe Street.

Thursday, 28 August — Field Survey Group Meeting in Conference Room, National Museum, at 8 p.m. Subject — "Clearfelling and Woodchipping". Speaker from Forests Commission. **Camp — 13, 14 September.**

Monday, 1 September — Marine Biology and Entomology Group Meeting. In Conference Room, National Museum at 8.00 p.m. Speaker.— Dr. Gillion Mapstone of Latrobe University. Subject — "The Veliger — Larval Mollusc".

Wednesday, 3 September — Geology Group Meeting.

Thursday, 4 September — Mammal Survey Group (F.N.C.V.) Meeting at 8 p.m. in Arthur Rylah Institute, 123 Brown Street, Heidelberg.

F.N.C.V. EXCURSIONS

Sunday, 17 August — Churchill National Park. The coach will leave from Batman Avenue at 9.30 a.m., fare $3.00. Bring one meal. Contact Mrs. J. Zirkler re bookings, etc., during the week prior to the excursion if necessary.

Sunday, 21 September — Pyrete Ranges. Leader, Miss P. Carolan. The coach will leave Batman Avenue at 9.30 a.m. Fare $3.50. Bring one meal and a snack.

Friday, 17 October - Friday, 24 October — Grampians and Nhill. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation, at 9 a.m. for Hall's Gap, where the Western Victorian Field Naturalists Association are spending the week-end. Bring a picnic lunch. The party will remain at Hall's Gap until Monday, then proceed to Nhill, which will be the base for trips for the rest of the week.

Motel accommodation has been booked on a dinner, bed and breakfast basis, and this should be paid for individually. The coach fare of $45 should be paid to the Excursion Secretary by the 22nd September, cheques to be made out to Excursion Trust.

Members going to Halls Gap for the week-end only should make their own arrangements for transport and accommodation. Details of the week-end activities and meeting place should appear in the next issue.

the victorian naturalist

Vol. 92, No. 8 — 6 August, 1975

Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

Contents

Unfortunately, the material for the news column has not reached the printer in time for publication due to the illness of our Assistant Editor. However, it should appear in next issue.

In the meantime, it is hoped that Graham makes a speedy recovery.

* * *

Perhaps it is appropriate, in view of the book review which appears on p. 172, for our city readers after having read it, to reflect on a sentence from R. H. Croll's "Along the Track" (1930) which alludes to the Botanic Gardens.

"... Melburnians are lucky indeed to have this in such proximity to their offices and warehouses, so close indeed that it may serve for an after lunch stroll".

Notes on Lake Omeo, Gippsland, Victoria, Australia

by

B. V. Timms*

Abstract

Lake Omeo is a large, shallow, ephemeral lake in the highlands of eastern Victoria, formed by faulting.

When water is present it is alkaline (mean pH 8.4), very slightly saline (mean TDS 1080 ppm) and opaque. Sodium and bicarbonate are the dominant ions.

Twenty-four species of invertebrates have been recorded. Most of the crustaceans are typical claypan forms developing from resistant eggs, while the insects, mainly corixids and chironomids, must recolonize from elsewhere following dry periods.

Introduction

Lake Omeo (Plate 1) is a large ephemeral lake in the Gippsland highlands 100 km north of Bairnsdale. It is about 700 m above sea level and is the focus of a small endorheic drainage area lying west and south of Benambra, which is situated on the eastern shore of the lake. Mention of it is made in a number of geological papers on the district (e.g. Crohn, 1950; Talent, 1965, 1969; Thomas 1937) and it has been the site of a detailed water balance study by the Meteorology Department, University of Melbourne (Bennett and Schwerdtfeger, 1970), but no published data are available on the physico-chemical features of the lake water, or on the aquatic life to be found in the lake.

This paper reports on limnological investigations made on a number of occasions during 1969-1971 (Table 1) and refer not only to Lake Omeo but also to a small stock-watering dam on Minute Creek, the main inflow to the lake. This dam is a likely source of at least some of the colonizing species when the lake refills after being dry. Some data is also presented on nearby Lake King, a small, shallow claypan on the flats of Morass Creek. The location of the three bodies of water is shown in Fig. 1.

The Lake

Lake Omeo is believed to have formed as a result of faulting (Hills, 1940; Talent 1969), Minute Creek being dammed and defeated about 3 km upstream from its junction with Morass Creek (Fig. 1). The former outflow is further blocked by an alluvial fan of granitic sand (Thomas, 1937).

The lake is 770 ha in area with a circumference of almost 15 km and is orientated with its major axis in a SW-NE direction. The floor is flat, but is slightly lower at the SW end. Interestingly Bennett and Schwerdtfeger (1970) reported a lowering of the water table towards the NW end, suggesting the possibility of a leak there associated with faulting. However, the shape of the lake (Fig. 1) and bottom topography tend to deny such an origin, but there has probably been sufficient time since its formation for other factors, especially wind deflation, to modify the morphometry of the basin.

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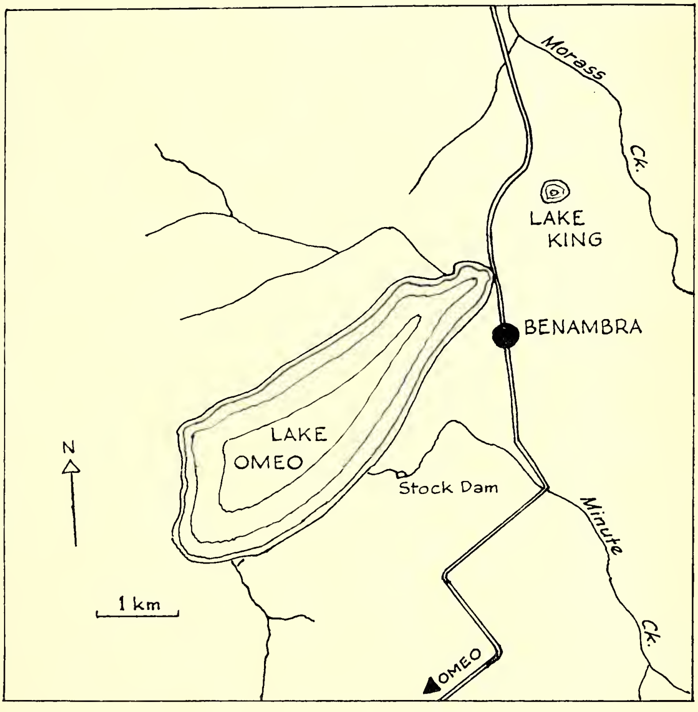
Plate 1

Lake Omeo, viewed from the southwest corner in November 1970.

Photo, Author.

Figure 1



Locality map showing Lake Omeo, Lake King and the stock dam on Minute Creek.

Photo, Author.

There is considerable secular fluctuation in the amount of water held in the lake basin. It was "full" — i.e. the water level up to a well-marked shoreline and 3 m deep — in 1896 and 1956, but dry in 1870, 1914, 1937, 1950, 1967 and 1972 (Bennett and Schwerdtfeger, 1970; Mr. W. Hollands, personal communication). During the last forty years a typical condition would be for it to be dry or to contain some water, particularly during spring. Bennett and Schwerdtfeger (1970) showed that the lake accumulates water only during exceptionally wet years, since annual evaporation is near 100 cm while average annual precipitation is only 62.5 cm. Except for the "full" period following 1956, in the last forty years the lake has contained less water and been dryer longer than was the case in the late 1800's and early 1900's (Bennett and Schwerdtfeger, 1970; Mr. W. Hollands, personal communication). This condition would be associated with long term rainfall fluctuations, but probably also influenced by the clearing of the vegetation along the lake shore, catchment deforestation and damming of the inflowing creeks.

Physico Chemical Features

(a) *Methods.* Surface temperature was determined with a mercury thermometer (accurate to $\pm$ 0.1°C), light penetration with a Secchi disc, pH with a Metrohm portable pH meter, and Total Dissolved Solids (hereafter TDS) by evaporation at 105°C.

Lake water was analysed for seven major ions. Sodium and potassium were measured by flame photometry, calcium and magnesium by atomic absorption spectrophotometry, chloride by potentiometric titration against silver nitrate, bicarbonate by titration with 0.01N hydrochloric acid to an end point of pH 4.5, and sulphate by the method of Ferrara et al (1965) on a Technicon Autoanalyser.

(b) *Results and Discussion.* Since Lake Omeo is usually very shallow and is montane, the seasonal temperature range is large—larger than the 6.0-20.5° range recorded in Table 1 and probably close to the mean monthly extremes of air temperature (3.1 and 24.2°C) recorded by Bennett and Schwerdtfeger (1970).

Water in both Lakes Omeo and King is coloured grey by colloidal clay particles and is opaque, light penetrating no more than a few centimetres. By contrast, in the dam on Minute Creek, there is much less discolouration and light penetration is greater (Tables 1 and 2).

Water in all three localities is alkaline (Tables 1 and 2) — the average pH in Lake Omeo is 8.4, and in Minute Creek dam 7.5. There is a single reading of 7.8 for Lake King. In Lake Omeo there is evidence of higher pH levels in summer when the TDS level is higher, though it is not known if this is the cause of the fluctuations.

The mean TDS level during 1967-71 was 1082 ppm in Lake Omeo and 225 ppm in the Minute Creek Dam. There is a single reading of 600 ppm for Lake King (Tables 1 and 2). In Lake Omeo the salinity increases as the lake shrinks in response to the high evaporation rate in summer. When water lies in Lake Omeo it is probably at least partly continuous with the local ground water as bores in the vicinity of the lake contain waters of a similar salinity range, *viz.* 300-3000 ppm, mostly greater than 500 ppm. Beneath the lake bed salinities near 24,000 ppm (at 36 m) have been recorded (Mines Department, Unpublished information).

The salinities recorded in Lakes Omeo and King are relatively high for upland lakes (Timms, 1970; Williams, 1964; Williams, Walker and Brand, 1970), though the high values in Lakes Omeo and King are expected in view of their closed nature. Water in Minute Creek Dam is more saline than that in lentic waters in the Kosciusko area (Williams, Walker and Brand, 1970) reflecting, no doubt, the influence of human settlement and differing geology and weathering patterns on water quality.

The concentration of major ions in Lakes Omeo and King is given in Table 3. For both lakes the cationic dominance is $Na^{+} > Mg^{++} > Ca^{++} > K^{+}$ and the anionic dominance $HCO^{-}_{3} > Cl^{-} > SO^{=}_{4}$. Despite the higher salinities, these dominances are typical of those of lentic waters in montane areas of south-eastern Australia (Timms, 1970; Williams, Walker and Brand, 1970). The dominance of bicarbonate in waters more saline than 500 ppm TDS is unusual in south-eastern Australia (Williams, 1967).

Biological Features

(a) *Methods.* Planktonic forms were caught in a conical plankton net of material with a pore size of 159 μm while a Birge-Ekman grab was used to collect benthic species. Littoral invertebrates were captured with a pond net of mesh size 0.8 mm.

Collections on some trips are more extensive than others, partly associated with varying habitat area due to water level fluctuations but also because of limited time and equipment availability. Thus collections on trip 3 (the only visit when benthos was sampled) are the most extensive, and those on trips 5 and 2 the least.

(b) *Results and Discussion.* Altogether 24 species have been recorded from the three localities, made up of 20 species in Lake Omeo, 9 in Minute Creek Dam and 5 in Lake King (Table 4). In addition a number of species of larval insects inhabit Minute Creek between the Dam and Lake Omeo (Timms, unpublished data), but all are apparently rheophilic and are excluded from the list in Table 4. As far as is known, all species in the lakes are widely distributed.

Of the faunal assemblage in Lakes King and Omeo, the crustaceans at least are typical of shallow ephemeral freshwater (*ca* 1000 ppm TDS) claypans on the volcanic plains of western Victoria (Geddes, 1973a). *Lepidurus apus, Boeckella triarticulata, Microcyclops australis* and *Daphnia carinata* are widespread in these. The presence of *Branchinella compacta* and not *B. australiensis* is unexpected as the former lives in slightly saline water (>1530 ppm) and the latter in freshwaters (<1200 ppm) (Geddes, 1973b). The presence of *B. compacta* at salinities of 340-670 ppm are the lowest so far recorded for this species.

Considering the altitude of the lake it is surprising that high altitude copepods such as *Boeckella montana* and *B. pseudochelae* are not present. Both are found in pools and lakes of the Kosciusko area (Bayly, 1970) while the latter lives in pools on the nearby Bogong high plains (Timms, unpublished data). In addition *B. montana* occurs in astatic lagoons on the New England Tableland (Timms, 1970). Perhaps relatively low altitude and its associated factors, or ephemeral conditions or very slightly saline waters are limiting to one or both of these copepods. Certainly the copepod present, *B. triarticulata* is known to be capable of inhabiting slightly saline waters (Bayly, 1969), ephemeral waters (Geddes, 1973a) and lakes of various thermal regimes (Bayly, 1964; Timms, 1970).

In that Lake Omeo is dry for long periods the question arises of how the fauna survives such an environmental vicissitude. Some species, e.g., *Bran-*

chinella compacta, Lepidurus apus and *Daphnia carinata,* are known to produce thick-shelled resting eggs and when water returns these would hatch and produce a new generation. Others, like the corixids, are capable of sustained flight and hence the lake would be colonized by adults from far and near. Perhaps many come from nearby waterholes and dams like Minute Creek Stock Dam. This dam, in particular, would also supply adult and juvenile crustaceans as water flows through it to the lake in wet periods. In addition it would probably be the major source of colonizing individuals of the two species of water-snail in the lake.

Acknowledgements

I wish to thank the Victorian Mines Department for access to unpublished information, Dr. S. Cole of A.F.R.L. for providing facilities for water analysis and Mr. M. Tarburton for field assistance.

Thanks are also extended to the following for identifications:—Dr. M. Geddes, University of Queensland (*Branchinella compacta*); Miss J. Knowles, Monash University (*Corixidae*); Dr. J. Martin, Melbourne University (Chironomidae); Mr. D. Morton, Monash University (Cyclopoidae); Mr. A. Neboiss, National Museum, Victoria (Hemiptera except Corixidae; Coleoptera); Dr. N. Smirnov, U.S.S.R. Academy of Sciences (Chydoridae) and Dr. B. Smith, National Museum Melbourne (Gastropoda).

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Table 1

LAKE OMEO: SOME PHYSICAL AND CHEMICAL PARAMETERS

Date	Date Code	Maximum Water Depth (cms)	Mid Morning Water Temp. (°C)	Total Dissolved Solids (ppm)	pH	Secchi Disc Reading (cms)
10/ 8/1969	1	*ca* 5	6	924	7.8	—
5/12/1969	2	*ca* 10	18	1360	9.0	—
1/11/1970	3	*ca* 45	10.6	667	7.8	6
21/ 2/1971	4	*ca* 8	20.5	1378	8.6	4
4/ 8/1971	5	dry	—	—	—	—

Table 2

MINUTE CREEK STOCK DAM AND LAKE KING: SOME PHYSICAL AND CHEMICAL PARAMETERS

Date	Total Dissolved Solids (ppm)	pH	Secchi Disc Reading (cms)
Minute Creek Stock Dam			
10/ 8/1969	343	7.3	—
5/12/1969	174	7.2	—
1/11/1970	201	7.8	34
4/ 8/1971	180	7.7	48
Lake King			
1/11/1970	600	7.8	1

Table 3

CONCENTRATIONS OF MAJOR IONS IN LAKES OMEO AND KING, 1st NOVEMBER, 1970

Lake	Na^+	K^+	Ca^{++}	Mg^{++}	Sum of Cations	Sum of Anions	Cl^-	HCO^-_3	$SO^=_4$
Omeo	7.17	0.23	0.41	0.81	8.62	8.53	2.84	5.40	0.29
King	7.15	0.16	0.19	0.34	7.84	7.85	2.58	4.60	0.67

TABLE 4

List of species collected from Lakes Omeo and King and Minute Creek Stock Dam on five visits during 1969-1971

Species	Lake Omeo date code*	Minute Creek Dam date code*	Lake King date code*
ANNELIDA: Oligochaeta			
Unidentified worm	3		
ARTHROPODA: Crustacea			
Branchinella compacta Linder	3	1	3
Lepidurus apus viridus Baird	3		3
Boeckella triarticulata (Thomson)	3, 4	1, 2, 3, 4, 5	3
Microcyclops australis King	3, 4		
Microcyclops sp. near *varicans* Sars			
Daphnia carinata King	3	1, 2, 3, 4, 5	
Macrothrix hirsuticornis Norman and Brady	1		
Alona cambouei Guerne et Richard	3		
Pleuroxus aduncus (Jurine)	3		
ARTHROPODA: Insecta			
Agraptocorixa sp. *eurynome* Kirkaldy	4		
Agraptocorixa parvipunctata (Hale)		5	
Agraptocorixa sp.		5	
Sigara australis Fieber		5	
Anisops thienemanni Lundblad	3, 4		
Berosus australiae Muls	3		
Dytiscidae larva	3		
Orthocladinae (? *Syncricotopus*)	3		
Chironomus australis Macquart	3	3	3
Chironomus oppositus Walker	3	3	
Chironomus tepperi Skuse	3		3
Unidentified Ceratopogonidae	4		
MOLLUSCA: Gastropoda			
Bulinus hainesii (Tryon)	3	3	
Lymnaea tomentosa (Pfeiffer)	3	3	

*See Table 1 for key to date code.

Victorian Ornithological Research Group Westernport Report No. 1

Part 4—Continued

The Birds of the Somers, Sandy Point, Hastings Districts, Westernport Bay, Victoria, Australia.

by William A. Davis and Alan J. Reid

Continued from Vol. 92, p. 123

142. *Petrochelidon nigricans,* Tree-Martin.
Rare. Noted 6 trips. 1962 September — 1 bird — Sandy Point. October — 10 same area, December — 4 Coolart. 1963 March — 4 Coolart. 1964 — August one Coolart, December — 20 Sandy Point bushland. H.3, 5.

143. *Petrochelidon ariel,* Fairy Martin.
Rare. Reported breeding 1961 under small bridge Camp Road, Somers. 2 December 1962 — 10 Coolart. October 1964 — 2 Coolart. June 1965 small flock education camp. H.4, 5.

144. *Anthus novaeseelandiae,* Pipit (Ground Lark).
Common resident, open fields throughout survey area. Four to 20 every trip, sometimes noted perching on trees in open forest Naval Depot during late summer. H.3, 5, 6.

145. *Coracina novaehollandiae,* Black-faced Cuckoo-Shrike.
Resident breeding species noted most trips, 2 to 10 seen. Consistent breeder often using same tree, favoured month November. 15 September 1963 flock of 20 noted open forest Naval Depot. H3, 4, 5, 6, 7.

146. *Lalage sueurii,* White-winged Triller.
Large influx 1963 open forest Naval Depot. 4 November — 6 males. 25 November — 10 males. 8 December — 12 males. 22 December — 6 males, 3 females. 31 December — 8 males, 3 females. 6 January 1964 — 3 of each sex. 19 January lone male. The early records of males only may have meant breeding. However no nests or flying young were observed. This was the only occurrence of the Triller for the survey. H.3.

147. *Turdus Merula,* Blackbird.
Introduced. Very common resident breeder Coolart, education camp, Sandy Point. Nests Spring. H.3, 4, 5.

148. *Zoothera dauma,* Mountain (Australian ground) Thrush.
Permanent resident foreshore scrub Balnarring to Sandy Point. Pair resident Coolart lagoon fringes January to June 1963, often seen. Nest found education camp bushland 18 August 1963. Species quite common Sandy Point. H.3, 4, 5.

149. *Cinclosoma punctatum,* Spotted Quail-Thrush.
Rare. Confined dense scrubby section education camp bushland. Listed prior to 1961. Seen again 3 times July-August 1961. Not recorded again in spite of intensive search. H.4.

150. *Pomatostomus temporalis,* Grey-crowned Babbler.

Visitors to Coolart prior to 1940 will remember the species as common along Coolart drive. It has long since disappeared. The reason is not obvious as the drive is still excellent habitat. Isolated pockets exist along several roadside verges throughout survey area. Noted Stumpy Gully Road December 1963, Coolart Road March 1964, Myers Road November 1964. Also known at Tyabb. Recently observed near Naval Depot gate 18 March 1972. H.7.

151. *Megalurus gramineus,* Little Grassbird.

Permanent resident Hanns Inlet salt marshes, reed beds, usually 2 to 6 listed. More often heard than seen. Pair Coolart November 1963 also August 1964. H.2, 3, 5.

152. *Acrocephalus stentoreus,* Reed Warbler.

Occasional visitor. Noted Christmas 1961 Naval Base reed beds, nest found. October and November 1963 seen and heard along Tulum Creek. H.3, 4.

153. *Cisticola exilis,* Golden-headed Fantail Warbler.

Permanent resident reed beds and grasslands Naval Base. Occasional records Coolart lower paddocks December, January and April. H.3, 5, 6.

154. *Cinclorhamphus mathewsi,* Rufous Songlark.

Very rare vagrant. Many recorded in ti-tree scrub. Crib Point during 1952 by B.O.C. member Phillip Brook while serving at Naval Depot. Single record of one bird Christmas 1960 Naval Depot open forest. H.3, 4.

155. *Ephthianura albifrons,* White-fronted Chat.

Common, listed most trips. Favoured habitats Hanns Inlet samphire flats, Naval Base reed beds and grassland, also Coolart lagoon fringes. Many nests found November to January. Enormous flock (in excess of 300) seen Somers beach August 1962. H.1, 2, 3, 5, 6.

156. *Acanthiza nana,* Little Thornbill.

Small parties, 6-20 birds, occasionally seen Sandy Point bushland, Coolart and education camp bushland. H.3, 4, 5.

157. *Acanthiza lineata,* Striated Thornbill.

Very common resident Sandy Point bushland, foreshore scrub and Coolart, 10-100 each trip. H.3, 4, 5.

158. *Acanthiza chrysorrhoa,* Yellow-tailed Thornbill.

Common. Favours open forest, roadside verges and occasionally Coolart lagoon fringes. Average count 20 birds per trip. Many nests found August to December each year. H.3, 4, 5, 7.

159. *Acanthiza reguloides,* Buff-tailed Thornbill.

Listed only once within survey area although very common further inland towards Red Hill. Small party observed during July 1965 along Coolart Road. H.7.

160. *Acanthiza pusilla,* Brown Thornbill.

Very common resident breeding species. Twenty to 100 noted every trip all bushland habitats. H.3, 4, 5, 7.

161. *Sericornis frontalis,* White-browed Scrub-Wren.

Common resident all scrubby habitats, 20 to 50 each trip. Nests located November to January. H.3, 4, 5.

162. *Calanthus fuliginosus,* Striated Field-Wren.

Resident breeder samphire flats, reed beds and low heathlands. Two to 6 noted all trips. Species was eliminated by clearing of heathland near Coolart 1961. Nest with half-grown young, samphire flats Hanns Inlet September 1963. H.2, 3(f).

163. *Stipiturus malachurus,* Southern Emu-Wren.

Confined to Sandy Point bushland where at least 8 different colonies were located in various habitats along the Sandy Point track. Six to 20 seen almost every trip. It was a most exciting time on 4 November 1962 when the species was first seen in the heathland. Although no nests were found flying young were often observed during early summer. Due to loss of habitat this species is becoming increasingly rare near Melbourne. W. Roy Wheeler (B.O.C., R.A.O.U.) commented Sandy Point is a most valuable habitat for the Emu-Wren especially the fact the species is easily observed. Often Emu-Wrens were seen from the car while slowly driving down the tract. H.3(d), (e), (f), (g) (h).

164. *Malurus cyaneus,* Superb Blue Wren.

Very common resident breeding species throughout all suitable habitats. Nests found October to January each year. Noted as foster parent to Bronze Cuckoos on two occasions Sandy Point, H.3, 4, 5, 6, 7, 8.

165. *Rhipidura fuliginosa,* Grey Fantail.

Common resident breeder throughout district. Noted all bushland habitats and Coolart, 10-30 each trip. Many nests Spring and Summer each year. One pair nested along lagoon path 1965. H.3, 4, 5, 7.

166. *Rhipidura rufifrons.* Rufous Fantail.

Rare visitor. First seen Coolart one bird December 1960. One bird education camp November 1962. Records of 1 to 3 birds Sandy Point bushland January and February 1963, 1964. Last record Coolart single bird November 1964. H.3, 4, 5.

167. *Rhipidura Leucophrys,* Willie Wagtail (Black and White Fantail).

Common resident most habitats — 4 to 10 each trip. Nests found Spring and early Summer each year. On one occasion a pair at Coolart were observed nest building. They would fly in with beaks full of spider web, alight in centre of cup-shaped nest then spin around discharging cobweb from their bills. One particular bird at education camp followed a regular circular route 2 or 3 times a day. H.3, 4, 5, 6, 7.

168. *Myiagra rubecula,* Leaden Flycatcher.

Very rare visitor. Noted Christmas 1961 Sandy Point, Easter 1962 education camp. H.3, 4.

169. *Myiagra cyanoleuca,* Satin Flycatcher.

Regular migrant arriving Sandy Point bushland first week November each year departing March, 4-8 birds. Nests found in tall peppermints during three consecutive years December 1962-1963-1964. H.3(b).

170. *Myiagra inquieta,* Restless Flycatcher.

Rare visitor. One bird education camp July 1962. Single bird Sandy Point open forest 9 September 1962. A pair open forest 15 March 1964. H.3, 4.

171. *Microeca leucophaea,* Brown Flycatcher (Jacky winter).

Occasional visitor. Noted 6 times, single birds, open forest Naval Base between December 1962 and March 1963. A pair resided at education camp May 1961, February to June 1964 then again 1965. H.3, 4.

172. *Petroica phoenicea,* Flame Robin.

Regular migrant arriving end March leaving late August each year. Observations at Hanns Inlet were most interesting. The first birds always seen last week March, number gradually increased during April, May and June. By July over 40 present. Large build up during August. By last two weeks over 100 females and 40 males, obviously a premigration flocking. This was, at the time, the largest flock of Flame Robins ever seen by any member of the survey team. This pattern continued through the systematic survey period The species was also present during the same months at Coolart in the paddocks and around the lagoon fringes. Reid carried out extensive banding up until 1967. Neil Wetherill continued the banding until 1971 commenting that trapping success diminished, the birds apparently becoming trap conscious. H.3, 4, 5, 6.

173. *Petroica rodinogaster,* Pink Robin.

Rare. Listed at Somers prior to survey. Sightings from 1960 onwards were mainly confined to individuals caught in mist nets during banding at Naval Depot open forest. Listed April and May 1963, January, April and May 1964. H.3.

174. *Petroica cucullata,* Hooded Robin.

The occurrence of this species so far South and near the coast is interesting. It occurred for a short period only and apparently bred in the district. On 25 November 1963 a lone male noted in open forest Naval Depot. Seen again 9 February 1964. On 3 May 1964 2 males, one female and one flying young observed. The only occurrence of the White-winged Triller was also during that period. H.3.

175. *Eopsaltria australis,* Southern Yellow Robin.

Common resident breeder all suitable habitats. Ten to 30 noted every trip. Many nests September to January. On Saturday 5 January 1963 no less than 20 immature yellow Robins were noted in various plumage stages. Some had striped plumage not unlike the Speckled Warbler, others with yellow pin feathers, many with a very rufous appearance about the lower back and flights.

Reid carried out extensive banding along the Somers foreshore. Results indicated a moving population during winter as there were few re-traps at the time. Many hundreds were banded. The programme was continued by Wetherill although he indicated a change in that many 1966 banded birds were still living and breeding up to 1971 in the same area. H.3, 4, 5, 7.

176. *Pachycephala pectoralis,* Golden Whistler.

Common resident breeder. Six to 20 every trip. Nests found October, November and December each year. Flying young (plumage similar to female) often recorded being fed by parents January and February.

On 26 July 1964 two males seen apparently fighting over territory. They adopted typical threat posture, calling loudly, tail stretched, wings extended and fluttering, head held high with back arched. H.3, 4, 5,7.

177. *Pachychephala refiventris,* Rufous Whistler.

Regular migrant. Ten to 20 present October to March. Arrival and departure variable. Earliest record 22 September 1963. Latest record mid-April. One wintering record of a lone male Sandy Point 6 June 1964. Nests found during December and January each year. During Spring 1964 there appeared an irruption of the species at Sandy Point. On 1 November over 40 counted. H.3, 4, 5, 7.

178. *Colluricincla harmonica,* Grey Shrike-Thrush.

Common resident breeder all suitable habitats. Six to 20 every trip. Nests located November to January. Flying young seen during January. They have striped breasts. H.3, 4, 5, 7.

179. *Falcunculus frontalis,* Eastern Shrike-Tit.

Variable occurrence. Listed every month until October 1963. From then on absent October to March each year indicating the species may leave to breed elsewhere. No evidence of nesting during survey. Occasionally visits Coolart and foreshore scrub. H.3, 4, 5.

180. *Neositta chrysoptera,* Orange-winged Sittella.

Common resident 4 to 10 seen most trips Sandy Point bushland. Nests located September, October and November. Sometimes visits Coolart and education camp. Recorded nesting in camp bushland 1965, 1966, H.3, 4, 5.

181. *Climacteris leucophaea,* White-throated Tree-Creeper.

Restricted to Sandy Point bushland. Two to 10 seen or heard every trip. Nest found in small hollow 50 ft. from ground during December 1962. H.3(b), (c), (d).

182. *Dicaeum hirundinaceum,* Mistletoe-Bird.

Very common confined to Sandy Point bushland. The parasitic mistletoe occurs in abundance in habitats 3(b), (c), (d). The area is one of the few places where this species can be consistently seen and heard. From 4 to 50 most trips. Many flying young observed being fed by parents during December and January each year. Birds extremely tame. On one occasion no less than 8 males and 10 females with flying young were recorded in one tree along the track. The young were plain grey with a pale salmon pink wash around the ventral region.

The species was often noted hovering for up to 10 seconds while feeding. H.3(b), (c), (d).

183. *Pardalotus punctatus,* Spotted Pardalote.

Common resident breeding species Sandy Point. Occasional visitor to Coolart and Somers foreshore scrub. Ten to 50 listed every trip. Favoured nesting locations Sandy Point track and rifle range. Four to 10 active nesting tunnels noted September to January each year. On several occasions the same tunnel was used. Sometimes the young could be heard chirping inside. On 4 November 1963 an Australian Goshawk was seen sitting outside a nest entrance. H. 3, 4, 5.

184. *Pardalotus striatus,* Yellow-tipped Pardalote.

Very rare. Phillip Brook (B.O.C.) noted the species nesting in a hole in gymnasium building Naval Depot 1951, 1952 and 1953. The only other record was during 1962 when a dead pardalote picked up at Balnarring was identified by the museum as the Yellow-tipped. H.3, 4.

185. *Pardatlotus substriatus,* Striated Pardalote.

186. *Pardalotus ornatus,* Eastern Striated Pardalote.

At the time of the survey considerable confusion existed concerning these two species. The Red-tipped Pardalote (P. ornatus) had just been split into P. Ornatus and P. substriatus. For the first year of the survey stripe crowned Pardalotes were listed 7 times as the Striated. On 6 October 1963 a large group of experienced observers recorded 2 Eastern Striated at Sandy Point. Since then both species were consistently seen. Several dead specimens found during 1964 were identified as one each P. Ornatus and P. Substriatus. During September 1963 and April 1965 irruptions occurred when from 50 to 100 counted at Sandy Point. Stripe-crowned Pardalotes occasionally visit Coolart and the education camp bushland. No nesting detected. H.3, 4, 5.

187. *Zosterops lateralis,* Grey-backed Silvereye.

Partial migrant. Recorded all suitable habitats all months. Numbers reduce to 4 to 10 per trip May to early September. From September to April average counts 50-100 each trip. Many nests Spring to late Summer. On one occasion during late May a large tight flock was noted flying higher and higher over Sandy Point until they passed from view. It was suggested they may have been seeking high air currents for a migration flight. H.3, 4, 5, 7.

188. *Meliphaga chrysops,* Yellow-faced Honeyeater.

Common, present all months except July and August Sandy Point bushland and occasionally education camp bushland. Average count 4 to 20 per trip. At times during Spring and Autumn influxes to over 100 Sandy Point. Nest found 10 February 1963 with half-grown young. H.3, 4.

189. *Meliphaga penicillata,* White-plumed Honeyeater.

General build up at Sandy Point during survey. During 1962-1963, 2-8 noted only occasionally. Large flock of from 20 to 50 took up permanent residence in habitat 3(b) from 1964 to end of survey. Also resident along Coolart drive and education camp bushland. Nest found Easter 1961 at camp. H.3(b), 4, 5.

190. *Meliphaga leucotis,* White-eared Honeyeater.

Common resident breeding species Sandy Point bushland, education camp and foreshore scrub. Ten to 100 counted every trip. It appeared the species became more common as the survey progressed. Nest with young Sandy Point January 19, 1964. Parents gave distraction displays and broken wing trick. H.3, 4.

191. *Melithreptus brevirostris,* Brown-headed Honeyeater.

Very common 50-100 noted every trip. Peak populations during Autumn. No nests found. H.3, 4, 5, 7.

192. *Melithreptus lunatus,* White-naped Honeyeater.

Common all months except July and August. There appeared a general increase in the population during the survey. By 1965, 50-100 listed each trip (except July and August). Nests found November, December, January and February. Species invariably recorded in parties of from 6 to 20, sometimes with flying young. Immatures lacked the black head and resembled Brown-headed without the nape marks. On one trip a White-naped expertly mimicked several simple whistling calls given by the observers. H.3, 4, 5, 7.

193. *Melithreptus gularis,* Black-chinned Honeyeater.

A very rare Honeyeater near Melbourne. W. Roy Wheeler in "A handlist of the birds of Victoria" p. 66 indicates the species had not been recorded South or East of Melbourne. During March 1966 a party of 4 to 6 Black-chinned Honeyeaters spent three weeks in the Banksias of the education camp bushland. They were seen on 4 separate days. This would therefore extend the known range by 40 miles south. H.4.

194. *Phylidonyris pyrrhoptera,* Crescent Honeyeater.

Listed for Somers prior to 1961. Eight Sandy Point 5 January 1963. From then on numbers increased till end of the survey when from 50-100 seen every trip. Species occasionally visits education camp bushland and foreshore scrub. Immature birds often caught in mist nets.

195. *Phylidonyris novaehollandiae,* Yellow-winged Honeyeater.

Very common resident breeder all suitable habitats. Possibly the most common honeyeater of the survey. From 50 to 100 every trip. Recorded breeding several times Sandy Point January and February. One interesting late breeding record on 9 June 1963, adult observed feeding flying young. H.3, 4, 5, 7.

196. *Acanthorhynchus tenuirostris,* Eastern Spinebill.

Resident Sandy Point bushland 2 to 20 every trip. Noted breeding November, December, January and February. Occasionally visits Somers foreshore, education camp and Coolart garden. H.3, 4, 5.

197. *Myzantha melanocephala,* Noisy Miner.

Resident breeder education camp 1956 to 1963. Birds then mysteriously left for no apparent reason. Reid noted they consistently used pieces of coloured paper in nest construction. Small population open forest and messmate-peppermint woodland Sandy Point 4-10 each trip. Often seen along timbered roadside verges. H.3(b), 4, 7.

198. *Anthochaera chrysoptera,* Little Wattle-bird.

Very common resident breeder favouring Banksias, Sandy Point, education camp and foreshore scrub. Fifty to 100 each trip. Nests located all seasons except winter. H.3(g), 4, 5.

199. *Anthochaera carunculata,* Red Wattle-bird.

Noted most months Sandy Point, Somers foreshore. Average count 4 to 10 per trip. Influxes from 20 to 60 April, May each year. H.3, 4.

200. *Anthochaera paradoxa,* Yellow Wattle-bird.

Mrs. Ruth Matthews, a most reliable local observer, reports that during high winds in the Autumn of 1951 she had excellent views of a Yellow Wattle-bird in her garden at Somers. She is most conversant with the habitats of the two preceding species, but this bird she described as larger than Red Wattle-bird possessing huge pendulous yellow wattles and peculiar calls (Bird Observer March 1967, p.3). H.4.

201. *Acanthagenys rufogularis,* Spiney-cheeked Honeyeater.
Very rare. Phillip Brooke listed the species twice during 1950 in Banksias at Naval Depot. Single bird seen Banksias, education camp 28 October 1962. Only other record 6 birds Banksias, Sandy Point 15 March 1964. H.3(g), 4.

202. *Carduelis carduelis,* Goldfinch.
Introduced. Very common resident breeder most habitats. Twenty to 100 every trip. Nests Spring and Summer Coolart and Sandy Point. H.3, 4, 5, 6, 7.

203. *Carduelis chloris,* Greenfinch.
Introduced. A large resident population inhabited the ti-tree foreshore scrub from Somers to Sandy Point. A favoured area for observation from February to July was the sand dunes west of the Point. Huge flocks up to 300 birds were regularly seen. The birds were noted feeding on seeds of the Sea Rocket (Cakile maritima). This was the largest concentration of Greenfinches ever seen by any member of the survey team. From August to January dispersal for breeding took place. Small parties often visited Coolart. H.3, 4, 5.

204. *Aegintha temporalis,* Red-browed Finch.
Common, scrublands, Sandy Point. Occasional visitor Coolart and Somers. Ten to 50 noted most trips. Nests found November, December and January. H.3, 4, 5.

205. *Passer domesticus,* House Sparrow.
Introduced. Permanent resident urban areas.

206. *Passer montanus,* Tree Sparrow.
Phillip Brooke lists the species as common 1949 to 1952, Naval Depot.

207. *Sturnus vulgaris,* Starling.
Introduced. Common resident breeder. Large flocks during Summer. Nests each year in duck nesting boxes Coolart. Listed at Sandy Point. On one occasion a lone Starling flew for 15 minutes in a tight flock of Red-necked Stints. Also at Sandy Point the species was seen feeding on nectar during April. H.3, 4, 5, 6, 7.

208. *Acridotheres tristis,* Common Mynah.
Introduced. Common resident breeder most urban areas. H4, 5, 6, 7.

209. *Oriolus sagittatus,* Olive-backed Oriole.
Rare visitor, education camp bushland 3 recorded 9 February 1964, 2 — 1 November 1964, single bird 7 March 1965. H.4.

210. *Grallina cyanoleuca,* Magpie-Lark.
Common. Listed all trips open forested areas, along roads, in paddocks. Nests located September, October, November each year. Flocks during winter months, open forest Naval Depot. H.3, 4, 5, 6, 7.

211. *Artamus cyanopterus,* Dusky Wood-Swallow.
Regular migrant arriving early September, departure variable January to April. Records confined to open forest Naval Depot where they breed each year. On several occasions the same tree was used. Average counts 6 to 20. H.3.

212. *Strepera versicolor.* Grey Currawong.

Very rare visitor. Listed along Stumpy Gully Road November 1962 and again in May 1966. H.7.

213. *Cracticus torquaitus,* Grey Butcher-Bird.

Several pairs noted most trips. One pair resident Coolart drive and education camp. Other pair open forest Naval Depot. Flying young seen Naval Depot during December and January each year. H.3, 5.

214. *Gymnorhina tibicen leuconota,* White-backed Magpie.

Common resident breeder all suitable habitats. H.3, 4, 5, 6, 7, 8.

215. *Corvus coronoides,* Australian Raven.

216. *Corvus mellori,* Little Raven.

The splitting of coronoides into coronoides and mellori occurred about the end of the systematic survey period. The common occurrence of both species in approximately equal numbers has since been confirmed. Since 1968 both have been observed nesting along Coolart drive and at the education camp (Wetherill 1972). Sometimes large flocks of ravens in excess of 100 birds noted. The appearance of these flocks did not follow any pattern and records exist for all months of the year. On a recent occasion at Coolart, an Australian Raven was observed harrassing an adult White Ibis with newly hatched young. The Raven was apparently trying to lure the Ibis from her young. H.1, 2, 3, 4, 5, 6, 7, 8.

Additional Species.

217. *Porzana pusilla,* Marsh Crake.

Shepherd noted the species as common around Westernport during 1896. Jack Jones recorded a Marsh Crake at Coolart during the summer of 1937. The bird frequented the lagoon fringes for some time.

218. *Limosa lapponica,* Bar-tailed Godwit.

A very recent list of the birds of Jacks Beach (near Golden Point) prepared for the Conservation Council of Victoria by W. Roy Wheeler, contained this species. It has been commonly recorded from other parts of Westernport.

219. *Smicrornis brevirostris,* Brown Weebill.

Also appears on Wheeler's Jacks Beach list. However it seems incredible the species was not detected at Sandy Point during the systematic survey. Possibly it has recently moved into the district.

220. *Hylacala pyrrhopygia,* Chestnut-tailed Ground-Wren.

On several occasions fleeting glimpses were obtained of a bird answering the description of the Ground Wren at Sandy Point. However it was never positively identified. The species was listed at Coolart during 1937 by Jack Jones. His manuscript reads as follows:— An extremely shy species both beautiful in plumage and song, and an excellent mimic. Hylacala can only be seen with certainty and then but a fleeting glimpse in the samphire swamps of the foreshores, a very unattractive resort. However my first acquaintance with the species was made at Coolart amidst bracken near a small creek about 200 yards from the house. Quite a number were seen and may still be there (a recent search by the authors indicated that this area of bracken no longer exists).

[Conclusion]

book review

"W. R. Guilfoyle, 1840–1912, The Master of Landscaping"

BY R. T. M. PESCOTT

24 x 16 cm. 153 pages. 16 photogr. plates & 4 line drawings. Oxford University Press, 1974. Retail price $9.75.

Tourists visiting Melbourne are customarily whisked around the two cathedrals, Exhibition Building, Captain Cook's Cottage, Young & Jackson's Hotel, the Cultural Centre and Shrine of Remembrance; but seldom do their itineraries extend to the Royal Botanic Gardens. More is the pity, since these Gardens comprise *the* really magnificent, spacious and soul-stirring masterpiece for which Melbourne will always be uniquely famous. Far too few local citizens are familiar with the history of this priceless asset, with the life and labours of the man chiefly responsible for bringing such a beautiful Reserve to its current state of scientific value and high aesthetic appeal. A multitude of botanists, horticulturists, naturalists, general plant lovers and the increasingly appreciative public will be grateful indeed that the record has at last been put straight in a biographical account of the late William Robert Guilfoyle—101 years after he assumed directorship of the then very different-looking Melbourne Botanic Gardens. And who better qualified to write the book than Mr. Richard T. M. Pescott, himself Director of the same Gardens for 13¼ years until retirement in August 1970, and for all of that period a resident in the old home occupied by Guilfoyle? As stated in his Acknowledgements, Pescott "made a resolve . . . to search out and record details of the training and experience of this man".

How thorough was the research and recording will become apparent on reading through this slender volume. It is in fact a story of the Guilfoyle family, from Irish antecedents to horticultural and landscaping careers in the Chelsea sector of London, whence Michael Guilfoyle emigrated to Sydney with his large family in the late 1840's. We learn how he established a large and important nursery at Double Bay, specializing in tropical plants. As a result of participation in H.M.S. *Challenger*'s voyage to various Polynesian islands in 1868, son William brought home a wealth of living plant material to enhance the family's famous nursery. Shortly after this voyage, several of the Guilfoyle boys played a major part in the development of cane sugar plantations in the fertile and subtropical Tweed River valley, where they also founded another nursery at Cudgen. Mr. Pescott devotes 20 pages to a documentation of "Life in the Tweed River Valley", but by the mid-1880's the last of the Guilfoyle family had pulled out of this district permanently.

The lifework of W. R. Guilfoyle really began with his appointment as Curator of the Melbourne Botanic Gardens in July 1873, in succession to Baron Sir Ferdinand von Mueller. There he remained for 36 years, retiring at almost 69 years of age in September 1909, the last decade so plagued with arthritis, gout and heart trouble that he was virtually a cripple in a wheelchair; but he could look back on a single-handed achievement of landscape architecture unsurpassed anywhere else in the world. Even after retirement, the great landscaper continued to design and lay out private as well as municipal gardens both around Melbourne and in the Western District of Victoria (e.g. in the Colac-Camperdown area). Pescott has divided the Guilfoyle dynasty—his was the fourth directorship in the new 130-year-old Gardens—into three very unequal periods, viz. planning (1873-77), development (1877-1901) and completion (1901-1909), each period forming the subject matter of a separate chapter. Other chapters deal with W. R. Guilfoyle's trip to Europe (Feb.-Oct. 1890), "Guilfoyle the writer", "Guilfoyle the artist" and "The closing years".

Throughout this biography the author has handled his resource material with great sympathy, understanding and sensitivity, and, from his own intimate knowledge of "Melbourne's Garden", has been able readily to assimilate the Guilfoylean spirit. One could perhaps wish that the humanity of his hero had been coaxed more out into the open. Indubitably William Guilfoyle had failings, foibles and idiosyncrasies that made him quite a colourful personality—if not somewhat of a "character" — but few of the surviving anecdotes about him appear in the biography. An unfortunate gap is the complete absence of information concerning formative years, his boyhood exploits and school-days—except that he was first privately tutored in Sydney by his maternal uncle, Mr. Louis Delafosse, then sent successively to Lyndhurst College in Glebe, Mr. Cain's private school at George Street, and Sydney College (for botanical instruction by the erudite Rev. Dr. William Woolls, a friend of Baron von Mueller's). He lacked University qualifications, and, to the end of his days, firmly eschewed all public honours and distinctions.

Considering the width of his experiences and depth of knowledge, Guilfoyle published relatively little — a mere 42 items (books and shorter papers), in comparison with Baron von Mueller's output of some 800 botanical publications through a similar life-span. His "swan song" was *Australian Plants suitable for Gardens, Parks, Timber Reserves, etc.* (1910). Pescott calls this "his greatest work . . . an authoritative book on the subject", in striking contrast to the tenor of its highly derogatory review that appeared in the *Victorian Naturalist 27*: 202-204 (Feb. 1911)! Actually, the book is of very limited use indeed as a guide to the horticultural suitability of various native plants.

In a historical work of such excellent presentation and overall merit as Pescott's *W. R. Guilfoyle, 1840-1912,* etc., one hesitates to point out small weaknesses. It is nevertheless disappointing to find the Australian Border of the Royal Botanic Gardens dismissed in three lines at the top of page 113; the reviewer has always found overseas visitors to be more interested in this section of the Gardens than in any other. A discrepancy occurs on page 26 where the death of John Guilfoyle is given as January 29th in line 10, but the 28th in line 27. In the index (pp. 149-153) the following typographical slips have been detected: *A conitum "napellum"* (instead of *napellus*); *"Fieus"* (for *Ficus*); Flinders "Peak" (for Park), and *Musa "cavandishii"* (for *cavendishii*).

These trifling imperfections, however, in no way detract from the importance of the present publication which, it is sincerely hoped, will find a place on the library shelves of every garden-lover, plantsman and collector of Australian biographies. Both author and Oxford University Press have pooled their respective talents in producing a sturdy book packed full of accurate, interesting information in very readable form.

—J. H. Willis.

Field Naturalists Club of Victoria

Extraordinary and General Meetings
14 July

Extraordinary Meeting The two motions printed in June *Naturalist* were proposed, seconded, read aloud in full, and passed.

General Meeting The speaker, Mr. Howard Jarman, of the Bird Observers' Club gave us an excellent address on Victorian Parrots. Mr. Jarman opened by saying that, although Australia is known as a land of parrots, we have only 50 or 60 of the 300 world species. But our species are more varied. Australia has three main groups — lorikeets (honey-eaters with brush tongues), cockatoos and lories. Lorikeets and cockatoos are limited to the Australian region, while lories are world wide. Mr. Jarman spoke of the nests of parrots — in hollows in trees or elsewhere, rarely is any nesting material used, and eggs are always white. The young are born naked and blind, and are at different stages of growth, for sitting begins as soon as the first egg is laid. The parents feed them with pre-digested food from their crops. Mr. Jarman continued with an absorbing commentary on slides provided by the BOC. Many of the slides were superb. Dr. Elizabeth Turner thanked Mr. Jarman on behalf of us all for a most informative and stimulating address.

Nature exhibits and notes: $2\frac{1}{2}''$–$3''$ Greenhood orchid (Pterostylis falcata); Mountain Correa (C. lawrenciana) with several $1''$ creamy bells below the pair of $2\frac{1}{2}''$ leaves; $1''$ foam-like (but firm) nest of praying mantis; various lichens with fruiting bodies; yellow and black gall wasp under the microscope; cutting of CSIRO research regarding Canadian Pondweed (Elodea canadensis). Canadian Pondweed is likely to become a worse pest than Water Hyacinth and members are warned to destroy it wherever seen.

Public statements by members. Members were reminded that under By-law 16, only authorised persons may make public statements bearing the Club name.

Maranoa Gardens. The Maranoa Committee of Management has completed its task and the Camberwell City Council will carry on without it. There was a vote of appreciation to Mr. Alf Fairhall for his work on the Committee for 8 years.

Plant identifications by Herbarium. Free of charge, the Herbarium will identify plants in batches of ten from this Club and associated organisations. Such specimens must be "processed" by this Club so that only those unidentified by knowledgeable laymen are passed on to the Herbarium.

Trust Fund for the Natural History Medallion is now open and donations will be welcome.

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Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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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.

Rates of Subscriptions for 1975

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 September — At National Herbarium, The Domain, South Yarra, 8 p.m. Speaker — Mr. Edmund D. Gill: "The Story of the Yarra and its Delta."

New Members

Ordinary:

Mr. Sigi Brooks, 206 Lennox Street, Richmond, 3121. *General.*
Mr. G. Peter Dapiran, 15 Lorne Street, Moonee Ponds, 3039. *General.*
Mr. Stephen J. Forbes, C/o Environmental Studies Dept., Rusden S.C.V., Blackburn Road, Clayton, 3168. *Botany.*
Ms. Linden Gillbank, 131 Arnold Street, North Carlton, 3054. *Botany.*
Mrs. Judith James, 1 Baynes Park Road, Monbulk, 3793. *Marine Biology and Botany.*

Joint:

Mr. Michael J. Kemp and Miss Christine Hardiman, 27 Derby Street, Camberwell, 3124. *General.*

Country:

Mr. Ian M. Johnstone, P.O. Box 196, Armidale, N.S.W., 2350. *Mammals.*

Monday, 13 October — Speaker —Miss Helen Aston: "Experiences at Kew Gardens, London."

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 11 September—Botany Group Meeting. Speaker — Mr. T. Sault: "Vegetation of French Island."

Wednesday, 17 September — Microscopical Group Meeting.

Thursday, 18 September — Day Group — "Cheltenham Park". Meet at Park Road Entrance, 11.30 a.m.

Thursday, 18 September—Field Survey Group Meeting in Conference Room, National Museum at 8 p.m. Speaker — Mr. P. Bock: "Geological Factors of the Environment."

Wednesday, 1 October — Geology Group Meeting.

Thursday, 2 October — Mammal Survey Group (F.N.C.V.) Meeting at Arthur Rylah Institute, 123 Brown Street, Heidelberg, at 8 p.m.

Monday, 6 October — Marine Biology and Entomology Group Meeting in Conference Room, National Museum at 8 p.m. Speaker — Mr. Bob Condron: "Butterflies and Moths."

Thursday, 9 October — Botany Group Meeting.

F.N.C.V. EXCURSIONS

Sunday, 21 September — Pyrete Ranges. Leader, Miss P. Carolan. The coach will leave from Batman Avenue at 9.30 a.m. Fare $3.50. Bring one meal and a snack.

Friday, 17 October-Friday, 24th October — Grampians and Nhill. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation at 9 a.m. for Hall's Gap, where the Western Victorian Field Naturalists' Association are spending the week-end. Bring a picnic lunch. The party will remain at Hall's Gap until Monday, then proceed to Nhill, which will be the base for trips for the rest of the week. Motel accommodation has been booked on a dinner, bed and breakfast basis, and this should be paid for individually. The coach fare of $45.00 should be paid to the Excursion Secretary by the 22nd September, cheques to be made out to Excursion Trust. Members going to Hall's Gap for the week-end only should make their own arrangements for transport and accommodation.

Programme for Week-End:—

Saturday, 18 October — Morning, 9 a.m.? (check time). Assembly Point: Hall's Gap Hall — Excursion to Barbican Rocks.
Saturday Afternoon — Excursion to Pomonal Road and/or Lake Fyans.
Saturday Night — Meeting of the W.V.F.N.C.A. Speaker: Mr. W. Davis, 8 p.m.
Sunday — Hall's Gap-Mt. Zero Road with lunch at Plantation Picnic Ground.

Tuesday, 4 November (Cup Day) — President's Picnic — Special invitation to all Junior Club Members. Brisbane Ranges (details next month).

the victorian naturalist

Vol. 92 No. 9 3 September, 1975

Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

Contents

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Front Cover:

In keeping with the leading articles from Tasmania, the Red-necked Pademelon is also from that State. Photo: John Wallis.

"THE VICTORIAN NATURALIST"—

Its Future?

Earlier this year, with the announcement of the resignation of the Editor, it was thought that some difficulty might be encountered in filling this vacancy. This proved not to be the case—a member accepted nomination in March.

That member was Fred Rogers, a busy schoolteacher, and author of the work "Victorian Wattles". It was at first thought that a gradual changeover from one Editor to the other would be possible for the remainder of the current volume. However, due to an unforeseen probable period of hospitalisation confronting him later in the year, our new Editor suggested that it may be more appropriate for the Acting Editor to complete the present year's volume. This would have allowed a completely fresh beginning for 1976.

Now, a new situation has arisen which has completely changed the picture.

Due to a change in an Education Department policy on age of retirement, our new Editor has been appointed to fill a vacancy as Principal, which was not expected to occur for five years. This of course has necessarily forced the Editor to reluctantly tender his resignation.

Therefore, if the Victorian Naturalist is to continue, it is expected that within the next three months, some person with the same willingness and convictions as were shown by Fred Rogers, will accept the nomination for Editor.

Following this serious message, I am sure that all members will join in wishing Fred the shortest possible stay in hospital, and a happy and successful future for his family and himself when he takes over as Principal of the Horsham West Primary School in January 1976.

The Cape Raoul Heaths, Tasmania

by J. B. Kirkpatrick*

There are several extensive areas of heath and open-heath (Specht, 1970) on the south coast of the Tasman Peninsula. Some of these heaths, such as those at Tunnel Bay, are found on deep, infertile, leached sands. Heaths can also be found on the longitudinal sand dunes near Half Moon Bay where the sand, although deep, is not so severely leached and infertile, and on the badly drained peaty sands near Remarkable Cave. These are all relatively normal situations for the occurrence of heath (Specht, 1969, 1972). However, the occurrence of heath on soils formed on the relatively nutrient-rich parent material dolerite is somewhat anomalous, yet such heaths are found at Cape Pillar, Brown Mountain, on the plateau to the west of Tunnel Bay, and at Cape Raoul. W. D. Jackson surveyed the vegetation of the Brown Mountain-Remarkable Cave Scenic Reserve, and compiled the list of plant communities given in Specht, Roe and Boughton (1974, p. 390). However, the list does not distinguish the heath communities found on Brown Mountain from those found on sands. In this article a preliminary description is given of the Cape Raoul heaths, and tentative hypotheses are advanced on the factors controlling their distribution.

Cape Raoul is the southernmost extremity of the Tasman Peninsula. It consists of a dolerite plateau, extending 3 km from the main landmass of the Tasman Peninsula, and is bounded by 200 m tall cliffs to the west, south and east, and by a deep gully and the slopes of Mt. Raoul to the north (Figure 1). The Cape is exposed to strong westerly and southerly winds and probably receives a mean annual rainfall of at least 900 mm. *Eucalyptus regnans* tall open-forest, *E. obliqua* open-forest, *E. globulus* open-forest, and *E. viminalis* open-forest are all found within 1 km of the Cape Raoul heaths, denoting reasonably moist conditions. On parts of the Cape Raoul plateau the dolerite has been overlain by thin sand sheets, and parabolic dunes. Elsewhere, the soils are skeletal and rocky except in enclosed minor depressions where fine material has accumulated.

The extent of the Cape Raoul heath is mapped in the Figure. The heath varies considerably in structure. In the most exposed situations where fires have occurred relatively recently the heath is really a low open-shrubland, but most of the area is either open or closed-heath which varies in height from a few centimetres to two metres. Height variations in the heath seem dependent on fire history, exposure, drainage and soil depth. The latter three factors also appear to be important in controlling floristic variation in the heaths.

In relatively sheltered situations where soil drainage is reasonable and plant roots can penetrate to some depth through soil or dolerite boulders a whipstick mallee eucalypt is dominant (Plate 1). This eucalypt is most similar to *E. tenuiramis* but varies in the direction of *E. coccifera*, especially in its buds and adult leaves. The eucalypts vary in height from 1 to 2 m with a projective foliage cover

*Department of Geography, University of Tasmania, Box 252C, G.P.O. Hobart, Tasmania.

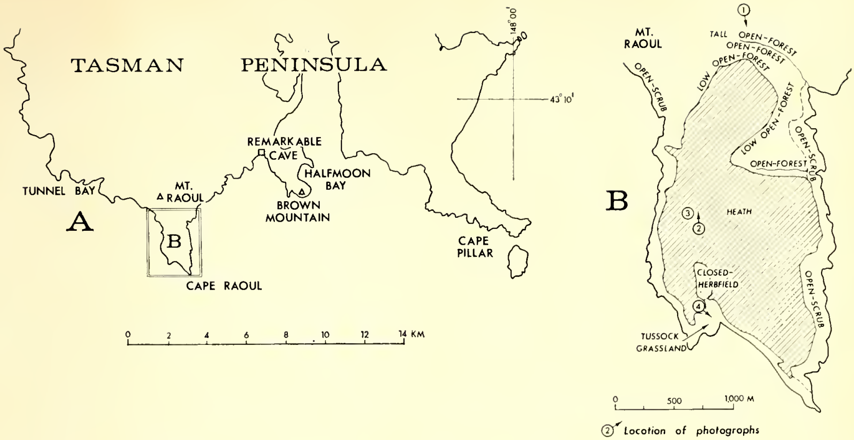

Figure 1.—Location map (A) and the extent of the Cape Raoul heaths (B).

generally between 20 and 50%. *Dianella tasmanica, Lomandra longifolia, Goodenia ovata, Amperea xiphoclada, Correa reflexa* and *Pteridium esculentum* are usually only found within the canopies of these mallees.

On ill-drained sites wet heath species such as *Melaleuca gibbosa, M. squarrosa, M. squamea, Leptospermum scoparium, L. lanigerum, Epacris lanuginosa* and *Sprengelia incarnata* are abundant in the taller stratum with a sparse ground coverage of *Schoenus nitens, S. tenuissimus, Tetraria capillaris* and *Tetrarrhena distichophylla* (Plates 2 and 3).

Plate 1:

Cape Raoul looking southwards from *Eucalyptus* aff. *tenuiramis* heath.

On well-drained sites with shallow soils *Casuarina monilifera, Leucopogon collinus, Pultenaea juniperina, Banksia marginata, Pimelea nivea, Daviesia ulicifolia* and *Diplarrena moraea* are among the most abundant species.

The extremely exposed clifftop areas on the south of Cape Raoul support species such as *Helichrysum scutellifolium, Olearia axillaris, Leptospermum sericeum, Calytrix tetragona, Epacris myrtifolia, Spyridium obovatum* and *Callistemon pallidus*, not found elsewhere in the heaths. Some of these species including the first two named have the rounded cushion form common in coastal shrubs (Parsons and Gill, 1968). Others, such as the latter two species, have adopted an espalier form.

The species list (Appendix) indicates the environmental range of each species in the heath as a whole. An interesting feature revealed by the species list is the concentration of endemic species in the exposed clifftop environment.

Heaths, by definition, are treeless communities, and the lack of trees in most of Cape Raoul can be relatively readily explained in terms of the prevailing environmental conditions. The strong winds that almost constantly buffet the exposed Cape would tend to inhibit tree growth by (a) increasing evapo-transpiration, (b) deposition of sodium chloride on leaves (Boyce, 1954), (c) removal of soil particles after fires. The skeletal nature of most of the Cape soils may be due to the combination of frequent firing exposing the surface and strong winds and surface wash carrying away the soil. Stratigraphic studies at nearby Remarkable Cave have indicated that fire has been a part of the environment of the south coast of the Tasman Peninsula for at least the last 30,000 years (Colhoun, pers. comm.), and in recent years fires are known to have occurred on the Cape at intervals from 4 to 7 years. Frequent firing may be responsible for the whipstick habit of the heath eucalypts, and parts of the heath might, in the absence of fire, become woodland or scrub communities. The skeletal nature of the soils of most of the Cape would (a) limit the nutrients available for plant growth, (b) limit water available for

Plate 2:

The vegetation of an ill-drained depression.

plant growth, especially during dry spells when soil moisture reserves would be depleted quite rapidly. Where soils attain any depth drainage is bad (Plate 3), and trees could be excluded by the combination of waterlogged conditions during wet periods, and lack of moisture during dry periods.

The environments occupied by non-heath communities on the Cape give some indication of the importance of the previously discussed factors in controlling the distribution of the heath. Low open-forest and open-forest are found in the two deep gullies. These gullies are sheltered from southerly and westerly winds, are well-drained, and have deeper soils than those prevailing in the heath. Tussock grassland and open-scrub are found on the colluvial deposits below cliffs and on some steep degraded cliff-faces. The *Poa poiformis* tussock grasslands are found on sites topographically sheltered from fire and exposed to heavy salt spray, which may preclude the occurrence of shrubs. The *Bedfordia*-dominated open-scrub receives drainage from the plateau, is topographically protected from fire, and usually occurs on deeper soils than those found on the plateau (Plate 4). The closed-herbfield occurs in an ill-drained depression which, in contrast to the other depressions on the Cape, is in a position to receive considerable amounts of salt spray. Certainly, evidence of sodium chloride necrosis of the seaward shoots of shrubs was stronger in the vegetation of the well-drained heath areas surrounding this depression than in the vegetation surrounding the depressions occupied by heath.

The presence of heath rather than grassland on the relatively fertile soils formed on dolerite may be a product of their stoniness and lack of depth. Carr (1962) has noted that a considerable build-up of soil and litter is necessary for grass species to establish in the rocky areas occupied by shrubs in the Bogong High Plains. Grasses are also unable to colonize bare scalded areas, which shrubs, if the areas are small enough, are capable of occupying. Frequent firing, strong winds and surface wash seem to have prevented any build-up of soils in the Cape Raoul heathlands, and scalded areas are quite common. Thus, an

Plate 3:

Melaleuca in seasonally filled ponds.

analogy may be drawn between grassland/heath relationships in alpine areas and the absence of grassland on the Cape Raoul plateau. With the exception of sedges, herbaceous species are most common in the Cape Raoul heaths where litter has built up under the canopies of the whipstick mallee eucalypts.

Plate 4:
The southern cliffs of Cape Raoul. *Calytrix tetragona* is dominant in the foreground.

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Appendix

Species Observed on the Cape Raoul Heaths

Nomenclature follows Curtis (1956, 1963, 1967) for Tasmanian endemics, and Willis (1970, 1972) for all other species except those for whom authorities are given. Endemic taxa are marked with a cross.

1 = relatively sheltered, well-drained with some depth of soil

2 = sites subject to periodic waterlogging

3 = well-drained with shallow soil

4 = extremely exposed to salt bearing winds

X = common in a particular environment. x = occasional in a particular environment or rare but confined to that environment.

	1	2	3	4
Dennstaedtiaceae				
Pteridium esculentum	x			
Lindsayaceae				
Lindsaya linearis	x	x	x	
Lycopodiaceae				
Lycopodium sp.		x		x
Gramineae				
Tetrarrhena distichophylla		X		
Cyperaceae				
Gahnia grandis	x	x		
+*Lepidosperma lineare* var. *inops*			x	X
L. longitudinale	x		x	
Schoenus nitens		X		
S. tenuissimus		X		
Tetraria capillaris		X		
Liliaceae				
Dianella tasmanica	x			
Lomandra longifolia	x			
Iridaceae				
Diplarrena moraea			X	
Casuarinaceae				
Casuarina monilifera	X		X	x
Proteaceae				
Banksia marginata	X	X	X	X
Hakea rostrata	x		x	x
H. teretifolia		x		
+*Lomatia tinctoria*	X		X	
Persoonia juniperina	x		x	
Santalaceae				
Leptomeria drupacea			x	
Aizoaceae				
Carpobrotus rossii				x
Lauraceae				
Cassytha pubescens	X	x	x	x
Crassulaceae				
Crassula sieberana				x
Baueraceae				
Bauera rubioides		x		
Tremandraceae				
Tetratreca pilosa			x	
Mimosaceae				
Acacia myrtifolia			x	
A. verticillata (incl. var, *latifolia*)	X	X	x	
Papilionaceae				
Bossiaea prostrata			x	
Daviesia ulicifolia	x			
Pultenaea daphnoides	x			
P. juniperina	X		X	
Rutaceae				
Boronia parviflora		x		

	1	2	3	4
B. pilosa	X			
Correa reflexa	x			
Polygalaceae				
Comesperma volubile	x		x	
Euphorbiaceae				
Amperea xiphoclada	x			
Rhamnaceae				
Pomaderris elliptica	x			
+*Spyridium obovatum*				X
Thymelaeaceae				
+*Pimelea nivea*	X	x	X	X
Myrtaceae				
Baeckea ramosissima			x	
Callistemon pallidus				x
Calytrix tetragona				X
+*Eucalyptus* aff. *tenuiramis* Miq.	X	x	x	x
Leptospermum lanigerum		X		
L. scoparium	x	X	x	X
+*L. sericeum*				X
Melaleuca gibbosa		X		
M. squamea	x	X	x	
M. squarrosa		X		
Haloragaceae				
Haloragis tetragyna			x	
H. teucrioides	x			
Umbelliferae				
Xanthosia pusilla			x	
Epacridaceae				
Astroloma humifusum			x	
Epacris impressa	x			
E. lanuginosa		X		
+*E. myrtifolia*				X
Leucopogon collinus	X		X	x
L. parviflorus				x
Sprengelia incarnata	x	X	x	
Rubiaceae				
Coprosma quadrifida			x	
Goodeniaceae				
Goodenia ovata	x			
Stylidiaceae				
Stylidium graminifolium	x	x	x	X
Compositae				
Helichrysum scorpioides			x	
+*H. scutellifolium*				X
Olearia axillaris				X

The Mollusc *Caryodes dufressnii* in Tasmania
Part 2

by

RON C. KERSHAW*

AND

ALAN J. DARTNALL†

Abstract

A report is given on a nest of eggs of *Caryodes dufressnii* (Leach) (Mollusca, Pulmonata), observed on Mt. Wellington during the summer of 1974. The discovery of many individuals including juveniles of the species at Coles Bay in November, 1973, is discussed.

Introduction

In the first report of this series (Kershaw and Dartnall, 1972) a discussion on the discovery, variation and habits of the Tasmanian snail *Caryodes dufressnii* (Leach) is given. A nest of eggs found in temperate rain forest is described. The discovery of a second nest reported here is of much interest as it occupies a very different situation.

The discovery of further live animals on the Tasmanian east coast at Coles Bay is also of considerable importance. The recognition that a range of more or less distinct morphs occurs has been discussed already by us (loc. cit.). We found no difference in chromosome number between rain forest animals and a live animal received from Mr. John Simmonds of Launceston. This animal, collected at Binnalong Bay in dry forest is of similar form to those taken in such situations in the past.

Recently, similar but dead shells were found in the Cataract Gorge, Launceston. Although long dead these specimens encourage the hope that this type of morph may still survive in forest near Launceston. The fauna of the Gorge has changed to a preponderance of introduced snails during the last decade or two, with the increased pressure of man's activities. The drowning of a considerable area by the Hydro-electric Commission dam, an important industrial event, has reduced the area available to native species drastically.

Therefore the discovery of a colony of dry sclerophyll forest type morphs at Coles Bay has provided invaluable comparative material.

Caryodes eggs on Mt. Wellington, near Hobart.

This nest was discovered adjacent to Shoobridge Track on Mt. Wellington in the spring of 1974 by one of us (A.J.D.). There were four eggs present (plate **1**). These were partly buried in the soil beneath a litter of bark and leaves. Some shelter was available from the earth bank above the track. The forest is fairly open with a gradually developing understorey at this point.

This area is within that burnt out by the disastrous bushfires early in 1966. There is effective recovery of the forest apparent but shelter still remains comparatively sparse in many places. The presence of the eggs is of great importance, demonstrating that

*Queen Victoria Museum, Launceston.
†Museums and Art Galleries of the Northern Territory.

the snail population was not completely decimated despite the intensity of the fire. The last of several observations, made in late December, revealed no apparent sign of hatching. A search revealed several dead but fresh shells in the area.

The translucent greyish-white eggs are closely similar to those found on Mt. Arthur. It is hoped that they will hatch eventually. They have exceeded the time taken by the Mt. Arthur eggs to hatch, but the artificial environment in which the latter eggs were kept could have affected this. Further information on this aspect of the snail's development is very desirable.

Caryodes at Coles Bay.

Coles Bay is a sheltered coastal resort on the central eastern Tasmanian coast. The settlement is separated from the Pacific Ocean by a low range of granite mountains. The mixed granite and sandy shoreline has a variably dense back shore coverage of tea-tree and she-oak. There is a steep drop of ten to fifteen feet to the beach in many places.

In the denser scrub areas the ground is covered with litter. In the more sparsely covered areas there is bare ground and grasses are intruding into open areas. Some scattered logs and branches of dead she-oak are encountered. Slabs of granite also offer shelter particularly near the shore. The pulmonate mollusc *Bothriembryon* (Tasmanembryon) *tasmanicus* (Pfeiffer, 1853) is very common in the area. These snails may be observed crawling on the ground and on the trees at night. By day they shelter in the litter, under the bark of the fallen trees and in suitable spots on living trees.

The discovery of *Caryodes* was made while investigating the distribution of *Bothriembryon* in the area. *Caryodes* is present in the litter with *Bothriembryon* but *Caryodes* appears to prefer deeper litter deposits. It is not present under the bark of dead trees nor was it seen climbing trees at the time. This area is probably the driest in which live *Caryodes* has been found still surviving in Tasmania. It apparently requires some measure of protection from dessication. *Bothriembryon* will settle for the day with no more shelter than offered by face of a rock wall or the bark of a tree. *Caryodes* is not observed in such a situation.

The area which is occupied by the snails is in moderately dense to easily accessible scrub immediately above the shoreline. It extends inland little more than fifty metres at the most. It is hoped that there are other colo-

Plate 1

Eggs of *Caryodes* discovered at Mt. Wellington.

nies in the area, particularly further inland. With increasing popularity of the area it may be expected that the snail population near the shore will not survive. But the adjacent National Park should contribute to survival in the area overall.

The discovery was made early in November, 1973. The many dead and alive specimens found were discovered only as result of careful sieving through the litter on hands and knees. This probably is the reason for the failure to discover the colony on previous visits although many small 'endodontids' have been found. Young animals in various stages of growth both alive and dead were present at the time. Based on the rate of growth reported in the previous study by us (1972) the most probable hatching date could be from early September on. An estimate on the observed number of shells would seem to suggest that at least 60% of young did not survive to adulthood.

The largest adult shells found are a little over 20 mm in length and very fragile. There is broad resemblance to rain forest animals in general morphology and colour banding. A study of the shells is proposed for a later contribution to this series.

Acknowledgements

Thanks are due to Dr. Frank Rowe of the Australian Museum for his assistance in obtaining the photograph of the eggs. R. C. Kershaw is indebted to the Science and Industry Endowment Fund for the loan of a microscope which is assisting in these molluscan studies.

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Award of Australian Natural History Medallion

As this issue goes to press, the Medallion Award Committee has just announced the successful candidate for 1975. Congratulations of our F.N.C.V. go to a worthy, enthusiastic South Australian naturalist and grower of native plants, ALISON M. ASHBY.

Miss Ashby had been nominated for a number of years, and it is most gratifying that her candidature has at length been crowned with success. Among many attainments, probably her best known is the series of *Australian Wildflowers*, painted in colour and published in postcard form by the South Australian Museum, Adelaide — Nos. 97 to 101 (Dec. 1966) and 109 to 114 (Oct. 1967) are magnificent portraits of alpine flora. Another labour of love by Miss Ashby, extending over many years, has been a daily exhibit of actual wildflowers in season at the Adelaide Museum, many of them treasures from her own garden in the Mt. Lofty Range. The superb Western Australian *Banksia ashbyi* (with large upright cones of silver-grey and gold) was named in honour of her family; her father, the late Edwin Ashby, F.L.S., was a noted malacologist (see *Vict. Nat.* **43:** 7-16, May 1926).

— J. H. Willis.

The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

continued from 150 (7)

by James A. Baines

Halgania. Named by Gaudichaud in 1829 after Emmanuel Halgan (1771-1852), a vice-admiral in the French navy, who distinguished himself in the wars of the First Republic and the Empire. Victoria has only 2 of the 15 Australian species, the Rough, *H. cyanea,* and the Smooth or Lavender Halgania, *H. lavandulacea.* The genus is in family Boraginaceae. (Omitted from Part 1.)

Halophila. Gk halos, sea; philos, loving; hence the Latin adjective halophilus, salt-loving. Our species, *H. ovalis,* Sea-wrack, is a flowering plant that grows in shallow sea-water. The genus belongs to family Hydrocharitaceae, the name of which means water-rejoicing or delighting in water.

Haloragis. Gk halos, sea; rhagos, a grape-berry; so-named because of the locality and appearance of the fruit in the first New Zealand species found. The Forsters (father and son) misspelt rhagos as ragis in their original description in 1776; this was later corrected to the more classical form *Halorrhagis* by later authors (except Bentham), but the generic name *Haloragis* of J. R. and G. Forster must stand, by the International Rules. Victoria has 14 species, all native, known as Raspworts, and usually far from the sea. The genus gives its name to the family Haloragaceae.

Harmsiodoxa. Named by O. E. Schulz in 1924 after H. Harms, Berlin botanist, who was, with L. Diels (Berlin), K. Domin (Prague), A. B. Rendle (London) and T. Nakai (Japan) a member of an important committee set up by the International Congress of Plant Sciences, August 1926, J. M. Black (Adelaide) representing Australia. Gk doxa, opinion; doubtless because of a colleague's opinion that a new genus should be set up as distinct from *Blennodia* and *Erysimum*, in which these plants had been placed by F. Mueller. *H. blennodioides*, May Smocks, and *H. brevipes*, Short Cress, are our two species (family Cruciferae).

***Hedera.** The ancient Latin name for ivy. Ivy, **H. helix,* is naturalized in the Port Phillip area and in East Gippsland; its specific name is Gk for anything twisted or wound, hence its use as a generic name in the Mollusca. The specific name *hederacea* is familiar for the Ivy-leaf Violet. *Hedera* is in the chiefly tropical family Araliaceae.

Hedycarya. Gk hedys, sweet; karyon, nut; the fruit being succulent, with the carpels packed in a yellow, mulberry-like head, hence the common name, Austral Mulberry, for our species, *H. angustifolia.* It is a broad-leaf tree, belying its 'narrow-leaf' specific name. It is usually placed in the same family, Monimiaceae, as Southern Sassafras, *Atherosperma moschatum.*

***Hedypnois.** Gk hedys, sweet; pnoe, breath; forming the classical name of a plant thought to have been either dandelion or chicory. There are only 3 species in the genus, ours being the Mediterranean subspecies *cretica* of *H. rhagadioloides,* the other species being in Madeira and the Canary Islands. It is a composite weed of our pastures, and has no common name other than Cretan Hedypnois, the middle syllable of which should be accented.

***Hedysarum.** Gk hedys, sweet; saron, a broom. **H. coronarium* (Soola Clover or French Honeysuckle) is grown in Victoria for fodder or ornament, but as an escape does not persist here as it does in Tasmania. *Desmodium varians,* Slender Tick-trefoil, is a native plant originally named as a *Hedysarum* species by Labillardière; it is in the Hedysareae tribe of Papilionaceae.

***Helianthus.** Gk helios, the sun; anthos, flower; from the resemblance of the disc and ray florets to conventional representations of the sun (cf. genus *Heliotropium,* 'turning with the sun').Often seen where garden rubbish has been dumped, Sunflowers are naturalized along the Murray in S.A. and possibly too in far N.W. Victoria. These composites are mainly native to North America, but are grown commercially in many other lands for the seeds.

Helichrysum. Gk helios, the sun; chrysos, golden; Greco-Latin name of some yellow everlasting. Victoria has 30 species, all native, and known as everlastings or paper daisies. Most have flower-heads living up to the meaning given, e.g. *H. bracteatum,* Golden Everlasting, *H. acuminatum,* Orange Everlasting, and the Common, Clustered and Button Everlastings, but some are white, e.g. *H. elatum,* White Everlasting, and *H. leucopsideum,* Satin Everlasting. The Grey Everlasting's common name comes from the appearance of the leaves. *H. dendroideum,* Tree Everlasting, is one of the many plants called 'Dogwood', more usually in Victoria a misnomer for Common Cassinia, *C. aculeata;* 'Dogwood' in Tas. is *Pomaderris apetala,* in N.S.W. it is *Eremophila longifolia,* and many other plants have been given this confusing name. The only true Dogwoods are species of the genus *Cornus,* the original Dogtree being Wild Cornel *(C. sanguinea)* in England, but North American species such as *Cornus florida,* the large white Dogwood that is the State flower of Pennsylvania, are equally entitled to the name.

Heliotropium. Gk helios, the sun; trope, a turning; Smith & Stearn state that the name was given 'in allusion to an old disproved idea that the flower heads turned with the sun; the leaves and flowers of many plants do this and are known as heliotropic'. Two of our species are native and two introduced, including **H. europaeum,* Common Heliotrope, from which the common name was transferred to the colour heliotrope and to the bloodstone known as heliotrope. There are 250 species in the world, in tropical and temperate habitats; one of our native species, *H. curassavica,* has a specific name meaning 'from Curaçao', the Dutch Caribbean island that gave its name to the bird called the curassow and to the well-known liqueur, curaçao.

Helipterum. Gk helios, the sun; pteron, wing or feather; the genus being separated by De Candolle from *Helichrysum* and named to indicate that it differs from that genus in its feathery or plumose pappus. Our 15 species are known as various kinds of Sunray, the best-known being *H. albicans,* Hoary Sunray, which, like *Helichrysum bracteatum,* is being increasingly cultivated and grown in gardens; especially fine mass displays of them may be seen in the Canberra Botanic Gardens.

***Helxine.** Gk helxine, a kind of plant with woody capsules, formerly applied to *Parietaria,* Pellitory; William T. Stearn states that '*Soleirolia soleirolii* is the latest name for the little creeping herb usully known as *Helxine soleirolii,* named in honour of Joseph

François Soleirol (d. 1863) who made vast collections of specimens of Corsican plants in the first half of the 19th Century'. This plant has a number of picturesque common names, such as Baby's Tears, Mind-your-own-business, Mother-of-thousands, and Corsican Carpet, which tell us that it can really spread over large areas! It is related to the nettles, being in family Urticaceae.

Hemarthria. Gk hemi, half; arthon, a joint; 'because the rhachis does not split into articles' (J. M. Black). Our sole species, *H. uncinata,* Mat Grass, was formerly called *Rottboellia compressa* by some Australian botanists.

Hemichroa. Gk hemi, half; chroa, colour; the perianth of *H. pentandra* being sometimes pink inside, whitish outside. Our two species are known as Joint-weeds, or as Trailing and Mallee Hemichroa respectively. Willis discusses his placing it in family Chenopodiaceae rather than Amaranthaceae, there being a number of competent botanists supporting either classification.

***Herniaria.** A Tournefort name taken over by Linnaeus, given by the French botanist because these plants were formerly supposed to cure ruptures (Lat hernia). Our species, **H. hirsuta,* is given the common name of Hairy Rupture-wort in Oleg Polunin's 'Flowers of Europe—A Field Guide'. It is in family Caryophyllaceae, and is naturalized in Victoria only in the far North-West.

Herpolirion. Gk herpo, to creep; leiron, lily; it is sessile rather than a creeper, despite the name. *H. novae-zelandiae* is the sole species, and it is shared between Australian mainland alpine areas, Tasmania, and, as the specific name indicates, New Zealand. The common name is Sky Lily, probably because the flowers look like stars dotting the grass among which they grow. The 'creeping' epithet was doubtless given because of the rhizome.

Heterodendrum. Gk heteros, different, variable; dendron, tree; the form with -um ending being the Lat version of the Gk *Heterodendron,* as it was long known. Our species, *H. oleifolium,* is known as Cattle Bush or Bullock Bush, and has leaves like those of the olive, as the specific name implies. The family is Sapindaceae, which includes *Dodonaea,* found in similar dry habitats.

Hibiscus. The Greco-Latin name for some kind of mallow, these flowers being in the family Malvaceae. Our native species, *H. farragei,* Desert Rose Mallow, is confined in Victoria to the far North-west, while our introduced species, **H. trionum,* Bladder Ketmia, is widely distributed. *Trionum* and *Ketmia* are superseded generic synonyms by Linnaeus and Tournefort respectively.

Hierochloe. Gk hieros, sacred; chloe, grass; so-named because species of these fragrant grasses were in some parts of northern Europe strewn before church doors on saints' days. Our species are *H. redolens,* Sweet Holy Grass, and *H. rariflora,* Cane Holy Grass or Scented Holy Grass, both native.

***Hirschfeldia.** Named by Moench in 1794 after C. C. L. Hirschfeld, a botanist of Holstein, whose surname means in German 'stag field'. **H. incana* is Hoary Mustard—it is closely related to Charlock and White Mustard, both species of *Sinapis,* another cruciferous genus near to it. (Omitted from Part 1.)

(To be Continued)

Some Notes on *Prostanthera walteri,* (F v. M)

by

MAX W. BOYCE

Of the Klanderia section of the genus Prostanthera, one of the rarest and most interesting species is the Blotchy Mint Bush, *Prostanthera walteri.* A small dense hairy shrub, which grows to about 60 cm, its leaves are ovate or lanceolate with recurved margins, about 1.5-3 cm long, whilst the flowers are greenish with violet streaks or blotches, large, and produced in heads in the leaf axils. It is named after Chas (Carl) Walter who first discovered it on Mt. Ellery in December 1869, and was described by Ferdinand von Mueller in *Frag. Phyt. Aust.* (1870), 7: 108.

Walter (1831?-1907) who was born in Mecklenberg, Germany, arrived in Victoria in the early 1850's. He soon became associated with von Mueller who had recently been appointed as Government Botanist, and was employed to travel extensively, particularly in East Gippsland, plant collecting and was responsible for adding a large number of species to the Victorian list. (Maiden, 1908). Walter was also photographer and botanical collector for the 1870-72 Geodetic Survey of Victoria in East Gippsland which marked out the boundary line between Victoria and New South Wales. R. J. L. Ellery, who was later Government Astronomer, was surveyor in charge of the party. It was during this survey that the tumbled granite peak of Mt. Ellery was named, although it was later discovered that the aborigines had named it Goonegerah, or Egg Mountain, from the shape of the stone on its summit.* (Baldwin and French, 1889.)

Mt. Ellery is a very rugged mountain. Spencer and French, when climbing the mountain during their Croajingalong trip, describe huge masses of granite, some 50 feet high, weathered quite smooth and covered with lichens, thrown about in great confusion so that at times their party had to make their way on hands and feet through crevices between them. Right among the rocks on the summit they found *P. walteri* in bloom.

Colbeck (1959) quotes from a letter written by the then Senior Forests Commission Forester at Orbost that "The Ellery massif comprises the most brutal country likely to be found in Victoria. In estimating your rate of progress at 20 chains an hour, no allowance is made for errors of direction or location . . ." (p.30).

There is now a vehicular track to near the summit. (See Sheet 8623 (Edition 1) National Topographic Map Series, Bendock, 1973.)

P. walteri has also been recorded from Mt. Buffalo (first report by Barnard and Sutton, 1903), and from a very few isolated areas in East Gippsland, viz. Mts. Elizabeth and Kaye, Butcher's Ridge near Gelantipy, and Yalmy River.

Spencer and French (1889) report finding a specimen on Goon Murk (now Goonmirk), south of Bendoc and close to Mt. Ellery. At about

*An illustration of the granite tor on the summit of Mt. Ellery, based on a photograph taken by Walter in 1870, can be found in Spencer and French (1889) opposite p.5.

3,400 ft. ". . . we see, for the first time, the conifer *Nageia alpina* and *Prostanthera walteri,* though the latter is not in flower." (p.19). However this location is not mentioned in the National Herbarium records (Churchill, 1974, pers. comm.) Presumably the specimen was not collected and thus the identification was not confirmed, although this seems surprising as they seemed to have been excited by the find, and as the members of their party did collect over 300 species of plants exclusive of introduced forms and lower cryptogams during their journey through Croajingalong. It may be however that because the plant they saw was not in flower it simply was not collected. As this location does not appear in the records apparently no one else has collected it there either. It is possible that it is there waiting for rediscovery, for Goonmirk is close to Mt. Ellery, and it does have that ". . . natural environment of tumbled granite rocks" that Stewart (1939) felt was so necessary for *P. walteri* to flourish.

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Victorian Ornithological Research Group Westernport Report No. 1

Conclusion

The Birds of the Somers, Sandy Point, Hastings Districts, Westernport Bay, Victoria, Australia.

by WILLIAM A. DAVIS AND ALAN J. REID

CONTINUED FROM VOL. 92, p. 171

BANDING CONSIDERATIONS.

As mentioned earlier in relation to some species, Reid carried out extensive banding over a number of years at selected habitats at Somers and Sandy Point. Some significant facts of interest are briefly summarised below:—

The fortunes of a banded White-backed Magpie runner at the education camp were followed over a five-year period. A male, it fed within its parents' territory for 18 months and helped defend it. At two years it mated with a female from a neighbouring territory to the South, establishing a small territory between the two. The pair nested unsuccessfully that year, the eggs never reaching hatching stage. The male still assisted in defence of the parents' Eastern boundary against the hostile Eastern neighbours, but was allowed some access to the territory to the South. This banded bird expanded his territory to the South in his fourth year and nested successfully, bringing out two

Large numbers of Red-browed Finches were trapped at four banding locations about Somers. There was some interchange between all four sites which were up to 3 miles apart. Most retraps were about 12 months apart suggesting seasonal movements and several parties were retrapped together. One individual was retrapped three times over a period of 3½ years. During this time its culmen growth was 1 mm. Two others were retrapped exactly 3 years later having moved 1½ miles to the North-East and 1½ miles to the South respectively. The longest retrap period was 3 years 10 months with a 1½ mile Northward movement.

Two Flame Robin retraps were noteworthy. Both birds were retrapped 2 miles to the North-West 39 months after banding.

A Welcome Swallow banded at the camp was found at the Naval Depot 7 years later and another was found dead 2 miles to the East 14 months after banding.

The Southern Yellow Robin was the subject of a colour banding study. Over 60 were successively banded at "Somer Cotes" without a retrap or sighting during the Autumn and Winter of 1962. This suggested a constant movement through the foreshore scrub during these months. A Robin was eventually retrapped 4 miles to the South-West after 4 months. A second was retrapped 3 miles to the West after the same period. There were sedentary birds recorded during the summer.

Banded Eastern Shrike-Tits were shown to be present along the foreshore for periods up to eight weeks. Banding records for the Eastern Silvereye indicated moulting as a regular phenomenon during March. One particular Silvereye was retrapped after four years and another after 20 months. Another Silvereye was banded during July and retrapped the following October, and later again in March. A Red Wattle-bird was retrapped after 33 months. A Brown-headed Honeyeater banded in March and retrapped the following February, showed a 1 mm growth in the culmen but measured 3 mm less in wing length. An adult male White-browed Scrub Wren was trapped 3½ years after banding and had a 3 mm longer wing and a culmen larger by ½ mm. Thirty-eight months separated the trapping of a particular Brown Thornbill which moved two miles to the West. A male Blue Wren in eclipse plumage with a blue-flecked head, banded during May, was retrapped in full adult plumage three weeks later.

The above notes indicate positively the great value of bird banding as an aid to tracking bird movements and plumage changes.

Conclusions.

As can be seen, the area under consideration is a most productive one in terms of avi fauna. The great variety of habitats represented undoubtedly contributes to this.

Examination of total counts on each survey trip supports this fact. Table 2 illustrates average counts per season 1962 to 1967. The largest species count was 102 during January 1964. On numerous occasions from 88 to 100 species were listed.

Many of those assisting with the survey often commented that there are very few areas in Victoria where over 90 species can be observed in a day's birding. The results clearly show that Spring and early Summer are the most productive in terms of species whilst Autumn carried peak estimated individual counts. It is during March, April and early May that influxes of Honeyeaters and Lorikeets frequent the Sandy Point Peninsula to feast on nectar from the flowering Banksias and Eucalypts. Premigratory flocking of waders also swell the individual bird counts.

The total of 219 species for the general survey area recorded during the period 1958 to the present, indicates this small part of the Westernport district of Victoria to be a prime bird habitat. Here again, there are few parts of the State that carry such a variety of avi fauna. The most prolific habitats were the Sandy Point Peninsula and Coolart lagoon. The preservation of these two areas is of utmost importance. Both are vital conservation units of untold value to the citizens of Victoria. Other significant areas were the foreshore scrublands from Merricks to Sandy Point, Crib Point, Golden Point, Jacks Beach and Denhams Road beach. These areas must be saved from the ravages of industrialisation and urbanisation if this valuable part of the National Estate is to be preserved for posterity.

Special Acknowledgement.

The authors would like to thank Mr. Neil Wetherill (V.O.R.G.) who took over from Reid as Nature Study Instructor at the children's camp during 1967. Neil continued much of Reid's banding work and also general observations until 1972.

TABLE 1

Sightings of the Pallid Cuckoo.

Year	Arrived	Departed	No. of Sightings
1962	6 September	February 1963	12
1963	18 August	February 1964	11
1964	18 September	February 1965	7
1965	16 September	—	1
1966	NO RECORDS		
1967	7 September	—	1
1968 onwards	NO RECORDS		

TABLE 2

Species	Spring	Summer	Autumn	Winter
Individuals	88	86	82	76
	2750	3125	3775	2550

Average counts per survey trip by seasons (1962 to 1967).

Wombat State Forest, Central Victoria

Bird Species List [29 September - 9 November 1974]

by

S. E. Townsend

From 29 September 1974 to 9 November 1974 the writer was camped in the Wombat State Forest, of the Daylesford and Trentham forest districts. The campsite was between the Lerderderg River and the junction of New Sultan Road and Lerderderg Road, approximately 2 miles west of the township of Blackwood.

In that time, a list was compiled of bird species seen and identified within the immediate proximity of the campsite, and extending to an area encircling it of approximately 1.25 mile radius. All species seen, except the Peregrine Falcon (*Falco peregrinus*), Wedge-tailed Eagle (*Aquila audax*), Sacred Kingfisher (*Halcyon sancta*) and Powerful Owl (*Ninox strenua*) could be found with regularity and ease in the correct habitat and right locality.

The Peregrine Falcon, Wedge-tailed Eagle and Sacred Kingfisher were seen only once. The Powerful Owl is included only on the evidence of a possible Ring-tailed Possum (*Pseudochierus peregrinus*) kill. This was located on a stump beside the Lerderderg River, in a dense riverine growth of Blackwood (*Acacia melanoxylon*).

Bird Species List

Accipiter fasciatus
Brown Goshawk

Acquila audax
Wedge-tailed Eagle

Falco peregrinus
Peregrine Falcon

Phaps elegans
Brush Bronzewing

Calyptorhynchus funereus
Yellow-tailed Cockatoo

Callocephalon fimbriatum
Gang-Gang Cockatoo

Cacatua galerita
Sulphur-crested Cockatoo

Platycercus elegans
Crimson Rosella

Cacomantis pyrrophanus
Fantailed Cuckoo

Chrysococcyx lucidus
Golden Bronze Cuckoo

Ninox novaeseelandiae
Boobook Owl

Ninox strenua
Powerful Owl

Dacelo gigas
Kookaburra

Halcyon sancta
Sacred Kingfisher

Coracina novaehollaniae
Black-Faced Cuckoo-Shrike

Zoothera dauma
Ground Thrush

Turdus merula
Blackbird

Malurus cyaneus
Blue Wren

Acanthiza pusilla
Brown Thornbill

Sericornis frontalis
White-Browed Scrubwren

Petroica multicolor
Scarlet Robin

Petroica rosea
Rose Robin

Eopsaltria australis
Eastern Yellow Robin

Rhipidura fuliginosa
Grey Fantail

Rhipidura rufifrons
Rufous Fantail

Pachycephala rufiventris
Rufous Whistler

Pachycephala pectoralis
Golden Whistler

Colluricincla harmonica
Grey Thrush

Neositta chrysoptera
Orange-Winged Sittella
Climacteris leucophea
White-Throated Treecreeper
Meliphaga chrysops
Yellow-Faced Honeyeater
Meliphaga leucotis
White-Eared Honeyeater
Melithriptus lunatus
White-Naped Honeyeater
Phylidonyris pyrrhoptera
Crescent Honeyeater
Acanthorynchus tenuirostris
Eastern Spinebill
Anthochaera carunculata
Red Wattle-Bird
Strepera versicolor
Grey Currawong
Corvus coronoides
Raven

Western Victoria Field Naturalists Club Association

Meeting at Halls Gap, 18 & 19 October, 1975

Host Club: Stawell Field Naturalists' Club.

PROGRAMME

Saturday, 18 October:

9.00 a.m. Assemble at Hall's Gap Hall.
9.30 a.m. Depart for Barbican Rocks on Redman Road for inspection of old flume line.
12 noon Return to Hall's Gap for lunch.
1.15 p.m. Assemble at Hall's Gap Hall.
1.30 p.m. Depart for Pomonal Road and/or Lake Fyans — wildflowers and birds.
5.00 p.m. Return to Hall's Gap for tea.
6.30 p.m. Annual Meeting of Delegates in the Hall's Gap Hall.
8.00 p.m. Evening programme in Hall's Gap Hall. Guest Speaker: Mr. W. Davis. Subject: Australian Conservation Foundation Aims and Policies.
10.00 p.m. Light Refreshments.

Sunday, 19 October:

9.00 a.m. Assemble at Hall's Gap Hall.
9.30 a.m. Depart for Hall's Gap-Mount Zero Road — wildflowers and birds.
12.30 p.m. Lunch at Mount Difficult Pine Plantation Picnic Area.
3.00 p.m. Afternoon tea and farewell.

Hot water, tea and milk will be provided at the Hall's Gap Hall for lunch and tea on Saturday and at Mount Difficult Plantation for lunch on Sunday.

The A.N.A. Holiday Park is situated off the Stawell Road at the entrance to Hall's Gap. Caravan sites with power are $2.00 per day, tent sites $1.40 per day. It is suggested that caravanners and campers use this park. Please book sites in advance with the Manager, Mr. John Squire, Hall's Gap, Vic. 3381. Telephone: Hall's Gap 56-4215 (Area code 053).

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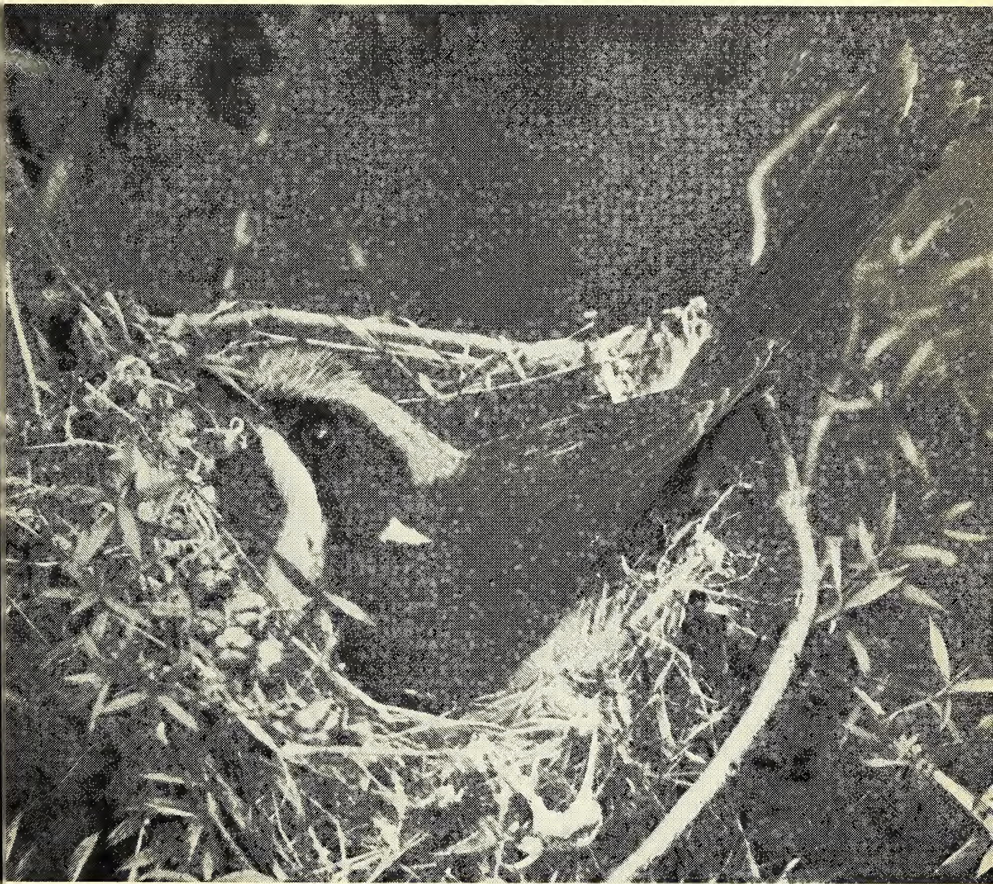

F.N.C.V.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 13 October—At National Herbarium, The Domain, South Yarra, 8 p.m. Speaker: Miss Helen Aston, Subject—"Experiences at Kew Gardens, London."

New Members

Ordinary:

Mr. B. W. Collins, C/o Farrer Hall, Monash University, Clayton, 3168.
Mr. Donald E. Darbyshire, 65 Comer Street, East Brighton, 3187. *Mammals.*
Mr. Stephen Harwood, 5 Prentice Street, Elsternwick, 3185. *Mammals.*
Mr. David P. McVilly, 6 Collins Street, Ormond, 3204. *General.*
Mrs. Ann Miller, Flat 4, 46 Scott Grove, Glen Iris, 3146. *Geology.*
Mrs. Pam Miller, 6 Bickleigh Street, Glen Iris, 3146. *Geology.*
Mr. P. J. Symonds, 60 Westgarth Street, Fitzroy, 3065. *Field Survey.*
Miss H. R. Vincent, 29/530 Toorak Road, Toorak, 3142. *Botany.*
Mrs. H. Weatherhead, 31 Hobart Street, Bentleigh.
Miss Raelene Westcott, Flat 8, 17 Charnwood Road, St. Kilda, 3182.
Mrs. Carleen J. Wheeler, 47 Eliza Street, Black Rock, 3193.
Mrs. Maureen Withell, 67 Charles Street, Kew, 3101.

Joint:

Mr. Mark Nelson and Mrs. Margaret Nelson, 31 Mark Street, East Rosanna, 3084.
Mr. John B. Taylor and Mrs. Sylvia L. Taylor, 4 Arthur Street, Essendon, 3040. *Ferns.*

Country:

Mr. Patrick Bulfin, 189 Jones Road, Somerville, 3912.
Mr. Ralph C. Robertson, 20 Lewry Street, Kyabram, 3620.
Mr. Russell J. Smith, Harding-Lawson Road, Fish Creek, 3959. *General.*

Monday, 10 November—Speaker: Mr. P. Bock. Subject—"Dynamics of the Earth's Crust."

GROUP MEETINGS

(8 p.m. at National Herbarium unless stated otherwise)

Wednesday, 15 October—Microscopical Group Meeting.

Thursday, 16 October—Day Group Meeting. Maranoa Gardens. Take 10.30 a.m. tram, cnr. Collins and Swanston Streets, to Stop 54. Bring lunch.

Thursday, 23 October—Field Survey Group Meeting in Conference Room, National Museum at 8 p.m.

Monday, 3 November—Marine Biology and Entomology Group Meeting in Conference Room, National Museum at 8 p.m. Speaker: Mr. J. Strong. Subject—"The Radula (teeth) of a Limpet."

Wednesday, 5 November—Geology Group Meeting.

Thursday, 6 November—Mammal Survey Group Meeting (F.N.C.V.) at Arthur Rylah Institute, 123 Brown Street, Heidelberg, at 8 p.m.

F.N.C.V. EXCURSIONS

Friday, 17 October-Friday, 24 October—Grampians and Nhill. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation, at 9 a.m.—bring a picnic lunch. The programme for the weekend appeared in the September "Naturalist" and it is hoped members not going for the week will make arrangements to join in for the weekend. Those going by coach should have paid the coach fare of $45.00 by the time this is published. Accommodation is to be paid individually and members are reminded this has been booked on a dinner, bed and breakfast basis so picnic lunches will be required.

Tuesday, 4 November (Cup Day)—President's Picnic at Brisbane Ranges. Coach leaves Batman Avenue at 9.30 a.m. Fare $3.50 Adults, $1.00 Juniors. Bring Picnic lunch. Private travellers to meet at Anakie Junction at 11 a.m.
Special invitation to all Juniors. Bookings with Excursion Secretary.

F.N.C.V. Excursions continued on p. 223.

the victorian naturalist

Vol. 92 No. 10 8 October, 1975

Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

Contents

Front Cover:

The Helmeted Honeyeater is again under threat—this time from the proposal to acquire land near its habitat for motor cycle sports!

Public awareness of conservation and environmental issues has grown substantially in the last decade. As more people have become involved the area of concern has shifted increasingly from the natural environment to what is now termed the built environment. There has of course always been concern with both. It would probably be fair to say that bodies such as the National Trust have always been more concerned with preserving the built environment than with the natural one. However, those like the Australian Conservation Foundation and the Conservation Council of Victoria were in the early days mainly concerned with the natural environment.

Reacting to the changed emphasis in the concerns of the conservation movement C.C.V. recently decided to change its Memorandum of Association to more clearly indicate its involvement with the built environment. Paralleling this change has been the trend to speak of the environment rather than of conservation. The recent decision to drop the word conservation from the name of the federal Department of the Environment and Conservation is indicative of the changing attitudes. Major changes in the A.C.F. some two years ago were also linked, among other things, with the increasing concern about the urban environment.

While there has always been a large number of urban people interested in conservation the percentage of those involved in the movement who have a purely urban background has grown enormously. In consequence the level of understanding and empathy with the natural environment among those in the conservation movement has declined. It was in part to try and overcome this problem, as it affected teachers giving instruction in subjects such as biology and geography, that the Environmental Studies Association of Victoria was formed. Much of its activity reflects a further change taking place in the character of the interest in the natural environment, that must concern serious naturalists. Increasingly the emphasis is on the availability of the natural environment to serve the recreational and residential needs of mankind, rather than with natural history.

See also p. 221 for further item of importance.

The Barilla Industry of Westernport Bay Victoria, Australia

by Juliet F. Bird*

In the eighteen-forties the mangroves which fringe the northern shores and inlets around Westernport Bay were the raw material for an interesting local industry, the production of *barilla*, or alkaline ash[1]. The period of exploitation was brief, but during this time over eighty thousand square metres of mangrove swamp was cut over, and it is possible that some of the damaged areas have never subsequently regenerated. Brilla Creek, in south-western French Island, commemorates the period, but Brilla Island, shown off the north-western corner of French Island on Cox's chart of the Bay (1865) is a misspelling of the original name, Barrallier Island[2].

The printed record of the *barilla* burners at Westernport is sparse, consisting of passing reference in two early books on the area[3,4] quoted by Gunson[5]. The only detailed account of the activity of the men who worked the mangroves is in the unpublished journals of George Henry Haydon, who burnt *barilla* on French Island from October 1843 to March 1844[6]. Other burners were at work before Haydon, for shipments of ash from the Bay began in May, 1843 (see Table 1); probably the early comers had selected mainland sites, forcing Haydon and his "mate", Jack Sanger, to cross to French Island (Plate 1). According to Haydon's description, their first task was to construct a clay burning floor, located near the mangroves, but above the reach of tidal inundation. They then began to cut the mangroves, chopping them with axes low down the main branches, and carrying or dragging them across the mud to the burning floor. It was hard and unpleasant work; the branches scratched their shoulders, their shoes rotted from constant immersion in wet mud, and the mangrove pneumatophores (Plate 2) scratched their feet, leaving wounds that refused to heal. When ten or twenty tons of wood had been collected the pile was ignited, and a day or so later it was reduced to a heap of hot ash. If rain fell during this period the ash was ruined, so Haydon and Sanger spent many nights anxiously watching approaching storms, and endeavouring to build temporary shelters across the ash heaps. Any attempt to hasten the process led to their bagging the ash while it was still hot, which ruined the bags. Nor was it safe to leave the bags of ash until they were despatched on one of the visiting trading ships, for even the isolation of French Island did not protect them from thieves, and on one occasion a load of ash, the product of several weeks work, was stolen while Haydon and Sanger were away on the mainland.

Table 1 gives details of shipments of *barilla* arriving in Melbourne, as listed in the Shipping Intelligence of the *Port Phillip Gazette*.

No record has been found of shipments of *barilla* from Westernport to any other port at this time, so it is reasonable to assume that these figures

*Department of Geography,
Melbourne State College.

TABLE 1

Date of arrival in Melbourne		Ship	Item
29 May	1843	*Alpha*	77 bags* barulla (sic)
29 June	1843	*Alpha*	40 bags ashes
12 September	1843	*Alpha*	1 ton mangrove ash
5 November	1843	*Alpha*	8 tons mangrove ash
22 December	1843	*Alpha*	12 tons mangrove ash
19 January	1844	*Emily*	$1\frac{1}{2}$ tons ashes
20 March	1844	*Alpha*	30 cwt. potash**
27 May	1844	*Ettrick*	3 bags ash
		Total —	65,760 pounds, or 29,891 kilograms

*Haydon describes a bag as of one hundred pounds weight.
**See reference (1).

are an indication of total production from the area. It is unlikely that any was sent overland to Melbourne, for sea transport was easier and cheaper in the 1840's, but the figures do not include stolen ash, which were probably left in the boats of visiting sealers, or ash spoilt by rain.

From these figures it is possible to calculate approximately the area of mangroves cut. Ash constitutes about 4% of above-ground wet-plant weight[7], so 29,891 kgm. of ash would be obtained by burning 747,275 kgm. of wet wood. Attiwell[8] calculated the above-ground biomass of Westernport Bay mangroves as averaging 8.9 kgm. per square metre, so this indicates a cut-over area of 83,963 square metres. Inevitably these calculations are approximate, but they are a guide to the extent of mangrove cutting at this period. The area cut, about 8.4 hectares, is only a small proportion of the total mangrove area, but it is likely that it was concentrated in areas accessible from existing squatters' stations and favoured shipping channels, so that within these sectors cutting would have been extensive. It could be the cause of the disappearance of sectors of mangrove shown at the Inlets and Red Bluff on Smythe's map of the Bay in 1842[9].

Plate 1:

Haydon's sketch of his hut on French Island. Reproduced from the microfilm held in the National Library, Canberra, with the permission of Judith Whitlock.

Table 2

Sample	Sodium ppm	Potassium ppm
Mangrove leaves	700	160
Mangrove stem	120	95
Arthrocnemum leaves	2750	390
Arthrocnemum stem	80	135
Salicornia	3100	475

The use of mangroves as a source of alkali seems to be unique to Australia, although many other plants are known to have served this purpose in other parts of the world[10]. The "best" *barilla*, at the end of the eighteenth century, was considered to come from Spain, where it was obtained from the ashes of *Salsola soda*, a salt-marsh plant found around the shores of Alicante and Tenerife[11]. It was exported from Spain to Britain and France, where it competed with an inferior local alkaline ash derived from kelp, or seaweed[12]. Mangroves were burnt on the New South Wales coast from the early years of the Colony[13], and the men who worked at Westernport probably based their technique on this earlier experience. Even before he went to French Island Haydon worked out some extraordinarily detailed calculations of the income to be derived from the activity, for he proposed to cut 5,963,106 tons, 3 cwt., 3 quarters and 18 pounds of wood, to yield him 59,631 tons of ash, selling at £10 a ton, bringing him a profit of £596,310.

Plate 2:
Interior of mangrove swamp, Westernport Bay, showing aerial root projections (pneumatophores). *photo:* E. C. F. Bird

Chemical analysis of saltmarsh plants around the shores of Westernport Bay (Plate 3) makes the choice of mangroves as a source of alkali rather puzzling, since the sodium and potassium content is considerably lower than that of other available plants, including *Arthrocnemum* sp. and *Salicornia* sp. (Table 2). The selection of an inappropriate plant for *barilla* production was probably one cause of the decline of the industry, but a more important one was the discovery, by the French chemist Le Blanc, of a chemical means of converting cheap common salt to soda. Le Blanc had a small factory utilising this process by 1791, but it was not until 1804 that this method was published[14]. Even then, its adoption was delayed by civil strife in France and by the imposition of high sales taxes in England. Following the repeal of the salt taxes in 1825 English factories rapidly converted to chemical soda production, which was both cheaper, and more efficient than the old plant-based method.

Thus on a world scale the *barilla* burners of Westernport Bay were behind the times, and even delays in the transmission of knowledge to Australia cannot explain their belated attempts to revive an outdated industry. It is possible that the small industries of the new settlement at Port Phillip possessed neither the equipment, nor the financial resources, for the production of soda by chemical means. The glass and soap-making industries, which were the chief users of alkalis, were still very much "backyard" affairs. In the early 1840's, however, the production of tallow and soap expanded greatly, for the slump in the wool market made it more profitable to send sheep to the boiling-down works than to retain them for their wool. Perhaps this industry had become large enough to develop chemical alkali production, causing the price of *barilla* to fall from £10 per ton in mid-1843 to £4 per ton by the end of the year.

The fall in price was the death-blow to the *barilla* industry. Ill-conceived in the first place, it succumbed to technological progress, and remains only as a brief but colourful episode in the history of Westernport Bay.

Acknowledgement

Melbourne State College provided financial support for the research upon which this paper is based.

References

1. The name *barilla* comes from Spain, where it is applied either to the plant, *Salsola soda*, or to the ash derived from it. This ash is a source of soda, but as used in the context of Westernport Bay *barilla* is an alkaline ash, and the relative proportions of soda ash and potash were almost certainly immaterial.
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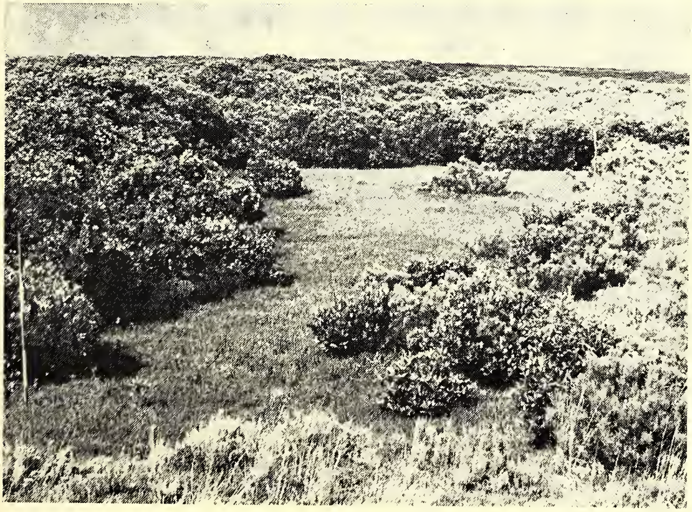

Plate 3:

Potential sources of *barilla* in the Westernport Bay marshes include Mangroves (left), Salicornia (centre) and Arthrocnemum (right).

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The Origin of Generic Names of the Victorian Flora

Part 2 – Latin, Greek and Miscellaneous

continued from 192 (9)

by JAMES A. BAINES

Histiopteris. Gk histion, sheet, sail, web, tissue; pteris, fern. Our species, *H. incisa*, has two common names, Bat's-wing Fern and Oak Fern, both referring to the shape of the fronds, as does the specific name (= incised or cut into). The genus is close to *Pteridium* (Bracken) in family Dennstaedtiaceae.

***Holcus.** Gk holkos, sorghum, which was classified by L. (1753) as *H. halepensis* but Moench named it *Sorghum halepense (1794). Our three species, **H. lanatus*, Yorkshire Fog (called Velvet Grass in U.S.A.), Creeping Fog, and Annual Fog are in the tribe Aveneae, whereas Sorghum is in the tribe Andropogoneae of Gramineae (Poaceae).

***Homeria.** Not in honour of the Greek poet Homer but from Gk homereo, to meet; in allusion to the joining of the filament of the stamens into a tube. Our introduced species are both from South Africa, the One-leaf Cape Tulip and the Two-leaf Cape Tulip (Afrikaans name Rooitulp = Red Tulip). These iridaceous plants have been declared noxious weeds in five Australian States and New Zealand.

***Hordeum.** Latin name for Barley, **Hordeum vulgare*, commonly grown as a cereal grain especially as an ingredient of beer, the name of which probably is the same as the first element in the word barley. Victoria has three naturalised species, the others being **H. leporinum*, Barley-grass, and **H. hystrix*, the specific name of the first meaning 'like a hare's ear' and of the second, 'like a hedgehog' (from resemblance of the long awns to the animal's spines).

Hybanthus. Gk hybos, hump; anthos, flower; alluding to the pouched petal. Two or our three species were originally placed in the superseded genus *Ionidium*, which comes from Gk ion, violet, the family being Violaceae, and the common names Shrub Violet, Erect Violet, and Slender Violet-bush, respectively.

Hydrilla. An ill-formed diminutive of Gk Hydra, the water serpent with many heads destroyed by Hercules as one of his twelve labours, probably given to the plant merely because it is a submerged aquatic herb. It belongs to family Hydrocharitaceae, and in Victoria is found only in the Murray River, and in Lake Moodemere near Rutherglen. It is known as Water-thyme, and there is only one species in the world, *H. verticillata* (so-named because the leaves are in well-separated whorls), distributed from Eurasia, Africa to Australia.

Hydrocotyle. Gk hydor, water (which always becomes hydro- as a prefix); kotyle, a small cup; from the form of the leaves in *H. umbilicus* (says Stearn), one of two species that acquired the name Pennywort in England, from the shape of their leaves. All of our 15 native species are known as pennyworts, but no introduced species are in the Victorian flora. The genus gives its name to Hydrocotylaceae, a family separated by some modern botanists from Umbelliferae, although it is a sub-family (cf. relationship of Papilionaceae to Leguminosae).

Hymenanthera. Gk hymen, a membrane; anthere, anther; the anthers of the flowers being terminated by a membrane (membranous staminal tube). Victoria has only one of the seven species, *H. dentata*, known as Tree Violet, a good name for a violaceous plant with its habit of growth.

Hymenolobus. Gk hymen, membrane, skin or parchment; lobos, pod; the valves of the pod having thin walls. (Hymen was the Gk god of marriage.) There are five species, of which Victoria has only one, *H. procumbens*, known as Oval Purse, since the genus is close to *Capsella*, Shepherd's Purse, family Cruciferae.

Hymenophyllum. Gk hymen, membrane; phyllon, leaf; in allusion to the membranous fronds of these ferns. Our two native species are known as Filmy-ferns. The genus gives its name to family Hymenophyllaceae.

Hypericum. Gk hyper, above; eikon, picture; Smith & Stearn state that St. John's Wort, **H. perforatum*, was supposed to keep evil spirits at bay, in revenge for which the Devil pierced the leaves with a needle. The flowers of some species were placed above images (icons) to ward off evil at the ancient midsummer festival. Victoria has six introduced species, and two native species. The genus gives its name to family Hypericaceae. All our species bear the name St. John's Wort with suitable adjectives for differentiation, except **H. androsaemum*, Tutsan, the specific name meaning 'man's blood', Androsaemum, an old generic synonym for *Hypericum*, and the common name being the French 'toute saine', all-healthy, since the plant was formerly used to cure wounds.

***Hypochoeris.** A name used by the Gk Theophrastus for this or a related genus. Gk hypo, under; choeros, pig; but the common name is Cat's-ear! Our two species are introduced. These composites are sometimes called Flatweeds.

Hypolaena. Gk hypo, below; laina, a cloak; alluding to the bracteoles and empty glumes at the base of the spikelets. There are only two species, of which Victoria has one, *H. fastigiata*, Tassel Rope-rush. *Calorophus lateriflorus*, Spreading Rope-rush, was formerly in the genus *Hypolaena*. These genera are close to each other in family Restionaceae.

***Hypolepis.** Gk hypo, under; lepis, a scale; alluding to the position of the sori, which are under a thin membrane called an indusium. Victoria has four species, all native, known as different kinds of ground-ferns. Printed sources all recommend that the stressed syllable should be the second rather than the third (cf. *Centrolepis* re local pronunciations).

Hypoxis. Gk hypoxis, somewhat acid (hypo, under; oxys, sharp, acid), but said to have been applied by Linnaeus in the sense of 'sharp beneath', because the capsule is contracted at the base. (Smith and Stearn state that it is an old Greek plant name transferred to these plants for no particular reason.) Of the 100 species in the world (chiefly African), Australia has only five, our three Victorian species being the common *H. glabella*, Yellow Star, *H. pusilla*, Tiny Star, and *H. hygrometrica*, Golden Weather-glass; the latter two common names are translations of the specific names. The genus gives its name to family Hypoxidaceae (Ewart included it in Amaryllidaceae).

Hypsela. Gk hypsos, hypselos, high; apparently alluding to the habitat of the type species high in the Andes; but hypsilon is the Gk letter upsilon, the form of which is similar to a two-branched growing plant. The five species in the world are shared between South America, New Zealand and Eastern Australia; Victoria has one only, *H. tridens*, apparently endemic, and found rarely in the Goulburn and Mitta Mitta river valleys. The family is Lobeliaceae, but it was formerly placed in Campanulaceae.

***Ibicella.** Lat ibex (accusative case ibicem), wild goat of the Alps and Apennines; -ella, diminutive suffix; in allusion to the fruit with two long slender upcurved horns, the male Steinbock, *Ibex ibex*, having very large, strongly ridged recurved horns. The genus is in family Martyniaceae, and is an introduction from tropical South America. Our species, found only in the Walwa district (Upper Murray) in Victoria, is **I. lutea*, Yellow-flower Devil's Claw, a Brazilian native known from 1825 till 1929 as a *Martynia*. **M. proboscidea*, Devil's Claw, from Mexico, is found in New South Wales and Queensland.

Indigofera. Neo-Lat for indigo-bearing, because two tropical species, *I. anil* and *I. tinctoria* are the plants from which indigo dyes, of a deep violet-blue colour, are obtained. The word indigo appeared first in English in 1555 as indico, from Lat indicum (as used by Pliny), from Gk indikon, meaning 'the Indian' (substance), a neuter adjective used as a noun; fero, I bear. Our sole species, *I. australis*, Australian or Austral Indigo, is a common pea-flower that has a distinctive variety, *signata* (= 'as though covered with writing'), found in the Warby Ranges and other parts of North-Eastern Victoria, and the more usual form seen in the Warrumbungle Ranges, New South Wales.

***Inula.** Lat name for *I. helenium*, a European weed known as Elecampane (which is a corruption of medieval Lat enula campana = Inula of the fields). Our species, **I. graveolens*, Stinkwort, is, as its common name implies, a fetid weed, obnoxious as fodder but not poisonous, a proclaimed noxious weed for the whole of Victoria. It is a yellow-flowered composite native to the Mediterranean countries. The specific name *graveolens* means 'of strong or rank odour'.

Helenium is a superseded synonym for *Inula*, but valid for a genus of western American composites; it is a latinized form of Gk helenion (the ancient name for *Inula*, which itself is probably a corrupted variant of the same word, by transposition of vowels in popular pronunciation).

***Iris.** Gk iris, rainbow; the genus being named after the goddess of the rainbow, because of the varied colours of the flowers. Our species is **I. germanica*, Common Flag Iris, or German Iris, which, despite its specific name, is probably native to the Mediterranean region. The garden irises are probably hybrids between this species and *I. florentina*, Fleur-de-lis. The heraldic fleur-de-lis or flower-de-luce is by some thought to have been a lily, but its shape points more to the iris, though some say it represents the top of a sceptre or that of a battle-axe or halberd. Our commonest native irises belong to the genera *Patersonia* and *Diplarrena*.

Isachne. Gk isos, equal; akhne, glume; all the glumes being nearly equal. Our sole species is *I. globosa*, Swamp Millet, it having been originally described by Thunberg in 1784 as a species of *Milium*, which was the classical Lat name for millet.

Isoetes. Gk isos, equal, or alike; etos, year; because the submerged species remain the same throughout the year. Victoria has two species, Plain Quillwort and Rock Quillwort, the former so-named from its habitat in temporary pools or swampy ground on plains country, and the latter from the rock pools it grows in. The genus gives its name to family Isoetaceae. Quillworts were called thus in England from a resemblance to a bunch of quills.

Isoetopsis. Gk 'with the form or appearance of *Isoetes*' (q.v. above), though there is no relationship, the latter being a monocotyledonous plant and *Isoetopsis* a dicot in family Compositae (Asteraceae). However, it grows in swampy habitats, our species, *I. graminofolia*, being known as Grass Cushion.

Isopogon. Gk isos, equal; pogon, beard; alluding to the tufts of hair at the tips of the perianth segments. Our two species are *I. ceratophyllus*, Horny Cone-bush (the specific name means horny-leaved), and *I. anemonifolius*, Drumsticks or Tall Cone-bush (with leaves like those of *Anemone*). They belong to family Proteaceae. (*Petrophile*, = 'stone-lover', is very similar.)

Isotoma. Gk isos, equal; toma, a cutting, a section; the segments of the corolla being equal in these lobeliaceous herbs. Our two species are *I. axillaris*, Rock Isotome, and *I. fluviatilis*, Swamp Isotome. *Isotoma* should be pronounced with the accent on the second syllable, but the common name variant Isotome on the first syllable. (Cf. *Thryptomene* in this regard; see Black.)

***Iva.** Gilbert-Carter states that this is probably a Romance name current in Switzerland, of *Achillea tomentosa*, Yellow Milfoil, but applied to our genus by Linnaeus, perhaps because of its aroma; however, it was used by Rufinus as a plant name. Black states the name was 'after *Ajuga iva*, because of the similar odour'. Our species is an introduction from North America, **I. axillaris*, Poverty Weed or Death Weed, and is a composite plant localized at Kerang and Newstead; it appeared at Sevenhills, S.A., in 1933.

***Ixia.** Gk ixia, bird-lime (from ixos, mistletoe berry or mistletoe plant). Two species of these iridaceous South African plants were introduced as garden flowers, but in a number of districts they have escaped and persisted: **I. maculata*, Yellow Ixia, and **I. polystachya*, Variable Ixia.

Ixiolaena. Gk ixia, bird-lime; laina, cloak; Bentham giving the name in allusion to the sticky glandular covering of the original Western Australian species, *I. viscosa.* Our two species are *I. leptolepis*, Plover Daisy, and *I. tomentosa.* A third species of these composites occurs on two Bass Strait islands.

Ixodia. Gk ixodes, sticky (like bird-lime); our species, *I. achilleoides*, being an erect, glabrous, sticky undershrub with profuse attractive flowerheads. The specific name of these composites points to a likeness to *Achillea*, the milfoils, yarrows and sneezeworts.

Jasminum. Lat version of yasmin, the Persian name of scented jasmine, sometimes called jessamine, the Common or White Jasmine, *J. officinale.* Our sole species is *J. lineare*, Desert Jasmine, an inland plant that is found in Victoria only in the far north-west. The genus is in family Oleaceae.

Juncella. Lat juncus, a rush; -ella, diminutive ending. *J. submersa* is now *Trithuria submersa*, but the superseded generic name is still sometimes used as a common name. It is in family Centrolepidaceae, not Juncaceae.

Juncus. Lat name for a rush. Victoria has 22 native species and six introduced, all known as different kinds of rush. Classical Lat had the word as Iuncus, the J being introduced in late Lat for the consonantal use of I, sounded like the y in young, not as j in junk. The family of course is Juncaceae.

***Lachnagrostis.** Gk lachne, lachnos, woolly hair, down. **L. phleoides*, Nit-grass, was transferred to *Gastridium* by C. E. Hubbard in 1954. This rather glabrous annual has lemmas pubescent all over (hence justifying the generic meaning 'woolly grass'?); *phleoides* means 'like *Phleum*, Cat's-tail or Timothy Grass'. Nit-grass was given this odd common name because the small flowers resemble the eggs of lice and fleas (nits).

***Lactuca.** Lat name for lettuce, from lac, milk, lacteus, milky. Our two introduced species are Prickly Lettuce and Willow-leaved Lettuce, fam. Compositate.

Lagenophora. Gk lagenos, a flask; phoros, bearing; alluding to the shape of the achenes, which also supplies the common name, Bottle Daisy. (Cf. the genus *Lagenaria*, Bottle Gourd.) Hj. Eichler prefers the Lat form of the generic name, *Lagenifera*, with same meaning, as spelt originally by Cassini and later self-corrected; the form *Lagenophora* is being conserved. Our flora includes three of the 30 species in the world total.

***Lagurus.** Gk lagos, a hare; oura, a tail; referring to the hairy inflorescence. (Lat lepus, leporis, hare, from Gk lagos, produced, through Old French, our word for a young hare, leveret, with diminutive -et added.) **L. ovatus*, our species, known as Hare's-tail, is a grass native to the Mediterranean lands.

***Lamium.** Lat name of some species of dead-nettle, a name used earlier by Tournefort and adopted by Linnaeus in 1753. Both our species are introduced, Henbit Dead-nettle and Red Dead-nettle. The genus gives its name to family Lamiaceae, the alternative name proposed by Lindley to replace Jussieu's Labiatae, and, like others with the preferred -aceae ending, winning increasing acceptance in recent years. (*L. maculatum* was Lamium in Pliny.)

Lampranthus. Gk lampros, shining, glossy; anthos, flower. Willis points out that our species, *L. tegens*, Little Noon-flower, always considered indigenous in Victoria, is likely to have reached Melbourne on an early sailing ship that called at the Cape of Good Hope en route from England, as the genus is otherwise entirely African. It was described as new by F. Mueller in 1866, but is probably conspecific with *L. caespitosus* described later by South African botanist, L. Bolus. Both species were transferred from *Mesembryanthemum* by N. E. Brown in 1930. The specific epithets *tegens* and *caespitosus* mean respectively 'covering, protecting' and 'growing in tufts'. The family is Aizoaceae, named from the genus *Aizoon*, related to the ice-plants, but called by some Ficoidaceae.

Lappula. Lat lappa, burr; -ula, diminutive suffix, *L. concava* of F. Mueller became *Omphalolappula* in 1931 (navel-like little burr, from the hilum on the seed), the common name being Burr Stickseed, and the family Boraginaceae.

***Lapsana.** Gk lampsane or lapsane, name in Dioscorides of a potherb, perhaps *Raphanus raphanistrum*, Wild Radish, which is still called lampsana in the provincial dialect of Apulia, Italy. Our species, **L. communis*, is known as Nipplewort, a name acquired from its former use for cases of soreness in the mammary glands; the plant was also used for salads. The genus is in the Cichorieae tribe of Compositate.

Lasiopetalum. Gk lasios, hairy; petalon, leaf, petal, sepal (from petalos, spread out, flat); alluding to the hairy calyx. Victoria has five species, including *L. baueri*, Slender Velvet-bush (named after Ferdinand Bauer, 1760-1826, after whom the genus *Bauera*, omitted from Part 1, was also named) and *L. behrii*, Pink Velvet-bush (named after Hermann Behr, German collector of plants and insects in early South Australia, who later wrote a flora of San Francisco region). The family is Sterculiaceae. (Bauer accompanied Robert Brown with Flinders in the 'Investigator', of which we have been reminded during the celebrations of the bicentenary of Matthew Flinders' birth.)

Lastreopsis. Gk for 'like Lastrea', a genus of ferns named by Bory in honour of Charles Jean Louis Delastre (c. 1792-1859), now considered part of the polymorphic genus *Thelypteris*. Ching erected the genus *Lastreopsis* in 1938, and four of our fern species have been included in it. For example, Trim Shield Fern has been successively in *Nephrodium* (R. Brown, 1810), *Aspidium* (Bailey, 1892), *Dryopteris* (N. A. Wakefield, 1944), *Ctenitis* (Wakefield, 1955) and finally *Lastreopsis decomposita* (M. D. Tindale, 1957), with Brown's specific name remaining constant throughout. All our species are known as shield-ferns.

***Lathyrus.** Gk lathyros, pea, or pulse, vetchling. Our two introduced species are Angular Pea and Everlasting Pea. In addition, Chickling Vetch, *L. sativus*, naturalized in New South Wales, has been found on a roadside near Ararat. Sweet Pea, *L. odoratus*, does not persist as a garden escape. Family Papilionaceae.

(To be continued)

ERRATA

Page 191, last sentence of entry *Helichrysum,* delete 'Pennsylvania' and replace it with 'Virginia' North Carolina (chosen 1918 and 1941). State flower of Pennsylvania is Mountain Laurel, *Kalmia latifolia,* in family Ericaceae.'

Page 192, first line of entry *Hemarthria*: The printer has omitted r from the second Gk element, which should read 'arthron', a joint.

The Plant and the Name

Acacia dallachiana—John Dallachy

by M. W. Boyce

One of the wattles endemic to Victoria is the Catkin Wattle, *Acacia dallachiana*, an erect or spreading tree with curved and tapered phyllodes up to about 16 cm long and 35 mm wide. The flowering period is from November to March, with the grub-like buds opening into light yellow catkins about five cm long. It is named after John Dallachy, second Superintendent of the Melbourne Botanic Gardens, and was described by Ferdinand von Mueller in *Fragmenta Phytographiae Australiae* (1858) 1 : 7. The initial discovery was made between granite blocks on the summits of the Buffalo ranges. Willis (1972) reports its distribution as being confined to Mount Buffalo, the Bogongs, and Sassafrass Gap on the Corryong-Omeo Road, although Galbraith (1962) reports having collected it at Beechworth.

Dallachy (1820?-1871), "that excellent collector" (Bailey, 1892), is frequently mentioned in the pages of Bentham's *Flora Australiensis*, whilst certain volumes of Mueller's *Fragmenta* teem with references to his finds. Maiden (1908) refers to the herbarium labels in the Melbourne Herbarium as testifying to Dallachy's "zeal and discrimination".

Born in the north of Scotland about 1820, Dallachy as a young gardener worked at Haddo House, the place of the Earl of Aberdeen, before successfully applying to Sir William Hooker for a position at Kew. He later returned as head gardener to Haddo, the grounds of which were looked upon as being the finest and most extensive in Scotland, and where New Holland plants were especially cultivated.

Leaving Scotland in 1847 to work as manager of a coffee plantation in Ceylon, Dallachy carried with him an introduction from Lord Aberdeen to the island's Governor. He appears to have stayed only a short time on the island, but he was able to obtain from the Governor a letter of introduction to Charles Joseph La Trobe, the Superintendent of the Port Phillip District of New South Wales. La Trobe took a great deal of interest in botany, and it was he who was responsible for the establishment of the Botanic Gardens and for the appointment of John Arthur (1804-1849) as its first superintendent. On arrival in Victoria, Dallachy took up a position as gardener for J. B. Were's Brighton property which he kept until Arthur's untimely death when La Trobe appointed him as the second superintendent of the Melbourne Botanic Gardens.

Dallachy made many botanical expeditions collecting on behalf of the Gardens. He is believed to have been the first to follow the Yarra to its source in the Baw Baws (Maiden, 1908), It was also Dallachy who introduced Ferdinand Mueller to La Trobe and, like Sir William Hooker, recommended him as a suitable person to be botanist. When Mueller set off in the Spring of 1852 on the first of his great collecting expeditions as Government Botanist, Dallachy went part of the way with him. Together they went north from Melbourne as far as Futters Range near Glenrowan before proceeding to the May Day Hills (Beechworth) and finally to the Buffalo plateau and The Horn. Dallachy then had to return to Melbourne, but Mueller continued on an incredible journey over the Victorian Alps and winding his way back to Melbourne, via Wilson's Promontory, covering in all a distance of about 2,400 kilometres (Barnard, 1904).

Through "various causes" (Maiden, 1908) Dallachy lost his position as Superintendent at the Botanic Gardens to Mueller in 1857, although he stayed on as Curator at a salary of £100 p.a. less. What the "various causes" were appears uncertain although Morrison (1957) suggests that he worked his way out of the position ". . . by cheerful and carefree neglect. . ." (p. 34). Certainly he appears to have held no grudge towards Mueller for displacing him as he continued to collect for Mueller for the rest of his life.

In 1861 Dallachy resigned as Curator and established a nursery at Mt. Erica (East Prahran), but as this proved to be an unsuccessful enterprise he became a full-time botanical collector. His collecting expeditions included a number of areas along the Murray and Darling Rivers. In late 1863, at Mueller's request, he joined the party led by G. E. Dalrymple which had settled at Cardwell on Rockingham Bay, North Queensland. Dallachy made substantial collections in north-eastern Queensland, his specimens being well presented and carefully annotated. Mueller described a large number of new species from these collections often simply citing the locality as Rockingham Bay, although some of the specimens came from as far as 350 km away.

Blake (1955) has pieced together Dallachy's movements from the labels to specimens collected by him and lodged in the National Herbarium, Melbourne. On his way from Melbourne to Cardwell, Dallachy apparently collected in the vicinities of Brisbane (Dec. 1862), Rockhampton (Jan.-Apr. 1863) and Bowen (June-Sept. 1863), arriving at Cardwell in late 1863. Whilst living at Cardwell, Dallachy made collecting forays along the coast from Tam O'Shanter Point (north Rockingham Bay) to near Townsville in the south, along the coastal ranges, and along the Herbert, Mackay (now Tully) and Murray rivers — the latter two running into Rockingham Bay north of Cardwell.

Jones (1961) suggests that the Aborigines in the Rockingham Bay area thought Dallachy was "quite mad", and because this made him sacrosanct he was the only one of the settlers who could wander without harassment through the swamps and jungles of the area. He wore a white panama and carried a small gun which he used to shoot down specimens from tall trees. "To shoot at nothing was curious enough, but to pick up a fallen leaf or berry, study it and carefully stow it in a boxful of similar "game" was convincing proof that the elderly white man was far from normal." (p. 93).

Dallachy, a ". . . botanical worthy, to whom justice has not been done either in Victoria or any part of Australia. . ." (Maiden, 1908, p. 107) died in his tent at Herbert Vale, about 30 km south-west of Cardwell, on 4 June, 1871.

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(A photograph of *A. dallachiana* may be found in *Victorian Naturalist*, 1962, p. 40).

Plant Survey of Proposed Dandenong Valley Park

In response to a request from the Zoology Department of Monash University, the Waverley Group of the S.G.A.P. undertook responsibility for a plant survey of the proposed Dandenong Valley Park. S.G.A.P. asked the Botany Group to assist by surveying a small part of the park.

The Group received this request at our meeting on Thursday 13 March. Our chairman went to the S.G.A.P. briefing on 14 March, three members attended a demonstration in the field on Sunday 16, and on Sunday 23 March the Botany Group went into action.

The area allotted to our group extended from Burwood Highway to High Street Road. We were asked to make Quadrats of 100 square metres (120 sq yd) (more or less as occasion demanded) of typical native vegetation with tree layer, shrub layer, field layer and showing height, percentage cover and species. This is not a very precise method but was all that time permitted and was adequate for the purpose—to find the distribution of native vegetation, if any areas were worth retaining in their present state, and to provide guidance if re-claiming and re-planting were planned.

We had to complete our fieldwork in one day, for the next weekend was Easter and our report was required by the end of March. The job was simplified by the fact that much of the land was occupied by orchards, market gardens or grazing, so our investigations were limited to the area close to the Dandenong Creek and to a few pockets along roads, between orchards etc. Our secretary then collated the work sheets of the separate teams.

Unlike previous projected surveys which have been impractical due to the distance and travelling time involved, this area was reasonably accessible. Most participants agreed that the survey was an interesting exercise and a demanding one. On excursions, many of us look only at the plants which interest us, but here we had to look at all plants within our quadrats and name them. Difficulties were presented by the intrusion of non-native vegetation and by the frequent lack of flowers, although fruits were often helpfully present. One of our Eucalypt specialists was happy to come across four specimens of *Eucalyptus yarraensis.*

What will be the outcome of the Survey? Reports were required by the end of March for assessment and preparation of a submission to the M.M.B.W. by the end of April. We can only hope that these surveys and the recommendations of the very alert Waverley S.G.A.P. will save a considerable amount of native vegetation with its natural flood areas, and thus prevent this stretch of the Dandenong Creek from being placed between concrete walls as has happened to the north and south of the area.

E. Jones

Descriptions of the Larvae of *Ceratognathus niger* (Westw.)

Coleoptera: Lucanidae (Stag Beetle)

by

JOHN ALDERSON*

Descriptions of the larvae of several species of Lucanidae *Lamprima varians* Germer., *Lissapterus howittanus* Westw., *Lissotes furcicornis* Westw. and *Syndesus cornutus* Fab. were given recently (Alderson 1975). As a continuation of the work, descriptions of the larvae of *Ceratognathus niger* Westw. and the differences found in the characters of these five species discussed in this paper.

The beetle *Ceratognathus niger* (Plate I) is one of the smaller species of Australian stag beetles and in Victoria this species breeds mainly in the rotting wood of Acacias, but occasionally inhabits the decaying outer layers of Eucalypt logs. Mature larvae have been observed to pupate either during spring months (Sept.-Nov.), with adults emerging in summer, or during late summer-early autumn (Feb.-April), with adults remaining in galleries during winter-spring, before emerging the following summer. The species is nocturnal and on warm summer evenings can be seen flying on the foothills of open schlerophyl forest in the south-eastern region of the State.

General appearance of mature larvae of *Ceratognathus niger* (Plate II).

Body white in colour, elongate, slightly tapering posteriorally, varying in length from 18 to 25 mm on the dorsal aspect. Head yellow in colour, with ocelli at the side of antennae. Abdominal spiracles and pre-spiracular sclerites are lightly pigmented; pale yellow. Abdominal spiracles become smaller posteriorally; 8th abdominal spiracle ill-defined. Anal segment with longitudinal anal opening.

EPIPHARYNX (Plate II, Fig. 2).

Anterior portion of lateral margin angulate. Mesal anterior projection extending to middle of spinose annulus and the fused keeled torma are lightly pigmented; pale yellow. Spines on spinose annulus thicker and somewhat truncated on right side. Keel on pternotorma longer. Distal sensory area with a patch of 8-9 very short, fine, truncated spines each situated in middle of sense spot. Proximad of these and immediately anterior to the spinose annulus occurs a curved transverse row of 6-10 pointed spines. Three stout, pointed setae are situated on the paria near lateral margin. Proximal sensory area comprises one long medial sense cone with three fine, pointed setae on right side; two shorter setae on left side (without paltes).

ANTENNAE (Plate II, Fig. 3).

First and second segment devoid of setae; terminal segment similar to *Syndesus cornutus*.

TARSUNGULUS (Plate II, Figs. 4-5).

Legs terminate with an elongate tubercle, tapering to a slightly curved, medial, spine-like claw. One small spine occurs on inner side near base

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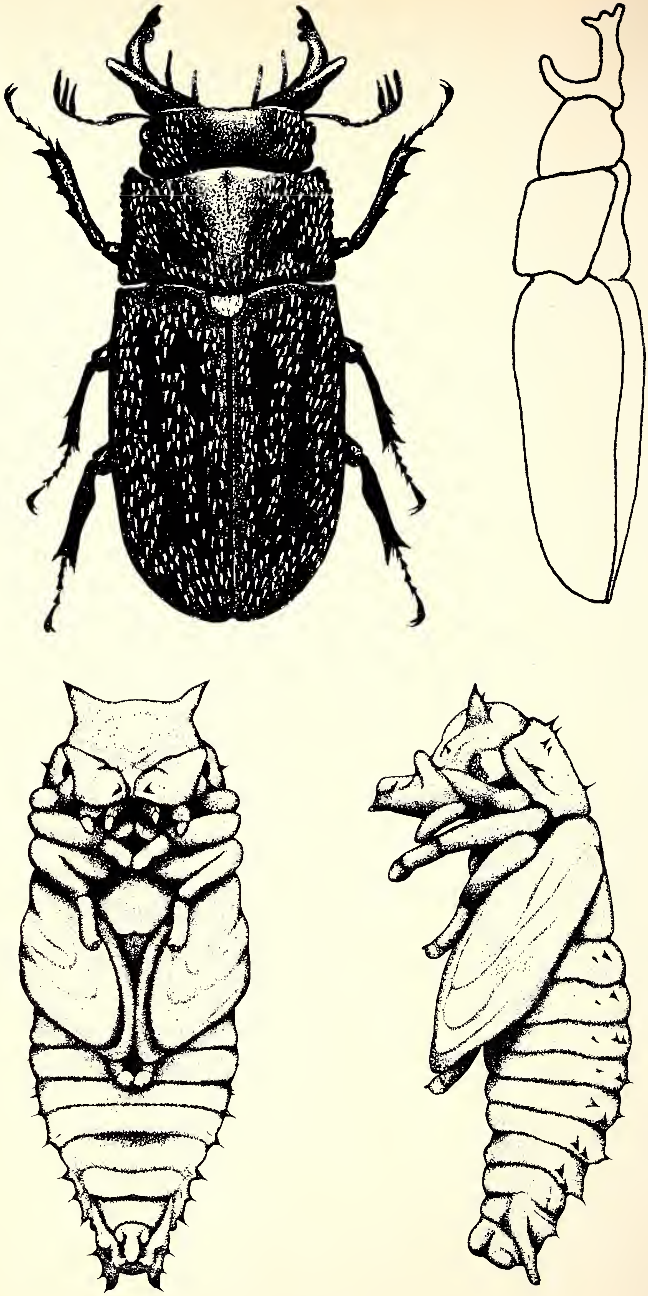
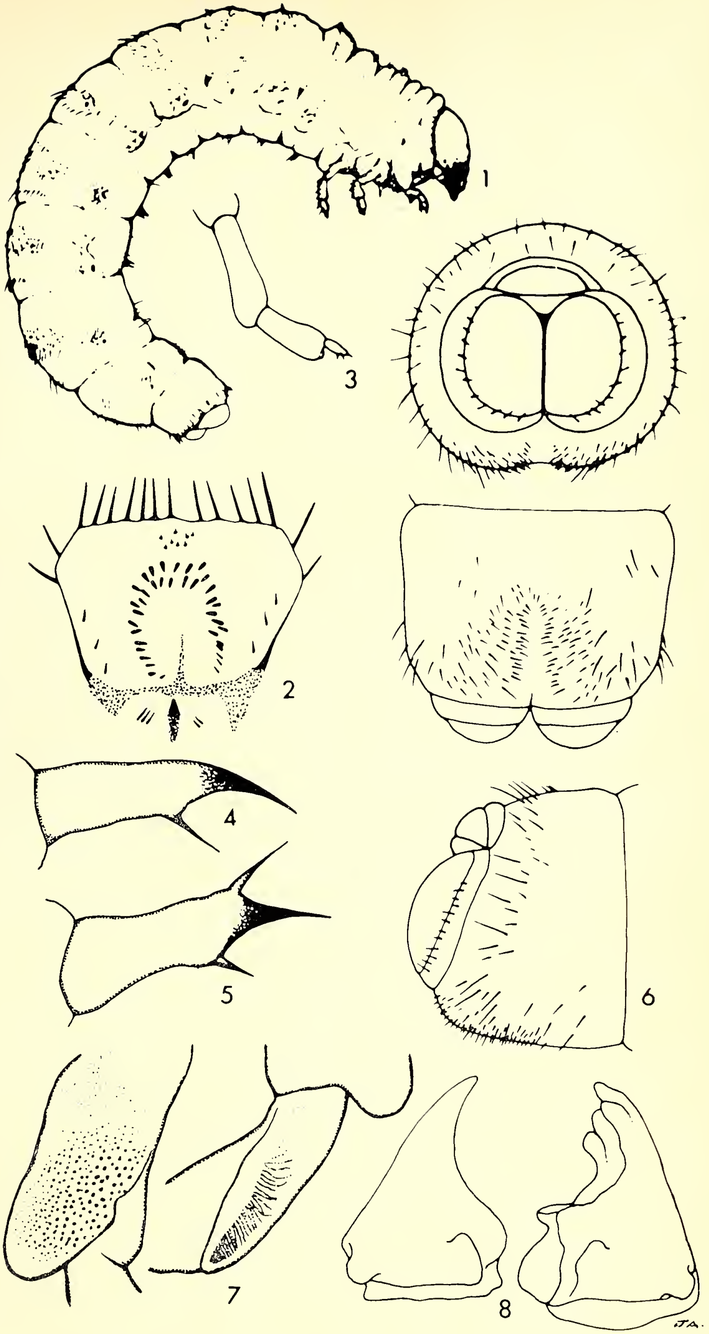


Plate I.
Ceratognathus niger (Westw.) adult male (length 12 mm), and pupa.

Plate II.



1. Larva of *Ceratognathus niger* (Westw.).
2. Epipharynx (underside of labrum).
3. Antennae.
4. Tarsungulus (lateral).
5. Tarsungulus (dorsal).
6. Anal segment (caudal, ventral, lateral views).
7. Stridulatory organs of mesothoracic and metathoracic legs.
8. Mandibles (ventral).

of medial claw; directed forward. Another small spine occurs ventrally, slightly behind inner spine; directed antero-ventrally.

ANAL SEGMENT (Plate, Fig. 6).

Anal segment tri-lobed, with dorsal anal lobe inflated and having distinct inflated pad; devoid of setae. Anal lobes and pads ovate, with several small setae forming a fringe along inner lateral margin of each lobe. Short, strong, introrse setae occur on each side of narrow, closed septula which extends about half the length of the segment (similar to *Syndesus cornutus*).

Mandibles and the stridulating organs are shown in Figures 7-8.

Discussion

In the initial stages of this study difficulties were encountered in distinguishing differences between larvae of Scarabaeidae because the existing key describing the Lucanidae larvae of Australia lacks description of specific key structures. To overcome this problem, the author bred-out several larvae to the adult stage to establish their identity. Although the results of this project are not intended for key construction, the consistent and inconsistent structural characteristics found in the five species (representing five genera) are briefly discussed.

EPIPHARYNGES

The structures of the epipharynges, such as the sense organs of the proximal sensory area; fused torma, spinose annulus and the anterior projection into the annulus, were generally consistent in form. The fused torma on most specimens of *Lissapterus howittanus* exhibit early (?) development of an apotorma each side of the anterior projection and on one specimen extended for about one-third the length of its anterior projection. It should also be noted that a second sensory projection is situated near the middle on the basal margin of the fused torma. This appears as a small, black extension behind the anterior projection and occurs on all species except *Ceratognathus niger*. The projection is rather small and difficult to locate unless the lighting is carefully directed. Characters of the distal sensory area (spines and spots) were consistent in form and position in *Lamprima varians* and *Syndesus cornutus*, but inconsistent in *Lissapterus howittanus* and *Lissotes furcicornis*. The spinose sensory spots on the distal sensory area of *Lissapterus howittanus* were often irregularly placed and lacked the spines; these are apparently broken off at an early stage soon after ecdysis. Sense spots anterior to the transverse row of four spots on *Lissotes furcicornis* are often irregularly placed. The sense organs on the distal sensory of both these species could be described as a longitudinal patch. The curved transverse row of spines anterior to the spinose annulus on *Ceratognathus niger* larvae do not always merge into the annulus, but often occur as a distinct, separate, shorter row. *Ceratognathus niger* larvae were the only ones having setae (not plates) on each side of the medial sense cone; these setae appear to be an important character in separating this genus from others.

Dr. B. P. Moore (pers. comm.) observed that tarsunguli on the larvae of *Lamprima aurata* are clawless. This is supported by the results of the earlier study (Alderson 1975) on *Lamprima varians* and unpublished observation (Alderson) on *L. latereillei*; both these species are clawless. Tarsunguli may well be a major character separating the genera, for the larvae of another species of *Lissotes* [*Lissotes darlingtoni* (unpublished observation)] had curved claws very similar to *Lissotes furcicornis*. The tarsunguli of *Lissapterus howittanus, Syndesus cor-*

nutus and *Ceratognathus niger* were also different in form from each other but consistent in form within each species.

Anal Segments

Larvae of *Lamprima varians* and *L. latreillei* exhibit anal pads which together are cordate when viewed from the caudal aspect and subsequently are distinctly different in form from all other species examined. The V-shaped upper half of the septula extending into the campus on *Lissotes furcicornis* is not always consistent in form. Some specimens often exhibit a few scattered setae which merge toward the middle line on the right side. The anal pads of *Lisspaterus howittanus* are more reniform (concave on inner margin) when anal lobe inflation is extensive. The position (angle) of the setae forming the septula and those setae situated on the ventral portion of the anal lobes were found to be consistent in all species.

Acknowledgements

This study could not have commenced without the generous assistance of Lorraine Alderson, Susan Beattie, Bill and Chris Robbins and Fabian Douglas. I am grateful to Dr. B. P. Moore (C.S.I.R.O.) for disclosing the importance of the "anal segment and tarsungulus" and wish to thank members of the Fisheries Divisions staff, Drs. D. Evans and Z. Abedi, Messrs. J. Cooper, J. Bacher, K. Beinssen, J. Seebeck, P. Rogan and R. Warnecke for their assistance in many ways.

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NEW SECRETARY NEEDED

Unfortunately Mr. Garnet Johnson, who was keen to do all he could as Honorary Secretary when he took over the job earlier this year, now finds that owing to circumstances beyond his control, he will be unable to attend meetings and regretfully has tendered his resignation as Hon. Secretary at the end of October.

This means the Club wants some member who has the welfare of the Club at heart, male or female, to step into the breach and help carry the Club along.

Can you assist in any way to share the work of secretary?

NATURAL HISTORY MEDALLION TRUST FUND

The following donations have been received, and we thank the donors:

Latrobe Valley Field Naturalists' Club	$10
Mr. Roy Wheeler (Medallion Winner, 1965)	10
Donald History and Natural History Group	2
Total at 29/9/75	$22

Our last quote for a medallion was $100, so with postage, printing of circulars and invitations, etc., the cost of awarding a medallion is over $200; and this does not take into account the services ('phone calls, fares, petrol, and so on) given freely by committee members, judges, and others.

As this award is, in the future, to be financed from the Trust Fund, now is the time for all donations to be sent in to ensure its worthwhile continuance.

GARNET JOHNSON,
Hon. General Secretary.

book review

Wild Food in Australia

BY A. B. AND J. W. CRIBB

Published by Collins Publishers Sydney 1975. 240 pps. with selected references, index, eight colour plates; recommended price, $8.50.

Wild Food in Australia provides interesting information about edible plants in Australia; some Australian and some introduced. It is hoped that readers will never be in the position where they need to remember what they have read in order to survive, but rather that they may use this information as a pleasant and carefree recreation.

Dr. and Mrs. Cribb have researched many old and now almost inaccessible journals and have presented the information in a pleasing and readable form. Some of the entries are quite large, e.g. Bunya Pine, while other entries have only a brief comment perhaps for more research.

The text is in a number of parts. I am sure that some will enjoy following the recipe given for preparing some of the fruits. Seeds form another part of the book and their varied use is recorded. Leaves and shoots, roots, tubers and bulbs, flowers, water sources and beverages, exudates, algae (which comprise the seaweeds, the green slimes of fresh water and a few other plants) and the interesting fungi are all included. To complete the information animals which are suitable as food is given.

A pleasant book and one which could open up some interesting areas for self-exploration.

The colour plates used have been specially painted by Charles McCubbin, one of Australia's finest botanical artists.

— F. J. C. ROGERS.

Field Naturalists Club of Victoria

General Meeting, *8 September 1975*

The speaker, Mr. Edmund Gill, gave us a most interesting address on some aspects of the geological history of the Yarra River. Mr. Sault thanked Mr. Gill on behalf of all present.

The chairman then announced the presence of the notable naturalist Mr. Alex Chisholm and he was greeted with acclamation.

Exhibits and Notes by Members. Exhibited were sundry rocks and stones gathered during a trip in W.A. Mr. McInnes spoke of three books and asked that orders be placed with him for—a book of paintings, mostly of Australian flowers, by Mrs. Daisy Wood and selling at $12.00; "Flowers of N.S.W. and South Queensland" being published at $18.95 and available to F.N.C.V. members for about $15; "Reptiles and Amphibians of Australia" publishing at about $22 and possibly at $17 to members; he also announced that the reprinting of the Fern Book had been completed and is likely to be on sale next month. Mr. Tom Sault related an example of the helpful natural history contacts that were made when the F.N.C.V car sticker was displayed when travelling interstate.

The Naturalist. For economy reasons, Council has decided that the November and December Naturalists should be published as one issue appearing in November.

Editor. Our new editor, Mr. Fred Rogers, has received promotion to a headmastership in Horsham. We congratulate Mr. Rogers and wish him well in his new undertaking but rue the loss of our in-coming editor. Our present editor, Mr. Grif Ward, has offered to carry on until the end of the year, but a new one is needed for 1976.

Secretary. Another item equally dismaying to this Club the announcement by our Secretary, Mr. Garnet Johnson, that he finds it necessary to resign as from the end of October.

DAY GROUP VISIT TO CHELTENHAM PARK

Sixteen members attended the outing on 18 September, and after lunch inspected quite a large area of the Park which is a Nature Reserve. Many native plants are blooming at the moment and especially noted were the following:-- Paynes Thryptomene; Correa: Mannic and reflexa; Acacias: drummondi, saligna; Grevilleas: laurifolia, aquifolum; Angophora lasiopetalum; Melaleuca armillaris; Hakea suareolens; Appleberry scandians; Eriostemon nerrucosa and myoporoides.

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Excursions—continued from page 202.

Sunday, 9 November—Geology Excursion: "Fossil Plant". Meet outside Yea P.O. at 11 a.m. Leader—Mrs. Miller.

Friday, 26 December-Friday, 2 January—Orbost. A coach has been chartered and accommodation booked at Orbost Motor Lodge and Traralgon Motel (last night) for the party. Day trips will be made to Buchan Caves, Marlo Plains, etc., but the excursion secretary would welcome suggestions from people familiar with the area. The total cost, fares and accommodation, will probably be about $150 for the eight days.

Field Naturalists Club of Victoria

Established 1880

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 November — At National Herbarium, The Domain, South Yarra, 8 p.m.
Speaker— Mr. P. Bock.
Subject — "Dynamics of the Earth's Crust."

New Members

Ordinary:

Mr. Simon J. Arnold, 3 Winmarleigh Close, Brighton Beach, 3186. *Botany and Geology.*
Mr. Graham E. Billing, P.O. Box 49, Ferntree Gully, 3156. *Botany and Ecology.*
Mr. Stefan Ottomanski, 162 Sydney Road, Coburg, 3058. *Wild Life Photography.*
Mrs. Dorothy Yunis, 16 Rubicon Crescent, Doncaster, 3108. *Botany, Birds and Geology.*
Miss Elaine D. Meehan, 25 Bambra Road, Caulfield, 3162.

Joint:

Mr. Rodney G. Clarke and Mrs. Elizabeth M. Clarke, 23 Reserve Avenue, Mitcham, 3132. *Mammals and Botany.*

Country:

Mr. Robert S. Dye, C/o High School, Shepparton, 3630.

Monday, 8 December — Speaker: Dr. M. Joshi. Subject — "The Grand Canyon, U.S.A." Flora, Fauna, Geology.

GROUP MEETINGS

(8 p.m. at National Herbarium unless stated otherwise)

Wednesday, 12 November — Microscopical Group Meeting.

Thursday, 13 November — Botany Group Meeting. Subject — "Vegetation of Salt Marshes." Speaker: Madge Lester.

Thursday, 20 November — Day Group Meeting. Blackburn Lake — Leader: Mr. Roy Wheeler. Subject: Bird Observing. Take 11.10 a.m. Croydon train; meet at Blackburn Station at 11.30 a.m. Bring lunch.

Thursday, 27 November—Field Survey Group Meeting in Conference Room, National Museum, at 8 p.m. Subject — "Fungi": Mr. Arthur Paul.

Monday, 1 December — Marine Biology and Entomology Group Meeting in Conference Room, National Museum, at 8 p.m.

Wednesday, 3 December — Geology Group Meeting.

Thursday, 4 December — Mammal Survey Group Meeting (F.N.C.V.) at 8 p.m. in Arthur Rylah Institute, 123 Brown Street, Heidelberg.

F.N.C.V. EXCURSIONS

Sunday, 16 November — Daylesford. The coach will leave Batman Avenue at 9.30 a.m., fare $4.00; bring two meals.

Sunday, 14 December — Portsea. Leader: Mr. T. Sault. The coach will leave Batman Avenue at 9.30 a.m., fare $4.00; bring two meals. Marine biology and general.

Friday, 26 December-Friday, 2 January — Orbost. A coach has been chartered and accommodation booked at Orbost Motor Lodge and Traralgon Motel (last night) on dinner, bed and breakfast basis for the party. Day trips will be made to Buchan Caves, Marlo Plains, Cape Conras, etc. The cost, fares and accommodation, will probably be about $150 for the eight days. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation, at 9 a.m.; bring a picnic lunch. A deposit of $20 should be made when booking and the balance by the December General Meeting on Monday, 8 December. Bookings with the Excursion Secretary, cheques to be made out to Excursion Trust; receipts will not be posted unless requested.

the victorian naturalist

Vol. 92 No. 11 5 November, 1975

Acting Editor: G. M. Ward

Assistant Editor: G. F. Douglas

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Field Naturalists Club of Victoria:

Front Cover:

When we reached the Upper Mowamba River . . .

(Drift Hill is in background)

A national seminar on Landscape Conservation in Rural Australia was held recently in Canberra. It was organised jointly by the Australian Conservation Foundation and the Department of Urban and Regional Development. Representatives from conservation bodies, official and voluntary, in all States attended the three day conference. Official policies, attitudes, and planning in regard to conservation and landscape issues at State and Federal level were outlined by the nine speakers on the first day. The four academics among them took a somewhat critical look at the situation in the areas they covered. Whereas the five departmental speakers generally took the line that while problems did exist their respective governments were on the whole doing a good job looking after the landscape. There was a tendency then, and on the following two days, for government speakers to imply that they ought to be trusted to look after the environment and not be subjected to so much criticism. That position was certainly not accepted by the non-departmental speakers, several of whom attacked the effectiveness of present government measures. However most speakers and delegates seemed to agree that results could only be achieved by working through government. Not surprisingly there was little agreement on how that should be done, and no firm resolutions or decisions on action programmes came from the conference.

Speakers in later sessions of the conference dealt with overseas experience and international efforts in landscape conservation, the role and responsibility of private enterprise in regard to landscape, and various special techniques for controlling land use. It was obvious there were many problems experienced in common, despite local peculiarities, and all attending understood the broad nature of the issues; but hardly any new ideas for solving them were presented.

Some of the most useful information presented was in regard to legal aspects of land ownership and agreements covering its use. The most disturbing concept that seemed to be implied in the attitude of many there was that nature must be subordinate to the pleasure of urban man.

Dr. John Lhotsky's Two Excursions into the Australian Alps

by the

LATE N. A. WAKEFIELD

In publishing this paper, a great sense of personal privilege is felt; and my deep gratitude is extended to Mrs. Audrey Wakefield for making the whole possible.

Just a month or so before the untimely death of Norman Wakefield, he told me, in course of conversation, that he had almost completed a paper on the journeys of Lhotsky. The content of that conversation, which fatefully was to be our last, has never faded from my memory.

It was because of this; together with the fact that so many readers would have never been able to appreciate another of his extraordinarily complete and meticulously detailed papers, that an approach was made to Audrey Wakefield on the subject of the possibility of publication.

Her instant willingness to co-operate in every way possible not only made the Editor's task so easy; but allowed this valuable work of a great naturalist to be published posthumously. —EDITOR.

* * *

The introduction to this paper was written prior to the death of the author; and was published in the Melbourne ***Age*** in two parts, during 1969 and 70, in "Nature Notes" — a weekly column appearing over a number of years.

Introduction

The wildflower gardens of the Grampians are at their best in November, and one of the floral showpieces is the blossoming snow-myrtle.

It flowers at lower elevations quite early in the month, but higher up, on the tops of the sandstone peaks and plateaux, the display is delayed by two or three weeks.

In our recent wildflower books the species is named Calytrix alpestris, but those of last generation had the snow-myrtle in a genus of its own. It was Lhotskya to the older botanist, and that name (albeit misspelt) commemorated an almost forgotten Polish scientist and explorer, Dr. John Lhotsky.

He came to Sydney in 1832, and early in 1834 made two excursions from the Monaro district of southern New South Wales into what was at the time completely unknown country to the south and west of the outlying cattle runs of that region.

He gave some account of these excursions in a letter to the newspaper, *Sydney Gazette*, in April 1834, and also in a small book entitled, *A Journey from Sydney to the Australian Alps*, which appeared in 1835.

These writings describe how on the first excursion he passed through Byron's Valley and Napoleon's Valley to ascend Mount William the Fourth, which, he said, was "from five to 7,000 feet and therefore the highest point ever reached by any traveller on the Australian continent".

The second excursion took him finally to a tract of the Snowy River where he discovered Pass Britannia, which, he wrote was "a place where a road, connecting Twofold Bay with the Murrumbidgee and other south-west parts of the Colony may be executed".

Lhotsky did not publish a map showing the routes of his excursions, and there was therefore insufficient evidence to indicate where he had been or to identify the geographical features which he had named.

Recently however, two historians found that the British Museum had an unpublished map and several pages of manuscript notes which had been prepared by Lhotsky, and after studying these they were able to throw some light on the routes of his two excursions.

For each, the starting point was close to the present site of Dalgety, to the south-west of Cooma. The first excursion was westerly into the alps, and the second was southerly into what is now East Gippsland in Victoria.

The matter is discussed in an article which appeared several months ago in the *Royal Australian Historical Society Journal*, and it postulated that Lhotsky's Mount William the Fourth, which he reached in March 1834, was actually Mount Kosciusko, and that his Napoleon's Valley was the uppermost part of the Snowy River valley.

I was allowed later to examine a photocopy of Lhotsky's manuscript and, with some knowledge of the country which he traversed, formed certain opinions about places he named.

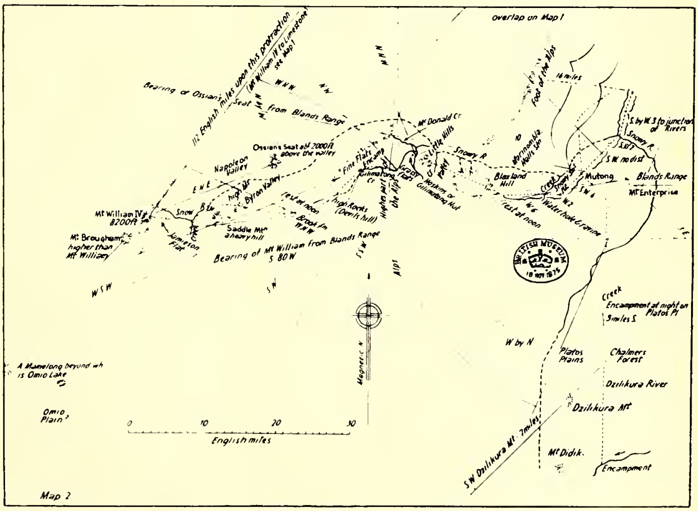
His first excursion appears to have reached a point to the south of the Crackenback River, rather than the Mount Kosciusko area, but that is too long a story to be discussed here.

What is more interesting to us in Victoria is the story of the second excursion, for it mentions names which, though spelt a little differently, can be recognised as Mount Tingaringy, Dellicknora, Jingalalla and Mount Deddick. Lhotsky must have obtained these names from Aborigines, or perhaps his party was led through the country by an Aboriginal guide.

He camped about where Dellicknora is now, on the night of March 11, 1834, and the next day, from a vantage point to the west, saw "Mount Deddik — and farther a succession of seven ranges of Mountains". These ranges would have included Mount Seldomseen (between the Snowy and Buchan rivers) and the Nunniong Plateau beyond.

That afternoon he went down the Deddick River valley, then "ascended (almost dead from fatigue) Durom

Fig. 1



Lhotsky's Map.

Plate 1

Pass Britannia.

Photo: Author.

Burmongi", on the other side of which he found the "Snowy River 70 yards broad" and the party "arrived and stopped at Gap Britannia".

Details of the manuscript indicate that Durom Burmongi was what we now call Mount Bulla Bulla, a few miles north of McKillop's Bridge, and Gap Britannia was probably the deep valley of the Snowy River, upstream from the bridge. The above photograph illustrates valley and mountain.

Lhotsky did not appreciate our gum-trees, for one of the passages in his book reads thus:

"In all the tract which I traversed this time, there reigns a uniformity in its forest trees, that banishes imagination and scantifies experience; and although I saw new kinds of Eucalyptus in Byron's and Napoleon's Valley, about Mount Didic and Pass Britannia, there is always the same monotonous ramification, the same simple coriaceous leaves, the same unshowy flower . . ."

However, he also admitted that the cypress-pines (which he called "Calithris" and evidently met with in the Deddick valley) did "make some variation in this mind-blunting monotony".

But, though we may resent Dr. John Lhotsky's comments about our trees, we must give him credit for penetrating to the vicinity of the Deddick-Snowy confluence in Gippsland on March 12, 1834.

On Lhotsky's Trail

The mists were hanging heavily about the mountains as we rode across the paddocks by the Mowamba River.

It was early morning, on January 27, 1970, and our goal was the rugged range which comprises the far watershed of the river, ten miles or so to the west.

The starting point was in the Moonbah area, 12 miles south of Jindabyne, in far-southern New South Wales, and our purpose, amongst other things was to get to the top of what official maps show as Drift Hill, 6,340 feet above sea level.

For five miles the route lay more-or-less westerly along the river, and we had to ford the stream several times.

Straight ahead was a symmetrical feature which local people call Little Round Mountain, but which the maps designate as Lady Northcote's Chair, and on the left was its rather larger partner, the Big Round Mountain.

Then an ascent for a mile and a half, up a steep heavily timbered valley, took us to Mill Gap, at 4,700 feet elevation. That is a pass, between Little Round Mountain and the more northerly and much higher Moonbah Mountain, and it leads to the upper valley of the Mowamba.

There the valley lies north and south, and we rode first west and then northerly, keeping our elevation, so as to reach the river again about a mile from its head.

It was beautiful country, with open grassy meadows alternating with a light forest of snow gums and mountain gums. There was an extensive meadow along the river itself and, as is usual in midsummer at that elevation, daisies, trigger-plants and the like made a colourful display.

Now the main reason for this excursion was to check a theory that that area had been reached, 136 years ago, by the almost forgotten Polish explorer, John Lhotsky. According to an unpublished record of his, in the British Museum in London, he had travelled south from Cooma to about the present site of Dalgety and then had journeyed westerly for several days. That was in early March, 1834.

His record of the directions and distances travelled, bearings to the mountains observed, and the disposition of streams, indicate that he reached the Moonbah area, then travelled up along Grosses Plain Creek and crossed over to the valley of the Mowamba River.

He believed he had reached the uppermost part of the Snowy River, and he named the place "Napoleon's Valley". He described how his party went up the valley and then took a westerly route for about two miles to what he called "Jamieson's Flat", where they made camp.

From the vicinity of the flat Lhotsky looked out and saw, in an arc from west-south-west to south, "a world of mountains, the last 40-50 miles off". That would have been the Victorian highlands, including Mounts Hotham, Feathertop and Bogong.

Next day the explorer ascended a peak which he named "Mount William the Fourth", and from it he observed "Mount Brougham", a somewhat higher feature a few miles to the south-west. After that the party returned through "Napoleon's Valley" and made their way back to the cattle runs of southern Monaro.

When we reached the upper Mowamba River we found that there was a narrow treeless corridor which led to the west for a mile or so, to the west, up a little lateral valley known as Wombat Gully — the obvious route that an explorer would take. And, sure enough, just beyond its head there was a wide snow plain which can be no other than Lhotsky's "Jamieson's Flat".

The plain lies at an elevation of 5,800 feet, between two 6,000-feet features known as Mount Terrible and Mount Leo. Actually it is the head of a long open plain which mountain cattle men call The Big Boggy and that embraces the head of the Crackenback River.

We rode up on to a plateau to the north of the plain — evidently the "Mount Brougham", and from there saw Lhotsky's "world of mountains" to the south-west. Then a two-mile ride took us on to Drift Hill, or "Mount William the Fourth", and more of the explorer's observations were checked.

Finally, there was the long ride back to the Moonbah pastures again, this time by way of the Little Thredbo River and the high range between the Crackenback River and the Mowamba.

An Appraisal of the Two Excursions

Dr. Lhotsky, in a letter written on 5th April, and published in the *"Sydney Gazette"* on 15th April 1834, made these statements:—

> "I crossed the Snowy River and brought my cart so far as Mutong. I converted my carthorse into a packhorse, and entered by Westall's Opening the very heart of the Australian Alps.
>
> 6th March at 8 a.m. I was on top of Mount William which according to preliminary calculation is from 5 to 7,000 ft. and therefore by far the highest point ever reached by any traveller in the Australian Continent. From this elevated position I discovered towards S.S.W. a very extensive plain, called by the natives Omeo. According to the information I got of the only man of the Menero tribe, who had once been at this plain, it contains a lake biger than Lake George. It was therefore my task to reach this interesting and important place. After my return from the mountains I hired four men on horseback, and entered a second time the vast scenery of the Australian Alps. I ascended Mount Duran Birmungi, where at almost half of the journey, I was obliged to lead my horse and go on foot. So I arrived for the fourth time at the banks of the Snowy River, where its breadth is about 200 yards. There I found a pass, formed by two high mountains, and was only one and a half days journey distant from Stanley's Plain. But the shortness of my provisions and the behaviour of the four men obliged me to go back. However, the discovery of Pass Britannia will before long become of a great importance to the Colony, this being the place where a road connecting Twofold Bay with the Murrumbidgee and the S.W. parts of the Colony may be executed."

Next year, Lhotsky produced a book describing his journey from Sydney to as far as Cooma (Lhotsky, 1835), but his description of his excursions beyond there was never published. Recently, in the British Museum, manuscript maps and notes of Lhotsky's were located which throw light on these more southerly excursions. On the basis of these maps and notes, Jeans and Gilfillan (1969) conclude that Lhotsky reached Mount Kosciusko in March 1834, and named it Mount William IV. That would predate Strzelecki's ascent and naming it as Kosciusko by seven years. Jeans and Gilfillan did not identify Pass Britannia but thought it to be somewhere west of the Snowy River, in the Buchan-Wulgulmerang area of Eastern Victoria.

The present paper presents the results of a study of Lhotsky's manuscript, maps and notes, kindly made available by Mr. W. Gilfillan, and the checking out of virtually all the details on the ground. Mount William is identified as Drift Hill, 6,340 feet high, and miles of Mt. Kosciusko, and Pass Britannia is located at lat. long†.

†The omission of distance and bearing to Drift Hill and Pass Britannia respectively was done purposely, to agree with the typescript as it was at the time of the author's death. To have attempted to add figures to that text would have been presumptuous.

—Editor.

Problems of Interpretation

During the course of the study it became apparent that Lhotsky had a number of idiosyncracies, and these need to be appreciated if his documents are to be interpreted fully.

Jeans and Gilfillan note that "some errors appear in the notes and in the maps". Those they cite apply to the Murrumbidgee district, but several others are found in details applying to the Snowy River area.

On a number of occasions Lhotsky records bearings or directions towards himself instead of the conventional method of recording them towards the feature being observed. As a result, some of the directions of flow which he records for rivers and creeks are actually upstream directions, instead of downstream, while many bearings, which he evidently read from a mariner's compass are very accurate. Others, such as cardinal compass points, appear to have been intended as general rather than precise directions. In some cases, Lhotsky appears to have judged directions possibly by the sun, with varying degrees of accuracy.

His diary record is incomplete, with many distances and directions omitted. On several occasions he assumed a straight route along an initially recorded bearing, but in fact made major changes of direction without realizing it. Often his written notes are found to correspond to features on the ground, but to be misinterpreted on his map. In some cases the contradictions between notes and map are so obvious that one wonders about his reasoning ability.

The diary notes were compiled in retrospect, sometimes with incidental insertions quite out of sequence. Some of the obvious mistakes in his notes were probably made in attempts to amplify details not fully recorded in the first place.

Lhotsky noted many small streams and hills, particularly in connection with the early part of his first excursion from Matong, but later omitted to mention features which are more conspicuous. He applied the term "Alps" to comparatively low ranges. Often Lhotsky over-estimated distances, in some cases recording them as over twice the correct value.

These matters are amplified further in subsequent sections of the paper.

Lhotsky's Diary

The notes which apply to Lhotsky's expedition beyond Cooma are quoted in full, without alteration to punctuation or spelling.

A day's notes are given at a time in the smaller print, and then these are discussed.

A correction of $9\frac{1}{2}°$ anticlockwise is applied to the bearings, and bearings given by Lhotsky, based on an estimate made by officers of the Victorian Department of Lands and Survey, of magnetic variations in the Monaro District in 1834.

Maps used:—

Jacobs River (Sheet 8524) and Numbla (Sheet 8624), of the Australia 1;100,000 Topographic Survey series.

Bega (85 55-4). Tallangatta (85 55-3), of the Australia 1;250,000 series.

Cooma to Matong

The diary for 23 February mentions "Arabell, a deserted station, whence the first water runs towards the Snowy". The distance from "Kuma" (= Cooma) is given as 7 miles. The Arable station site is at lat. 36° 17′S., long. 149° 00′E.

"Thursday 24 febr. Direction S.S.W. near the Cromwell (which begins at Arabell). Arrived at Wulway, 7 Miles from Arabell. Afternoon direction S.W. about 3 Miles near Cromwell. Descending from a hill, Snowy Mountains first visible, in a segment of a circle from W.N.W. to

W$\frac{1}{2}$S, in the first range of mountains is Hosking's Station 14 Miles of (the yoke of the Alps say 10 & 15 Miles behind the hut). From this hill S$\frac{1}{2}$W is Cooper's Station Bridjimil, 9 Miles in a Straight line, S 30-40 Miles is Deligate on the banks of the Snowy, from whence (they say) it turns W. There is but *one* secondary Creek which disembogues itself into its left bank. Camped on the Cromwell about 6 Miles from Arabell."

Lhotsky's "Cromwell" comprised Arable Creek (7 miles long) and the lower 8 miles of Wulway Creek (spelt "Wullwye" on recent maps). The Snowy Mountains observations were from near Wulway Hill (4 miles N.E. of Dalgety). The bearings equivalent to 302° and 274° (true), point close to Gungarton (6,788 ft.), and Kosciusko (7,314 ft.), and thus embrace the highest point of the Australian Alps. Hosking's Station (see 2 March) was in fact, 20 miles from Wulway Hill. The camp was about 6 miles from Wulway, *not* Arable.

"Friday 25 febr. 3 Miles further Cromwell falls into the Snowy, the junction takes place at a very obtuse angle, taking the left sides of the waters as the lines of the angle. 2 Miles beyond the Snowy, on the top of a range a Mamillon was visible, bearing E by S, 18 Miles off, called Ginny Brothers. Before it is Sherwin's station. At a very great distance a solitary Mount, bearing S, sayd to be beyond Deliget. General direction S.W. until Mutong, 12 Miles from Arabell."

The "top of a range" is a point 2 miles S.W. of Dalgety, and the "Mamillon" is probably the Teapot, on Sherwin's Range. The "solitary Mount" is Tingaringy, at 30 miles and 6° to 8° west of *magnetic South*. This southerly observation is only possible from the watershed of the Matong Creek system and would have been made from Twelve-mile Hill (local name) 6 miles due south of Dalgety. Matong (now named "Finister") is 11 miles from Dalgety, on a line slightly east of South. Lhotsky's "general direction S.W." is based on the *initial* trend of the track after the Snowy River crossing and his failure to note subsequent changes of direction. Matong is 12 miles from the Snowy crossing, *not* from Arable (Note 1).

First Excursion into the Alps

"1 March, Direction from Mutong S.W. 4 Miles. 2 Miles farther with a W. direction a ravine and a water hole (right under the first range of mountains, skirting the Alps) — forming subsequently a Creek, which falls in the Snowy River 3 Miles N.E. and it is known that it turns so, that it is distant 8 Miles in S.S.W. — At noon calculated distance from Mutong 10 Miles. After noon direction W.N.W. over Blaxlands hill 2 Miles. Several small Creeks come from N.W. Passed several minor ranges, forming the plateau of Blaxland. At the second range (after a few Miles travelling) the Alps were visible, extending from S. to S.E.-S.S.E. Shewn Deligate hill 40 Miles off. Afterwards direction W.N.W. 3 Miles from Hoskings (vide after) we met a Creek, running N, to the Snowy R (?), distant 1$\frac{1}{2}$ M, the latter runs then with one of its branches W.N.W. From Mutong to the Creek 20 Miles.

The initial 4 miles from Matong was surely N.W. *not* S.W. Had Lhotsky gone S.W. from anywhere in the Matong area, then W, he would have encountered features such as the deep southward trending valley of Back Creek, completely incompatible with his subsequent observations of that day. The "ravine and water hole" were evidently close to Muranumbla Station, at one of the heads of Blackburn Creek, which joins the Snowy about 4 miles N.N.E. The "8 Miles in S.S.W." applied to the Snowy River and was evidently a local report, for a northerly bend of that river lies about 11 miles S.W. on Muranumbla. The noon distance from Matong put Lhotsky at Beloka Creek, which he omits to mention though he must have crossed it. "Blaxlands hill" is a spur south of Guises Creek, rising 700 ft., in 1½ miles. The plateau begins ½ mile farther on, and its main component is a flat basalt cap about 2 miles by a mile, overlying the sedimentary rock. The present name is Guises Range (misspelt "Guys" on some maps). From the edge of the basalt, a distant panoramic view is obtained, including the Byadbo Range (about 4,000 feet and 20 miles S.), then Tingaringy (31 miles) and Deligate Hill (42 miles) and somewhat east of S.S.E. The day evidently terminated at Steels Creek, at a point 4 miles south of its junction with the Mowamba River (Note 2). "The latter" must refer to the creek, for there is a tributary gully running W.N.W. from the point identified as the camping place. The actual distance from Matong is about 6 miles.

"Monday 2 March. After leaving the Creek direction W.N.W. 3 Miles, through small hills. On a flat Gilimatong (Hosking's Station). Near it junction of 2 Creeks, the Gilimatong running from N.N.W. to S.S.E., then it turns round a small elevation, and goes N.N.W. towards the junction. Second Creek (the M'Donald) comes strait W.N.W. from the ranges. Thus joined they fall into the Snowy River E.N.E. about 3 Miles distant. From the hut extends a grassy flat S.W., along the banks of the Gilimatong, farther on are ranges towards W.N.W., at the foot of which Gilimatong runs N.N.E. (or the contrary). About the end of the flats, the Gilimatong recieves an other River, the main Gilimatong being more towards N.N.W. the second coming here from N.N.E. — but its heads are more towards the main range or N.W. We went along the creek runing W.S.W. and crossed it about 5 Miles higher up. Distance from hut to Camp about 10 Miles."

The first 3 miles were along the tributary gully, and the "small hills" were Jillamatong Hill, and two lesser features northerly from it. The "Gilimatong" is Grosses Plain Creek, which in that vicinity flows N.N.W. then turns round a rocky knoll, then flows N.N.W. again across flats, then receives a small tributary (Lhotsky's "M'Donald" but now known locally as Knobby's Creek) from the west, then joins the Mowamba River a further 1½ miles to the north. Lhotsky's map places the hut between Grosses Plain Creek and a north-flowing tributary on the east side. This tributary is a small creek, without any name, with a little flat, the site of the hut — evidently, in its northerly bend about 200 yards from the junction with Grosses Plain Creek.

The first "junction" in Lhotsky's notes apparently applies to the entry into Grosses Plain Creek of the unnamed creek and the second to the entry of Knobby's Creek. From the valley of Grosses Plain Creek, the valley of the Mowamba River is not visible, and Knobby's Creek thus appears to come from the high ranges beyond that river.

Lhotsky's route S.W. from the hut would have followed, approximately, the present alignment of the Moonbah-Ingybyra road. There is a broad grassy flat for two miles along the N.N.E. stretch of Grosses Plain Creek, and at the upper end of the flats the smaller Pig Rendezvous (or Black Swamp) Creek comes from the W.N.W. to join the main stream. The "ranges towards W.N.W." are low ridges within a mile of the main creek. Lhotsky must have crossed Pig Rendezvous Creek only 2 or 3 miles up, for its head is barely 5 miles from the junction, and a direct route from hut to camp would have been 6 miles at most.

"Tuesday 3 March. Direction 3 Miles S.S.W, & W.S.W, at 3rd Mile fine flats towards N.E. At 5 Miles a Creek (Gilimatong?) running from W.S.W. Hereabouts Deivils hill — near the Creek. Noon rest, after making 9 Miles — 3 Miles farther a brook coming from W.N.W. — 1 Mile farther is visible.

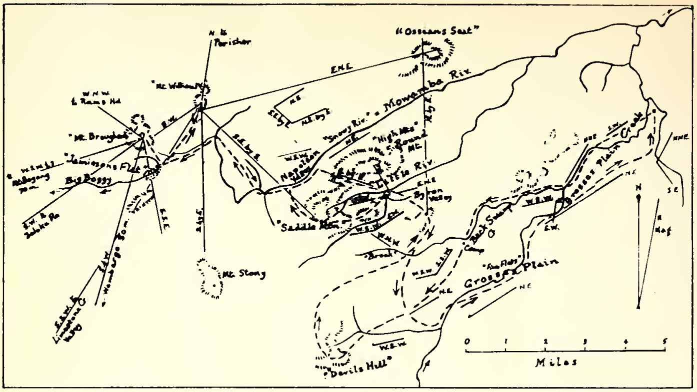


Fig. 2

Excursion 1

. . . Grosses Plain Creek–Mt. William IV . . .

Ossians Seat in a N. by W direction 9 Miles of — 2000 feet above the valley. Camped in Byron's Valley, stretching W.S.W. surrounded by large mountains towards N.W. & S.W."

The "fine flats" are those along Grosses Plain Creek upstream from the Ingybyra road bridge, and the next stream is King's Arm Creek, a westerly tributary of Grosses Plain Creek. At this stage Lhotsky evidently made a major change of direction which he did not record, probably because of the northerly disposition of the main head of King's Arm Creek. His "Deivils Hill" (= Devils) would be a steep rough spur running up westerly from the upper part of the creek. The "noon rest" was probably on the hill north of the head of King's Arm Creek (the site of an old gold mine) and thence the route was north-easterly to the upper part of Pig Rendezvous Creek which there is a tiny fast flowing runnel tending W.S.W.-E.S.E. A mile farther north-east affords the outlook to "Ossians Seat", which is identified as a hump on the range west of Moonbah; it is slightly over 5,000 feet high and some 1,400 feet above the Mowamba River valley. A mile north-westerly then took Lhotsky to Byron's Valley, with Little River (or Rendezvous Creek) W.S.W. in it. Round Mountain (5,193 feet) a mile to the N.W., and another range rising up to the S.W. (Regarding distances, "Ossians Seat" was 4 miles (not 9) from the place of observation, and the day's route was a circuit of 9 or 10 miles which finished only 2 miles direct from the starting point.)

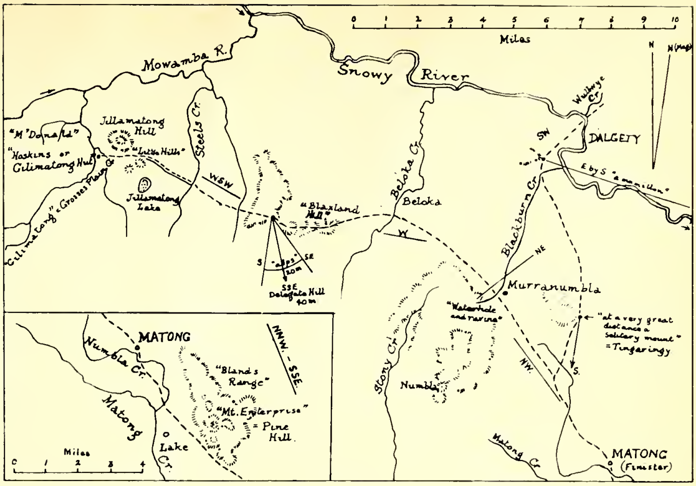
"Wednesday 4 March. Direction S.W. right up a high range $1\frac{1}{2}$ Miles. Then 2 Miles W.S.W. an other heavy hill, from the top the stream — valley of Snowy River visible in a radius from W. to E.* (*went through it afterwards). Descent into Napoleon's Valley, which contains the Snowy River, which lasted 1 Mile. Then I went on in the Valley W.S.W. The Snowy turns by a succession of bendings from a W.S.W. to a westerly, and then N. Easterly, and then Easterly direction. At "Black path a Creek comes from the main range N.W. in the Snowy. (we were going *up*, towards the source of it) Direction W about 2 Miles to Jamieson's flat. At that point, 3-5 ranges of high mountains visible stretching from S.S.E. to W.N.W., and seen in the arc of an acute angle so far as from W.S.W.$\frac{1}{2}$S to S$\frac{1}{2}$W — a world of mountains, the last 40-50 Miles off. S.W. 30 Miles a Mamillon, beyond which is Omeo.(?)"

The S.W. and W.S.W. fit precisely the spur between Little River (or Rendezvous Creek) and its tributary, Little Rendezvous Creek. Lhotsky's map identifies the second "heavy hill" as Saddle Mountain; the "from the top the stream" is interpreted as meaning that the top of the hill is at the head

Fig. 3

Excursion 1

. . . Matong–
Jillamatong
Hill . . .



of Little River, which relationship is shown clearly on his map. The "Snowy River" is again Mowamba River. The valley is aligned W.S.W. for about a mile before turning westerly, then northerly, and finally north-easterly. Lhotsky's present assessment of these trends is not as accurate as the similar observations he made from a better vantage point the next day. There is a small creek, flowing north-westerly to the Mowamba River from between Mount Pepper and "Saddle Mountain", as shown on Lhotsky's map. "Black path" seems to indicate an Aboriginal track. If so, this probably went north-westerly direct to the confluence of Wombat Gully with the Mowamba River.

It is most unlikely that Lhotsky kept to the left of the river (as his map would indicate), on the rough eastern slopes of Mount Terrible. He reached the extensive treeless tract, several square miles in area, which comprises the head of the Mowamba River valley. Wombat Gully, its westerly tributary, affords the obvious outlet, and this leads up to another broad treeless tract at the head of the Big Boggy, at 5,200 feet elevation ("Jamieson's flat"). To make the final observations Lhotsky must have ascended the Adams Monument feature (Note 3) half a mile north of, and several hundred feet above his Jamieson's flat. S.S.E. points to the left-hand (east) end of the nearby Chimneys Ridge, and W.N.W. (magnetic) is the precise line to Rams Head. (Kosciusko, also visible from that point, is lower in angle of elevation than Rams Head.) W.S.W.$\frac{1}{2}$S. (magnetic) points to the Bogong High Plains between Mounts Feathertop and Bogong, 60-70 miles away, and S$\frac{1}{2}$W. is a line to the eastern end of the Wombargo Range, 35 miles distant. The Mamillon would be the point known as Johnnies Top (about 5,140 feet) on the Victorian Beloka Range, 15 miles N.N.E. of Lake Omeo (Note — Abs.).

"5th of March. Distance from the flat to the top of Mount William 2 Miles straight. Near the top, we had a view, at the Saddle Mountain, whence we descended into Napoleon Valley, it beares E by N 8 Miles strait. As seen from here, Napoleons Valley takes from the foot of the Saddle the following directions. It stretches first N E by N 3 Miles, then it turns under a nearby right angle to S E by E $\frac{3}{4}$ of a Mile, & then it turns again N E. Ossian Seat bore E N E 15 Miles off. On the top of Mount William (8200′) wide horizon extending S by E until N, immense accumulation of mountains, the range of Mount William bearing S S W to N N E-S S W 30-40 Miles distant a plain visible — Omeo plains? S W from Mt. William a contiguous mountain (about 4 Miles distant) somewhat higher than the former — say Mt. Brougham, S E side of the horizon (viz the opposite view) not so wild — & a coast range (about Twofold Bay?) shutting up the horizon.

Returning through Napol. Valley, & following it higher up, than we first did, I found, that at its E N E corner, the Snowy runs down in a direction nearby similar to the valley. We went 2 Miles farther up, and after descending (E by S) high mountain, we came down into Byrons Valley, just to the place, we slept on the 3rd March."

"Mount William" is Drift Hill, 6,340 feet high. Assessment of the three directions taken by "Napoleons Valley" corresponds closely to the course of the Mowamba, from near "Saddle Mountain" to its source, the bearings being read, in each case, away from the observer. These observations demonstrate that Lhotsky correctly identified his "Saddle Mountain", but the "E by N" is grossly erroneous. It lies about south-west, and 4 miles distant, from the observation point. E.N.E. (magnetic) is the precise line to "Ossians Seat", 6 miles away. S. by E. points to Mt. Stony (5,875 feet at 5 miles), and magnetic N. is the line to the Perisher (6,741 feet, at 7 miles). SSW points to the valley of Limestone Creek, 30-40 miles distant, the only depression visible in that general direction, and this evidently gave Lhotsky the illusion of a plain. The Drift Hill ridge lies about N.N.E.-S.S.W., and "Mt. Brougham" is the highest part of the Adams Monument feature, 2 miles due S.W. of Drift Hill, and slightly higher.

Drift Hill is due N.E. of "Jamieson's flat", but on his map Lhotsky shows it in a westerly direction. The map has the head of the Mowamba (labelled "Snow R.") pointing westerly too, in contradiction to the N.E. of his notes. Thus the map has the features correctly oriented relative to each other but with *all* three, collectively rotated anticlockwise through about 120°.

The "up" (twice) appears to mean northerly (a common convention when referring to a map), in which case Lhotsky went back initially along his original route but then followed the Mowamba downstream a mile or so farther from where he first descended into it. Then he would have found that the river continued on in about the same direction as the valley which he had been following (see map). Leaving the river, he would go approximately due east (E. by S. magnetic), over the shoulder of Round Mountain and down to the previous campsite on Little River.

"6th March. Direction E N E. We went this time more E of the Deivils Hill, & came on the banks of the Creek (Gilimatong?), which we crossed ½ Mile farther N. Afterwards direction N E., & remained a longer time on the banks of the Creek. Afternoon again N E direction. N many ranges with fine timber, S W mountains in clouds. Arrived at a creek, coming from S.E. & running down S.S.E."

The E.N.E. refers to the initial direction only. Thereafter Lhotsky must have partially retraced his outward route, going well to the South, to reach, follow, and cross, Grosses Plain Creek. He would then have followed its right bank north-easterly observing a mile or so to the north, the same "ranges" noted on March 2nd. The "mountains in clouds" would be the high ranges about the heads of Grosses Plain Creek. The un-named eastern tributory of the Grosses Plain Creek (c.f. March 2) has the N.N.E.-S.E. elbow, and the "secondary ranges" would refer to some rough terrain between the two streams.

Bland's Range Observations

"From Matong 6 Miles E. is Bland's range, road just 2 Miles along a water-run or temporary Creek, running S. & N. A little to the S. a dry Lake. Ascended the range, stretching S.S.E. for about 4 Miles."

Although this statement is placed with the diary record for March 10 (by means of an insert mark), it evidently refers to a short excursion made a day or so before that day. The "road" is probably a mis-spelling of the verb "rode". The "water-run" would be the lower part of Numbla Creek, which joins Matong Creek 2 miles S.S.E. of Matong (or "Finister"). The small lake lies less than a mile farther to the S.S.E. (Note 4). The range begins about a mile east of Finister and thence extends the 4 miles S.S.E., so the "6 Miles E" must be interpreted as meaning that the range extends *to* that distance from Matong, on the easterly side. Pine Hill (also called Curlewis) 3,567 feet, the conspicuous peak of the range, is the "Mt. Enterprise" of Lhotsky's map.

From a point a mile N.N.W. of "Mt. Enterprise", one line is drawn on Lhotsky's map at 280° magnetic, labelled "Bearing of Ossian's Seat from Bland's Range". Another line, at 260° magnetic is accompanied by the legend, "Bearing of Mt. William from Blands Range S.80W." Both lines are very wide of Lhotsky's mapped positions of the respective features. The Ossians Seat feature (at 290° magnetic, and 27 miles) is not visible from Blands Range, as it lies behind the horizon provided by the Numbla Range, 8½ miles distant. The 280° magnetic (true bearing, approx. 290°) is the line to Round Mountain, N.W. of "Byron Valley" (see comments March 3) which is similar in appearance to "Ossians Seat". From Blands Range the "S.80W" (= almost due W. true bearing) points to the highest part of Davies Plain Ridge, 44 miles distant, where there are two humps, about a mile apart, each between 5,700 and 5,800 feet elevation. Evidently Lhotsky mistook these for his Mounts Brougham and King William IV. Drift Hill is 10° farther round towards the north. It is 34 miles from "Blands Range" but is hardly recognizable against the background of the Ramshead Range, several miles beyond.

Second Expedition into Another Part of the Alps

"10 March. We rode first S E, through forest, when Bland range lays to the left. After 5 Miles mountains were met with, & then our direction was W. After 12 Miles arrived at the Snowy River. Succession of ranges, direction S. — arrived at Kariwon or Plato's plains 20 Miles from Mutong.

More about Plato's plains. Its axis is from N.E. to S.W, 4 Miles long, 2½ broad, intersected by a Creek. It is obvious that Snowy River runs behind one of the ranges to the W of the plain. Where we forded it on the 10th it comes Eastward out of Menero, & forms 2 Miles near Plato's a knee or angle, it is very torturated, & goes then behind the higher ranges to Gap Britannia. (Vide infra)."

The description of the route fits the alignment of the present road S.E. from Finister (= Matong), which, after 5 miles, swings to the right. Lhotsky's note that "direction was W" merely indicates a westerly trend. The general direction of the last several miles to the Snowy River crossing would have been about south-west, and 12 miles is an accurate assessment of the distance from Finister to the Snowy. The route would then be about S.S.W. over the hilly country to the west of Currawong Creek (spelt "Currawang" on

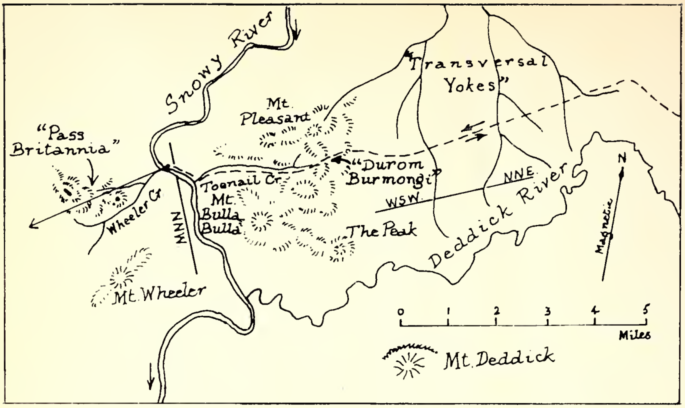


Fig. 4

Excursion 2

. . . Mt. Bulla Bulla – "Pass Britannia" . . .

recent maps). The plains are several square miles in area, about the junction of Bossy's Creek and Currawong Creek. The second paragraph, above, was a later insertion to Lhotsky's redraft of his notes.

"11 March. From the hut on Plato's direction S., the same direction has a Creek, which has some branches towards E. After 3 Miles ranges visible to the W, which shelve down very soon. After 7 Miles from hut reached Chalmer's forest, an escarped Mountain covered with lofty timber. Descending from this, main Alps visible to N.W., running from E.S.E. to W.N.W. 20 miles distant — at the middle of descent visible Dzilikura in S.W. 7 Miles distant, 2000′ high. W by N lies a plain Ambat — 3 Miles farther in a S direction we passed a fine plain called, Dzilikura. Proceeding farther a Panorama of mountains — Wakuran S.S.W., Dzingiringo N.W. — Dzimigulala W.S.W. — between the mountains fine Alpine Plains. Dzilikura especially very luxuriant, small river runs in a S.S.W. direction by E to S.W. Night passed at that river. Made during the day 25 Miles."

The hut must have been near the junction of the creeks, and Bossy's Creek is the one referred to, having its lower tract S-N and its heads to the S.E. The ranges to the west are about 2 miles away, just beyond Currawong Creek. "Chalmer's Forest" was The Round Hill (about 3,350 feet), the highest point of Black Jack Range, probably reached by following the rising main ridge from Currawong. The "Alps", 20 miles north-west, are the mountains about the Byadbo Range, which were also part of the "Alps" noted from "Blaxland's Plateau" on March 1. The first "Dzilikura" was most likely the hill, about 2,500 feet high, a mile north-west of the northern-most Dellicknora farmlands. The "plain Ambat" would be the Karachi area on Currawong Creek, 3 miles to the west. The next observation — "we passed a fine plain called "Dzilikura" — almost certainly originated from a distant view of the Dellicknora area and the "passed" should read "saw" (Note 5). The route appears to have been along the top of the range, running S.S.W., just west of the Delegate River. From the southern end of this range Tingaringy ("Dzingaringo") is conspicuous, 7-8 miles north-west, and the Bowen Range lies between S.S.W. and S.S.E., 10-12 miles away. The highest peak, Mt. Tower Bowen (4,500 feet) is Dzimiligulala (= Jingallala, Note 6), and Wakuran is not identified. The route then would have been west for 3 miles, down to Dellicknora

Creek, about the point where its general direction changes from S.S.W. to S.W., with a short S.S.E. section (the "by E") between. For the day's mileage Lhotsky wrote "25" but then altered this to "20", and the latter is very close to the actual distance.

"12 March. Travelled W. 5 Miles. Mount Didik — & farther succession of 7 ranges of Mountains visible. (From Didik the Gap to Omeo lies W.) Snowy River runs here S. To here 15 Miles from the morning. Afternoon direction W.S.W. on the N side of Didik, where again a small Creek. Traversed several transversal Yokes, running out from Didik, & they all stretch towards N. Descended again towards Snowy River which is very sinuous, but general course is here from N.N.W. From this place Didik lies E.N.E. — direction hence W, ascended (almost dead from fatigue) Durom Burmongi. On the other side — Snowy River 70 yards broad — arrived & stopped at Gap Britannia. Made in the day 25-30 Miles."

The route must have crossed over the southern end of Forlorn Hope Ridge, 3 miles E.N.E. of Tubbut and 3,600 feet high, to allow the observation of Mount Deddick and the ranges beyond. The line of view, between Mts. Deddick and Bulla, would include Mt. Wheeler, Langham's Bluff, Wulgulmerang Plateau (3,000 feet), the Buchan Top including Mt. Seldonseen (4,000 feet) and the Nunniong Plateau including Mt. Nunniong (34 miles distant and over 5,000 feet high) — all in about the same line.

By noon, Lhotsky was somewhere to the north of Amboyne Crossing, and thence the route was north of, and parallel to, the Deddick Valley. The "transversal Yokes" are the several ridges which come up from the valley and rise towards the north, and the part of the valley about Amboyne Crossing would finally be E.N.E. of the party. Thence the route was westerly, to the north of the ridge connecting Mt. Bulla and The Peak. Had Lhotsky reached this ridge, he

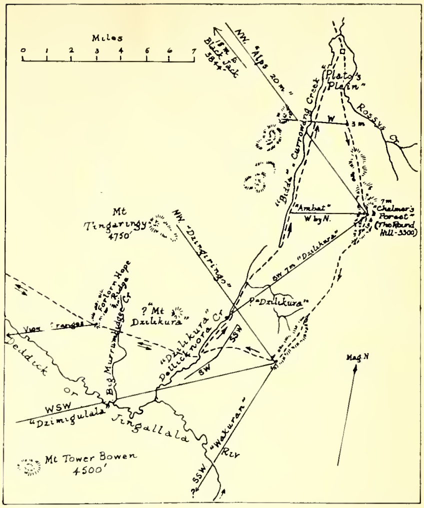


Fig. 5 — Excursion 2
...Plato's Plain–Chalmer's Forest...

would have been looking down on the Snowy River, only two miles away, and would certainly have descended to it rather than go on over a difficult mountain. "Durom Burmongi" is the main ridge a mile north-east of Mt. Bulla — further north the terrain would not have been negotiable. The Snowy River, two miles further west, must have been reached by way of Toenail Creek (local name) three miles upstream from McKillops Bridge and the mouth of the Deddick River. The distance travelled from Dellicknora would have been about 20 miles. In this day's diary, the first two references to the Snowy were inserted in retrospect. Where Lhotsky actually reached the river it does flow N.N.W.-S.S.E. for a few miles, and its more general course through that region is N-S.

Lhotsky and his party were now in a cul-de-sac. At that place horses cannot proceed either up or down the river, and evidently the party was also unable to cross to the other side. Apparently they remained here for 9 or 10 days but there is no diary record of activities for that period. Lhotsky must have explored a little on foot, for what he identified as "Gap Britannia" is observable only from a point three-quarters of a mile up-river from Toenail Creek. The feature is 1-2 miles west of the Snowy, about the valley of Wheelers Creek, and it is discussed further towards the end of his paper.

"20-21 March. Returning I saw, that from Mount Didik the Gap bears W. Night Camp at a Creek. In these mountains all of them come from a direction from between N & W, for the sake of running S., none came from between S & E to run N.
22 March. (Last day before returning to Plato.) Direction E 3 Miles, then 12 Miles N, first we saw mountains topped with snow, then fine cattle land. Bidda a water run of 400 roods brith & 7 Miles long, all luxurient Alpine meadows."

Lhotsky evidently retraced his outward route, travelling easterly to the north of the Deddick River, and camped on one of the many creeks flowing southerly into the river — probably the Big Murrumbidgee. The "Mount Didik" is probably an error for the Deddick valley (Note 7). The Gap is west of part of the valley but north-west of the mountain.

For the last day the route would be easterly to Dellicknora Creek, then straight N.N.E. for about 13 miles. On the latter line the Dellicknora system is followed for five miles to the head of McLauchlans Creek, and thereafter Currawong Creek ("Bidda") is followed for seven or eight miles. The "mountains topped with snow" may have been the Bowens and Tingaringy, all of which are visible from the Dellicknora valley.

Notes

1. The erroneous reference here to "Arabell", and the similar glaring error at the end of the diary notes for 24 Feb., could have arisen only by the later addition of that name to original incomplete notes such as "6 Miles to camp" and "to Mutong 12 Miles".
2. From this point onward, Lhotsky erroneously identified the Mowamba River as the upper part of the Snowy.
3. Adams Monument is a large cairn of rocks on top of a conspicuous crag. It was built many years ago as a pastime by a shepherd who spent some time in the vicinity, grazing a flock of sheep.
4. The lake is on "Lake View", the property of Mr. Kevin Bruce. According to Mr. Bruce it is sometimes dry for several years at a time.
5. This appears to be another case of expanding an original brief note (of Note 1). The original must have been simply a fine plain called "Dzilikura" to which Lhotsky apparently added "passed". He reached, and camped at Dellicknora *after* the north-west view of Mt. Tingaringy, and he could not possibly have *passed* the place prior to that observation of this mountain.
6. The name Jingallala, or Jingalalla, evidently applied also to the upper valley of the Deddick River, for it was the name of a pastoral run taken up there in 1845. The area is now Cabanandra, to the south of Dellicknora.
7. The bracketed comment in the diary notes for 12 March, simply says that "From Didik, the Gap to Omeo lies W", and this "Didik" evidently means the valley (as later in that day's notes). The comment 20-21 March was probably derived from same bracketed note, to which the "Mount" was added in error. (C.f. Notes 1 and 5 above.)

According to Mr. W. McGufficke, of "Flisk Milne" on Steels Creek, Lhotsky's route from Beloka Creek to Grosses Plain Creek, as deduced from his notes of March 1 and 2, coincides precisely with a section of the old bridle track from Dalgety to Moonbah. It is likely that Lhotsky followed an already established track as far as "Hosking's Station". Furthermore the recognition of the distant Delegate Hill suggests that he had with him, at least on March 1, a person familiar with the country.

The several uses of "we" in the notes for the first excursion indicate that Lhotsky was not alone, but there is no record of who accompanied him. The complete absence from his notes of native place names, and the erratic route which he followed demonstrated that he did not have an Aboriginal guide on that excursion.

The wording of his reference to Omeo in the letter to the *Sydney Gazette* suggests that Lhotsky received information about that place on his return to Matong after the first excursion. The name "Omeo" was probably inserted later in his diary notes for March 4 and 5. The Omeo plains are not visible from any part of the route he traversed.

On the second excursion, Lhotsky's party must have included an Aborigine. This is demonstrated by the direct route taken — particularly the short-cut across the mountains from Dellicknora to the Amboyne Crossing area and by the abundant use of native place names.

The Pass or Gap Britannia was something of an illusion. From the east bank of the Snowy, opposite Weelon Creek, there does appear to be a pass, similar to those of the European Alps, between the two "high Mountains" but in actual fact those two features are connected by a ridge and there is no pass. In his book, *"Journey from Sydney to the Australian Alps"*, Lhotsky refers to "new kinds of Eucalyptus — about Mount *Dedic* and *Pass Britannia*, but the evidence is that he did not actually visit either the mountain or the pass.

Lhotsky was probably the first white man to reach the country about the heads of the Mowamba and Crackenback Rivers, and his claim that "Mt. William IV" was the highest point reached by anyone in Australia was almost certainly justified. Also, he was probably the first European to penetrate the Deddick River valley and to reach the now Victorian tract of the Snowy River. But his incomplete, and often inaccurate, record of the routes precluded the possibility of his producing and publishing maps which could identify and properly record his discoveries. He lacked competence (?) as a surveyor and as a cartographer. His map (Fig. 1) demonstrates his limitations in these directions.

Matong

Jeans and Gilfillan (1969) state that "Mutong was situated north of the present 'Matong' homestead and closer to 'Marranumbla' (Hall's Station)." This conclusion is evidently based on Lhotsky's "General direction S.W. until Mutong" of 25 Feb. and his "Direction from Mutong S.W." of 2 March. However as indicated earlier in this paper, the S.W. is evidently erroneous in each case. Lhotsky's observation of Tingaringy on 25 Feb. requires that "Mutong" was southerly from Twelve-mile Hill. His description of the excursion to "Bland's Range" — particularly the reference to the lake — and the distance of 12 miles from "Mutong" to the Snowy River (in notes for 10 March) demonstrate that Lhotsky's "Mutong" of 1834 was precisely where the Matong (or Finister) homestead is today.

Remnants of a *Diuris* series at Warrandyte

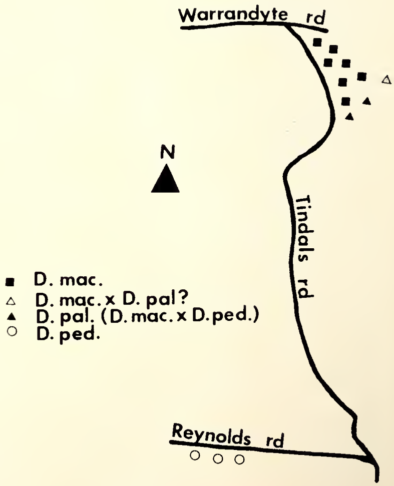
by David V. Beardsell

The genus *Diuris* is perhaps the most botanically interesting genus of Australian terrestrial Orchidaceae. The genus is extremely complex due to both extreme morphological variation and the high frequency of interspecific hybridisation (Rupp, 1945; Nichols, 1969; Jones, 1970a, 1970b; Ingram and Whitehead, 1970).

This paper was written to show how precarious some orchid study areas are. Until four years ago there existed alongside Reynolds Road in Warrandyte a large colony of *Diuris pedunculata* and *Diuris maculata* growing together. Within this colony there existed a hybrid swarm with representatives of *Diuris palachila* (F1 hybrid) and a number of other hybrids including back crosses to both parents (Jones, 1970a; 1970b). Recent road widening has destroyed this almost unique study area. Nevertheless remnants of this hybrid series can still be found in the Warrandyte area as shown in the location map in Fig. 2. Seven plants of *Diuris pedunculata* (Fig. 1d) flowered during 1973 on the south side of Reynolds Road about half a mile from its junction with Tindals Road. This group of plants represents the western tip of the previous colony. In this area not one *Diuris maculata* specimen or hybrid (including *D. palachila*) remains.

The unfenced area north of the wildflower reserve in Tindals Road abounds with *D. maculata* (a typical specimen is shown in Fig. 1a). Last season (1973) I did not record a single specimen of *Diuris pedunculata* in the wildflower reserve although it was once common less than one mile away. Nevertheless about a dozen orchids fitting the description of *Diuris palachila* (Willis 1962; Nichols, 1969; west corner of the reserve (a typical specimen is shown in Fig. 1c). Also found in this area was a solitary plant which had floral characters somewhat between those of *Diuris maculata* (Fig. 1a) and *Diuris palachila* (Fig. 1c). Unfortunately it was growing precariously alongside a horse-track, and a later search failed to locate it. A description of this plant as illustrated in Fig. 1b is as follows.

The lamina of the lateral petals were similar in shape to those of *Diuris maculata.* Orientation of the lateral petals was also very similar to *D. maculata.* The lateral lobes of the labellum however were closer to those of *Diuris palachila* or even *Diuris pedunculata*, while the middle lobe of the labellum was narrow as in *Diuris*



Locality Map.

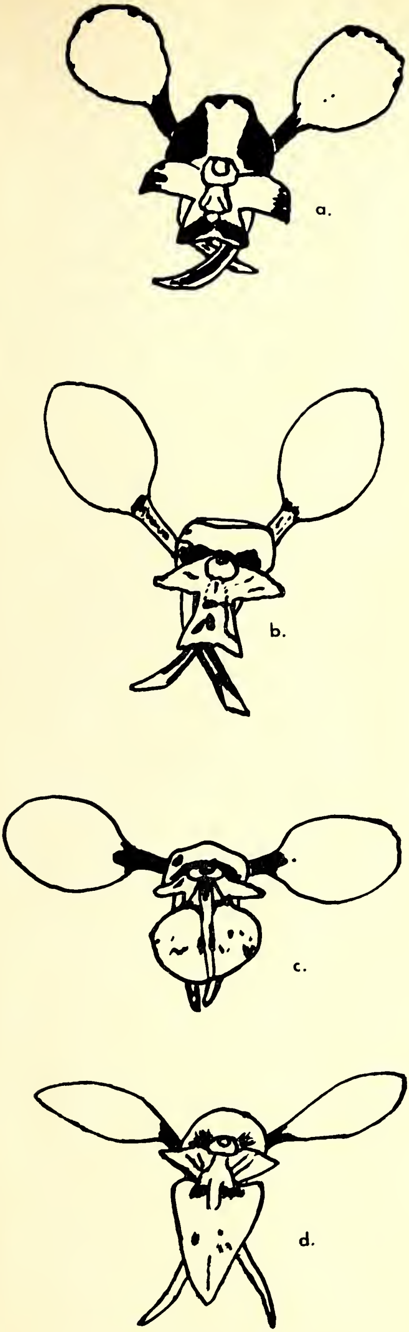


Fig. 1

maculata. The dorsal sepal was more rounded than *D. maculata*. Lateral sepals were crossed in a similar fashion to most *D. maculata* in the vicinity. The yellow ground colour of the lateral petals, labellum and dorsal Jones 1970a) were found in the south-sepal of this hybrid were paler than the yellow of most *D. maculata* that grow in the Warrandyte area. Flowers of the hybrid had less brown marking on the dorsal sepal and labellum than *D. maculata*. Specimens that fit the description of *D. palachila* in the reserve are variable, especially in brown marking, but a typical specimen with its broad middle lobe of the labellum and horizontally oriented lateral petals is shown in Fig. 1c.

It is interesting to note that a colony of at least five *Diuris palachila* plants occurs in Gum Tree Road, Research, approximately two miles north of the Warrandyte specimens. These plants apparently grow in the absence of both *D. maculata* and *D. pedunculata* and could have arisen from wind dispersal of seed from the colony that existed on Reynolds Road. Similarly the presence of *D. palachila* in the reserve without *D. pedunculata* indicates either short distance wind dispersal of seed or *D. pedunculata* had died out here.

Further searching of the Warrandyte area may bring to light further areas where *Diuris* spp. exist, but road widening and the other urban development which is occurring in Warrandyte may destroy the remnants of *Diuris* that are still there. Similarly the continued access of both mini-bikes and horses, together with rubbish dumping has reduced the extent of both *Diuris maculata* and *Diuris longifolia* and a number of other orchids in the unfenced area north of the wildflower reserve.

ACKNOWLEDGEMENT

To D. L. Jones, both for reintroducing me to the botany of Australian Orchidaceae and for correction of this paper. I would also like to acknowledge Mrs. B. Wilson for typing the text.

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Field Naturalists Club of Victoria

General Meeting

13 October

Miss Helen Aston gave us a most interesting address on "Birds and Botany in Britain". Miss Aston told us of some aspects of her work as Australian liaison officer to Kew Herbarium during 1973-74. Then she spoke about the wide interest that exists in Britain regarding birds and conservation, and of the many amateur bird organisations there, some being very purposeful and well financed. These introductory remarks were followed by slides, with commentary, about Kew Herbarium and Gardens and various birds.

Exhibits included some water fleas under the microscope, a two-inch burrowing frog from the Mallee that appeared to have no interest in escaping when dug out from its jar of earth, and the Pigmy Clubmoss, *Phylloglossum drummondii*. This tiny plant was found in the Little Desert, although it is more usual in damp patches on coastal heathlands; it is easily overlooked, but this specimen carried several one-eighth to one-quarter inch fruiting "clubs" on slender stalks rising an inch or more above the half-inch grass-like leaves.

Government Grant. The Secretary announced that the grant from the Victorian Government has been increased by $500; total $1,500.

Fern Book. The revised edition of "Ferns of Victoria and Tasmania" is now for sale at $3.25 retail, $2.50 to Club members. Members were asked to see that their libraries, etc., know about and stock this book.

The Naturalist. Due to the success of our economies and to the increased government grant, it was decided that there should be an issue both in November and December, but publication is unlikely in January because of one-month printers' holiday.

Editor. The Club is still awaiting a volunteer for this most interesting job which becomes vacant in January.

Secretary. At the end of October we will be without a Secretary. Mr. Johnson says he will be able to handle some things at home but will be unable to attend meetings. Secretary (F.N.C.V.) is a demanding job, but the person who undertakes it will be in the know on almost everything that is happening in matters of natural history and conservation throughout Victoria and much of Australia.

Book Sales Officer at General Meetings. Mrs. Peg Strong has resigned and a replacement is desirable. This service enables members to buy natural history books at meetings and brings some financial benefit to the Club.

Notice

Mr. Garnet Johnson, who has had to give up the position of Secretary of the Club, is still keen to do all he can and has accepted the position of Correspondence Secretary. Inquiries and letters may still be sent to his address for attention.

NATURAL HISTORY MEDALLION TRUST FUND

The following donations have been received and we thank the donors.

Investments to 29th September, 1975	$22
Society for Growing Australian Plants, S.A. Region Inc.	10
West Australian Wildflower Society (Inc.)	10
Society for Growing Australian Plants, Victorian Region	100
Rene and Garnet Johnson, Chadstone, Victoria	10
Wild Life Preservation Society of Australia	10
Total at 23rd October, 1975	$162

A splendid donation of $100 by S.G.A.P. Victoria has got us off to a good start towards our target of $2,000. All money donated has been invested and is earning interest.

GARNET JOHNSON, Hon. General Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1975-1976.

President:

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Treasurer — Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145.

Acting Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3151. (52 2749.)

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Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$0.75

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

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Category "B"

F.N.C.V.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

At National Herbarium, The Domain, South Yarra, 8 p.m.

Monday, 8 December — Speaker: Dr. M. Joshi.
Subject: "The Grand Canyon, U.S.A."
Flora, Fauna and Geology.

Monday, 12 January — Subject: "Members' Night". Organiser: Mr. Ian Cameron. (Please contact or phone Mr. Cameron if you have slides you wish to show. Tel. 86 7035.)

Monday, 9 February — Speaker: Mr. M. D. Gottsch.
Subject: "Red Wilderness."
Ecological Study of N.W. Mallee.

New Members

Ordinary:

Miss Helen Garretty, P.O. Box 217, Toorak, 3143. *Botany and Geology.*
Mrs. Enid J. Hallister, 26 Swinburne Avenue, Hawthorn, 3122. *Botany.*
Miss Margaret Harris, 26 Mary Street, Kew, 3101. *Mammals.*
Mr. John Kune, 1 Hillside Road, Rosanna, 3084.
Mr. Ross G. McDonald, P.O. Box 9, Upper Ferntree Gully, 3156. *Botany.*
Miss Bernadette O'Connor, 55 Bellairs Avenue, Yarraville, 3013
Mr. Nicholas Schumejko, 354 Lower Plenty Road, Rosanna, 3084. *Botany.*
Mr. Russell Thomson, 115 Hawdon Street, Heidelberg, 3084. *Mammal Survey.*
Mr. Stephen Whately, 461 Nicholson Street, North Carlton, 3054. *Botany and Geology.*
Mr. Graeme C. Cox, Crystal Brook Caravan Park, Warrandyte Road, East Doncaster, 3109. *Fauna and Flora.*

Country:

Mr. William Taylor, 32 Victoria Street, North Geelong, 3215. *Botany.*
Mr. Adrian Walker, "Tarwin Farm", Tarwin Meadows Road, Tarwin Lower, 3956. *Birds and Mammals.*

GROUP MEETINGS

(8 p.m. at the National Herbarium, unless otherwise stated.)

Thursday, 11 December — Botany Group — Members' Night. It is hoped as many members as possible will contribute.

Most groups go into recess in December or January, if uncertain contact the group secretary; usually groups which meet after the general meeting in January will meet on their regular nights.

Wednesday, 21 January — Microscopical Group Meeting.

Thursday, January 22 — Field Survey Group Meeting.

Monday, 2 February — Entomology and Marine Biology Group Meeting.

Thursday, 5 February — Mammal Survey (F.N.C.V.) Group Meeting.

Thursday, 12 February — Botany Group Meeting.

F.N.C.V. EXCURSIONS

Sunday, 14 December — Portsea. Leader: Mr. T. Sault. Marine Biology and General. The coach will leave Batman Avenue at 9.30 a.m.; fare $4.00; bring two meals.

Friday, 26 December-Friday, 2 January — Orbost. A coach has been chartered and accommodation booked at Orbost Motor Lodge and Traralgon Motel (last night) on dinner, bed and breakfast basis for the party. Day trips will be made to Buchan Caves, Marlo Plains, Cape Conras, etc. The cost, fares and accommodation, will probably be about $150 for the eight days. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation, at 9 a.m.; bring a picnic lunch. A deposit of $20 should be made when booking and the balance by the December General Meeting on Monday, 8 December. Bookings with the Excursion Secretary, cheques to be made out to Excursion Trust; receipts will not be posted unless requested.

Sunday, 18 January — Warburton District. Ferns and General. The coach will leave Batman Avenue at 9.30 a.m.; fare $4.00; bring two meals.

the victorian naturalist

Vol. 92 No. 12 — 3 December, 1975

Acting Editor: G. M. Ward
Assistant Editor: G. F. Douglas

Contents

Front Cover:

The Eastern Native Cat (*Dasyurus quoll*), a dweller in Studley Park, Melbourne, until 25 years ago.

It is common at this time of year to be looking either forward to the coming year, or back over the one just past. In any assessment of a current situation it is usually necessary to do both if it is to be valid. At present it appears more people than ever are interested in natural history. There seems to be more public awareness of nature, and more official recognition of the work of natural history groups.

The winning of the Victorian Conservation Prize for 1975 by the Bird Observers Club, presented on 1 December, is evidence both of the work being done by natural history groups and of its recognition; as was the award of the 1974 prize to the Mid-Murray Field Naturalists Group. The help which these and other voluntary bodies with naturalist interests have given to the Land Conservation Council and to the carrying out of various environment impact statements has won them increased recognition from government. There has of course been some limited appreciation of their value over a long time. However, while there is ample publicity given to natural history topics these days, and wide interest in them, the numbers who are actually doing serious study remains relatively small.

The level of publicity given to natural history in recent years seems to carry both benefits and dangers. There is wider interest and awareness of nature. On the other hand there appears to be a growing apathy about the need to study and understand it. So much information is presented through the media that it seems many who have no depth of knowledge believe all is well. It is almost like the attitude recorded as widely held late last century and early this one when many apparently believed man had reached the pinnacle of civilization and had little more to learn.

In wishing members season's greetings it is suggested all might try to take advantage of the current wide interest in nature to encourage more people to study it, and join the club.

Snakes in Combat

by

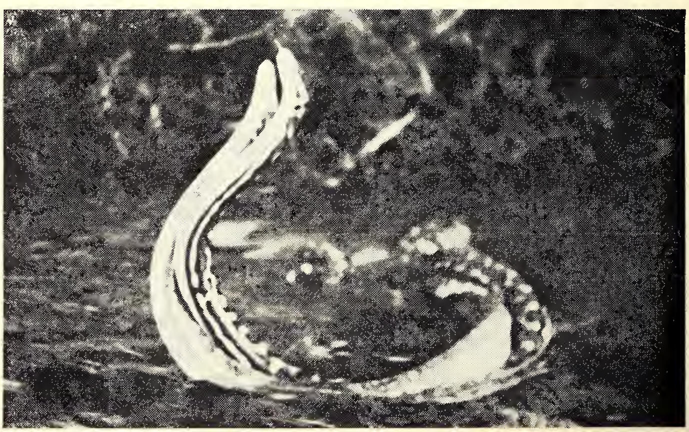
Jeanette Covacevich*

Little has been written about the behaviour of Australian snakes in their natural habitat and almost nothing is known about the form ritual combat takes or the reasons behind such conspicuous behaviour. Combat has been observed and reported on, in only two species of Australian snakes, both Elapids; the Red-bellied Black Snake (*Pseudechis porphyriacus*) Fleay (1937), Baker (1968) and the Brown Snake (*Pseudonaja textilis*) Fleay (1951). While this form of behaviour has been dealt with more widely in overseas, especially American, literature there are apparently no descriptions of combat between Australian pythons (Boids) although Ross (1973) has noted "wrestling" in captive males prior to mating of Children's Pythons (*Liasis childreni*).

On 30 September, 1974, two Carpet Snakes (*Morelia spilotes variegata*) were observed in combat in shallow water near the bank of the Logan River, some 8 km west of Beenleigh, on the Mt. Tamborine road. The two snakes were first observed through binoculars from a distance of approximately 400 m and the initial impression gained was of a pair of large, long-necked birds (possibly cormorants) engaged in a complicated courtship dance. Closer examination of the pair showed that the "bodies" of the "birds" were in fact the posterior half-third of each snake closely entwined, and that the "necks" were very long, sometimes up to 1.6 m out of the water at any one time. How long the ritual had been in progress is unknown but it was observed for about an hour close to dusk. During this time the snakes remained close to one position in the shallow water with the lower parts of their bodies closely entwined. The remainder of the bodies was free and the ritual involved constant writhing, falling back, entwining, releasing of the anterior portions of the bodies. No hissing or biting was

*Queensland Museum.

Plate 1



Morelia spilotes variegator in combat.

observed. Often the entwined or parallel necks were between 1.2-1.6 m out of the water before falling back to start the same movement over again. The snakes were undaunted by a group of about a dozen quiet but very interested and closely placed observers. One position adopted in the combat is shown in Plate 1. When an attempt was made to approach the snakes with the intention of determining their sex they moved away slightly and were carried downstream with the current, still entwined together.

Although the sexes were not examined; in the light of Baker's (1968) observation that . . . "Copulation in all snakes would appear to be a rather passive affair with the female lying quietly uncoiled and with the male sliding alongside" and observations of copulation in captivity of many species of snakes, it seems reasonable to assume that this relentless writhing, entwining, relaxing was a case of combat rather than copulation or pre-copulation behaviour.

Baker (1968) has reviewed the literature available on combat in snakes. The significance of this conspicuous behaviour is not understood but it is generally agreed that it is important in the social life of snakes. Whether it has a sexual (♂ fighting ♂ for ♀), territorial (♂ defending territory from intruding individuals), or some other basis is not known and, as combat is apparently observed infrequently both in captivity and the natural habitat, may not be understood in any detail for some time.

ACKNOWLEDGEMENTS

Without the invitation to accompany a group of American Academy of Science visitors led by Dr. R. Orr this event would not have been observed. Mrs. H. McAvin took the transparency and provided the duplicate from which the photograph was made.

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Elusive Bird Species Photographed

Cape York Peninsula, Australia

An expedition of eight bird photographers and naturalists to Iron Range on the Cape York Peninsula has succeeded in photographing one of Australia's rarely seen birds — the Marbled Frogmouth.

The bird has been seen by few people during the past 50 years and noted ornithologist Mr. Arnold McGill has described it as "practically unknown".

Twelve other elusive species were also photographed by members of the highly successful expedition to this unique monsoon rainforest area of Australia.

The expedition was sponsored by the Bank of New South Wales and mounted by the National Photographic Index of Australian Birds.

The Wales supports the Index through a special grants scheme of $20,000 spread over four years.

The Index is based at The Australian Museum, Sydney, and is a unique concept. A replica of the Index is held in the National Library, Canberra. When completed it will be the only systematic photographic Index of a country's birdlife established anywhere in the world.

Plate 1:

The Marbled Frogmouth — rarely seen in 50 years.

750 Species

Of the approximately 750 bird species in Australia, the Index has high quality photographs of all but 100.

Among the 20 or so species photographed on the expedition 13, including the Marbled Frogmouth, are new to the Index. The most significant achievement for the expedition was to successfully photograph 10 of the 23 species endemic to the Cape York Peninsula.

The expedition comprised Mr. Donald Trounson, executive officer of the Index, Sydney, Mr. Laurence Le Guay, Sydney, Mr. Chris Cameron of Chinchilla, Qld., Mr. Eric Zillman of Gin Gin, Qld., Mr. Kerry Muller, curator of birds at Taronga Zoo, Sydney, Miss Molly Clampett, a member of the Australasian office of the BBC, Sydney, Miss Lisa Halaby, a visitor from the U.S., and Mrs. Wilma Tait of Miles, Qld., who was cook for the group. Mr. Ray Howarth provided a liaison base in Cairns.

Expedition leader, Mr. Donald Trounson, said the Marbled Frogmouth is exceedingly difficult to find in the gloom of the rainforest. It is nocturnal, silent and has what is called "cryptic plumage"— able to blend almost completely with the forest. By day the bird resembles a log.

On capturing the Marbled Frogmouth the expedition immediately telegraphed the Queensland Government and received a special permit to retain it for exhibition and study at Taronga Zoo. It is believed to be only the second time one has ever been held in captivity.

Nest Never Found

Another interesting species caught and photographed is the Green-backed Honeyeater whose nest has never been found.

The bird itself is difficult to photograph because it lives in the canopy of the rainforest.

The other rarely seen species photographed for the first time for the Index are:
Chestnut-breasted Cuckoo, Frill-necked Flycatcher, Little Yellow Flycatcher, Northern Scrub Robin, White-streaked Honeyeater, Tawny-breasted Honeyeater, Fawn-breasted Bowerbird, Magnificent Riflebird, Grey Whistler, Dusky Honeyeater and Little Cuckoo-Shrike.

Most of these birds were photographed in a special field studio developed by Mr. Trounson and Miss Clampett over several years. The studio has a transparent end to enable the bird to be photographed against the habitat in which it lives. Because of the perpetual gloom of the rainforest, the background had to be fully illuminated by six flash heads.

The field studio is designed around a Hasselblad camera and lenses. Much of the equipment used by other photographers of the team was loaned equipment provided under the Bank of New South Wales grants scheme.

The birds were caught by a special technique of mist netting. Up to 15 nets were set at heights varying from ground level to 20 m and spread over some 250 m. Four members of the expedition were kept occupied from dawn to dusk patrolling the nets.

Many Mishaps

Despite careful planning the expedition suffered a number of mishaps which created considerable difficulties.

The expedition was hampered by having only one vehicle available to it instead of the two that had been arranged.

It rained for 18 days of the month; six accumulators to power the flash heads were delayed; and Mr. Chris Cameron was pecked in the eye by a Magnificent Riflebird.

Rocks and Very Early Man

by Dr. A. W. Beasley

Recent discoveries of fossil skeletal remains in East Africa indicate that man probably originated there about four million years ago. During the past 20 years various finds of the fossil remains of primitive man have been made in Central East Africa, and these have been dated by radioactive dating methods at between 1.75 to 3.75 million years old. Evidence from the fossil teeth of very early man imply that he most probably ate raw meat; and so, he was almost certainly making stone tools to hunt the animals and carve the flesh.

Rocks appear to have played a very important role in the life of very early man, and he depended on them largely for his existence. The oldest stone tools found are rudimentary ones where a simple blow has put an edge on a large pebble. Archaeological excavations in Tanzania and Kenya have unearthed a very large number of stone tools; some found recently in the Lake Rudolf area of Northern Kenya are 2.6 million years old. The very early stone tools were apparently used to strike and to cut by pressing their thick end against the palm of the hand in a power-grip. For a million years or more very early man in his further evolution does not seem to have changed his type of stone tool. We can assume that he prepared and stored them for later use, and made steady use of the same tool for a long period.

Obsidian, showing conchoidal fracture and sharp edges.

The fossil remains found in Africa indicate that very early man was considerably shorter than modern man, being about 1.2 metres (4 feet) in height. We can picture him hunting wild animals to obtain meat, and moving from place to place in a nomadic life. Presumably he hunted by stalking the animals until they became exhausted, or attacking them by surprise. He then killed them with his crude stone axe and his bare hands, and used a piece of rock with a sharp edge for skinning.

He chose rocks found nearby which had suitable physical properties for his purposes. In Central East Africa these were mainly volcanic rocks such as basalt and obsidian. Such rocks are relatively hard, homogeneous and durable, and break to produce a sharp edge. Obsidian is a volcanic glass that breaks with a conchoidal fracture into pieces with particularly sharp edges. Sometimes fairly large pebbles of quartz were used for making cutting tools.

As time progressed during the evolution of early man and his intelligence and dexterity improved, he named stone tools of a higher quality. Excavations in the Olduvai Gorge in Tanzania, carried out by Dr. Louis Leaky and his wife, have unearthed thousands of stone implements, and these show how stone cutting and chopping tools have been developed down the ages. Particularly during the last half-million years or so primitive man produced stone tools which required much finer manipulation in the making.

As the numbers of very early man in Central Africa increased, it became necessary for some to migrate. Hunting cannot support a growing population in one place, and the choice for man was either to move or starve. He appears first to have moved to North Africa, and by one million years ago it is believed that he had probably spread beyond Africa. By 700,000 years ago, or even earlier, he was in Java, and by about 500,000 years ago he had fanned out and marched north to China in the east and Europe in the west. These incredible spreading migrations made man, from a fairly early time, widely dispersed geographically, even though his total numbers were most probably not very large.

Rocks and minerals are still used for making tools and weapons by primitive races of man in Brazil, New Guinea and certain other places. Before the spread of white man over Australia, they were extensively used by the Australian aboriginals. Flint and quartz were used extensively for making small artifacts such as spearheads and scrapers, and quartzite, diabase, basalt and similar hard, fine-grained rocks for making axe-heads.

It is worthwhile to realise the very close relation between rocks and man from the very early time of man's origin in Africa.

Notice to Contributors

It is important that material submitted for publication should preferably be typewritten on foolscap or quarto sheets at double spacing, and with a 2.5-3 cm (1″) margin on the left. No underlining of words should appear unless absolutely necessary. Where dates occur, the day should precede the month, e.g. 15 May 1972 **not** May 15 1972.

Eucalyptus Woodlands in the Eastern Holey Plains, Gippsland, Victoria, Australia

by

R. F. Parsons*, G. W. Carr* and

D. G. Cameron*

Introduction

As part of a programme to document the ecology and floristics of native vegetation which is in danger of being cleared (Parsons, Scarlett and Rosengren, 1972; Parsons and Carr, 1974), a woodland area dominated by *Eucalyptus consideniana*† and *E. nitida* was chosen in the eastern edge of the Holey Plains (Figure 1) on Crown land. It has been recommended that the area be cleared for "pine planting" (Victoria : Land Conservation Council, 1973), so this is likely in the near future. If not, it seems certain to be cleared eventually as it is underlain by the Coolungoolun brown coalfield.

The only previous botanical work in the entire Holey Plains area is the brief ecological summary and vegetation map of Thornley (1972), the general floristic check-list of Beauglehole, Carr and Parsons (1975) and a primary ecological survey of small woodland areas in the north-west (Parsons and Carr, 1974). The present work gives the first detailed account of the *Eucalyptus consideniana* woodlands widespread in the area (Thornley, 1972) and supplements previous data on the *E. nitida* woodlands (Parsons and Carr, 1974).

Mean annual rainfall for the study area is about 61 cm (24″) and other regional data are given by Thornley (1972). The area is gently undulating with an elevation of about 114 m (375′) above sea level. Geologically, the area is poorly known; the soils have formed on various sediments of either Tertiary or Quaternary age (Thornley, 1972).

Methods

A rectangular study area was chosen which ran from *Eucalyptus consideniana* woodland through an ecotone to *E. nitida* woodland. In this, a series of quadrats (6 m x 2 m) were laid out along a number of line transects running at right angles to the vegetation boundary, all within an area 177 m x 72 m. In each quadrat, species cover was determined for all vascular plants, the soil profile was described by augering and soil pH of the surface 3 cm determined using a CSIRO soil pH test kit (Inoculo Labs., Surrey Hills, Victoria). The work was done in March, 1974 with supplementary plant collections (especially annuals and seasonal perennials) in October, 1974.

Results

The transects began in *E. consideniana* woodland and ran upslope into *E. nitida* woodland in a south-westerly direction. They were parallel to the track shown in Figure 1. The pure *E. consideniana* woodland was in the lowest part of the study area and was more or less surrounded on three sides by slightly higher ground from

*Botany Dept., La Trobe University, Bundoora, Vic. 3083.

†Plant nomenclature, unless otherwise indicated, follows Willis (1970, 1972) throughout.

which it may receive supplementary moisture.

The soils under pure *E. consideniana* were duplex, with shallow (15-40 cm) sandy topsoils over sandy clay (Table 1). Going upslope, *E. nitida* begins to appear with the *E. consideniana* and this change generally coincides with sandier topsoils which are often deeper than before (25-50 cm) and which overlie a very coarse gravel of sand grains cemented by humus and iron oxides rather than sandy clay as before. At the highest elevations, pure *E. nitida* woodland occurs on similar soils with coarse gravel, often with even deeper topsoils up to 100 cm deep. Field pH values showed that all topsoils were acidic in the range from 4 to 6, with a tendency for the higher values to occur at the lower elevations. The total change in elevation was probably not more than 10 m.

The *E. consideniana* woodland had an understory in which *Gahria radula*, *Xanthorrhoea minor*, *Lepyrodia muelleri* and *Lindsaya linearis* were prominent, with some patches, often dense, of *Leptospermum phylicoides*.

Upslope, both in mixed woodland and in pure *E. nitida*, the most prominent understory species are *Leptospermum juniperinum*, *L. myrsinoides*, *Banksia marginata* and *Pteridium esculentum*. *L. juniperinum* generally decreases in abundance going upslope, while *L. myrsinoides* increases. In pure *E. nitida*, trees of *Banksia serrata* are common.

There are clear differences between the predominantly monocot understory in much of the *E. consideniana* woodland and the abundance of

Fig. 1. Location of study area (shown by asterisk) on Crown Land in the eastern Holey Plains. Roads shown as solid lines and tracks as dashed lines. Hatching shows land owned by Australian Paper Manufacturers Forests Pty. Ltd. (1973 boundaries), virtually all of which carries *Pinus radiata* pantations.

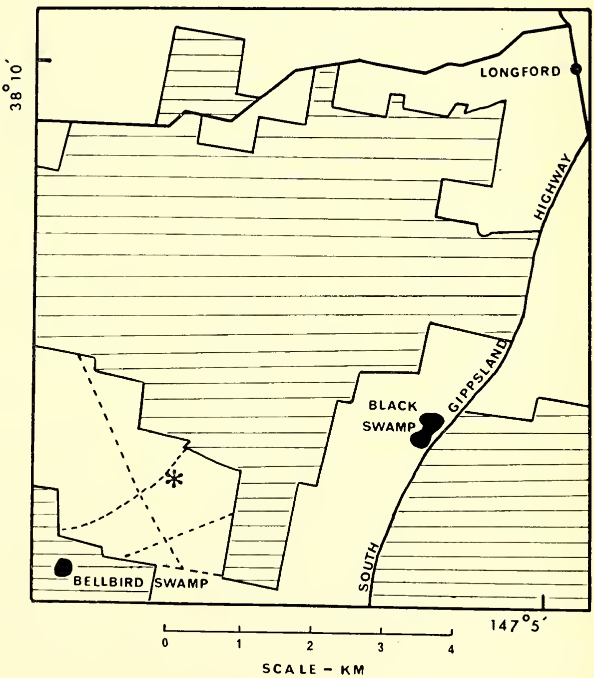

Table 1

Description of two soil profiles in the study area. Munsell colours of air-dry soil in all cases. Slight quartz gravel was present throughout both profiles.

Depth (cm)	Horizon	Description
(a) *Eucalyptus consideniana* woodland		
0-8	A_1	Dark grey (5YR4/1) sandy loam.
8-25	A_2	Pinkish grey (7.5YR6/2) sandy loam.
25-30	B	Reddish yellow (7.5YR6/6) mottled with pinkish grey (7.5YR6/2) sandy clay.
(b) *E. nitida* woodland		
0-15	A_1	Very dark grey (SYR3/1) loamy sand.
15-60	A_2	Light grey (5YR7/1) sand.
60-65	B	Dark brown (7.5YR4/2) mottled with reddish yellow (7.5YR6/6) sand cemented by humus and iron oxides to form coarse gravel.

sclerophyllous dicots under pure *E. nitida*, where, in addition to the species above, others like *Acacia oxycedrus*, *Dillwynia glaberrima*, *Hibbertia acicularis*, *H. virgata* and *Leucopogon ericoides* are found. (See also Appendix 1.) These changes are accompanied by a general reduction in stature and density of the tree stratum.

Discussion

In this area, a crucial difference between *E. consideniana* woodland and *E. nitida* woodland is likely to be that the badly structured sandy clay subsoil under the former impedes drainage more than the gravel under *E. nitida*. Combined with the elevation changes, this effect is likely to cause wetter topsoils under *E. consideniana* in rainy periods and probably also occasional topsoil waterlogging. Gravitational drainage downslope may also carry nutrients in solution from the *E. nitida* woodland down to the *E. consideniana* zone. In addition, greater fertility is suggested by the higher clay content of topsoils and subsoils under *E. consideniana* (Table 1). The larger, denser trees in the *E. consideniana* woodland compared with the *E. nitida* suggest higher site quality there, and this is likely to be caused by increased water or nutrients or both.

The *E. nitida* area described here has generally similar soils and floristics to the one described earlier in the north-west of the Holey Plains (Parsons and Carr, 1974). A major difference in dominant shrubs is the occurrence of *Leptospermum juniperinum* in the present study area and its complete absence from the north-west area studied, while the converse is true for *Brachyloma daphnoides*. The reasons for these differences are obscure.

In the present study, interesting floristic records include the presence of *E. aromaphloia* as scattered trees in the ecotone between *E. consideniana* and *E. nitida*. The range of this eucalypt in Gippsland is very poorly known, and the present record seems to be the first from the apparent gap in its range between the stands near Melbourne and those from far east Gippsland (Willis, 1972). The only other eucalypt, *E. bridgesiana*, was recorded as very scattered trees in the lowest parts of the area. Records of plants apparently rare in this part of

Victoria include *Astroloma pinifolium* and *Danthonia purpurascens*. The area was rich in orchids and it is unusual to find the three species of *Caladenia* listed in Appendix 1 at one site. From previous work, an area in the far west (south west of Rosedale) was said to be the only locality in the Holey Plains in which the two duck orchids *Caleana major* and *Paracaleana minor* occurred together (Victoria : Land Conservation Council, 1973, where *P. minor* is given as *Caleana minor*.) This situation also occurs in the persent study area.

The study area occurred in grid rectangle X10 of the Plant Survey Council of Victoria. The present work was done too late to include the records in the check-list of Beauglehole, Carr and Parsons (1975) except that a few species new for the Holey Plains recorded early in the work were included in a footnote.

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APPENDIX 1

Vascular plants recorded in the study area. Nomenclature follows Willis (1970 ; 1972) unless otherwise stated. Voucher specimens held at La Trobe University Botany Department Herbarium. * = alien species. † = new record for Holey Plains, not in check-list of Beauglehole, Carr and Parsons (1975).

C = found in *Eucalyptus consideniana* woodland

M = found in *E. consideniana-E. nitida* woodland

N = found in *E. nitida* woodland

T = found throughout.

Pteridophyta

Adiantaceae
Lindsaya linearis CM

Dennstaedtiaceae
Pteridium esculentum MN

Monocotyledoneae

Centrolepidaceae
Centrolepis strigosa C

Cyperaceae
Baumea acuta C, *Caustis pentandra* M, *Gahnia radula* T, *Lepidosperma laterale* M, *Schoenus apogon* CM, *S. tenuissimus* M, *Scirpus antarcticus* C.

Gramineae (Poaceae)
Agrostis avenacea C, *Amphipogon strictus* M, *Anisopogon avenacea* M, †*Danthonia purpurascens* C, *D. setacea* CM, *D.* spp. T, *Deyeuxia quadriseta* C, *Dichelachne crinita* M, *Eragrostis brownii* C, *Hemarthria uncinata* C,

Microlaena stipoides CM, *Poa labillardieri* Steud. M, *P. sieberana* Spreng, M, *Stipa semibarbata* M, †*Tetrarrhena distichophylla* CM.

Hypoxidaceae
Hypoxis hygrometrica C.

Liliaceae
Burchardia umbellata T, *Caesia parviflora* M, *Chamaescilla corymbosa* CM, *Dianella revoulta* T, *Thysanotus patersonii* M.

Orchidaceae
†*Caladenia aurantiaca* M, †*C. caerulea* M, *C. carnea* CM, *Caleana major* CM, *Calochilus robertsonii* C, *Cryptostylis subulata* C, *Glossodia major* T, *Lyperanthus nigricans* T, *Paracaleana minor* (R. Br.) D. Blaxell CM, †*Theymitra antennifera* M, *T. pauciflora* CM, *T.* sp. C.

Restionaceae
Lepyrodia muelleri C.

Xanthorrhoeaceae
Lomandra filiformis CM, *L. longifolia* CM, *Xanthorrhoea minor* CM.

DICOTYLEDONEAE

Apiaceae
Xanthosia dissecta CM.

Asteraceae
Gnaphalium gymnocephalum DC. C, **Hypochoeris radicata* CM, *Lagenophora stipitata* C.

Dilleniaceae
Hibbertia acicularis MN, *H. stricta* T, *H. virgata* MN.

Droseraceae
Drosera auriculata CM, *D. peltata* C, *D. pygmaea* C.

Epacridaceae
†*Astroloma pinifolium* C, *Epacris impressa* MN, *Leucopogon ericoides* MN, *L. virgatus* MN, *Monotoca scoparia* MN.

Euphorbiaceae
Amperea xiphoclada MN, *Poranthera microphylla* CM.

Fabaceae
Bossiaea cinerea MN, *B. prostrata* C, *Dillwynia glaberrima* MN, *D sericea* N, *Pultenaea humilis* CM,

Goodeniaceae
Dampiera stricta T, *Goodenia humilis* C, *G. paniculata* C.

Haloragaceae
Haloragis micrantha C, *H. tetragyna* MN.

Hypericaceae
Hypericum gramineum CM.

Lauraceae
Cassytha pubescens N.

Mimosaceae
Acacia genistifolia Link N, *A. oxycedrus* MN.

Myrtaceae
†*Eucalyptus aromaphloia* M, *E. bridgesiana* C, *E. consideniana* CM, *E. nitida* MN, *Leptospermum juniperinum* MN, *L. myrsinoides* MN, *L. phylicoides* C.

Polygalaceae
Comesperma calymega M.

Proteaceae
Banksia marginata MN, *B. serrata* MN, *Grevillea chrysophaea* CM.

Rubiaceae
Opercularia varia T.

Rutaceae
Boronia anemonifolia M, *Correa reflexa* MN.

Thymelaeaceae
†*Pimelea glauca* CM, *P. humilis* C.

Tremandraceae
Tetratheca ciliata M.

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GARNET JOHNSON, Correspondence Secretary.

Improving the Quality of Life in Cities

by EDMUND D. GILL

Most Australians live in cities and towns. Quite a disproportionate percentage of the population lives in Melbourne and Sydney, which are big cities by world standards although in a country of relatively small population. People have now realized that big cities can become Black-Holes-of-Calcutta where human beings can deteriorate instead of improving their standard of living. How can we improve the Quality of Life in our cities? Students of natural history have much to offer towards a solution.

History of Cities

We can increase understanding by looking at the history of cities. In Europe, cities are a mixture of the work of three historical periods:

1. *The Medieval,* with stone streets too narrow for a vehicle, and overhanging houses that nearly meet in the middle.
2. *The Victorian,* with streets to take horses and carts, and the housing areas in blocks related in size to the speed of horses and carts.
3. *The Modern,* with asphalt streets and a better standard of housing, but blocks of the same size as those of the horse and cart days.

The Medieval cities did not provide parks and gardens for the mass of the population, but they are a feature of a well-planned Victorian city. In Australia we have no Medieval stage, and we have benefited a great deal from the ideas of the Victorian era planners, who provided extensive gardens. In the modern period there has been a reversal, in two ways:

1. Population increase has made land expensive, so governments have taken the easy way out by using parkland for hospitals, schools, and freeways.
2. The increase in traffic, noise and fumes has reduced the effectiveness of parklands, so that larger and not smaller areas are required.

I estimate that in 200 years or less, at the present rate of alienation, Melbourne will cease to have effective parkland. By effective parkland I mean areas where one can escape the noise, smells and pressures of city life and enjoy a more natural environment. After all, man evolved to live in the open air of forest and plain, and not cooped up in artificial structures like fowls in a modern cell-type egg factory. We need to plan a better ecology for city man, and so to improve the Quality of Life. How can we do this when land is so expensive, so many new public utilities are required, and traffic has reached a density previously unknown?

Gardens of Peace

After modernizing its wharves, a certain city found that a large area of land was no longer needed, so the Authority concerned had the bright idea of turning it into a garden of peace where people could get away from the crowds and relax. To their credit they did it, but immediately high rise flats sprang up all round the garden, negating the original purpose. This kind of thing has happened so often to both public and private concerns, that it is apparent that wider planning is necessary to create *zones of limited use* that will protect parks and gardens, so maintaining their usefulness. This seems to be the only way to maintain *effective* parklands.

In U.S.A. the principle has been accepted that escape from the pressures of modern life is not a luxury, but a necessity. It is an important form of preventive medicine. This is a positive way of thinking on the subject.

Improving Melbourne's Quality of Life

Let us move now from general ideas to a practical example. When I first visited the Fitzroy Gardens, they were a charming escape from the noise, dust and fumes of the city; they were a delight in themselves, and it seemed as though one had been transported away into the peace and fresh air of the country. How that has changed! The roar and dust of the city penetrates far into the gardens. As an effective parkland it is much smaller. Recently the ring road planners proposed to cut a broad swathe through the east end of these gardens, but mercifully this was prevented. The gardens would then have become completely ineffective. A legal stricture is needed whereby planners are not permitted even to consider excising further land. Because of their decreased effectiveness, such areas need to be bigger and not smaller.

Indeed *the only way to restore the effectiveness of the Fitzroy Gardens is to have a zone of limited use around them*, which will shield them from the noise and pollution of the city. Two large hospitals lie on the east side of the Fitzroy Gardens. When ill there last year, I found that the traffic noise literally *hurt,* especially the motor bikes and cars with baffles removed. When convalescing I would have loved to have gone to the gardens, but to pass through that fast traffic was far too risky. This set me thinking on the subject.

Buffer Zones Round Parks and Gardens

Roads are shockingly expensive to build, so why not halve the bill by having half the number? The design is related to Victorian horses and carts, not modern cars. When the Housing Commission builds areas of high rise flats, it closes down the intermediate roads, and in spite of population increase, the remaining roads work effectively. We use expensive road surfaces for parking. Why not park in intermediate closed roads? Little areas of quiet could be provided there too, and safe playgrounds for children (far too many children are hurt when playing on roads). Visitors to the hospitals could find somewhere to park. In desperation some have been parking on nature strips, but are now being fined if they do so. Close down Clarendon Street. Use it as a buffer to help retain the effectiveness of the Fitzroy Gardens. Have crossings where convalescent patients can go to the gardens. Have playgrounds and parking areas there. Use the next street, without parking and street playing, for traffic (at least two lanes each way). Traffic would not be slowed so much by cars coming out of side streets. Would not such a plan improve the Quality of Life in Melbourne?

You are no doubt thinking of difficulties. There are problems, of course, but if these principles are accepted, suitable compromises could be worked out. The principles are:

1. Total ban on alienation of parkland.
2. Provision of zones of limited use around parks and gardens to retain their effectiveness. Put hospitals, churches, schools, lecture halls, galleries, professional rooms and such in the zone of limited use.
3. Reduce the number of roads. Keep the thick-paved expensive roads for traffic only. Put all parking out of the roadways, which would then be more effective.

4. Use some of the closed streets for parking, for children's playgrounds, and for gardens of peace. Ban children playing on the traffic-ways. It is safer, and also makes these clearways more effective in handling traffic. Money from parking could pay for the extra gardens and playgrounds, or the halving of road-building costs could pay for them.

The Origin of Generic Names of the Victorian Flora
Part 2 – Latin, Greek and Miscellaneous

continued from 213 (10)

by James A. Baines

***Lavandula.** Middle Lat lavandula, the lavender, from lavo, wash (from its use in soaps and toiletries of various kinds). Our naturalized species, **L. stoechas*, Topped Lavender, is known in Europe as French Lavender, the specific name being Gk for an aromatic plant (from stoichos, a row, doubtless from its cultivation in rows for its perfume and the other uses mentioned above).

Lemna. Gk name of a water-plant (perhaps from lemma, that which is peeled off, skin, scale, because of the appearance of the thallus). Our four species are all indigenous, and known as duckweeds of different kinds. The genus was founded by L. in 1753, and gives its name to family Lemnaceae.

***Leontodon.** Neo-Gk name meaning lion's tooth, and formed as a translation of the French "dent de lion" (dandelion), a plant that was placed in this genus by Linnaeus. Gk leon, lion; odous, genitive odontos, tooth; in allusion to the sharp leaf-lobes. Our sole species, **L. taraxacoides*, Hairy Hawkbit, has a specific name indicating its resemblance to the dandelion, *Taraxacum*. The common name hawkbit was formed from hawkweed and devil's bit, bit being a piece or bit bitten off, perhaps by the lion's tooth!

Lepidium. Gk lepidion, diminutive of lepis, a scale; the classical name of a plant used against scurvy, and applied by Tournefort to these plants, adopted by L. in 1753. Victoria has 13 native species and five introduced, all known as various kinds of pepper-cress. **L. sativum*, Garden Cress, and **L. campestre*, Field Cress, are from Europe, **L. virginicum*, Virginian Pepper-cress, from North America, while from Argentina came **L. pubescens* and **L. bonariense*, the specific name of the latter meaning "from Buenos Aires", being the Latin form of the Spanish for "good airs". One of our native species was named *L. halmaturinum* by J. M. Black because it grows on Kangaroo Island, the specific name meaning "from Kangaroo Island", adopted because these marsupials were unknown to the Greeks or Romans but Gk halmaturinos means "jumper" (from halma, a spring or leap). Many K.I. endemics bear this specific name.

Lepidobolus. Gk lepis, lepidos, a scale; bolos, throwing away; the sheathing bracts of the stems being very deciduous. Our sole species (of only four in a genus confined to Australia) is *L. drapetocoleus*, Scale-shedder or Curly Chaff-rush, the specific name of which means "sheathshedding" (Gk drapetes, fugitive; koleos, sheath), the common names referring to the same characteristic of the plants, which belong to family Restionaceae.

Lepidosperma. Gk lepis, lepidos, scale; sperma, seed; alluding to the hypogynous scales surrounding the nut. Victoria has 17 species, all native, and mostly known as sword-sedges of different kinds. *L. canescens* is Hoary Rapier-sedge, and *I. limicola* (so-named by Norman Wakefield because he found it growing in far East Gippsland swamps, = "mud-dwelling") is known as Razor Sedge. They belong to family Cyperaceae.

Lepilaena. Gk lepis, a scale; laina, a cloak; because the flowers are solitary within bifid sheathing bracts. Three of our four species were formerly included in *Althenia* (named after J. Althen, who introduced the cultivation of madder, *Rubus tinctorum*, in 1760). They are known as different kinds of water-mat, and are in family Zannichelliaceae, being closely related to *Zannichellia palustris*, Horned Pondweed, a cosmopolitan water-plant.

Leptocarpus. Gk leptos, slender, thin; karpos, fruit. Victoria's two species, both native, are known as twine-rushes, and are in family Restionaceae.

Leptoceras. Gk leptos, thin; keras, horn; referring to the slender petals. This monotypic genus is close to *Caladenia* (included in it by J. C. Willis in "A Dictionary of the Flowering Plants and Ferns", but kept distinct by J. H. Willis in "A Handbook to Plants in Victoria", Nancy Burbidge in "Dictionary of Australian Plant Genera" and most other Australian botanists). *L. fimbriatum*, Fringed Hare-orchid, does resemble *C. menziesii*, Hare Orchid, as their common names imply.

Leptomeria. Gk leptos, slender; meros, a part; alluding to the slender branchlets. Our two species, both native, are *L. acida*, Sour Currant-bush, and *L. aphylla*, Leafless Currant-bush, and belong to family Santalaceae.

Leptorhynchos. Gk leptos, slender; rhynchos, snout, beak; alluding to the beaked achenes. Victoria has nine species of these composites, all known as different kinds of buttons. The latinized spelling ending -us was long used, but the purer Gk form with -os, as used by Lessing in his original naming of the genus in 1832, has been reverted to.

Leptospermum. Gk leptos, slender; sperma, seed; alluding to the narrow seeds. Victoria has 16 species, mostly known as different kinds of tea-tree. Newspapers and popular magazines persist in using the erroneous spelling ti-tree, which belongs correctly to the cabbage-trees of N.Z., ti being the Maori name for the genus, with different words added to distinguish the species, of *Cordyline*. Captain Cook brewed tea from leaves of *L. scoparium*, Manuka. *L. phylicoides* has an Aboriginal common name, Burgan. Family, Myrtaceae.

Lepyrodia. Gk lepyrodes, furnished with bracts (from lepyron, a shell or husk). Victoria has four species of the 16 in this solely Australian genus of Restionaceae, all known as different kinds of scale-rushes.

Leucopogon. Gk leukos, white; pogon, beard; alluding to the white-bearded corolla lobes. Victoria has 26 species, all native, and known as different kinds of beard-heath. They belong to family Epacridaceae.

***Lilaea.** Named by Humboldt and Bonpland after French botanist A. R. Delile. Our species, **L. scilloides*, appeared spontaneously in 1961 along a

Laverton watercourse. The genus is monotypic, as is its family, Lilaeaceae (not to be confused with Liliaceae). It resembles *Scheuchzeria*, and was formerly included in Scheuchzeriaceae. Its common name is Flowering Quillwort, from the quill-like appearance of the leaves, as in the case of Plain Quillwort and Rock Quillwort, which belong to the unrelated genus *Isoetes* (family Isoetaceae). The specific name *scilloides* means like Scilla (squill). *Lilaea* is indigenous to the Andes, Mexico and the Rocky Mountains; the name should be pronounced on the second syllable.

Lilaeopsis. Named by Greene in 1891 from its resemblance (as far as the quill-like leaves are concerned) to the genus *Lilaea* (see previous entry), -opsis being Gk for "with the form of, like", but the plants are quite unrelated. *Lilaeopsis* is an umbelliferous genus (family Apiaceae), and our species, *L. polyantha*, is one of three Australian endemic species, another 17 of the genus being in North, Central and South America. There is no common name other than Australian Lilaeopsis.

Limnanthemum. Gk limne, marsh, pond; anthos, anthemis, flower; from the marshy habitat of marshworts (*Nymphoides* spp.) and marsh-flowers (*Villarsia* spp.) formerly included in this superseded genus of family Menyanthaceae.

Limonium. Gk leimon, a meadow; in allusion to the common habitat in salt meadows. Victoria has two introduced species, and one native, all known as different kinds of sea-lavender. The genus belongs to family *Plumbaginaceae*.

Limosella. Diminutive of Lat limosus, muddy (from limus, mud); from the habitat. Our two species, both native, are known as mudworts; family Scrophulariaceae.

***Linria.** Gk linon, flax; from the flax-like leaves. Our three species are all introduced, and known as different kinds of toadflax, including Common Toadflax, **L. vulgaris*; they are in family Scrophulariaceae, named from the genus *Scrophula*, so-called because the roots of some species look like the tumours of scrofula, the disease of glandular swellings formerly known as king's evil — scrofula is the diminutive of Lat scrofa, a breeding sow, this animal being supposed to be susceptible to the disease!

Linum. Lat name for flax, which appears also in the word linseed, for the flax seed and the oil obtained from it. We have two introduced species, **L. usitatissimum*, Flax, and **L. trigynum* (syn. *L. gallicum*), French Flax, and one native, *L. marginale*, Native Flax. The genus gives its name to family Linaceae. The name of the fabric linen, of course, has the same origin.

Lipocarpha. Gk lipos, fat, lard, hence liparos, sleek, oily, shiny with oil; karphos, chaff; alluding to the silvery glumes of some species. Victoria's sole species is *L. microcephala*, Button Rush, the specific name referring to the small head of flowers that also prompted the "button" common name. The genus is in the Scirpeae tribe of family Cyperaceae.

Lissanthe. Gk lissos, smooth; anthos, flower; the corolla lobes are not bearded as they are in the related genus *Leucopogon*, beard-heaths. There are only two species (Australian endemics), of which Victoria has one, *L. strigosa*, Peach Heath, the specific name of which means "closely covered with pointed bristles". The family is Epacridaceae.

***Lithospermum.** Gk lithos, stone; sperma, seed; in allusion to the hard nutlets. Our introduced species is

**L. arvense*, Corn Gromwell, the common name of which came from Old French gromil, altered by influence of speedwell and perhaps (Oliver) Cromwell. It was formerly used in treatment of gravel (stone in the kidneys), on the usual fallacious basis (cf. *Scrophula* above). The genus belongs to family Boraginaceae.

***Lobularia.** Lat lobulus, small pod (diminutive of Gk lobos, pod). **L. maritima* was formerly known as *Alyssum maritimum*, hence the common name, Sweet Alice. It belongs to the Alysseae tribe of Cruciferae.

***Lolium.** Lat name for **L. temulentum*, Darnel, which is one of our five species, all introduced, including Wimmera Rye-grass, once thought to be a hybrid but now universally recognized as the Mediterranean species **L. rigidum*. In view of the latter specific name, it is confusing that another of our species, **L. loliaceum* (a specific name explained by its having been classified in *Rottboellia* from 1832 to 1914), has common names Stiff or Rigid Rye-grass. Our other species are Italian Rye-grass and Perennial Rye-grass.

Lomandra. Gk loma, margin, fringe; aner, andros, male; alluding to the circular margin of the anthers in some species. Victoria has ten species of this mainly Australian genus, which extends to New Guinea and New Caledonia. They are known as different kinds of mat-rush; some species are called iron-grass in South Australia, and *L. longifolia*, Spiny-headed or Long Mat-rush, is known as Sagg in Tasmania. It is in family Liliaceae, though some follow Hutchinson in placing it in Xanthorrhoeaceae.

Lomaria. Gk loma, margin, fringe; German botanist Willdenow set up this genus, to which Colenso in N.Z. assigned Lance Water-fern (1888), but it was transferred to *Blechnum* as *B. aggregata* by M. D. Tindale (1960). The name *Lomaria* was given in allusion to the sori on the edge of the fronds.

Lomatia. Gk loma, border, edge; a reference to the winged edges of the seeds. Our three species are *L. fraseri*, Tree Lomatia (named after Charles Fraser, who collected in New South Wales with Allan Cunningham, founded Sydney's botanic gardens, and later collected in Western Australia), *L. ilicifolia*, Holly Lomatia (the specific name means holly-leaved), and *L. myricoides*, River Lomatia, the specific name meaning like *Myrica*, a genus of wax-myrtles (Myricaceae).

***Lonicera.** Named by L. in 1753 after Adam Lonitzer (1528-1586), a German botanist whose name was latinized as Lonicer; he was the author of a herbal (or Kreuterbuch) that was reprinted many times between 1557 and 1783. Our introduced species is **L. japonica*, Japanese Honeysuckle (an enormous number of plants in the Japanese flora bear the specific names *japonica* or *nipponica*, both meaning "of Japan"; it has become an English common name for an attractive garden shrub). The genus is in family Caprofoliaceae. (Omitted from Part 1, so included here.)

Loranthus. Gk loron, a thong; anthos, flower; the perianth-segments are strap-shaped. Most of our mistletoes were formerly in this genus, which gives its name to family Loranthaceae. Of these species, two are now in *Muellerina*, six in *Amyema*, one in *Lysiana*, and one in *Dendrophthoe*. Jointed Mistletoe, *Korthalsella japonica*, was formerly in *Viscum*, the genus to which belongs the English Mistletoe, *V. album*, so venerated by the Druids when growing on oak trees rather than, as far more usually, on apple-trees. Golden Mistletoe, *Notothixos subaureus*, is the other of our species, named in 1863 and the only mistletoe to retain its original botanical name.

Lotus. Lat lotus, Gk lotos, ancient name given to a number of different plants and applied by L. in 1753 to a genus of pea-flowered legumes. The plant yielding the fruit eaten by the Lotophagi (= lotos-eaters) represented by Homer in the Odyssey as producing a state of dreamy forgetfulness and loss of all desire to return home was probably the Jujube Tree, *Zizyphus lotus* (family Rhamnaceae); the lotus-tree mentioned by ancient writers as having hard, black wood was probably the Nettle-tree, *Celtis australis* (family Ulmaceae); the lotus of exotic Indian poetry is *Nymphaea lotus*, Egyptian Water-lily, thought to be the original sacred lotus of Egypt, but the name is also used for *Nelumbium speciosum*. Smith and Stearn state that the name lotus is used for clover, bird's-foot, trefoil, fenugreek, melilot, etc. Victoria has four introduced species of bird's-foot trefoil, and two native species, *L. cruentus*, Red Bird's-foot Trefoil, and *L. australis*, Austral Trefoil. The family is Papilionaceae (Fabaceae).

***Lupinus.** The classical Lat name for *L. albus*, White Lupin, and other species native to the Mediterranean countries, reputedly from Lat lupinus, of or relating to a wolf, wolfish, because of the old superstition that these plants destroyed the fertility of the soil — a most erroneous belief, since lupins have long been used as a green manure ploughed in because like other leguminous plants they are able to fix nitrogen and thus improve fertility! On the other hand, the seeds are poisonous when fresh, and the wolf was associated with some toxic plants, such as *Aconitum vulparia* (Wolfsbane). **L. hirsutus*, Hairy Blue Lupin, is now naturalized here.

Luzula. Neo-Lat, from Italian luzziola, lucciola, the firefly; probably alluding to the shining and quivering character of the heads or clusters of flowers. Our species is *L. campestris*, Field Woodrush, a highly variable, perhaps aggregate, species. Native here, it is also indigenous in Europe. Polunin gives Sweep's Brush as an alternative vernacular name. The family is Juncaceae (it was originally named by L. in 1753 *Juncus campestris*).

***Lychnis.** The classical name, said to be from Gk lychnos, a lamp; possibly referring to the brilliant flowers of some species, or to the ancient use of leaves of a woolly species for wicks. **L. coronaria*, Rose Campion, is often a garden escape, and **Silene alba*, White Campion, formerly *L. alba*, is fully naturalized. They are in family Caryophyllaceae.

Lycium. Gk lykion, the name of a thorny tree or shrub, with juice and roots used medicinally, from Lycia, a region of Asia Minor. Australian Box-thorn, *L. australe*, is our native species, and the introduced species are known as African, Kaffir and Chinese Box-thorns respectively. African Box-thorn, a very common noxious weed, is **L. ferocissimum*, a prickly shrub whose specific name, appropriately, means fiercest. They belong to family Solanaceae.

(To be continued)

A Relation between Honey Production and Rainfall in Victoria, Australia

by J. W. Porter*

Apiarists in south-eastern Australia have reported marked fluctuations in honey production after both dry and wet seasons (Commonwealth Bureau of Census and Statistics, 1969). The reasons for this phenomenon and its implications to apiculture and nectar-eating birds are discussed.

Mean annual rainfall (Commonwealth Bureau of Meteorology, 1960-71) and average honey production in pounds per productive hive robbed were obtained (Commonwealth Bureau of Census and Statistics, 1960-71) for each of the eight statistical districts in Victoria. I suggested that honey production in each district depended on rainfall and used the following multiple regression to test this hypothesis:

$$y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 \qquad \textit{Equation 1}$$

where y = honey yield per productive hive robbed

x_1 = annual rainfall in the same year as honey production

x_2 = annual rainfall in the year before honey production

x_3 = annual rainfall two years before honey production

Regression coefficients for extra lbs of money produced per hive by an additional inch of rainfall: b_1 in the same year as the honey was produced; b_2 in the year before production of honey; b_3 in the year which occurred two years before production of honey.

The values of the regression coefficients b_0, b_1, b_2, b_3, and their standard errors were calculated for each district. The value of b_3 was not significant for any district and was therefore omitted from the equation. The coefficients b_0, b_1, b_2, and their standard errors were again calculated using the equation:

$$y = b_0 + b_1 x_1 + b_2 x_2 \ldots \textit{Equation 2}$$

The values obtained for the regression coefficients were tested for significance, using a standard "t" test. The values of the regression coefficients and "t" values for b_1, and b_2 are shown in Table 1.

These data show a correlation between honey production and rainfall in five of the eight districts (Table 1). A significant correlation between honey production and rainfall during the year of production was confirmed for two of these districts (Mallee and North-Central). A correlation between honey production and annual rainfall during the year preceding production was shown to be highly significant in the North-Central, Northern and Mallee districts and significant in the Wimmera and North-Eastern districts.

There was no correlation between honey production and rainfall in the Western, Central and Gippsland districts.

The two districts where there was a correlation between honey production and rainfall in the same year as production are located in the drier, inland areas of the State. Wykes in her review (1974) of the possible environmental influences on nectar secretion in plants suggests that a number of

*Fisheries and Wildlife Division, Arthur Rylah Institute, Brown St., Heidelberg, Victoria 3084.

factors operating during the year of honey production may influence the quantity of nectar secreted. The most relevant of these factors was the finding of Bonnier that the quantity of nectar secreted increases with increased soil moisture. When more nectar is available bees would be able to produce more honey. Another factor, the growth and flowering of annual plants, is most likely dependent on rainfall during the year of production. In wet years, annual plants would grow and flower more prolifically than in dry years and would provide more nectar.

The correlation between honey production and the rainfall of the previous year may be related to the initiation of flower development in *Eucalyptus.* This genus is a major source of nectar in Victoria and species set flower buds from 2 to 21 months before flowering (Wykes 1947). Wet conditions during the season before the honey harvest may stimulate much foliage growth which results in a greater production of food reserves and the formation of flower buds and next season, a greater flow of nectar. Two other factors which could influence the yield of honey from *Eucalyptus* are irregular flowering (Boomsma 1972) and variation in yearly flowering abundance (Ashton 1975). It is possible that these factors are also related to rainfall.

It is interesting to note that the correlations between honey production and rainfall follow Victoria's rainfall isohyets. The most significant correlations occur in the Mallee. the driest district; significant correlations occur in the central districts; and no correlation occurs in the three wetter coastal districts. In arid areas, the flowering cycles of plants depend, to a large extent, upon rainfall, and because rainfall occurs erratically, honey production from these areas would fluctuate greatly if dependent on rainfall. In coastal districts, which have more reliable and higher rainfalls than the arid Mallee, the flowering of plants would be more related to temperature and photo-period and occur annually. In high rainfall districts the influences of variations of rainfall on honey production would be more readily detected only if they persisted for a long period and were of a large magnitude.

Interpretation of these results should be made with the following qualifications in mind: the data were collected during a period of only 11 years; district rainfalls were averaged; and honey statistics were collected on the home addresses of beekeepers, rather than the districts where their hives were located. Further studies using data collected over a long period and from specific sites are needed to confirm the correlations between honey production and rainfall suggested in this paper. Such studies may allow a better understanding of the climatic factors which affect nectar production and will provide a basis for forward planning in the honey industry.

A flow of nectar dependent on rainfall rather than on a regular yearly pattern may have implications to the movements, feeding and breeding of birds which feed on nectar or the insects which associate with the flowering of *Eucalyptus.* Irregular patterns in the distribution and time of rainfall and consequently flowering abundance of *Eucalyptus* may influence the breeding and movements of some of these birds.

I wish to thank Mr. D. Powell and Miss D. Davy of the Fisheries and Wildlife Division for assisting with mathematical calculation; and Mr. Langridge and Mr. Goodman of the Department of Agriculture for their helpful comments.

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TABLE 1

Honey Yield From Each District
(yield in lbs per hive, rainfall in points)

District	Regression equation for yield	t values	
	$y = b_0 + b_1 x_1 + b_2 x_2$	b_1	b_2
Mallee	$y = -62.4 + 0.051X_1 + 0.071X_2$	4.9**	5.0**
Wimmera	$y = -63.1 + 0.011X_1 + 0.047X_2$	0.6	2.5*
Western	$y = -4.6 + 0.012X_1 + 0.021X_2$	0.9	1.8
Northern	$y = 32.0 + 0.012X_1 + 0.027X_2$	1.5	3.6*
North-Central	$y = -101 + 0.030X_1 + 0.042X_2$	3.3*	4.4**
Central	$y = 36.4 + 0.006X_1 + 0.010X_2$	0.8	1.3
North-Eastern	$y = -10 + 0.007X_1 + 0.027X_2$	0.8	3.1*
Gippsland	$y = 30.6 + 0.0003X_1 + 0.022X_2$	0.003	1.8

*b_1, b_2 significant at 5% level when $t = 2.36$.
**b_1, b_2 significant at 1% level when $t = 3.49$.

Readers' Nature Notes

Sighting of Spotted Quail-thrush at Kinglake

According to Roy Wheeler in his "Handlist of the Birds of Victoria", the Spotted Quail-thrush (*Cinclosoma punctatum*) is moderately common, but in 20 years of bird-observing I have seen the bird only twice. So it was with considerable satisfaction that Miss Jean Hood and I saw a female with a party of Buff-tailed Thornbills on a path on Mt. Sugarloaf during the April Sunday excursion.

Despite, or because of the quite heavy fog, we had prolonged and excellent views before her "ladyship" flew away downhill. About 11 inches long with dark-spotted back, white tail tips, pale eyebrow, and grey breast, she was easily identified; her mate whom we did not see, has a black throat and upper breast. Both the quail-thrush and thornbills seemed to find food on the track but I did not notice anything edible on the bare pebbly ground. As a party of children approached the thornbills left, but the quail-thrush kept flying just ahead like a blackbird in the garden. To see such an elusive bird so tame was most gratifying. The children behaved well, too — also very gratifying.

MARGARET McKENZIE,
Yarraville.

Tailed Emperor in Victoria

I was interested to see, listed among the nature exhibits at the June meeting, a specimen of the Tailed Emperor Butterfly, *Polyura p. sempronius*, taken at Box Hill North in May.

On 25 April of this year I visited the Botanic Gardens, entering from the highest corner through the Nareeb gates. Flopping about the garden border along the eastern fence was a huge black and white butterfly, unable to fly. Its wings were crumpled and had failed to expand fully on emerging. As it obviously had no future there I collected it for identification and brought it home. It proved to be a Tailed Emperor, sex undetermined, but a very vigorous creature.

The butterfly fed readily when offered syrup, diluted jam, or over-ripe figs, etc. (We happened to be right out of beer and spirits, to which the species is said to be partial.) After each meal it made valiant efforts to fly, and lived in a sunny window for over three weeks. We thought its crippled condition might be due to the lateness of the season so far south, as Wanderers sometimes suffer likewise. However, the Box Hill specimen was apparently perfect?

Mr. C. N. Smithers of the Australian Museum in Sydney, where the species is common, suggests that, due to a mild season, many species had temporarily extended their range. Mr. Gooding of Warragul tells me they have been taken in Northern Victoria and in the North-east. It would be of interest to hear of further Victorian sightings of this beautiful butterfly.

ELLEN LYNDON,
Leongatha.

book review

"Field Guide to the Flowers and Plants of Victoria"

By J. H. Willis, B. A. Fuhrer and E. R. Rotherham

21 x 14 cm., 304 pp., 428 colour plates. A. H. & A. W. Reed, Sydney, 1975.

Recommended retail price: $9.95.

When the publishers launched the series "Australian Flora in Colour" with "Flowers and Plants of Victoria" (1968), they envisaged an eventual full coverage of this continent's commonest native plants. The success of that book (the second edition is still available) was emulated by "Flowers and Plants of Western Australia", by Rica Erickson, A. S. George, N. G. Marchant and M. K. Morcombe (1973), and now, just published, in similar format, "Flowers and Plants of New South Wales and Southern Queensland", by E. R. Rotherham, Barbara G. Briggs, D. F. Blaxell and R. C. Carolin. This latter book (to be reviewed soon in the "Victorian Naturalist") contains 556 colour plates, many of the species depicted being also native to Victoria, so wildflower enthusiasts in this State should acquire this volume also as a wonderful addition to our identification resources.

The new "Field Guide" under review has come into being because of the need for the original plates of "Flowers and Plants of Victoria" to be more easily available on bush walks, the size being such that it can be easily carried in a walker's pack. To reduce the material to fit this size, it was decided to eliminate the chapters on the 16 ecological habitats — these were written by G. Ross Cochrane, whose name therefore no longer appears as joint author. Also, the number of plates was reduced from 543 to 428, mainly by removing illustrations of species less likely to be met with by the average person, and all the plates of Fungi.

The authoritative caption descriptions to each plate, written by Dr. J. H. Willis, are basically as they were in the original larger-format book, but some have had to be reduced judiciously for considerations of space. Ted Rotherham and Bruce Fuhrer, as before, are the chief photographers, and the former has again capably carried out an editorial function. In some cases a plate is found in a different category, but this is legitimate, as the range of many species extends over a number of habitat types. Representatives of 11 Genera of Orchids are grouped in a final section.

The clearly reproduced plates will be useful as a "short cut" for identification in the field, and the ecological arrangement will, as before, speed this process. The photographs of the plants found in each habitat type are preceded by a brief summary of the characteristics of such areas, and the "general aspect" habitat plates have been retained. Opportunity could have been taken to return to their more familiar botanical nomenclature all species listed under *Styphelia* except Golden Heath (*S. adscendens*), since the broader concept of this genus has not been generally accepted. Purchasers of this book should change *S. behrii* to *Astroloma conostephioides, S. humifusa* to *A. humifusum, S. pinifolia* to *A. pinifolium, S. ericoides* to *Leucopogon ericoides, S. suaveolens* to *L. suaveolens, S. strigosa* to *Lissanthe strigosa* and *S. urceolata* to *Melichrus urceolatus.* These changes are in accordance with Willis' "Handbook to Plants in Victoria", Vol. II.

The following species, mis-spelt in the index, are correctly spelt as follows:— *Acacia pycnantha, Banksia integrifolia, Boronia algida, Gnaphalium luteo-album,* Rock Isotome, *Muehlenbeckia adpressa, Nicotiana velutina* and *Pultenaea humilis.* Errata noted in the caption paragraphs are mis-spellings of *Triglochin* (pl. 175), *Vittadinia* (pl. 206) and *Pelargonium rodneyanum* (pl. 210).

Many of our members who already possess the larger book will wish to buy this one too; it is available from the club's book sales officer at a discount. The book should have a ready sale also to the general public, especially the increasing number growing native plants in their gardens.

J. A. Baines.

Field Naturalists Club of Victoria

General Meeting

10 November

The address for the evening, "Dynamics of the Earth's Crust", by Mr. P. Bock, was on plate tectonics or, in the layman's term, continental drift. The theory of continental drift was advanced by the German geologist, Wegener, at the turn of the century, but was by-passed by most geologists. The idea has received more acceptance in recent years with the development of theories regarding the movement and contacts of various "plates" of the earth's crust. Although somewhat technical, Mr. Bock made the topic most interesting and well within the understanding of the layman; slides of diagrams were a great help. Mr. Bock said that the matter is still being debated but that many aspects of geology have been revised due to the theories of plate tectonics.

Exhibits included some mites (black with red legs) that are proving very destructive on climbing beans, an insect gall with another species of gall on it. In Siluro-Devonian rocks from the Yea district were some fascinating fossil plants, *Baragwanathia longifolia.* A large larva, $1\frac{1}{2}''$ x $\frac{1}{2}''$ diameter, the larva of a scarab beetle, was displayed with its pupa shell, seemingly made of earth and almost the size of a pullet's egg. A book containing numerous pressed grasses led the botany exhibits, and there were living specimens of the lovely pink Boronia muelleri, the deeper pink Grevillea barkleyana, and a Fan fern Sticherus species, all three from the Labertouche forest; the Grevillea is confined in Victoria to that area.

Secretary: The Club is still awaiting a volunteer for this job. Mr. Garnet Johnson has accepted the position of Correspondence Secretary but is unable to attend meetings. With his assistance, the task of an incoming secretary will be greatly lightened.

Lacking a Secretary, the President sat alone at the dais; he read items of correspondence of particular interest to the meeting, and all correspondence was tabled at the back of the hall.

***The Naturalist* and Need of an Editor.** An editorial committee has been formed to ensure that publication of *The Naturalist* continues in the interval between the retirement of Mr. Griff Ward and the arrival of a new editor. An editor is urgently needed.

Members will recall that, early in the year, it was decided to reduce *The Naturalist* to six issues in 1976, but with 36 pages instead of 28. This is due to the economics of the matter, not to the lack of an editor. The first issue for 1976 will appear in February, **not** January.

Western Victoria Field Naturalists Clubs Association

Report of Member Club Activities for 1974

Ararat Field Naturalists Club.
President: Mr. L. Solly.
Secretary: Miss Z. Banfield.
Membership: 22.

This year the Club produced a small brochure on McDonald Park for tourist purposes. A list of 33 orchid species and 74 birds was also compiled. The Club made a weekend trip to the Little Desert in September. Two submissions have been made for land to be reserved in the Ararat district, and results are awaited.

Colac Field Naturalists Club.
President: Mr. K. White.
Secretary: Miss J. Miles.
Membership: 45.

Topics discussed at meetings included geology of the Western District, work of the Land Conservation Council, New Guinea flora, and conservation of arid areas of Australia. Saturday excursions were held to places such as Aire River, Carisbrook Falls, Melba Gully, Brisbane Ranges, Barongarook and Yaugher Reserves. A car nature trail proved popular and successful.

Creswick Field Naturalists Club.
President: Mr. H. Barclay.
Secretary: Miss J. Wilson.
Membership: 31.

Syllabus items at meetings were interesting and varied for the average of 22 members in attendance. Spiders, pollution, Clunes Swamps and wood structure were some topics discussed, and speakers also attended from the Fisheries and Wildlife Division and Conservation Council of Victoria. Enjoyable and well-attended excursions were held to Clunes Swamps, Linton, Maryborough, Spargo Creek and Newlyn Reservoir. Two successful events were a camp-out at Mount Beckworth and a weekend Nature Show.

(To be continued)

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

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Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
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Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
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All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

At National Herbarium, The Domain, South Yarra, 8 p.m.

Monday, 9 February —

Speaker — Mr. M. D. Gottsch.

Subject —"Red Wilderness." Ecological Study of N.W. Mallee.

Wednesday, 10 March —

Speaker — Dr. T. H. Rich.

Subject —"New News about Old Bones."

Monday, 12 April —

Speaker — Miss M. Doery.

Subject —"A Naturalist's Journey." Darwin to Perth.

New Members —

Ordinary:

Mr. Peter J. Bascomb, 51 Park Drive, Parkville 3052. *Mammals and Birds.*
Miss Linda Lumsden, 240 Drummond Street, Carlton 3053. *Mammal Survey Entomology.*

Joint:

Mr. and Mrs. M. Doherty, Flat 10, 18 Smith Street, Thornbury 3071.
Mr William J. McNeice and Mrs. Beatrice A. McNeice, 57 Brynor Crescent, Glen Waverley 3150. *Botany*
Mr. A. E. Richards, 6 Cityview Road, Balwyn North 3104.

GROUP MEETINGS

(At the National Herbarium, The Domain, South Yarra, at 8 p.m.)

First Wednesday in the Month — 3 March, 7 April, 5 May — Geology Group.

Third Wednesday in the Month — 18 February, 17 March, 21 April — Microscopical Group.

Second Thursday in the Month — 12 February, 11 March, 8 April — Botany Group. (At the Conference Room, The Museum, Melbourne, at 8 p.m.)

First Monday in the Month — 1 March, 5 April, 3 May — Marine Biology and Entomology Group.

Fourth Thursday in the Month — 26 February, 25 March, 22 April — Field Survey Group. (At the Arthur Rylah Institute for Environmental Research, Brown Street, Heidelberg, at 8 p.m.)

First Thursday in the Month — 5 February, 4 March, 1 April, 6 May — Mammal Survey Group.

F.N.C.V. EXCURSIONS

Sunday, 15 February — Glen Nayook. The coach will leave Batman Avenue at 9.30 a.m. Fare $4.00. Bring two meals.

Saturday, 6 March — Monday, 8 March (Labour Day Weekend) — Bendigo Camp Out. This is the weekend when the Victorian Field Naturalist Clubs Association holds their annual gathering. This year Bendigo is the host club and they have arranged excursions of general interest to birdos, botanists, geologists and zoologists in the Mandarang Forest — Mount Herbert range area with an alternative excursion to the Barfold Columns on Sunday for those desiring a more active day. Activities will start on Saturday afternoon at 2 p.m. at Sedgewick campsite, about 10 miles South of Bendigo and will include an evening at the

(Continued on page 35)

the victorian naturalist

Vol. 93, No. 1 — 4 February, 1976

Acting Editor — G. M. Ward
Assistant Editor — G. F. Douglas

Contents

Front Cover:

Graham Pizzey photographed the beautiful Little Egret. It may be seen near swamps or the edge of lakes, fairly generally along the eastern Australian area.

It is now just ten years since I began as the new editor of the *Victorian Naturalist.* They have been ten memorable and enjoyable years, during which I have come to know a great number of people both in town and country, and from varied walks of life

Many of these people have given me inspiration and confidence during this time, and I shall always be conscious of the debt of gratitude which I owe. The loss of some firm friends has tinged those ten years with sadness also; but the memory of their effect on my work shall never fade.

During my term as editor, the *Naturalist* has undergone some changes, and entered into some difficult times — but I think none so difficult as exists at present. The financial strain on non-profit publications is particularly severe; and in the case of our magazine, has caused the change from monthly to bi-monthly publication. This, I hope, will be only temporary: for we are within eight years of a century of monthly publication!

May I recall the words of the last paragraph of my initial editorial in 1966 —

". . . I am optimistic that the publishing of the *Naturalist* in its present form, can and will be maintained by virtue of the large and keen membership which exists."

My optimism in this regard has not diminished, and together with that statement I add my sincere thanks to every contributor over the years, and my sincere apologies to all to whom I have caused any inconvenience or hardship.

My best wishes go to all members and readers, wherever they may be.

G. M. Ward

Geology of the Sandringham-Beaumaris Coastline

by

G. B. Pritchard

Editor's Introduction by Thomas A. Darragh.*

This article is the second chapter of G. B. Pritchard's manuscript and is entitled *Old Port Phillip History as told by the Geology of Sandringham to Beaumaris.*

The first chapter on the geology of Royal Park appeared in *Victorian Naturalist* **91**:223 and the reader is referred to it for background information.

The area described here is still one of the most popular areas of suburban Melbourne for the study of geology, as it was when Pritchard wrote his chapter (1947). Some of the photographs date from the mid nineties of last century and others were taken in the early decades of this century. They are of considerable interest as historical records, since they demonstrate the destruction of the natural scenery which has taken place because of vandalism and official interference with the coastline since that time. Sea walls, roads, boat harbours, buildings, and foreshore filling have obscured many of the interesting features of this coastline. Many of these artificial features have lead to erosion of beaches and siltation in other areas.

The fossils from Beaumaris illustrated here are still frequently found and the illustrations will provide an accessible means of identification, though the editor stresses that the shark's teeth have recently been studied in some detail and the names may change when this modern revision is published. There are a number of other fossils not mentioned which are rare and have been described recently. They are fossil birds (*Diomedia thyridata* a fossil albatross; *Pseudaptenodytes macraei* and *P. minor* fossil penguins) and marsupials. Fossil birds and marsupials of this age are of considerable rarity and Beaumaris is a unique locality of considerable scientific importance because of these occurrences.

This article fills a gap in the popular literature of the geology of greater Melbourne, however, if a more detailed scientific account is required the reader is referred to Kenley, 1967, Tertiary in Geology of the Melbourne District *Bull. geol. Surv. Vict.* 59.

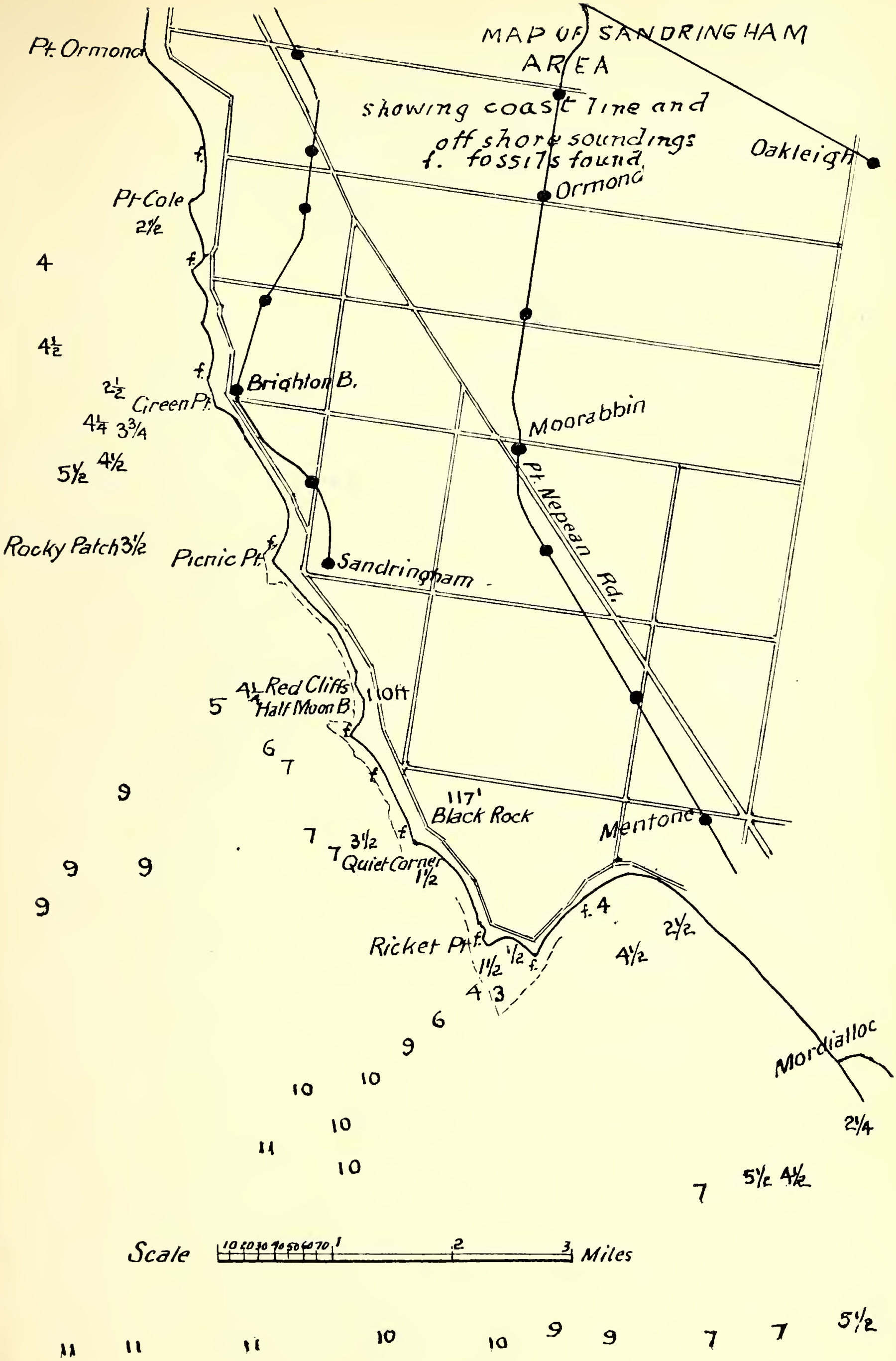
As in the previous article only minor corrections have been made to Pritchard's text in order to ensure clarity and accuracy of stratigraphic terminology.

Introduction

From the earliest times in the history of our state fossils have been known to occur in the shore line rocks at the locality known variously as "near Mordialloc", or "near Moorabbin", or "near Brighton", or as it is better known and more accurately placed at a later date as Beaumaris. The cliffs of Beaumaris are very rich in fossil remains and have been a very popular hunting ground for many years.

Who has not heard of fossil shark's teeth from this locality? There is no manner of doubt that one of the chief attractions to a very large number of

* National Museum of Victoria.


MAP OF SANDRINGHAM AREA
showing coast line and off shore soundings
f. fossils found
Pt. Ormond
Oakleigh
Ormond
Pt Cole
2½
4
4½
2½
Green Pt.
Brighton B.
4¼ 3¾
5½ 4½
Moorabbin
Pt. Nepean Rd.
Rocky Patch 3½
Picnic Pt.
Sandringham
5
4¼
Red Cliffs
Half Moon B.
110ft
6
7
9
117'
Black Rock
Mentone
7
3½
7
Quiet Corner
1½
9
9
9
f. 4
2½
4½
Ricket Pt.
1½
½
4
3
6
9
10
10
10
11
10
Mordialloc
2¼
7
5½ 4½
Scale
1
2
3 Miles
11
11
11
10
10
9
9
7
7
5½

school boys and others for this spot was the ease with which such remains could be gathered. Frequently competitions would run high in the endeavour to be the one who could find the largest number of teeth in a day or an afternoon as the case might be. One old fossicker who used to be a very frequent visitor to this locality had a large Coleman's Mustard Box full to the brim of these relics. It used to be a favourite boast of my own that I never paid a visit to this locality without finding at least one tooth, but for many reasons the crop nowadays is not so great as in former times for one had only to wade along the shoreline at low tide to be rewarded with many specimens. Then by more careful search and investigation the actual bed from which all these specimens had been washed and distributed could be opened out and carefully examined, and making a rough calculation on several occasions it usually happened that at least one tooth would turn out from each square foot examined. Frequently however you would be rewarded by the discovery of several other different types of fish remains as well, such as the grinding teeth of the forerunner of the Port Jackson Shark and its spines, the jaws and palates of an ancient Porcupine fish, the plates from the palates of some ancient Rays and Skates, and the jaws of an old Rock Ling.

The Beaumaris beds are chiefly a soft porous buff-coloured sandy marl not at all well adapted to the preservation of all types of fossil remains, for example notice the shells, which though very numerous along certain beds are usually of such a soft chalky consistency that it is almost impossible to get perfect specimens out, and when obtained unless great precautions are taken, they will not reach home safely; in some beds all the limey matter has been dissolved out and only casts and impressions of these relics are then obtainable. In this connection you will notice how the cliffs where they overhang just above high tide mark, are constantly dripping water, placing a billy under these drips you can soon collect a nice lot of clear cool water. This water on examination is found to be hard, or in other words that it contains in solution quite a lot of mineral matter that it has dissolved out of the beds through which it has passed, chiefly limey matter from the shells. That this is really the character of this water just look at the sand, shingle, shells and other shoreline gatherings butting up against the foot of the cliffs and you will find that it has become veritably cemented into a hard rock even though it is of such recent origin. Hence while this type of action brings about destruction in one part of its course it immediately sets about binding or strengthening loose incoherent materials into a strong compacted mass in another and closely adjoining part. Limey matter is not the only mineral that can be seen acting here in this way, iron as hydrated oxide is almost as active and in some places the rocks are often said to be hard as iron, where the sands have been cemented with this mineral. This is not a very correct statement perhaps, but remarkably expressive. Both of these minerals as well as acting as binding or cementing agents in the rocks, play tricks on us and make a number of peculiar shapes which are often gathered on account of their fancied resemblance to some familiar object such as seeds, fruits, mushrooms, or wood. These objects are known under the general name of concretions or fairy stones and the accompanying plate illustrates some of the forms common to these shores.

Fig. 1

Some common concretions, Beaumaris.

SANDRINGHAM TO BEAUMARIS COASTLINE

This locality may be reached by electric train to Sandringham, thence the coast may be studied all the way to Beaumaris. As an alternative the electric train can be taken to Cheltenham thence along Charman Road about one mile to the coast where the Beaumaris sections can be specially examined.

A very short walk from the Sandringham railway station along Melrose Street will enable one to reach the coast-line, and immediately coastal sections can be examined from several points of view. A sandy deposit varying in the coarseness of its particles and showing evidence of irregular bedding, and irregularities in coloring and binding matter can be seen in the first section. A good contrast can be made out between atmospheric weathering and marine erosion, and the influence of irregularities in consolidation due to the presence or absence of cementing matter, in this case limonite or one of its varieties. The formation of a platform of marine denudation can be well seen at low tide, with its relatively recent protective incrustation of gregarious worm tubes of calcareous matter commonly mistaken for coral growth. The accumulation of a strip of sandy beach at the foot of the little cliffs, looking at first sight like a protective apron, but in reality being the material that is battered by the sea-water against the ferruginous sandstone to do the cutting or filing action which gives rise to the undermining and cave formation at high tide level. This sand is entirely locally derived being mainly composed of quartz particles from the sandy beds with a few fragments of ferruginous sandstone and shelly particles. The formation and breakdown of cliffs on a small scale, the development of capes and bays, fiords, isthmuses and islands can be clearly illustrated. Some of the lower beds of this locality are fossiliferous and these shell and other remains indicate, first, that the deposit was a marine one, second, that it was laid down under shore line conditions, and third that the fossil remains though comparable with living forms are for the most part extinct. The geological age cannot reasonably be expressed in years, but the remains belong to the Upper Miocene subdivision of Cainozoic time. Some of the sands of this shoreline are noted for their coarseness, long stretches of quartz particles the size of small peas are worth looking at for they show clearly enough that they are broken down fragments from small vein or leader quartz and thus give a clue to their probable origin from the old bed-rock of Melbourne. The formation of shingle as well as sandy beaches can be seen in progress.

The Red Bluff or as it is sometimes called the Yellow Bluff is one of the boldest cliffs of these parts with its 110 feet above sea-level, running down to a hard jutting cape of ferruginous gritstones and sandstones with a very fine protective apron of large angular blocks of the same rock, the fall away of which has been materially assisted by the jointing which is quite a feature of these rocks at this spot.

The softer and less cemented beds consisting of sands and grits with some clay which form the upper beds of this section show the influence of rain and atmospheric conditions in a very marked manner, and give the exact appearance of canyon and badland weathering. The numerous steep gullies washed out show the talus accumulation at the foot and the build up of a considerable deposit of fans spreading out into a flat or plain development. Wind has been the cause here of considerable trouble as far as the road has been concerned,

Fig. 2

Red Bluff, Sandringham from the North with Half Moon Bay behind. Photographed in the mid 1890's.

Fig 3

Closer views of cliffs at Red Bluff. Photographed in the 1890's.

for it has been constantly covered with considerable deposits of blown sand carried up by a regular funnel. Several attempts have been made to arrest this action such as shrub fences, paling fences and iron fences, but all of these have been badly beaten. Man as a geological agent is much in evidence at this point and considerable wear and tear around the cape is distinctly attributable to him. There is evidence of many marked changes at this locality in the last fifty years. The northerly face of a hundred odd feet has been ripped into a considerable depth and the crest of the cliff has receded by many feet. Much of the loosened material has been blown away but quite a quantity has accumulated at the foot of the face as a series of dry deltas. A considerable area of foreshore in this little bay was thus being reclaimed and for many years it had all the appearance of permanency yet in July 1944 with strong northerly winds of gale force for two days, most of the dry deltas have been cut back almost to the cliff face, however, they still show a nice section of the successive layers of the materials of which they were built. Then one may ask — where has all this sand and clay gone? A general view from the headland or point of the bluff will show that it has been levelled off and spread in such a manner as to widen the beach and shoal up the little bay to the north of this point.

On the north side of this bluff there used to be visible a lenticular patch of fine grained greyish sandy limestone, a little above high tide mark, and this on close examination yielded a nice collection of rather well preserved fossils, chiefly marine shells, giving further evidence of the Miocene age for these beds. Unfortunately this patch can no longer be reached as a mask of considerable thickness now covers it owing to the slipping of large masses of material from above. Recorded from near the base of this bluff is also some fossil wood, giving evidence of the nearness of land and confirming the shallow water origin or shore line conditions of this series of deposits. Conditions at present have removed a lot of the fallen material and very soon access may once more be had to this fossiliferous horizon. A little beyond this bluff and forming the northern end of Half-Moon Bay the shore platform is an excellent spot for the study of some aspects of concretionary formation, and around the point forming the southern cap of Half-Moon Bay a shingle beach can be examined made up largely of ferruginous concretions variously modified by marine action and shore-line trundling. Many peculiar shapes can be collected here, some resembling seeds, fruits, mushrooms, branches and stems of wood, and the more imagination one has the greater the number of identifications. Some resemblances are certainly very striking and it is quite excusable for the uninitiated to regard these shapes as fossils while they are not attracted by the genuine specimens at all. Many a pleasant hour can be put in turning these things over and wondering on the peculiarities of their formation. (See Fig. 1.) Between these two hard ferruginous sandstone points lies that little sandy cove long known as Half-Moon Bay, a very favoured picnic and bathing locality; some of the earlier bathers at this spot used to deplore the fact that the sand was very dirty, without ever giving a thought to the reason for it. A little investigation shows quite a fair accumulation of shell, charcoal and shingle pebbles, one flat piece and one more or less pointed piece for breaking away the shells in such a way that the soft mollusc could be more easily extracted. This locality was evidently also favoured by the aboriginals of this district for they made of it a camping and feeding ground and left behind sufficient relics for us to interpret this little bit of early history. The sandy portion of this bay was a good natural home for various kinds of cockles, while the rocky points and reefs yielded an abundance of mussels and periwinkles. The aboriginal was quick to detect the haunts of these succulent molluscs and appreciate their value as a change of food.

When one proceeds beyond Half-Moon Bay a rough strip of rocky shore line is encountered with practically no sandy beach, but this bare rock shows clearly many points of additional interest, the formation and development of pot-holes being an outstanding feature, the marine erosion of cliffs, the atmospheric weathering of cliffs, the protecting influence of vegetation.

The rock here varies from a very hard dark coloured conglomerate and fine sandstones to much softer buff coloured sandstones and sands. The bedding is not very regular but current bedding is much in evidence, and coarse to fine sediments occur in rapid alternations. Notwithstanding the unfavourable appearance of these rocks for the preservation of fossils, many molluscan remains can be collected along this stretch of coast; they exist now only as casts and impressions, as all the original calcareous matter has been carried away in solution. In addition to large fragments of quartz which show clearly their breakdown from small veins there are fragments of sandstone and mudstone which compare so exactly with the Melbourne rocks that their origin from the breakdown and wear and tear of the Silurian leaves no room for any doubt whatever. Thus this bit of lithological evidence is helpful in determining whence these marine Tertiary sediments have been derived, and the fossil or palaeontological evidence will tell when this happening took place in our past history.

From here to Black Rock corner there is a very fine sandy beach with only an occasional outcrop of the harder ferruginous sandstones. As a rule bathers along this shore have a perfectly smooth sandy bottom with reef protection on the seaward side, but occasionally with a change in the set of the wind and current the sand

Fig. 4

South of Half Moon Bay looking South.

South of Half Moon Bay looking East at the Cliff.

Fig. 5

View of near the Point, South of Half Moon Bay.

may be heaped up shorewards or carried along further north and then a shingle or actual rock bottom is encountered much to the discomfort of the regular or casual bather. Under favourable conditions this shingle will be worth examination for petrified whale bone, shark's teeth and other fossil relics of the past have turned up in this position. Behind the sand beach there are banks of sand and sandy clay clad with tea-tree shrubs, acacias, mesembrianths, currant bushes and a few straggly honeysuckles, the tea-tree showing a plastering down on the slope as a distinctive influence of wind action and producing an almost impenetrable tangle except for the well worn pathways which plentifully intersect it. At the foot of the slope in some places the sandy talus is held in position by the salt bushes which make their appearance and this when cut back by storms or tidal action resembles a higher level beach. Coarse running grasses also help to bind and give relative permanency to this protecting foot.

Now the question may be asked: how can marine erosion take place under such conditions? Obviously marine erosion is not making any headway where these accumulations are at present and they would have to be removed before a fresh attack could be made. In the near neighbourhood undermined cliffs and vertical cliffs can be seen and a study made of the balance between the marine horizontal and undermining action and the landslips due to saturation and the action of gravity in vertically straightening up the bluffs, followed by the eating back of rain and other atmospheric agents to produce the more gradual ramp-like slope. It is thought by many who visit this locality that Black Rock refers to some of the dark coloured ferruginous sandstones of this coast, and when it is known that Mr. Ebden actually quarried stone from the shoreline for the construction of the very elaborate stables and that he called his place, Black Rock House, confirmation appears to be lent to the idea. However, Mr. Ebden came from Ireland where his estate was known as Black Rock, and he merely called his new abode after his old. Stone was probably taken from the same place on the coast for the construction of Glenmore House in Bluff Road. This house was pulled down in 1911 and the stone used for road purposes by the municipal authoriites; extra interest attaches to this as the stone showed worm tubes and *Pholas* borings with the dead valves still in position before it was broken up, indicating that the stone was got from low tide mark.

Quiet Corner is a very good spot for examining present marine erosion but more particularly under rough or extremely stormy conditions. The undermining by the sand bearing sea can be seen on the sandy clays and its horizontal working into caves by successive falls from the top of the cut, assisted by or even produced by water soakage from above. The material which falls in acts as a temporary check to the horizontal intrusion of the sea until the harder portions only are left to form a slight shingle. One stormy Sunday, 21st March, 1911, was responsible for more change at this spot than had previously been noted by the oldest inhabitant, there being falls of several tons at the foot of the cliffs, and about half a dozen tea-trees on the beach gave further evidence of the extent of the encroachment. One grim old monument of the former extent of a projecting point or cape here can be seen in a little island or outlier which is quite detached at high tide though still accessible over a sandy floor at low tide.

At about five chains from Quiet Corner the darker and more firmly cemented ferruginous sandstones again outcrop at the foot of the cliffs showing their irregular and more or less undulating surface and strong current-bedded structure. Black streaks, patches and low level platforms of hard sandstones show as the tide falls and some of these are fossiliferous while they show distinctly their resistance to the blind fury of many storms. This reach of shoreline shows distinctly some evidence of natural shoreline reclamation. At the next point beyond Quiet Corner there is a nice low platform sloping seawards, it is very dark in colour, rough and ragged, and on close inspection shows pot hole erosion in every stage of development and breakdown to the formation of open channels or courses to the sea. These conditions give rise to the formation of natural armchairs, pulpit rocks and such like features. There is also a marvellous concretionary layer to be seen in relief on the sea floor showing pipes, tubes and stems in the utmost abundance and obviously the source of the many interesting forms to be gathered from the shingle hereabouts. Fairly regular joints run seawards through the rocks of this floor, with occasional curved joints crossing them. The flat here is undergoing natural reclamation as shown by the bare rock at the water's edge, then rock with its irregularities of surface somewhat modified by accumulations of shelly sand found to be supporting mesembryanths or pigface, a few coarse grasses and other plants, then there is a narrow strip of fifteen feet or so of bare shelly sandy beach, then a fringe of wiry grass tussocks on the old storm shingle, then a flat area of half an acre or thereabouts of reclaimed land held by banksias, currant bushes and tea-tree, of a growth to indicate permanency for a considerable period of time.

A dip in the sandstone beds now becomes noticeable apparently due to slight rolls parallel to the coast, there is a slight dip inland and also seawards. Little bluffs again make their appearance as these compacted sandstones ascend above sea level.

More attention should be paid to the very distinctly concretionary structure to be seen on the large scale in some of these beds near Chipperfield's. The shore platform at low tide shows a large number of more or less circular or elliptical curved beds and a splendid study in dome structures. These structures run from one to thirty feet in diameter, therefore some sections might show the appearance of a very definite dip or roll. It is quite certain that this explanation for some of the features to be noticed along this coast must be given full consideration before folding and crumpling agencies are called in to our aid. Below the Beaumaris Hotel in the cliff face a similar structure in section may be examined; it has been taken by some as minor folding or contortion of the beds, but neither the immediate overlying or underlying beds are affected and that would seem to rule out folding. A suggestion may be put forward that gas of some sort, not necessarily steam, may have contributed somewhat to the formation of this structure.

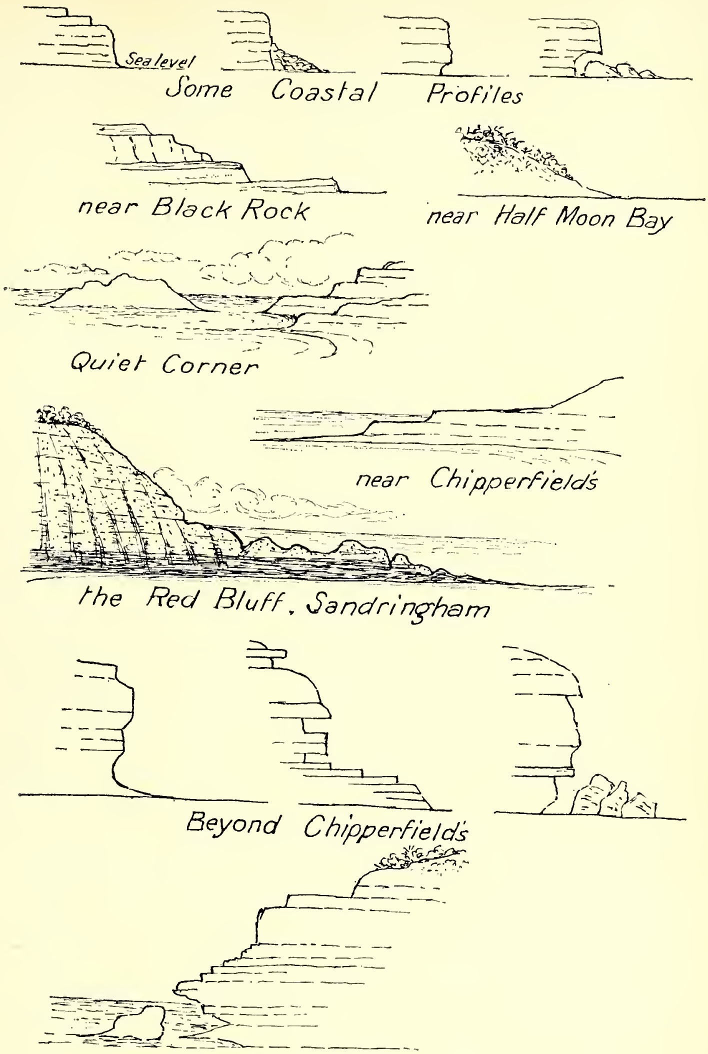
The underlying beds are exceptionally rich in organic remains from whales downwards on the animal scale and it might be possible that the gases given off in the decay of the organic matter of these creatures may have been sufficient for such a purpose. In recent years we have had some remarkable shore strandings of schools of whales on the north coast of Tasmania as well as on South Australian shores where the conditions were hardly favourable for their preservation. There is no manner of doubt about the gaseous emanations from such an accumulation, but more notice is taken of the hard or bony remains of such creatures and very little attention is given to what is happening or likely to happen to the organic portions. Some such happenings as this very likely took place in our seas in the neighbourhood of where Beaumaris now stands judging by the very large number of whale remains that can now be found at that locality. [See below for a comment on this statement. Ed.]

Near what is known as Lang's place there used to be notices along the shore running "The Beach in the vicinity of this notice is dangerous", also, "Caution. The foreshore in the vicinity of this notice is dangerous and unsafe." During recent years nothing has been heard of these quicksands,

Fig. 6

Concretionary structures near Chipperfields.

Fig. 7



Coastal Profiles.

but in the early days many a hair-raising story centred around some of these patches. Along this shoreline sandbanks have been and are still forming on the shallow shelving rocky platform, the land in shore is relatively high sandy and very porous, this would act as a gathering ground for fresh water which would drain down towards the sea until no doubt some of the sands of the shoreline become supersaturated and developed quick-sand patches.

Just below Lang's there is another naturally reclaimed shoreline area, and a still larger one further on below Chipperfields these now form much favoured holiday resorts and picnic grounds.

Along this shore fossils occur in

patches and pockets in the reddish ferruginous sandstone and dark brown beds and are not generally distributed in layers. When a pocket is struck the impressions and casts of bivalve shells are in the utmost profusion, the commonest being examples of *Placamen subroboratum* and *Mactra hamiltonensis*. Here is definite proof of marine conditions. Very coarse sediments can be noted along this shore also, angular and subangular vein quartz fragments of about one quarter of an inch diameter, occasionally one and a half to two and even four inches diameter, as well as large fragments of the dark blue Silurian rock. It should be pretty evident that such coarse material did not travel far and the shoreline supplying this material must have been fairly close. The presence of the remains of driftwood may be taken as a further hint in this direction. At the first bluff to the east of Chipperfields thick beds of close grained brown sandstones show excellent examples of marine erosion in the form of cliff undermining, cave formation and cave collapse.

The floor here being in softer sandstones is ripped out in long shingle runnels by the rise and fall of the tide, there are also good examples of pot holes and the residual ridges running seawards. Honeycomb weathering is another feature of some of these sandstones.

Another point a little further on still shows a portion of vertical cliff bathed by the sea, but the softer beds above have been severely attacked by atmospheric agencies and cut back and the material carried away to quite a considerable extent.

There are many cliff profiles along here that are exceptionally interesting in many ways showing the influence of different beds with different qualities against the atttck of marine and atmospheric agencies.

From here along to Beaumaris there have been considerable falls of the cliff face, the joints have opened out with water, and later large masses have slipped down and great blocks of the more solid sandstones can be seen in all sorts of positions. Most of this shoreline is only accessible at extreme

Fig. 8

Bluff to the East of Chipperfields looking towards Beaumaris.

low tide and although some scrambling about the cliffs and rocky faces can be indulged in it is not too safe and scarcely to be recommended. Several people have tried these simple looking cliffs, but have found much to their sorrow that satisfactory footholds cannot be expected on rotten and crumbling material.

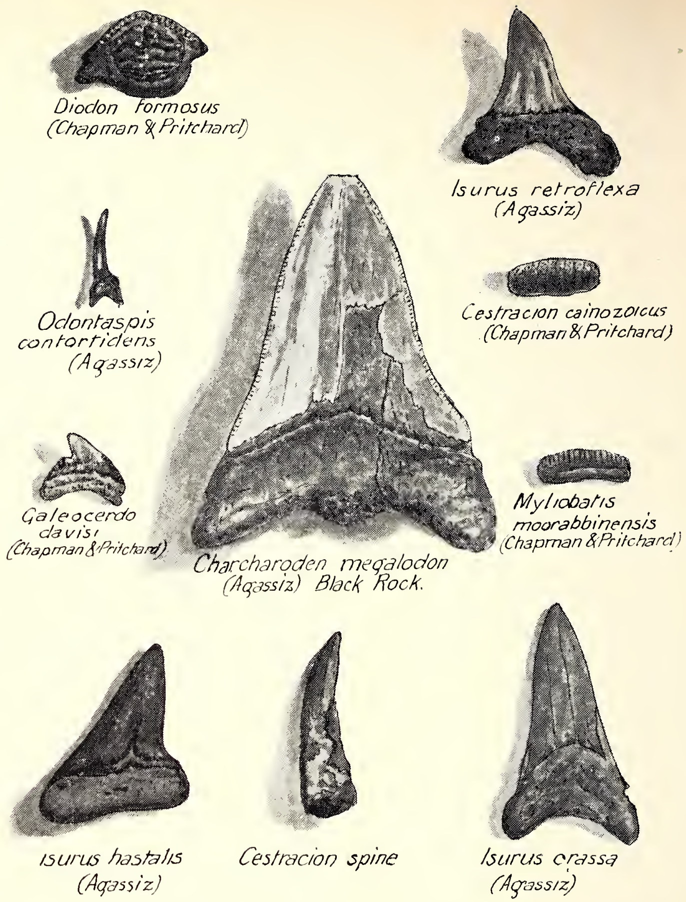
Beaumaris

The Beaumaris section is that part of the coastal cliffs below the hotel and extending along towards Mentone as far as Charman Road. This is another locality where the indiscriminate collecting of fossils leads to much trouble and argument. It is quite a common practice to pick up shark's teeth and casts and impressions of shells from amongst the shingle without a thought about the origin of the shingle or the beds represented. It so happens that a small patch of Balcombian or Mornington beds [Balcombe Clay] is just visible at low tide, where it has been subjected to much wear and tear. Most of this material, calcareous sandy clay, is very soft but it contains hard calcareous concretions and bands, and these harder parts can be trundled about the beach and mixed up with similar concretions from the overlying beds of the cliffs. The soft beds as well as the concretions are fossiliferous and contain the typical volutes, cowries, cones, and other forms belonging to the Balcombian series. Resting on these older beds is an interesting conglomerate containing many peculiar elongated shapes apparently concretionary in origin, also coarse quartz and numerous fossils, including some derived forms from the older beds. It is in this conglomerate bed especially that most of the shark's teeth and other fish as well as whale remains are to be found. There can be very little doubt that the popularity of this locality from the point of view of the collecter, the student, or the geologist is to a great extent due to these interesting fossils.

In these beds there are the remains of a great many different kinds of shark, at least fifteen have already been recorded under the names of *Notidanus, Cestracion, Asteracanthus, Galeocerdo, Odontaspis, Lamna, Isurus* and *Carcharodon*. In addition there are other fish remains such as rays (*Myliobatis*), chimaeras (*Edaphodon*), wrasses (*Labrodon*), Porcupine fish (*Diodon*), rock Ling (*Genypterus*) and many others. Whale remains include ribs, shoulder blades, paddle bones, portions of skulls, snouts, earbones (Cetotolites four different types), teeth (*Physetodon, Scaldicetus*). Older Ziphoid whale remains occur in the lower or older beds but these are very rare. Thus showing clearly the presence of several types of these extinct creatures. (In addition marsupial and bird bones, including penguins, have been found here. Ed.)

In recent years we have had some remarkable shore strandings of schools of whales in the north coast of Tasmania, on the Gipsland coast, as well as on the South Australian shores where the conditions were hardly favourable for their preservation. Some such happening as this very likely took place in our older seas in the neighbourhood of where Beaumaris now stands judging by the very large number of whale remains that have already been discovered at this locality. Numerous remains of the invertebrate division of the Animal Kingdom are also present in direct association with the above, notably mollusca or shellfish and corals. (The modern view of this deposit is that it is a "lag deposit" formed as a result of erosion of the underlying sediments leaving behind a concentrate of whale

Fig. 9



Fossil Fish,
Beaumaris.

bone before the overlying sediments were deposited. Ed.)

A little higher up in the beds mollusca become much more abundant and definite layers of different shells such as *Placunanomia, Cucullaea, Eucrassatella, Chione* and *Mactra* show in a striking manner. *Placunanomia* is a thin pearly translucent shell not unlike some oyster shells and it occurs in and above the concretion bed. *Cucullaea* is one of the box shells and occurs in patches and local beds. Then the *Eucrassatella* band is very pronounced but few of the shells are well preserved. This bed shows a very pronounced roll in this section; it is first to be noted at sea-level some distance west of the hotel, below the hotel it is several feet above sea level, while at the east end of Beaumaris Bay it again descends to sea-level. As a rule the *Chione-Mactra* bed is a little higher in the section. These molluscan remains on account of the porous, sandy character of the beds have been for the most part converted into soft, chalky material and the greatest care is necessary to collect anything like fair specimens; in some

Field Naturalists Club of Victoria

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To be used by new members or subscribers.

(Cross out parts which are not applicable.)

I wish to subscribe to the *Victorian Naturalist* for 1976. Please post it monthly to the address below.

Ordinary
I wish to apply for Country membership of the Field Naturalists Club
Junior
of Victoria.

My full name and address is:

Mr.
Mrs. ....
Miss

....

....

I enclose the sum of $ .... in payment of the year's fee.

Date............/............/1976.

Signature..

....

(Cut along this line.)

The Field Naturalists Club of Victoria

ELECTION OF OFFICE-BEARERS

Under the terms of the Articles of Association, nominations for elections to Council at the Annual General Meeting must be received by the Secretary two calendar months before the Annual General Meeting, i.e., by the January General Meeting. I therefore call for nominations for the following positions:—

President	Vice-Presidents (2)
Secretary	Treasurer
Assistant Secretary	Assistant Treasurer
Editor	Librarian
Assistant Editor	Assistant Librarian
Excursion Secretary	Residual Councillors (5)

Any financial member may nominate for any of the above positions. Nominations must be proposed and seconded by financial members, and nomination forms must be signed by the nominee, the proposer and the seconder.

It is most important that nominations be received for all positions as the Club cannot function effectively without a complete, enthusiastic and effective Council.

GARNET JOHNSON,
Correspondence Secretary.

(see over)

The Field Naturalists Club of Victoria

AN INVITATION TO PERSONS INTERESTED IN AUSTRALIAN FAUNA, FLORA AND COUNTRYSIDE

If you have not already an affiliation with the F.N.C.V., you may apply to the club either for membership or for regular subscription to the *Victorian Naturalist.*

These are some of the club's activities:

- General meetings each month, with informative, illustrated talks by prominent naturalists. These are held on the second Monday of each month, at the National Herbarium, South Yarra.
- Meetings of study groups comprising those with specialized interests such as geology, botany, microscopy, entomology, native fauna, etc.
- Organized excursions led by nature experts, to places of interest, both near and far.
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Membership is available to any person interested in nature; it is not necessary to have any specialized knowledge.

Non-members may subscribe to the "Victorian Naturalist".

If you are interested in either membership of the club or subscription to the *Victorian Naturalist*, please complete the appropriate parts of the form on the reverse side of this leaf and post it to:

Honorary Secretary, F.N.C.V.,
National Herbarium, South Yarra, Victoria 3141.

(Cut along this line)

....

The Field Naturalists Club of Victoria

ELECTION OF OFFICE-BEARERS

Nomination Form

I, ...of........................

....

hereby nominate...

for the position of..

Seconded by...

of...

I hereby accept nomination as a candidate for the above position.

Signed...Date.........................

(To be removed.)

SUBSCRIPTIONS NOW DUE

The Field Naturalists Club of Victoria is administered by a relatively small number of honorary office-bearers.

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Joint Country	$10.00
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(To be removed.)

The Field Naturalists Club of Victoria

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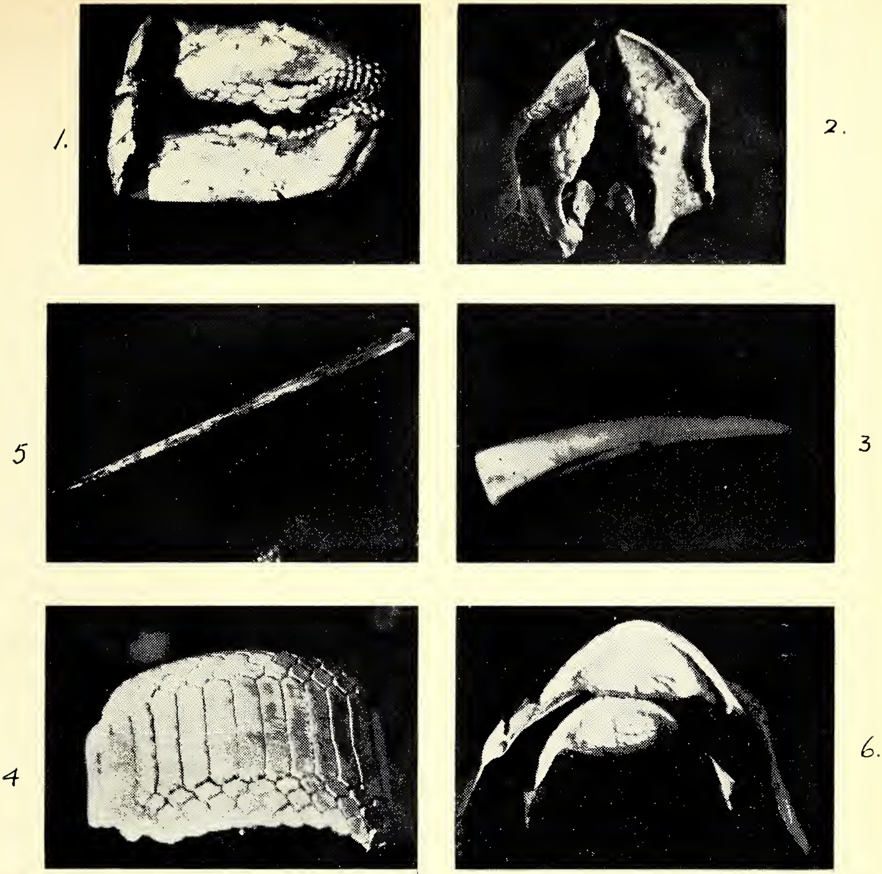

FIGURE 10

1. The Port Jackson shark or pig fish *Cestracian (heterodontus) philippi*. Side view of cartilaginous jaws with their strong lateral grinding teeth of varying size and shape and the much smaller gripping teeth at the front. These usually break away from the cartilage and preserve as individual teeth, hence great care is necessary in their collection and identification. Every modification of form does not mean a new species.
2. Top view of same without the front teeth.
3. Side view of dorsal fin spine of *Cestracian*.
4. *Myliobatis*. Pavement of crushing teeth of the living skate. These also disintegrate into individual pieces in the fossil state.
5. Tailspine or so called sting of a Ray. These may be obtained up to 18 inches or more in length and represent a fish of several hundredweight.
6. Porcupine fish (*Diodon hystrix*). Upper and lower jaws, teeth and crushing palates of the common Porcupine fish.

cases the calcareous matter of the shells has been entirely removed and only casts and impressions in limonite are now to be seen, but these amply show the great abundance of the shells. Above this molluscan bed there is another very characteristic layer packed very full of sea-eggs or sea urchins in an excellent state of preservation. The commonest type is a more or less heart-shaped, convexly rounded test which is known under the name of *Lovenia Woodsi* (Etheridge), but several other forms can also be procured by careful collecting.

It can thus be noted that there are many interesting differences in the preservation of fossils in this section, and several questions can arise as to differences in the composition and structure of shells and other organic remains. These beds are constantly wet with percolating water and where some of this water drips out on to the recent sand and shingle the binding or cementing of the material can be seen in progress, on examination it is easy to prove that the cement is a calcareous one, and consideration of these facts will show quite clearly how the numerous calcareous concretions in the cliff section have originated. Towards the top of the section the beds are inclined to show rather less iron colouring matter, until in places practically white sands are in evidence of whales on the north coast of Tas- and the character of the soils in the whole of this district is well known to be sandy, light or dark in colour according to the quantity of organic or vegetable matter present. In some parts these upper beds carry quite a number of fragments of recent shells of windblown origin, sometimes the shell remains are redistributed material from the early aboriginal camping grounds, and are in consequence usually to be observed only in the immediate vicinity of the coast.

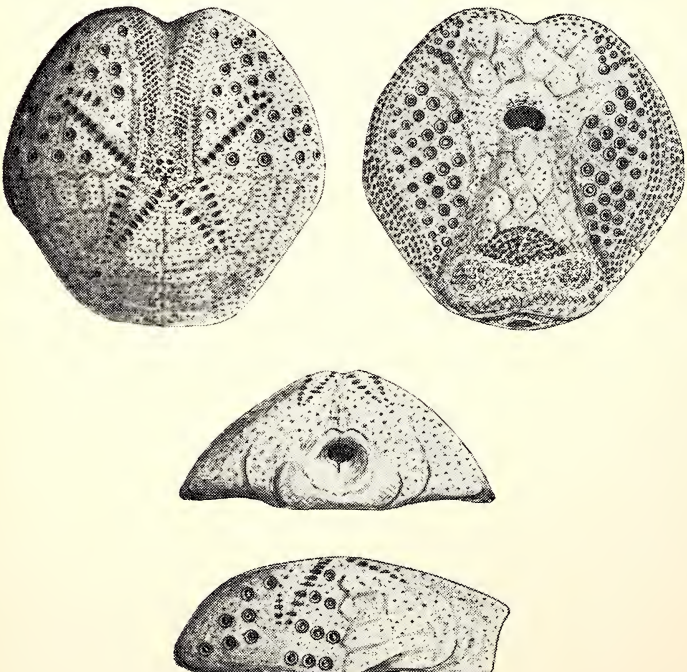

Fig. 11

Lovenia woodsi (Etheridge) one of the most common Beaumaris fossils.

A new race of *Trogonoptera brookiana* Wallace (Lepidoptera: Papilionidae) from West Malaysia

by Bernard D'Abrera*

Victor Doggett**

Norman Parker †

Synopsis

The population of *T. brookiana*, occurring on the eastern to south-eastern side of the Malay Peninsula, previously regarded as being identical to the race *trogon* Vollenhoven from Sumatra, is here recognised and described as a distinct sub-species, differing significantly from *trogon* on morphological and geographical grounds.

Discussion

The genus *Trogonoptera* Rippon comprises two species confined to Sundaland (excluding Java) which are *T. brookiana* Wallace and *T. trojana* Honrath. The latter species is confined to Palawan, but *T. brookiana* is known to occur in four races, *T. b. brookiana* (Borneo, Balabac Is.), *T. b. natunensis* (Natuna Is), *T. b albescens* (West Malaysia) and *T. b. trogon* (Sumatra).

About 1937, specimens of a population of *T. brookiana* were taken in the swamps of south-eastern Johore by Eliot and Cowan. Corbet and Pendlebury (1956) merely refer to this population as being *trogon*, which decision does not appear to have been formally published with irrefutable evidence as to its conspecificity with *trogon*.

Fleming (1975) follows Corbet and Pendlebury in treating this population as *trogon*.

Eliot has since published two references to this population (1958; 1973) and in neither does he appear to be aware of its possibly different identity. D'Abrera (1975) suspected the existence of an anomalous situation between *trogon* from Sumatra and the population being described here. Other specimens of this population have also been taken at various localities in Trengganu State by different collectors, and there have been verbal reports of sightings in localities between Trengganu and Johore on the eastern side of the central massif, at low to medium elevations.

On a recent excursion to West Malaysia, the first author was shown specimens of this population belonging to the collections of the other two authors as well as to those of W. A. Fleming and his wife, Alix Fleming.

It soon became apparent that this population might differ from *trogon* and it was resolved to make a thorough examination of available material.

While external morphology appears distinctive enough, it is in the male genitalia that significant differences may be observed between *T. b. trogon* and the population now being described.

We do not agree with Eliot (1973) that the new population has only recently reached the Peninsula by immigration across the Straits of Malacca for indeed it is a puzzle that it is not established in the western portion of the Peninsula, obviously closer to Sumatra than is its present habitat. That the form has been present on the

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Malay Peninsula even before *albescens* must now be regarded as a possibility, with *albescens* being the more "recent" development of the two—indeed similarity of the eastern population to both *trogon* and *natunensis* emphasises rather the specialised nature of *albescens.*

If, as Zeuner suggests (1943: 147) the phase of divergence of *Trogonoptera* from ancestral *hypolitus* was in the late pliocene (his "W" stage) then it is to the early pleistocene ("Y" stage) that we can look for the beginnings of *albescens.* It is now apparent that the common ancestor of the *Trogonoptera* group spread westwards from the Celebes, one slightly northwards (*trojana*) and the others across Borneo to Malaya and Sumatra. This would comfortably explain the presence of three similar forms in a westward configuration at similar elevations, with the undescribed form inhabiting the *eastern* side of the Peninsula.

That *albescens* has been the most recently isolated, specialised semi-montane and successful form would also be thus explained, while it would be further clear why it has as yet not penetrated Thailand or Southern Burma. There is no doubting the capacity of *albescens* to surmount high terrain or fly across great distances, but because it appears to be still in the process of establishing itself in the north-west and central parts of the Peninsula (commercial plundering notwithstanding) it will only be a matter of time before it does invade Thailand and South Burma.

The other Peninsula population, however, is not as successful, and this would tend to draw attention to its comparative antiquity in terms of the respective ages of both races. Plainly, that *albescens* is the fitter of the two to survive, is now patently clear. We would also suggest that although *albescens* is a strong, successful insect, it is also very strongly territorial when compared with *Ornithoptera* species or most *Troides.*

Individual specimens of *brookiana* have frequently been observed operating a particular corridor or flight path with almost ceaseless monotony. This behaviour is virtually unknown among the *Ornithorptera* or most *Troides*, which by comparison are very adventurous creatures. Its lack of willingness to colonize new territories is thus apparently explained. Other phenomena, such as the habit males have of congregating over seepage in large numbers, the confinement of the genus to Neomalaya, the development of a sphragis on the ostium of the female, and the difficulty naturalists have had in locating the breeding areas of most races show a conservatism and exclusiveness not known in any of the other allies of *Troides.* It is then interesting to note that in the experience of all of the few who have observed the eastern population, contrary to what is known about the other *brookiana* races, it is the female which is the most often encountered sex.

Eliot's (1973) comment that the two populations have not interbred so far because of differences in food plant is most probably true, but an examination of the genitalia also indicates why this is not probable.

Trogonoptera brookiana mollumar subsp. nov.

Both sexes of this race wear the well-known livery of the *brookiana* group and detailed descriptions are not necessary. However, those individual characters which tend to distinguish it from its nearest (in appearance) relative, *T. b. trogon*, are here described. It must also be pointed out that this "new" race is nowhere as strongly sexually dimorphic as *albescens* or the nominate race.

MALE. Principal observable differences are mainly on the recto (above, upper) surface of the hindwing where the green discal area is more extensive than on *trogon* being extended to more than half the distance from the base of the h.w. to the dorsum. In the specimens examined the distal margin of this green disc is also very noticeably convex where in *trogon* it is straight in some specimens and markedly concave in others.

The space between veins* 7 and 8 is also very noticeably suffused with green scaling (closer to vein 7 than it is to vein 8) a feature which is almost non-existant in *trogon*, being at best a very occasional and weakly developed character in that race. The hindwing itself of *mollumar* differs noticeably in shape from that of *trogon* (and the other races) in the region of the apex. In this race vein 8 is more bowed close to the costa and vein 7 less bowed along its length than in *trogon*.

Consequently the apical margin of the hindwing of this race is more sharply angled away from the costa than it is on *trogon*, and indeed does not possess the faintly scalloped or incurved section of the dorsum between vein 7 and 8 which is a feature of *trogon* and *albescens*.

FEMALE. As in the male, the female also differs noticeably from *trogon* principally in the hindwing. The green discal area of the recto surface of the hindwing is more extensive than it is on *trogon*, occupying as it does more than half of the area of the hindwing, where in *trogon* it covers less than half the area of that wing. Further, the whitish sub-apical area of the f.w.r., only faintly indicated in *trogon*, is better developed on this race, as are indeed the sub-marginal white spots on the hindwing.

MALE GENITALIA. Zeuner (1943: 115 Fig. 38) illustrates the clasper and harpe of *trogon* remarking as he does that "The other subspecies of *T. brookiana* Wall. have very similar claspers and harpes".

That this is so has been clear to us as well, so it is significant that such wide differences should exist between *trogon* and *mollumar*. Harpe spatulate with tapering neck and elongate body (in *trogon* this is poorly developed and just barely in-relief to the clasper on *trogon*); valvae elongate with better defined mid-marginal tooth than on *trogon*. Vinculum bulkier and blunter than on *trogon* (in which race it is narrow and produced into a somewhat bulbous saccus) produced into a finely sculptured saccus.

The apex angularis is short, blunt and sharply downcurved, while on *trogon* it is long, slender and very gently bent. The aedeagus, itself a variable feature among individual specimens of the aristolochia papilios, is here noted for a marked difference in the head of this organ between the two races. In *trogon* the head of the aedeagus is narrow and characterised by two lateral delta-shaped processes with a finely scooped-out apex. In *mollumar* no such processes exist, but the head of the aedeagus is tubiform and prognathic at its lower extremity.

Type Data

Holotype ♂ Ulu Sedili, Johore, W. Malaysia (V. Doggett), 17th February, 1974. F.W. 8.5 cms.

Allotype ♀ Ulu Sedili, Johore, W. Malaysia (N. Parker), 29th August, 1971. F.W. 6.95 cms.

(Type specimens now in the British Museum (Nat. Hist.) Collection.)

*Because of its simplicity and un-ambiguous applicability to the Papilionoidea, the classical numerical system of notation is here applied, in preference to the cumbersome and currently fashionable Martynov system.

The authors wish to express their thanks to the following who either generously allowed examination of their collections, rendered assistance or engaged in useful discussion regarding *T. brookiana* . . . W. A. Fleming, Alix Fleming, T. G. Howarth, Henry Barlow, Elizabeth Matheson, Helen Malcolm, Judy Shaw, Fred Hamilton and Nigel Quick.

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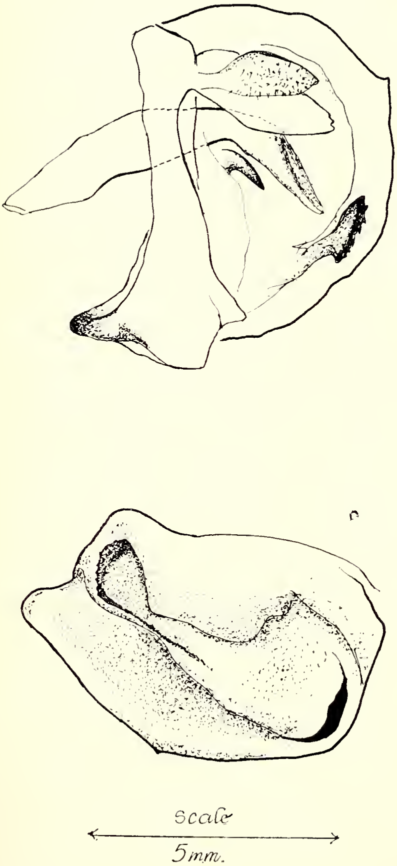

T. brookiana mollumar subsp. nov.
(opposite clasper)

Trogonoptera brookiana trogon
(opposite clasper)

A Nest Constructed by Wild Pigs

by

J. Covacevich*

In June, 1972, at Amos Bay approximately 19 miles south of Cooktown, northeastern Queensland, a carefully constructed nest of blady grass was found accidentally. This nest is illustrated in Plate 1a. Amos Bay where the nest was found is a fairly moist area of open *Eucalyptus* forest with a dense Blady Grass (*Imperata cylindrica*) cover. The nest was approximately 6 ft. long, 4 ft. 6 in. wide and 2 ft. deep along the mid line. It contained a well-formed chamber with a diameter of approximately 10 ins. and a length of 4 ft. The nest was very carefully constructed with each sheaf of grass placed meticulously for best support and shelter and yet to keep the chamber clear. A search in the adjoining area for the mammals which might have constructed the nest or be using it was unsuccessful, as was the search for animal traces (faeces, tracks) over a much wider area. A methodical examination of the whole area resulted in the location of several other nests in various states of disrepair, obviously abandoned, but of the same basic construction. One of these is shown in Plate 1b.

Several native mammals construct nests of grass and although none was known to utilize such a large structure it was assumed that a marsupial, possibly *Bettongia tropica* (which occurs in the general area but is very rare), *Aepyprymnus rufescens* (which also occurs in the area), or some other Macropodid must be responsible. The size of the nest was not consistent with descriptions of marsupial nests in standard Australian mammal texts and the possibility that the structure was a meedja (shelter) of local wandering Aborigines was investigated. Meedjas are, however, larger than the nest and are constructed with a light twig frame. Mr. R. Bell of Normanby Station, about 50 miles west of Cooktown, provided the solution to the mystery. The nests are used by female wild pigs (*Sus scroffa*) for shelter when they have suckling young. Mr. Bell has reported riding over similar nests many times, sending a tribe of piglets and their mother rushing off in wild fright.

Pigs were introduced to southern Australia with the first settlers and to settlements in the north about fifty years later. They now occur widely in isolated coastal areas of Western Australia, near the coast in the Northern Territory, almost throughout Queensland, and in central and western New South Wales (Frith 1973, p. 158). Despite the facts that they are considered a pest wherever they occur and that they are often very common, occurring in "plague" proportions in many areas, no detailed study has been published on the species in Australia. One such study has been completed on the species in southern U.S.A. (Conley et. al. 1972). These authors comment "Hogs are usually inactive in the daytime in characteristic beds. Often these beds are no more than slight depressions in leaves on the forest floor. The material utilized for beds is that which is readily available. If the

*Queensland Museum

Plate 1a (at top). Nest used by female wild pig when suckling young as described on page 25.

Plate 1b. Old nest that has been abandoned.

beds are located on bare soil, leaves, needles, and twigs from nearby will usually be utilized for construction. The beds are not elaborate structures." No nests utilized by lactating females are described. The Amos Bay nests, in contrast to the beds described by Conley et al., are elaborate and carefully constructed.

Pigs are very adaptable animals. They utilize every habitat from lush moist rainforest to dry, sparse ridge country open plains, and salt pans and can survive on almost anything. Undoubtedly nest construction is not common to all habitats because materials for such elaborate structures are not available throughout northern Queensland. It seems certain, however, that such nests are constructed fairly widely in north-eastern Queensland and that they present further evidence of adaptability of wild pigs.

Acknowledgements

Mr. C. Tanner took the photographs and Mr. R. Bell provided information on nests in his area.

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The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

continued from 269 (12)

by James A. Baines

Lycopodium. Gk lykos, wolf; podion, little foot; because the leaves resemble a wolf's claws. Victoria has seven species, all native, and known as different kinds of clubmoss. The genus gives its name to family Lycopodiaceae. The name clubmoss is a translation of Lat muscus clavatus, applied originally to the European species, *L. clavatum*; clava, a club or cudgel; from the club-like shape of its upright fertile spikes of spore-cases.

***Lycopsis.** Gk lykos, wolf; opsis, face or appearance; the name was used by Dioscorides for a plant of this boraginaceous family. The resemblance may be fanciful, but credit for some plausible imagination must be given to the botanist who named a puffball genus *Lycoperdon*, which means "a wolf's fart!" **L. arvensis*, Bugloss, or Field Bugloss, is related to **Echium lycopsis*, Paterson's Curse or Salvation Jane, and **E. vulgare*, Viper's Bugloss, which are also naturalized here. Bugloss comes from the Gk for ox-tongue.

Lycopus. Gk lykos, wolf; pous, foot; from a fancied resemblance of the leaf to a wolf's foot. *L. australis*, Australian Gipsywort, is akin to *L. europaeus*, Gipsywort or Water Horehound, which yields a black dye, but has not been found here. The genus belongs to family Labiatae (Lamiaceae).

Lyperanthus. Gk lyperos, mournful; anthose, flower; referring to the gloomy colour of the flower. *L. nigricans*, Red-beaks, has this common name from the purplish-red colour of the flowers when fresh, and the specific name and two other vernacular names from the fact that the flowers dry to jet-black — it is also known as Undertaker Orchid in Victoria and Black Orchid in Tasmania. Our other species is *L. suaveolens*, Brown-beaks, with its common name deriving from its colour and the specific name from its scent.

Lysiana. Gk lysis, a loosening. *L. exocarpi*, Harlequin Mistletoe, has a variety of host trees, most commonly on the Buloke (*Casuarina luehmannii*), but it was named from its parasitism of the Cherry Ballart (*Exocarpos*).

***Lysimachia.** Gk lysimachos, ending strife, whence the English common name, Loosestrife, of **L. vulgaris*, only rarely collected in the wilds in Victoria (including by F. Mueller). **L. japonica*, Japanese Loosestrife, was found growing in quantity at Toorloo Arm, Lake Tyers, in 1971. The Gk name lysimacheion, with the above meaning, was given to the European plant in honour of King Lysimachos of Thrace (= "the Peacemaker"). The genus belong to family Primulaceae.

Lythrum. Gk lythron, blood; from the colour of the flowers on the species named first. *L. salicaria*, Purple Loosestrife, a common English wildflower, is also native here. Our other native species is *L. hyssopifolia*, Small Loosestrife, and we also have Mediterranean Loosestrife, **L. flexuosum*. The genus gives its name to family Lythraceae, quite distinct from the loosestrife of the previous entry. One is tempted to suggest that the meanings are opposite, that *Lythrum* means "to let loose blood", i.e. start strife rather than end it!

Machaerina. Gk machaira, a dagger, short sword; from the form of these twig-rushes, which were formerly in the genus *Cladium*; Churchill and De Corona list eight species in their book "The Distribution of Victorian Plants", citing changes made by Koyama and by J. H. Kern; Willis retains them in *Cladium*.

Macroglena. Gk makros, large, long; glene, a cavity. Our sole species, *M. caudata*, Jungle Bristle-fern, was transferred from *Trichomanes* in 1938 by Copeland. This large Bristle-fern belongs to family Hymenophyllaceae.

***Madia.** Chilean name of **M. sativa*, Pitch-weed or Tar-weed, the species that is naturalized in Victoria. The common name comes from the plant's viscidity and heavy scent. In Chile the 'madi' is cultivated for the oil from the seed of these composites. Two other American genera in Compositae, *Hemizonia* (California) and *Grindelia*, are also known as tar-weeds.

Malacocera. Gk malakos, soft; keras, horn; because the spreading appendages are soft and horn-shaped, not spiny as in *Bassia*. (Malacology comes from the same root, being the science of soft animals, i.e. the living animals of molluscs.) Our sole species, *M. tricornis*, Goat-head or Soft-horns, was classified in *Chenolea* in 1870. Sydney botanist, R. H. Anderson, established the new genus of *Malacocera* in 1926. (Mueller had transferred this chenopod to *Bassia*.)

***Malus.** Lat name for the apple. Our wild crab apples, **M. sylvestris* (originally named by L. in 1753 as *Pyrus malus* var. *sylvestris*, literally 'woodland apple-pear') are, according to J. H. Willis, descended from subspecies *mitis*, descended from cultivated apples, not directly from wild crabs. Smith & Stearn state that all domestic apples are considered to be cultivars of the species *M. pumila*, a crab with very wide distribution, growing wild from Norway to the Himalaya, and from Asia to Spain.

They mention possible minor intervention of other species, such as *M. prunifolia* and *M. sylvestris*. Apples belong to family Rosaceae.

***Malva.** Lat name for the mallow and a number of closely allied malvaceous plants. The word mallow is merely the English form of the same word; in German it is Malve and in French mauve, hence the colour. Victoria's five species are all introduced. **M. sylvestris*, Common Mallow, is here only in varietal form, var. *mauritiana* (=from Mauritius); **M. nicaeensis*, Mallow of Nice, is a native of all Mediterranean countries except Albania, despite its localized specific name. (Marsh Mallow is *Althaea officinalis*, not introduced here.)

Marianthus. Gk Maria, Mary; anthos, flower; an endemic Australian genus named by Huegel in 1837 after the Virgin Mary. Nearly all the 16 species are in the S.W. of W.A., but Victoria has two species, Orange Bell-climber and White Marianth. Shakespeare's 'winking marybuds' in Cymbeline, and the marigold that 'rises weeping' in A Winter's Tale, both refer to another flower with similar name origin. A great number of old common names had religious connotations, such as St. John's Wort, Herb Bennet and Angelica.

***Marrubium.** Lat name of **M. vulgare*, Horehound; from Hebrew marrob, bitter juice. This plant provided the aromatic bitter juice for an extract commonly used as a cough remedy. The Old English name, hare hune, meant hoary hune (an unidentified plant name), so the alternative spelling hoarhound would be truer to the etymology than the more usual spelling horehound, a form resulting from folk etymology as though the plant had something to do with whores and bitches!

***Matricaria.** Medieval Lat name for Mayweed, probably from matrix, womb, because of its one-time use by doctors in affections of the uterus. Our two introduced species are **M. globifera*, Globe Chamomile, and **M. matricarioides*, Rounded or Rayless Chamomile (called Pineapple Weed in U.S.A.), originally named as a species of *Artemisia*, hence the specific name meaning 'like *Matricaria*'. Polunin gives Rayless Mayweed as an alternative common name of these composites.

Mazus. Gk mazos, a breast, a teat; from the tubercles closing the mouth of the corolla (two protuberances in the throat). Our species, *M. pumilio*, Swamp *Mazus*, is the sole representative of this scrophulariaceous genus in Australia.

Mecodium. Gk mekodios, seen by the way (mekos, length, height). Victoria's four species are known as different kinds of filmy-fern, three of them formerly classified in *Hymenophyllum* and one in *Trichomanes*. Family Hymenophyllaceae.

***Medicago.** Name originally formed by Jacques Dalechamp (1513-1588) from Lat medica, lucerne, so-called because lucerne was believed to have been introduced into Europe from Media, a province of the old Persian Empire. This is Black's explanation; Jaeger says the origin was Gk medike, a kind of clover from Media. All our ten species are introduced, including **M. sativa*, Lucerne or Alfalfa; the others are known as different kinds of medicks (bur clovers in U.S.A.). British writers on the flora invariably use the spelling of medick with the final k, as in Ewart's 'Flora of Victoria', but present-day Australian botanists drop the k (as happened much earlier with words like publick). Medic is pronounced as in medical when used for an army medical assistant; medick should be pronounced with the first syllable as in meed (or in Medes and Persians). The genus belongs, of course, to Papilionaceae.

Melaleuca. Gk melas, black; leukos, white; Linnaeus naming the genus in 1767 because an Asiatic form of *M. leucadendron* has a black trunk and white branches. On the other hand, most of our Australian species of paperbarks have white or whitish trunks and give a general appearance of blackness in the distance from the dark foliage. The species named above has a specific name meaning white tree. Victoria's 12 species, all native, are known as paperbarks, honey-myrtles, and one species, *M. lanceolata* (syn. *M. pubescens*) has an Aboriginal name, Moonah. From the close-packed arrangement of its fruits, *M. decussata* is known as Totem-poles (as well as Cross-leaf Honey-myrtle) and *M. uncinata* is known as Mallee Broom-bush in addition to Broom Honey-myrtle. These shrubs and trees belong to family Myrtaceae.

***Melianthus.** Gk meli, honey; anthos, flower; known as honey-bush or honey-flower from the same characteristic. Our naturalized species, **M. comosus* (Tufted Honey-flower, known in its South African homeland by the Afrikaans name of Kruidje-roer-my-nie (= Touch-me-not) because of its unpleasant odour and toxicity to stock), has also been successful in establishing itself in South Australia, whereas **M. major*, Cape Honey-flower, persists only about old estates. The genus gives its name to family Melianthaceae.

Melichrus. Gk melichros, honey-coloured (from meli, honey; chros, colour). Our sole species, *M. urceolatus*, Urn Heath, has an urn-shaped flower, as the specific name indicates (Lat urceus, urn or pitcher; urceolus, little urn). The genus is in family Epacridaceae.

***Melilotus.** Greco-Latin name of these plants, from Gk meli, honey; lotos, lotus; the genus being related to *Lotus*. Victoria's three introduced species are Sweet Melilot, Mediterranean Melilot, and Bokhara Clover. Common Melilot has been found as an occasional weed, mainly among crops of lucerne. (Papilionaceae.)

***Melissa.** Gk melissa, a honey-bee, from meli, honey; Melissa was also the name of a Cretan nymph who first discovered how to get honey; the flowers are liked by bees. Our species is **M. officinalis*, Common Balm, the word balm being an English shortening of Lat balsamum, balsam. The family is Labiatae, to which belongs *Prostanthera melissifolia*, Balm Mint-bush, whose specific name means 'with leaves like *Melissa*'.

Melothria. Gk melothron, a wild vine, applied to some species of *Bryonia*, another member of this family, Cucurbitaceae. Our species, *M. micrantha*, Mallee Cucumber, is found only in the N.W. of the State.

Mentha. Gk minthe, from which Lat mentha and menta, classical name of mint, the English word being a form of the same word, as is French menthe (e.g. in creme de menthe). Victoria has three introduced species, Pennyroyal, Spearmint and Lemon Mint, and four native species (River, Forest, Creeping and Slender Mints). Plants approaching the typical form of **M. piperita* have been noted at Sassafras in the Dandenongs (the Peppermint). The family is Labiatae.

(To be continued)

IN MEMORIAM

We regret the death of two long-standing members of this Club and express sympathy to their relatives.

Ivo Hammet 30/12/75. Mr Hammet was President FNCV 1944-5. He was a pioneer grower of native plants and many members will recall his fine garden of natives; he was the foundation President of SGAP and of great assistance in establishing the Maranoa Gardens. Mr Hammet was also noted for his book collection of Australiana with particular emphasis on natural history.

George Collis 1/1/76. Mr Collis was an enthusiastic field naturalist and school teacher, but was forced to retire early due to ill health. He attended many FNCV extended excursions and camp-outs, and spent a happy two days (though necessarily inactive ones) after Christmas with the FNCV excursion at Orbost.

Field Naturalists Club of Victoria

General Meeting

8 December

Speaker for the evening was Dr. M. Joshi. The topic was to have been "The Grand Canyon U.S.A." but the accompanying slides had been mislaid. Instead, Dr. Joshi spoke of the granitic rocks that extend down the west of America from Alaska to Chile, and showed slides of three national parks of California in that granitic belt — Yosemite, Lassen and Sequoia National Parks.

Exhibits included three intriguing items under the microscopes. An amoeba, formless and almost colourless, was accompanied by an alga, presumably unicellular; although x100, the alga appeared as minute green dots. A scarlet mite was bewilderingly active, never still for a moment, the eight legs often blurred by its rapid movement. A marine protozoa, euglena type with one flagellum, had been found as green scum on the beach.

Secretary and Editor. Again the President called for volunteers for these two jobs.

Reports on surveys. The President read a letter from the Department of Conservation asking for reports on fauna or flora surveys carried out by groups or individuals.

The *Naturalist*. While awaiting a new editor, an editorial committee will ensure continued publication of the *Naturalist* and articles should be sent to the Editor, F.N.C.V., National Herbarium, The Domain, South Yarra, 3141. More articles, short or long, would be welcome from both scientific and research workers and from laymen with information or observation on any particular species, genera, areas or other aspects of natural history. Now that the *Naturalist* is to be issued only six times each year, it would be desirable to increase the contents considerably.

The *Naturalist* has been published for more than 90 years. A subject index prepared by the late Miss K. Hall and an author index prepared by Mr. J. Baines are being typed — in the hope that we can find a way to finance their publication. These indices are held at the National Museum and are available there for reference.

A volunteer is sought to take charge of the page "Diary of Coming Events". This has largely fallen on Mr. McInnis but he does a great many other things for the Club and should be relieved of this extra task. Group Secretaries are asked to send in their programmes as early as possible, especially necessary now that the *Naturalist* will appear only on alternate months. If programmes for

4-6 months or for the whole year are received well in advance, it will be possible for each fixture to appear in two issues.

General Meeting

12 January

The meeting opened with the announcement of the death of Mr. Ivo Hammet and of Mr. George Collis. All members stood in silence for a minute. See page 31.

Traditionally, the first meeting of the year is a Members' Night and six members presented items.

Mr. Alan Morrison showed superb slides of some W.A. wildflowers, and of a caterpillar and moth similar to the Emperor Gum but very hairy.

Dr. Brian Smith spoke of a scientific expedition to Lizard Island, 150 miles north of Cairns. It was mainly to study marine molluscs but Dr. Smith's purpose was land molluscs. He showed slides of the area, of goannas, of a turtle camouflaging the spot after laying eggs, and of two carnivorous snails that are abundant in the tropical forest. One of them is only $\frac{1}{4}$ in. across the shell, the other $1\frac{1}{2}$ ins. A carnivore does not show a tail behind the shell when on the move as a garden snail does. Returning via Townsville, Dr. Smith was pleased to find a rare snail that produces a red mucus.

Mr. Ken Strong spoke of a gall fly obtained from galls on flower buds of a Eucalypt. Each gall might contain up to 60 fly larvae which pupate in the gall. The adult fly, about $\frac{1}{8}$ in. long, has a sucking mouth and pads on the feet like a house fly, and Mr. Strong wondered how such a soft-mouthed, soft-footed creature could emerge through half an inch of hard woody gall. He discovered that the young fly, when about to emerge, has a balloon-like structure or ptilinum on the front of the head, and the ptilinum is covered with hundreds of rasp-like teeth. Mr. Strong has not been able to find any information about the development of a ptilinum in gall flies, but it is present in some flies that emerge from the ground. Large, clear diagrams illustrated the talk and they also supplemented the slides under several microscopes which were examined at end of the meeting.

Photographic slides of Switzerland were shown by Mr. Reuben Kent, of U.S.A by Mr. Jim Baines, and of land forms of South Australia taken from the air by Mrs. Seamons.

Bird Atlas. A letter from V.O.R.G. organising committee for a bird atlas, asked for the co-operation of members of this Club who can identify birds and plot their positions on a map. Those interested should contact our Council, and perhaps an address could be obtained from one of the organisers.

Spare-time workers for National Museum. Dr. Brian Smith said that the invertebrate section of the Museum could utilise several voluntary workers in writing labels, and suggested it would be a helpful, instructive, though unpaid occupation for teenagers on school holidays.

Exhibits were dominated by Ken Strong's excellent display on the gall fly — clearly annotated diagrams and slides under microscopes of pupae in the gall, the head of fly with ptilinum, the long ovipositor, etc. A ghost moth, 4 in. long, was obtained near Swan Hill, and a specimen of Bolwarra, Eupomatia laurina, with $\frac{3}{4}$ in. cream flower, was obtained near Orbost.

Western Victoria Field Naturalists Clubs Association

Report of Member Club Activities for 1974

Donald History and Natural History Group.
President: Mrs. J. Golding.
Secretary: Mrs. R. Falla.

The Group has had another busy year, with members attending the three W.V.F.N.C.A. meetings. Keen interest has continued in the Mount Jeffcott Flora Reserve, with many individual and group visits. A party from Warracknabeal was escorted through the Reserve in September. Members are delighted with the regeneration taking place in the area now that grazing has ceased, and the seventh type of orchid was found on the Mount in spring.

Geelong Field Naturalists Club.

President: Mr. J. Hunt.
Secretary: Mr. G. McCarthy.
Membership: Approximately 500.

Well-attended camp-outs were held to the Otways, Grampians, Mud Islands and Brisbane Ranges. Monthly excursions, including two by bus, were held with upwards of 20 carloads of members attending. The monthly meetings, with both visiting and Club speakers, usually attracted 130 members. The Club hosted the Latrobe Valley F.N.C. in October. Tree-planting has been undertaken at the You Yangs, Belmont Common and Ocean Grove Nature Reserve.

Hamilton Field Naturalists Club.
Secretary: Mr. D. McKenzie.

The highlight of the year was the staging of "Photoflora 74" slides. This proved most successful and over 180 attended. Maintenance of the Wannon Wildflower Reserve continued, and tree-planting was undertaken at Bryant's Swamp. Club members have been elected to the committees of management of both Mount Napier and Lake Linlithgow. Excursions included the Billywing-Black Range area (with Portland F.N.C.), Heywood Forests, Byaduk Caves and Mount Napier (with Warrnambool F.N.C.), and Port Fairy district. Camp-outs were held to the Little Desert and Mount Richmond (with W.V.F.N.C.A.).

Horsham Field Naturalists Club.
President: Mr. C. Kroker.
Secretary: Mrs. J. Hill.
Membership: 23.

The annual essay competition, with nature and environment topics, was again conducted for primary school children and books were given as prizes. Regular film nights were held, also members' nights, featuring seven-minute talks on subjects of interest. Guest speakers discussed use of forests, parks of the west U.S.A., field trip to the Grampians and Aboriginal paintings. A submission was made to the Minister of Lands re suggested purchase of land adjoining Mount Zero.

Maryborough Field Naturalists Club.
President: Mr. H. Beer.
Secretary: Mrs. L. Courtney.
Membership: 90 adults, 10 juniors.

The Club enjoyed a successful year with well-attended monthly meetings and excursions. "Photoflora 74" was staged and was enjoyed by a good audience. Local apiarists donated 550 pounds of honey to the Club; this was bottled by members and sold at the Club display stand during the Golden Wattle Festival to augment funds for sanctuary fencing. A working bee was held to eradicate boneseed from the local bush, with satisfactory results.

Mid Murray Field Naturalists Trust.
President: Mr. J. Hayward.
Secretary: Miss G. Willoughby.
Membership: 40 adults and 10 juniors.

A very busy year with the usual regular meetings and outings, plus all the extra planning and work that goes into the local screening of "Photoflora 74", hosting the W.V.F.N.C.A. August weekend, preparing submissions for the Land Conservation during general meetings. All this was wonderfully topped off by the exciting news in December that the Trust had won the Victorian Conservation Award for 1974. This is a great honour to us, and in fact to all the work of conservation carried on by all the scattered Field Naturalist Clubs of Western Victoria.
Council Mallee Report and members taking turns to lead the juniors for a half-hour

Portland Field Naturalists Club.
President: Mr. M. Streeter.
Secretary: Mr. C. Shoebridge.

The average attendance at meetings during the year was 23, and this included three regular juniors. The highlight of the year was the hosting in October of the W.V.F.N.C.A. Annual Meeting. The efforts were well rewarded by the many thanks tendered by those who made the journey to the Mount Richmond camp-out area.

Club excursions were not well attended. The striking of a Club badge was an important event, and a good effort by members resulted in all the ordered badges being paid for. Their sales in future years will provide some revenue.

Stawell Field Naturalists Club.
President: Mr. I. McCann.
Secretary: Mrs. J. Hughes.
Membership: 20.

The average attendance at meetings has been nine. Half and full-day excursions were held. Slides of the area, and its flora and fauna were again shown at Hall's Gap during the holidays. Two new plants have been added to the local flora list; the Pale Leek Orchid at the Three Jacks Sanctuary, and Urn Heath in the forest north-east of the town.

Sunraysia Naturalists Research Trust.
President: Mr. I. George.
Secretary: Mr. P. Watson.
Membership: 120.

Topics discussed at meetings included bushfires and control-burning, biological control of red scale in citrus, geology and gemstones and growing Australian plants. Places visited during excursions included Frenchman's Creek (using water transport), Tapio Station to see original mallee country along the Murray, Hattah, and the Mount Henschke rock country. The Christmas meeting following a picnic tea was unique in that the business part was held at the picnic area on the rowing club lawns. A natural history film is shown before each general meeting.

Timboon Field Naturalists Club.
President: Mr. K. McQuinn.
Secretary: Mrs. F. Negrello.
Membership: 9 family groups, 8 single adults, 2 juniors.

Average attendance at meetings has been 27. Outings were held to Beauchamps Falls near Beech Forest, Hawk's Nest Road near Lake Corangamite, Bay of Islands and coastal areas, Cape Otway. Some were held with Warrnambool and Colac Clubs. Guest speakers for the year covered such topics as the Colac Lakes area, travels to the Big Desert, Antarctica and Western Australia, and included speakers from Geelong, Portland and Melbourne.

Warrnambool Field Naturalists Club.
President: Mr. V. Yeoman.
Secretary: Mrs. M. Yeoman.
Membership: 38, including 4 juniors.

Meetings and field outings were well attended during the year. Highlights of the year included the hosting of the autumn camp-out of the W.V.F.N.C.A., the combined Field Naturalist and Gem Club display, a weekend at Hall's Gap, a trip to Lady Julia Percy Island and a visit to Melba Gully. Approaches were made to various departments in the hope that Melba Gully could be retained in its natural state. It was due to these efforts, plus the wonderful gesture of Mr. and Mrs. Madsen that Melba Gully has now been handed to the Victorian Conservation Trust. The gift to the Trust of land owned by Club member Mr. R. Illidge came as a great closing note for 1974.

NOTICE TO CONTRIBUTORS

Due to increased postage costs, it has become policy to advise contributors, only of the non-acceptance of an article. However, if you wish acknowledgement in any case, please include a stamped and addressed envelope.

(Continued from page 2)

Sedgewick Hall when the local Club will provide the speaker. A full-day excursion on Sunday with an informal discussion around the camp fire in the evening and another excursion on Monday. The Bendigo Mammal Survey group will arrange spotlighting on one evening. The campsite is on a private block at Sedgewick with plenty of room for tents and caravans and shelter if the weather is bad. Basic toilet facilities will be provided but there will not be any electric power for caravans. Those wishing to camp on Friday night should ring Bendigo (054) 43 7950.

It was not possible to obtain sufficient group accommodation for those not wishing to camp to justify a coach but it is hoped many members will go by private cars and it should be possible for them to book accommodation in the district for a car load. Would anyone going by car who would like to take another member, please contact the Excursion Secretary.

Sunday, 21 March — Hanging Rock. The coach will leave Batman Avenue at 9.30 a.m. Fare $3.00. Bring one meal and a snack.

Friday, 16 April — Monday 19 April (Easter Weekend) — Beechworth. The coach will leave Flinders Street, outside the Gas and Fuel Corporation at 8.30 a.m. Contact Excursion Secretary later for further details. The coach fare will be $20.00 and should be paid to the Excursion Secretary by the end of March. Members will pay for accommodation individually as it is probable the party will be in two groups.

GROUP EXCURSIONS

Day Group — Any Member is Welcome — Third Thursday in the Month.

Thursday, 19 February — Royal Botanic Gardens (Western Side) and Alexandra Gardens. Meet outside the Herbarium at 11.30 a.m.

Thursday, 18 March — Caulfield Park. Meet at Tramway Junction, cnr. Hawthorn and Balaclava Roads, 11.30 a.m.

There will not be a Day Group Meeting in April as Easter intervenes.

Thursday, 20 May — Fitzroy Gardens Kiosk at 11.30 a.m. then after lunch to Institute of Archaeology.

GROUP CAMP NOTICES

FIELD SURVEY GROUP

14-15 February. Pyalong Area.

6-8 March. Otway Ranges.

(Details Robin Sandell, 83 8009 (home).)

MAMMAL SURVEY GROUP

21-22 February.

6-8 March.

Winning Slides of Photoflora' 76

Ninety minutes of top competition slides on native flowers, birds and bushland will be shown at 8 p.m. at **Kew** Baptist Church Hall, Highbury Grove on Wednesday 10 March; at **Malvern** City Hall, corner Glenferrie Road and High Street on Tuesday 30 March; and in **Melbourne** at Theatrette, AMP Building, corner Bourke and William Streets on Monday 5 April. Adults $1, children and pensioners 50 cents, family $3.

Contact Native Plants Preservation Society of Victoria, 3 Allfrey Street, East Brighton, 3187, phone 58 5753 for information on the other twenty centres in suburbs and country where these slides will be shown.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1975-1976.

President:

Mr. P. KELLY, 260 The Boulevard, East Ivanhoe, 3079.

Correspondence Secretary: GARNET JOHNSON, 20 Sydare Ave., Chadstone, 3148.

Treasurer — Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145.

Acting Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3151. (52 2749.)

Magazine Sales Officer: Mr. D. E. McINNES.

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

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Day Group: Miss D. M. BELL, 17 Tower Street, Mont Albert, 3127. (89 2850.)

Entomology and Marine Biology: Mr. JOHN ZIMMER. (419 4706, business hours.)

Field Survey: R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126. (83 8009)

Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$0.75

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

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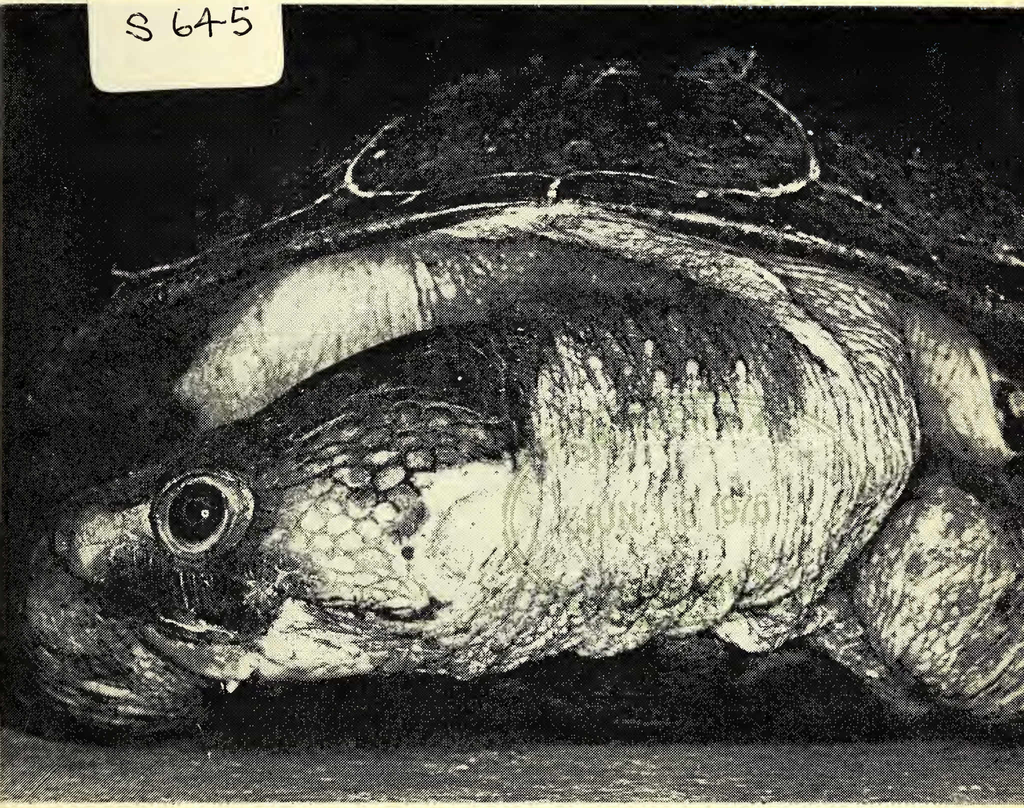

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F.N.C.V. DIARY OF COMING EVENTS

At the National Herbarium, The Domain, South Yarra.

Monday, 10 May (7.55 p.m.) — Extraordinary Meeting.
Business: Application for Affiliation by St. Arnaud and District Historical Society.

Monday, 10 May (8.00 p.m.) — Annual General Meeting.
Business: Minutes of 1975 Annual General Meeting to be read.
Receive Report of Council.
Receive Balance Sheet and Statement of Receipts and Expenditure.
Elect Council (President, Vice-President and 10 Members of Council).
Elect Office Bearers.

GENERAL MEETINGS

Monday, 12 April (8.00 p.m.) —
Speaker — Miss Doery.
Subject — "A Naturalists Journey" (Darwin to Perth).

Monday, 14 June (8.00 p.m.) —
Speaker — Mr. Ian Morrison.
Subject — "Nature Walkabout".
New Members — Elected March General Meeting:

Ordinary:
Miss G. Flood, Unit 7/8 Hepburn Street, Hawthorn, 3122.
Miss M. B. Lock, 9 Norfolk Road, Surrey Hills, 3127.
Miss L. P. Robertson, 155 Prospect Hill Road, Canterbury, 3126.
Mr. John Wainer, 241 Dandenong Road, Windsor, 3181 (*Mammals and Botany*).

Joint:
Mr. Colin Kitchen and Mrs. Phyllis Kitchen, 91 Berkley Street, Hawthorn, 3122.
Dr. J. A. Ferguson, 5 Mossman Drive, Heidelberg, 3084.

Country:
Mr. K. Todd, 93 Melwood Avenue, Killarney Heights, N.S.W., 2087.

New Members — April General Meeting:

Ordinary:
Mr. Roger Pech, 1-3 Non-Collegiate Flats, Monash University, Clayton, 3168.
Miss Helen J. Gordon, 7 Gaynor Court, Malvern, 3144.
Miss Josephine Kenrick, 90 Adeney Avenue, Kew, 3101.
Mr. Bruce Waixel, 25 Santon Street, Greensborough, 3088.

Joint:
Mr. Keith M. Brown, 176 Liverpool Road, Kilsyth, 3137.

F.N.C.V. EXCURSIONS

Friday, 16 April-Monday, 19 April (Easter) — Beechworth. At the time of writing, this excursion is very poorly booked and it may be necessary to modify the trip unless there is an increase in numbers; if there is any alteration, members who have booked will be notified. Accommodation was not available in Beechworth itself and has been booked in Wangaratta with the intention of making day trips to Beechworth and district.

Sunday, 16 May — Fungi Excursion to be led by Dr. J. H. Willis. The destination will probably be in the Dandenongs but will depend to some extent upon the weather. The coach will leave Batman Avenue at 9.30 a.m. — fare $4.50 (bring a picnic lunch).

Sunday, 20 June — Keith Turnbull Research Station, Frankston. Details next issue.

Saturday, 21 August-Sunday, 5 September — New South Wales. Should sufficient members be interested, there will be an excursion to New South Wales, taking three days to reach Cronulla, where the party will stay until 27 August, 1976, then proceeding to Gosford and staying there until 2 September, 1976, when the return journey will begin. Accommodation, hotel and motel, mostly room only, and coach fare would be approximately $265.00 plus meals. Please let the Excursion Secretary know as soon as possible if you are interested.

(Continued on page 79)

the victorian naturalist

Vol. 93, No. 2 7 April, 1976

Editor: M. J. Lester.
Editorial Committee: Margaret Corrick, Reuben Kent, Roland Myers, Brian Smith (chairman), Grif Ward.

Contents

Cover illustration is the Short-necked Tortoise *Elseya dentata*; see page 41. Photo: E. R. Rotherham by courtesy the National Museum of Victoria.

Grif Ward has been editor of this journal for ten years and is certainly due for a break. We on this Editorial Committee are only just beginning to realise the complexity and time-consuming nature of his work.

Many nights each month must have been spent checking manuscripts, photographs and drawings on a variety of natural history subjects, and marking them with the instructions necessary for the printer; then more nights after proofs were received and he pasted them in the page form as a final guide to the printer. No sooner was one issue published than he was preparing material for the next. How he fitted in this 'spare time activity' for ten years is truly remarkable, and we express the appreciative thanks of all Club members and readers.

With Mr. Ward's long service in mind, perhaps it is not surprising that we have not been inundated with offers to replace him. Finally, Madge Lester volunteered but is emphatic that it is for one year only.

We should not expect an editor to continue for years and we now recognise that this Editorial Committee must be permanent, but, of course, with changing personnel over the years. Such a committee can help lighten the load of an incoming editor should he wish it, and we hope it will eventually provide a pool of experienced persons who can relieve an editor for holidays or in an emergency. Please turn to page 71 for further information about this Committee.

In 1976 there will be only six issues of 'The Victorian Naturalist'. This is due to economic reasons, but it makes our job a little easier than the 12-a-year that Mr. Ward produced. Nevertheless, we plan to increase the size of each issue, as evidenced by this one.

Editorial Committee.

Feeding Habits of some Australian Short-necked Tortoises

by

JOHN M. LEGLER*

Short-necked chelid feeding

The dietary habits of turtles are poorly known in general but there is an acute dearth of knowledge for Australian chelids. Observations of turtles feeding under natural conditions are rare even in well-studied groups. The following observations result from 19 months of fieldwork in Australia (December 1972-July 1974).

Emydura: Surface feeding

Belkin and Gans (1968) described an unusual feeding behaviour for *Podocnemis unifilis* in which individuals were observed to skim particulate matter from the surface of the water and then to evacuate excess water from the pharynx in "a crude process of filtration" before swallowing. They termed this behaviour "neustophagia" and reported it also (to varying degrees) in *Chrysemys picta* and *Podocnemis expansa.*

The following observations are for *Emydura* sp. under natural conditions at Kookabookra, N.S.W. (30° 01′, 152° 03′ 30″, elev. 1000m) on 2 December 1973. The feeding behaviour observed is similar to the neustophagia described by Belkin and Gans. Turtles were observed in bilobate pool (70 x 20m x 5m deep) immediately adjacent to the Sara River; many such pools in the immediate area result from former gem-mining operations (abandoned for at least ten to fifteen years). Populations of *Emydura* sp. and *Chelodina longicollis* occur in both the river and the pools but are denser in the pools. This locality is the highest at which *Emydura* has been recorded in Australia.

An adult male was observed with 7 x 50 binoculars at a distance of 10m for approximately one hour at midday (and was seemingly unaware of my presence). Its activities were confined to the area of a 15m equilateral triangle. The turtle cruised about slowly and almost continuously at or just beneath the surface for the entire hour.

When feeding, the turtle appeared to be taking a bite of the surface of the water. After each bite it submerged the head, expelled bubbles (and presumably pharyngeal water) from the nostrils and then swallowed (as judged by throat movements). This sequence was repeated 8 to 10 times, followed by a brief rest, then begun again. Sequences of feeding often alternated with shallow underwater cruising during which the neck was fully extended and moved from side to side as in circumspection. Underwater feeding did not occur during the period of observation.

During the cruising associated with

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and
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Australia

surface feeding, the turtle moved the head from side to side, often altered course, and often directed its bites to one side or the other. In most instances the target of these bites could not be discerned. In a few instances (*ca.*, 20) it was clear that the turtle saw, pursued, and bit at water-striding arthropods; the animals escaped by a comfortable margin in all these cases. Although the biting behaviour was essentially the same for the arthropods as for the unseen objects, I feel that the targets were different. The circumspection and the direction of bites at unknown targets strongly suggest visible orientation to motile prey.

At any given time during the observations, ten or more *Emydura* could be seen at or near the surface of the pond; most were adult males. These turtles cruised about and dived out of sight repeatedly; none engaged in the surface feeding behaviour alluded to above. Ten days later, baited traps set in the same pond caught a total of 14 *Emydura* sp. (4♂ 9♀, 1 im) in 12 hours.

Neustophagia was never observed again in nature or in captivity; however, no effort was made to determine its frequency since the initial observations.

I observed neustophagia repeatedly in a captive of *Podocnemis unifilis* at the University of Utah (almost precisely as described by Belkin and Gans). The behaviour here described for *Emydura* differs from *P. unifilis* in being much less delicate and in involving almost constant forward movement, a definite forward lunge with each bite, probable visual orientation, and a body position nearly parallel with the surface. In general the neustophagia of *Emydura* seems to be intermediate between that of *P. unifilis* and the "apparently ineffective biting" of *P. expansa* described by Belkin and Gans.

Elseya dentata: Fig feeding

The following observations were made from a boat on the Gregory River approximately 8 km upstream from Gregory Downs Homestead, Queensland (18° 40′, 139° 12′, elev. 100m) on 10-13 May 1974. At this point the river is approximately 30m wide, 3-6m deep and the current is slow. At the time of these observations the water was slightly murky and the level was still falling after the wet season. Gallery forest consisted of *Pandanus* in dense clumps and mixed larger trees. Among the latter were a few figs (*Ficus* sp. — nr. *ehretioides*). *Pandanus* limbs projecting into the water and many tangles of deadwood created favourable habitat for *Emydura australis* and *Elseya dentata.*

Approximately one hour before dusk on 10 May our attention was attracted to a disturbance on the surface within a tangle of deadwood. From a distance this appeared to be a small fishing float being pulled violently beneath the water and then released. Closer examination revealed the object to be a fig approximately 35mm in diameter. There was a fig tree directly overhead. Since we had not been aware of figs anywhere on this stretch of the river, it was assumed that fruit had just begun to fall.

By approaching the area quietly to a distance of about 3m we could clearly discern that the disturbance was caused by several small (200-220mm carapace length) *Elseya dentata* chasing figs on the surface. The figs were much larger than any of these turtles could take into its mouth. A turtle would approach a fig, bite at it, and send it scooting forward (or attempt to submerge with it and have it pop immediately to the surface), much in the manner of small children bobbing for large apples. Turtles were crawling over the backs of other turtles in their zeal to get at the figs. They were so engrossed in this activity that we were able to catch three specimens by hand (the species is usually very shy). A large female (325mm) was later caught in a trap baited with figs at this spot.

Most specimens of *E. dentata* from this locality had figs in their stomachs. Size of the figs (or pieces thereof) was directly proportional to size of turtle; the largest specimens contained some whole figs and many that had been bitten into two or three pieces.

On subsequent evenings figs could be seen in abundance and we observed figs being eaten beneath several trees that were dropping fruit. Most figs disappeared in a small swirl soon after hitting the water and without revealing the identity of the feeding animal. In several instances where no fruit was floating beneath a laden tree, we threw figs there to simulate fruit dropping from a tree. These figs disappeared as described above. Several *E. dentata* were captured by embedding a long-shank hook in a fig and casting it with a fishing rod beneath a fig tree where we had seen turtles. In all cases the fig was pulled suddenly but gently beneath the surface almost immediately (the process was reminiscent of a large trout taking a fly).

We think turtles ate most of the figs we saw taken and that most of these turtles were *Elseya dentata;* we found figs in only one of the *Emydura australis* dissected at Gregory Downs. The behaviour described suggests that *Elseya* congregate beneath laden trees and actually wait for figs to drop at certain times of the day. Fig eating was common only in late afternoon and it was our impression that significantly more fruit was dropping then than at any other time of the day.

At another locality in the Northern Territory (East Baines River, near Auvergne, 130° 03′, 15° 47′) the water was clear enough for snorkeling and we could clearly see and catch *Elseya dentata* as they moved about in tangles of deadwood and beneath undercut banks. In the late morning I cautiously approached and explored the area beneath a laden fig tree. Although there was abundant sign that figs had been eaten (pieces of fig on bottom) there were no turtles near the tree at that time.

The only other turtle species obtained or observed in the Gregory River was *Emydura australis* (*Chelodina rugosa* occurs there but chiefly in non-fluviatile habitats). Detailed analyses of gut contents for all Australian chelids will appear elsewhere, but the following generalities are of interest. All populations of *Elseya dentata* studied were herbivorous, although they could be attracted with meat or fish bait and regularly ate these foods in captivity. At Gregory Downs (and elsewhere in northern Australia) *Emydura australis* is an opportunistic omnivore with carnivorous tendencies. Both species at Gregory Downs were eating *Pandanus* fruits; only one *Emydura* contained figs. Small molluscs were the commonest and most abundant item in *E. australis* guts; molluscs were never found in *E. dentata* guts.

The exploitation of windfalls as an opportunistic feeding niche is probably of general occurrence in diverse groups of turtles, but it has been mentioned only a few times in the literature: Antillean species of *Pseudemys* (Barbour and Carr, 1940); *Trionyx triunguis* (Loveridge and Williams, 1957); *Carettochelys insculpta* (Schodde et al., 1972); *Terrapene ornata* (Legler, 1960); *Pseudemys scripta* (Moll and Legler, 1971). I have observed figs dropping into the Río Chagres in Panamá and being taken almost immediately in a manner similar to that described for *E. dentata.* I have also removed large succulent fruits (unidentified) from the stomachs of large snapping turtles (*Chelydra acutirostris*) taken on Escudo de Veraguas Island, Panamá. It seems likely that, in *Elseya dentata* and in at least some of the other aforementioned species, the exploitation of windfalls involves some learning (rather than chance alone).

Acknowledgments

The research in Australia was supported partly by the Allegheny Foundation Fund for Animal Behavior Studies (Carnegie Museum of Natural History, Pittsburg, Pa.) and the Ian Potter Foundation (Melbourne). I am grateful to J. J. Bull and A. F. Legler for their sharp eyes and other assistance in the field.

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Tortoise Care

by Susan Beattie *

This article was prepared in view of the many requests to the Fisheries and Wildlife Division for information on the care of tortoises held in captivity.

Species

Three species of freshwater tortoises occur in Victoria. All are *Pleurodires* (necks retract sideways) and are members of the family *Chelidae*. The species are *Chelodina longicollis* (Shaw 1793), *C. expansa* (Gray 1856) and *Emydura macquari* (Cuvier 1826).

Distribution

In Victoria, the species *C. longicollis* occurs over the whole of the State, and *C. expansa* and *E. macquari* inhabit areas in the northern and western part of the Murray River System.

General appearance

Many differences and similarities in morphology occur in individuals of

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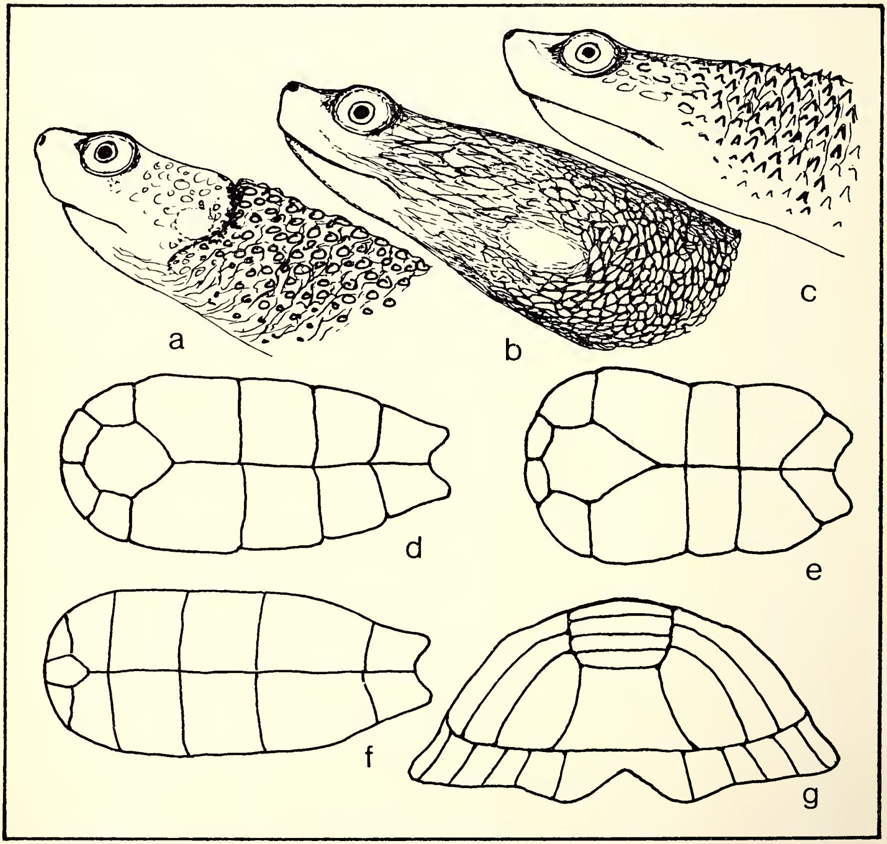
the same species at different stages of their growth and in different species of the same or related genus (Goode 1968). The young of *C. longicollis* have small red or orange spots which change to bone colour at about three months of age. The adult *C. longicollis* has a shell length of up to 254 mm and is distinguished by its long neck and by the emission of an exceptionally strong odour, hence the common names 'snake-neck' or 'stinker'. This species is capable of lifting its head high above the shell. The neck is covered with black skin bearing fine pointed tubercles, and from the rear the two hindmost marginal shields on the carapace form an inverted 'V' shape.

The species *C. expansa* is the largest of the three, with its shell exceeding 384 mm in length. It is distinguished by its long neck covered with fine, olive-coloured wrinkled skin and



Structures of
Emydura macquari: (a) Tubercles on neck; (f) Plastron (underside of shell).
Chelodina expansa: (b) Wrinkles on neck; (d) Plastron.
Chelodina longicollis: (c) Tubercles on neck; (e) Plastron; (g) Rear view of shell showing inverted 'V' shape.

when walking, adults never raise the top of their head above the rim of the carapace; the bottom of the neck frequently touches the ground (Goode 1968). The hindmost marginal shields of the carapace project downward below the general line. Because of its broad shell it is commonly known as the 'broad-shelled tortoise'.

The species *E. macquari*, commonly known as the Murray snake-necked tortoise, is identified by its short neck and oval-shaped shell, the width of the front being almost equal to that of the rear. Its shell length exceeds 300 mm.

Sex determination

Most of the sex determining features do not appear until the tortoise is mature. *Emydura macquari* male is immediately recognizable by the length and thickness of its tail. In *Chelodina* species it is almost impossible to determine the sex, and captive females often lay fertile eggs without apparent contact with a male. The female can retain sperm from a mating in the wild for a period of four years. Normally the female comes ashore to nest, but if unable to do so, will lay eggs in water where the embryos suffocate.

Hibernation

Kept indoors at room temperature the tortoise will not hibernate and requires lighter feeding during the winter months. If kept outside *C. longicollis* occasionally comes ashore to burrow into earth, either beneath leaves or among the roots of trees or shrubs. Other species bury themselves in mud beneath the water, taking oxygen from the water. Care should be taken not to disturb the tortoise during this period as shock may kill it.

Food

In the natural environment, tortoises feed on snails, small fish, worms and tadpoles. Lean meat fed daily in summer and twice weekly in winter is a good substitute but it is important that uneaten food should be removed from the tank to avoid fouling of the water. Tortoises should be fed in water as the structure of the neck makes it impossible to pick up food from the ground. As small quantities of water flora are also consumed, water lilies or floating plants and weeds serve both as food, and water cleaners. The diet should also contain relatively large amounts of calcium (see Health problems — Soft Shell). Growth rate is quicker during the immature stages and is conditioned by the amount of food consumed. Shell distortion can occur through overfeeding as the organs of the body grow faster than the shell.

Garden Pond

After 2-3 years the tortoise may grow too big for the indoor tank, and an outside pond should be provided. An enclosure with walls about one metre high may be constructed from chicken-wire sunk 15 cm into the soil to prevent tortoises burrowing out. The enclosure should be well-shaded especially in summer by shrubs and aquatic plants, which will provide shelter as well as food. Before introducing the tortoise or other aquatic species into new concrete ponds, the ponds should have been filled with water for three weeks, or coated with a liquid and powder mix to seal in harmful chemicals (available from Nonporite Pty. Ltd.)

Health Problems

In their natural habitat tortoises regularly bask in the sun either floating on the water surface or basking on the bank. Warm, not hot, sunlight is the best cure for most health problems. The tortoise should be left in the sun for several hours each day, but not prevented from returning to the water. Only if sunlight treatment fails to cure complaints should medication be applied.

1. Soft shell, the most common complaint, is the result of insufficient sunlight. Large amounts of calcium should be included in the diet. Only after sunlight treatment has been tried should soluable calcium lactate (obtainable from chemists) be applied to the tank once a month in sufficient quantity to cover a 10 c coin.

2. Algal growth on the shell is a natural condition and is not a health problem.

3. Bacterial or fungus infections may appear on the shell or body. The tortoise should be given daily salt baths (¼ teaspoonful of table salt to one measuring cup full of luke warm water) for 15 minutes each day over 2 weeks or until the infection disappears. If the tortoise emerges from its hibernation with fungus, leave it in the sun for 1½ hours, then apply 'Magical Fungus Cure' obtainable from aquarium shops.

4. Cuts and bites may be cleaned with a swab of common antiseptic (Mercurochrome should not be used).

5. Moulting of shell plates occurs at regular intervals and is not a health problem.

6. Holes should never be drilled into the tortoise shell to secure it as the shell is living tissue.

7. Painting the shell will restrict shell growth and may even kill the animal.

8. Plastral sores on the lower shell are usually caused by rough substratum. Rough rocks should be replaced by smooth ones, and concrete should be covered with sand and pebbles. Treat sores as 'cuts'.

9. Swollen eyes are a result of poor living conditions and diet. Begin with salt treatment and check diet.

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New Officers at Ringwood Field Naturalists Club

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FNCV Grampians and Little Desert Tour 17-22 October, 1975

BY ELIZABETH K. TURNER
with assistance from Elsie Costermans (eucalypts),
Dorothy Dawson (birds),
Ian Morrison, Ercil Webb-Ware and Laura White (botany),
and others.

The Grampians

Although the huge sandstone masses of the Grampians with its weathering and erosion of the original Devonian sediments were visible from the bus windows as escarpments, dip slopes and etched out rock formations, the forays of the 37 enthusiastic persons in our party were mainly confined to the non-architectural, non-spectacular, non-tourist infested areas; mostly the low weathered hills and sand plains, where we found in profusion some of the 1,000 or more vascular plants which are known to grow in that area.

After lunch at Lake Bolac, where we observed pelicans in flight and a white egret also, we heard the song and caught glimpses of the elusive reed warbler (*Aerocephalus australis*) and were observed by a little falcon. Then we entered into this vast area of Western Victoria via Dunkeld at the southern end. Here, massive sediments of quartzose sandstone interbedded with thin layers of siltstone were deposited some 400 million years ago, to be folded, faulted and weathered into the shapes now known as the Grampians. We interupted a family of cock and hen emu with ten striped chicks and saw a flight of straw-necked ibis, and conspicuous beside the road were scattered deep blue patches of tinsel lily (*Calectasia cyanea*). By the time we had reached our motel at Halls Gap, we had counted 35 wallabies, numerous koalas (some with babies) and also a couple of stumpy tails (*Trachysaurus rugosus*) crossing the road.

Next day we joined with the Western Victorian Field Naturalists Clubs Association for a visit to Barbican Rocks in the Mt William range. Our leader, Ian McCann of the Stawell Club, said that this area was the oldest and most eroded of all the Grampians sediments. In brilliant sunshine, we inspected along the old flume line which was an aquaduct formerly conveying the water supply for Stawell north to the tunnel through the Mt William range. The freely draining rocky slopes above the south side of Redman's road carried very little plant nutriment, but thick beds of moss, in which grew the dwarfed hooded trigger-plant (*Stylidium calcaratum*) in a startling pink colour alongside the lilac fairies aprons (*Utricularia dichotoma*), *Eucalyptus alpina* (the Grampians gum) and the *Leptospermum nitidum* (the shining tea-tree) grew on the exposed scarps.

After lunch, we walked around the southern end of Lake Fyans where the outstanding botanical features were orchids, the commonest being *Caladenia carnea* (pink fingers), rabbit ears (*Thelymitra antennifera*) and the wax-lip (*Glossodia major*). Some of the members of the Bendigo Field Naturalists Club took some convincing that *Thelymitra macmillanii* could be salmon pink and not crimson. *Thelymitra carnea, Thelymitra rubra* and *Thelymitra luteocilium* were also seen. One of the most exciting finds for the day was the pigmy club moss (*Phylloglossum drummondii*); this diminutive single member of its genus was not previously recorded at this site. *Dodenœa procumbens* (the trailing hop bush) was a new find for most of us. Birds observed here included the black-fronted dotterel (*Charadrius melanops*), a rainbow bird (*Merops ornatus*), a hooded robin (*Petroica cucullata*) and the white-winged triller (*Lalage sueurii*).

In the evening, Mr W. Davis led the discussion amongst a large audience in the Halls Gap hall on the Aims and Policies of the Australian Conservation Foundation.

The following day was overcast and we were taken along a stand track east of the Mt Difficult Pine Plantation Picnic Ground to an open forest area consisting mainly of brown stringy bark (*Eucalyptus baxterii*), where it was almost impossible not to stand on fragile orchid blooms such was their profusion. Here we recorded: Onion orchids (*Microtis*), *Calochilus robertsonii* (purplish beard), *Thelymitra carnea* (pink sun-orchid), *T. macmillanii* (crimson sun-orchid), *T. antennifera* (rabbit ears), *T. ixiodes* (dotted sun-orchid), *T. rubra* (salmon sun-orchid), *T. luteo-cilium; Acianthus reniformis* (mosquito orchid), *Caleana major* (large duck orchid); *Caladenia menziesii* (hare orchid), *C. dilatata* (green-comb spider orchid), *C. filamentosa* (daddy long-legs), *C. angustata* (musky caladenia), *C. cucullata* (hooded caladenia), *C. iridescens* (bronze caladenia), *C. carnea* (pink fingers); *Glossodia major* (wax-lip orchid), *Diuris maculata* (leopard orchid), *D. longifolia* (wallflower orchid); *Pterostylis nutans* (nodding greenhood), *P. nana* (dwarf greenhood).

In defence of the pine plantation which had been planted 36 years previously, Mr Ian McCann mentioned that koalas had been observed eating pine needles, and that morels and other fungi grew in abundance beneath the trees, whilst flame and scarlet robins nested in the pines. For many of us, it was the first time we had found laxmannia (the wire lily) in flower, many of the flowers were pink; both species were seen (*Laxmannia sessiliflora* and *gracilis*).

The parrot family is well represented in the Grampians and we observed flocks of long-billed corellas, galah, crimson and eastern rosellas, gang-gang and sulphur-crested cockatoos, red-rumped parrots and the yellow-tailed black cockatoo.

On Sunday night 19 October, thunder storms occured and Monday morning was wet, windless and cold. McKenzie Falls were in spate and were worth the damp walk to the viewing spot, but we were grateful for hot scones and tea at Grant Taylor's home beyond Zumsteins. Half a mile further north on the Horsham Road, a walk was made to inspect the Montrose Environmental Groups native plants garden; here we saw the old bridge of the original route to Adelaide for conveying the gold from the diggings at Pleasant Creek (Stawell).

During the afternoon, a visit was made to the Wimmera Forest Nursery at Wail where the trees and shrubs were all correctly named and labelled, which was such a help to aspiring botanists! We noted the prolific bird life encouraged by the oasis of so many native trees. For instance, we saw the purple-crowned lorikeet (*Glossopsetta porphyrocephala*), the little wattle-bird (*Anthochaera chrysoptera*) and the diamond firetail (*Emblema guttata*).

Nhill, the Little Desert and Mt Arapiles

The greater part of the road south from Nhill to Gymbowen (48 km) runs in a straight line through the Little Desert, dissecting the eastern one-third from the western two-thirds of this well-vegetated, well-watered, sandy area formed mainly of sand blown across many thousands of years ago from South Australia. Often the road cuts through sand dunes containing lateritic sandstone and running for the most part in an east-west direction throughout the approximate 60 miles east-west length of the desert.

On these dunes we discovered some of our most exciting flora and avifauna, the latter included the southern scrub-robin (*Drymodes brunneopygia*), the shy heath wren (*Hylacola cauta*), the superb blue wren (*Malurus cyaneus*) and the purple backed wren (*Malurus assimilis*). Also the tawny-crowned and the white-fronted honeyeaters, and very numerous yellow-winged honeyeaters.

In conjunction with brown stringy bark (*Eucalyptus baxterii*), there were several mallees, the yellow (*E. incrassata*), the green (*E. viridis*) and the narrow-leaf red (*E. foecunda*). We also discovered patches of bull mallee (*E. behriana*) and dumosa. The pale green foliage of the desert banksia (*Banksia ornata*) was conspicuous, but the flower cones were mostly grey and withered. The most prolific colour was the creamy-pink clusters of the fringe myrtle (*Calytrix tetragona*) interspersed with patches of golden pennants (*Loudonia behrii*), unusually yellow candles (*Stackhousia viminea*) (plate I) and the yellow of the acacia

Plate 1: Yellow candles, *Stackhousia viminea.*
Photo: I. Morrison

flowers such as the wallowa (*Acacia calamifolia*).

Near clay pan areas and swamps which were filled with water, we were delighted with the cyclamen pink blooms of *Melaleuca wilsonii* and the pea-green low bushes of *Melaleuca neglecta.* There were patches of bright blue *Dampiera lanceolata* and some scarlet mint-bush (*Prostanthera aspalathoides*), while various shades of yellow were supplied by at least four species of guinea flower (*Hibbertia fasiculata, stricta, virgata* and *sericea*).

Especially delightful discoveries were pink zieria (*Ziera veronicea*) with citronella-scented leaves (plate 2), small leafed waxflower (*Eriostemon difformis*), yellow *Phebalium stenophyllum,* blue spike milkwort (*Comesperma calymega*), flax-leaved logania (*Logania linifolia*) and several varieties of orchids, as well as the diminutive rosettes of the flannel cudweed (*Actinobole uliginosum*), and a peculiarly unattractive-looking plant with tiny ruddy wheel-like flowers which became fascinating when viewed through the lens; this was the wheel-fruit (*Gyrostemon aus-*

Plate 2:
Pink zieria,
Zieria veronica.
Photo: I. Morrison

Plate 3:
From Mt Arapiles looking north-west over Mitre Rock to the Little Desert.
Photo: I. Morrison

tralasicus).

Surprising plant associations were the dense spiney porcupine grass (*Triodia irritans*) and the flowering grey mulga (*Acacia brachybotria*), both real desert plants growing quite close to plants such as the lilac tinged sweet apple-berry (*Billardiera cymosa*), the shrub violet (*Hybanthus floribundus*) and blue herons-bill (*Erodium cygnorum*), and the delicate lilac eye-bright (*Euphrasia collina*).

At Gymbowen, we turned east past the drab little stone cairn in memory of Jane Duff, the 12-year-old girl who in 1864 was sent by her mother with her two younger brothers to collect broom-brush (probably *Melaleuca uncinata*); they became lost and lived for nine days in the bush before they were found. One of our party, Nancy Carstairs, remembers Jane as a very old Mrs Turnbull who came to talk to the children at the Natimuk school and to show them the little frock that she wore during the adventure. At the foot of the cairn, there was a flourishing bush of black nightshade (*Solanum negrum*).

We had lunch near the summit of Mt Arapiles where the vegetation is just recovering after the disastrous bushfires of two years ago (plate 3). Here there were clusters of violet fairy-fan-flower (*Scævola aemula*); also the blue grass-lily (*Cæsia vittata*), chocolate lilies (*Dichopogon strictus*) and the nodding blue lily (*Stypandra glauca*) in abundance. *Eristemon verrucosus* (the fairy wax flower) was blooming, and near the rocky summit was a fine display of golden everlastings (*Helichrisum bracteatum*).

During a walk along the road in the Little Desert area on our return

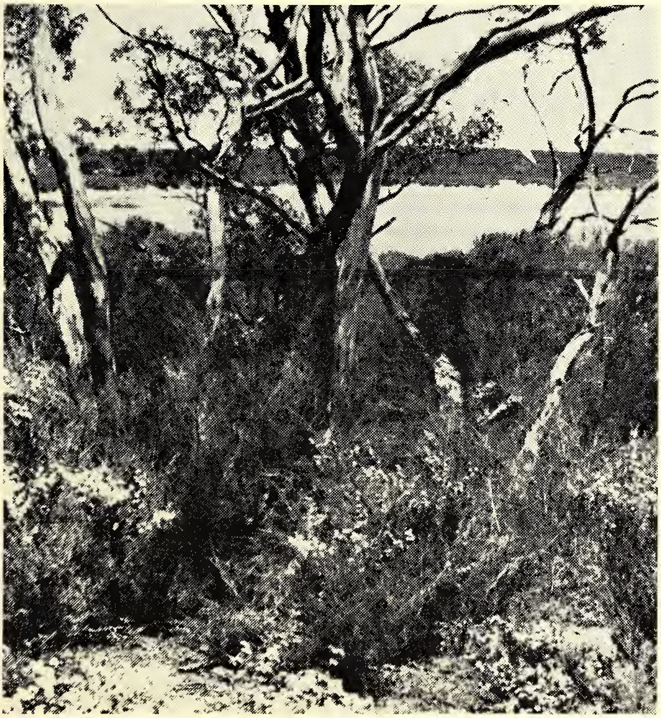

Plate 4:
Salt lake in the Little Desert.
Pink fringe-myrtle, *Calytric tetragona* in foreground.
Photo: Author

journey, we were fortunate to witness the golden whistler (*Pachycephala pictoralis*) nesting in the low branches of a melaleuca, also a hooded robin (*Petroica cucullata*).

That evening the Nhill Senior Citizens allowed us to use their fine club-rooms to view some colour slides taken and shown by Mr Ray Reichelt, who runs the Little Desert Tours. We had a chance to meet some of the Senior Citizens at a fine supper afterwards.

Kiata and Wimmera River

Wednesday, 22 October dawned clear and cloudless and this day may have been the highlight of the trip for most of us. Firstly, we drove to the Kiata Lowan Reserve picnic area and followed the Nature Trail beside the yellow gums (*Eucalyptus leucoxylon*), wattles, slaty she-oaks (*Casuarina muelleriana*) and cypress pines (*Callitris rhomboidea* and *preissii*); one interesting bonus discovered here was a fine patch of adders' tongues (*Ophioglossum coriaceum*). Here we observed the ring-necked mallee parrot (*Bernardius barnadii*) nesting in a hollow bough of a yellow gum. Other birds observed here were the wedge-tailed and the whistling eagle, numerous honeyeaters and the brown and white-throated tree creepers. The joyous paroxysms of song from the rufous and golden whistlers accompanied us on our walk through the bush, and a rufous songlark was observed nesting and also heard calling beautifully.

Then, led by two National Park Rangers, Mr Keith Hately and colleague, we set off in Land Rovers, utility trucks and a couple of private cars over the sandy tracks south for approximately 11 miles, almost in the centre of the park, to a shallow salt lake filled with water, more saline to the taste than sea water (plate 4).

After lunch, Keith Hately showed us the sandy mound with sealed entrance and escape hole of the silkly desert mouse (*Pseudomys albocinereus*) (plate 5). Pink *Boronia pilosa* grew in the most arid-looking areas in association with the porcupine grass and abundantly flowering *Eutaxia microphylla, Aotus ericoides* and *Pimela* sp. There were occasional bushes of blue *Dampiera lanceolata.* Standing on the tray of the utility trucks as they mounted the sand hills, afforded us an extensive panorama of the Little Desert, at the same time as we brushed against the rather spikey

Plate 5: Silky desert mouse, *Pseudomys albocinereus.* Photo: Author

dark green branches of *Melaleuca wilsonii* with it's beautiful cyclamen pink flowers.

We detoured and walked along a cleared sandy track towards the west, where an enterprising mallee fowl (*Leipoa ocellata*) had recently built its characteristic mound of sticks from those which had been pushed aside when the track had been cleared, and of leaves, vegetable debris and sand. This being October, egg laying had commenced and we had a brief glimpse of a departing male bird who was forced by our presence to have a short respite from his arduous temperature-regulating duties at the incubator mound. Apparently, after preparing the mound, this hard-working bird begins his daily excavations and the temperature assessments in September using his beak and tongue, and must continue morning, noon and night, through until autumn to keep the heat of fermentation around the 33° C mark. The task seems rather thankless for after the nuggety chicks have struggled up through 70 or 80 cms of sand and rested briefly, they begin their independent existence in the bush at once and take no further interest in the parent birds, nor they in their off-spring! Although we waited a while with cameras poised, the male bird did not return for his photo. In a cleared paddock bordering the park we saw a flock of 25 emus.

Next morning, Thursday, 23 October, was overcast and rain occured in the afternoon. We travelled the Nhill to Jeparit road and at a stop near the Gerang-Gerung cross-roads, we investigated a forest of black box (*Eucalyptus largiflorens*) and were delighted to find the turkey-bush (*Myoporum deserti*) in full flower, also the nealie wattle (*Acacia rigens*) and nearby the gold-dust wattle (*Acacia acinacea*) had corkscrew-like pods; also at this spot were small stands of weeping pittosporum (*Pittosporum phillyreoides*) and desert cassia (*Cassia neminifolia* var. *zygophylla*) in flower. In the grass under the bulokes (*Casuarina luehmannii*), bull-mallees (*Eucalyptus behriana*) and scrub-cypress pines (*Callitris verrucosa*), we found the delicate blue broughton pea (*Swainsona procumbens*) and a mauve daisy (*Brachycome* sp.).

The Wimmera River which rises so hopefully in the Grampians and is acutely diverted north at Natimuk along the lower east side of the Hindmarsh fault, a geographic monocline,

Plate 6: Lake Hindmarsh in flood.
Photo: Author

was flooded and threatening to breach the sandbagged barricades around the town of Jeparit. Lake Hindmarsh had extended its waters to waterlog some of the lovely river red gums (*Eucalyptus camaldulensis*) growing near its banks (plate 6); in spite of all this volume of water, the Wimmera River never achieves union with the Murray in the north, but peters out in a series of shallow lakes extending along the red gum and box flats of Wyperfeld National Park area.

Most of the party were unfamiliar with blue rod (*Morgania glabra* var. *floribunda*) which we found on the shores of Lake Hindmarsh; here also we found the violet coloured monkey flower (*Mimulus repens*) and the austral hollyhock (*Lavateria plebia*), also the mallee bitter-bush (*Adriana hookeri*), ruby saltbush (*Euchylæna tomentosa*) and wild tobacco (*nicotiana velutina*) as well as the introduced tree tobacco. A real 'grandfather' echidna was seen in the sandhills, judging by its enormous size. Here the rounded noon-flower (*Disphyma autrale*) was in flower and *Acacia trineura* (the three-nerved wattle and *Acacia lingula* (the small cooba) were found. A red-capped robin and a diamond firetail were seen in the melaleucas growing in the sand dunes.

Water birds abounded, including the pied cormorant, the little and the hoary-headed grebe, black swan, black, musk and white-eyed ducks, chestnut-breasted shelduck, chestnut teal, dusky moorhen, eastern swamp hen and coot.

The rain then terminated outdoor exploration so we finished with a visit to the Wimmera-Mallee Pioneer Museum at Jeparit where, amongst many interesting exhibits, there were photos of a fine-looking, former Jeparit storekeeper, James Menzies, father of the present Sir Robert.

Finale

On the weather map, a large tropical 'low' seemed to have descended from the north and we sped home through rain most of Friday, 24 October. In fact, Melbourne received a flooding downpour co-inciding with our return and some of us unceremoniously alighted from the bus in an unsheltered area of Flinders Street, only to find that the rain and the arrival of Princess Margaret seemed to have caused the disappearance of taxis from the streets.

The harsh realities of the city, however, could do nothing to erase our pleasurable memories of colour and sunshine in the Grampians and the Little Desert.

Natural History Medallion Trust Fund

The following donations have been received and we thank the donors:—

Amount invested as at 22 November, 1975	$259
Ringwood Field Naturalists Club	20
Amount invested as at 18 February, 1976	279
Mr. J. A. Baines	$10
Geelong Field Naturalists Club	10
Amount invested as at 10 March, 1976	$299

We have placed a forward order for this year's Medallion, so if you are contemplating sending a donation please send it now.

GARNET JOHNSON, CORRESPONDENCE SECRETARY.

The Broad-toothed Rat still in Sherbrooke Forest
A successful search for *Mastocomys fuscus* Thomas

BY H. BRUNNER AND I. D. BERTUCH *

In 1970, a small colony of the broad-toothed rat (*M. fuscus*) was located in wet sclerophyll forest near Belgrave in Sherbrooke Forest Park (Seebeck 1971). In the presence of other small terrestrial mammals, this rat was difficult to trap, so that a study of the colony was only possible after all captured species of *Rattus fuscipes, Antechinus swainsonii* and *A. stuartii* were transferred to another area. This left the traps vacant for the apparently more shy *M. fuscus.* At the completion of this study in 1972, as many *M. fuscus* specimens as could be trapped were taken into captivity before the colony area was sprayed to eradicate blackberry. Two weeks later the rats were released again. This was done in the belief that blackberry spraying might affect the rats (Brugman, unpublished data). We wish to point out that the herbicide 2,4,5-T used to spray blackberries in Victoria would be unlikely to affect populations of small mammals (Parsons, 1972) and that at the Sherbrooke site where there are large thickets of wire grass, the effect of the herbicide on cover for animals would be negligible.

In the following year, a trapping programme was carried out to determine whether the *M. fuscus* population had survived. Only one specimen was caught (approx 650 trapnights). It was suggested that the population may have perished as a result of increased predation by foxes (due to the reduced blackberry cover), (Reed and Wallis, 1975).

However, during an extensive survey of the whole of Sherbrooke Forest Park, which included the known colony area, from July, 1973-June, 1974, it was found that 46 out of 1888 predator scats contained hairs of the broad-toothed rat (Brunner *et al.,* 1975). These hairs are readily identified by microscopic examination of cross-sections, whole mounts and in particular of scale casts. Although the hairs look similar in some respect to those of a few other rodent species, they can be easily recognised by their characteristic scale pattern (Brunner and Coman, 1974). The 46 occurences of *M. fuscus* were located from most parts of the forest and included the 'colony' area.

A further brief survey, involving 309 predator scats was carried out in September, 1975. We found 6 occurrences of *M. fuscus* in these scats and a carcass of the species was also found on one of the trapping lines described by Reed *et al.* (1975). The scats collected from this original colony area had a significantly greater proportion of broad-toothed rat occurrences than two other areas in the park. Thus, this rat still exists in the area described by N. A. Wakefield where the blackberries were sprayed.

Because Sherbrooke Forest Park is close to the city of Melbourne, we feel that every effort should be made to protect the remaining animals in this forest and especially the broad-toothed rat. As several casualties of *M. fuscus* have occurred using trapping, we believe that occasional checks for its presence could be better carried out using scat analysis.

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M. fuscus in other localities.

Hairs of *M. fuscus* have also been identified in two samples from a few predator scats collected in heath scrub just below the summit of Mt Feathertop (1954 m) in October, 1975 (G. Friend, personal communication). In the same region, *M. fuscus* hairs were recovered from a small number of scats collected at an altitude of approximately 610 m and examined by us.

A further 20 occurrences of *M. fuscus* remains were found during a recent scat analysis survey of the Dartmouth Dam inundation area. One interesting point about this survey was that all scats containing *M. fuscus* hairs came from one small area (Brunner, Amor and Stevens, in press).

Single occurrences, using the same methods, were also located in the Otway Ranges (September, 1972), in the Boola Boola area (October, 1973) and at Naringal East (October, 1972).

These results indicate that the broad-toothed rat may be more common than previously thought and that scat analysis is an effective method of locating the colonies.

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The Broad-toothed Rat

BY J. H. SEEBECK *

Editor's Note. Questions aroused by the previous article led to the discovery of this one. It provides basic information that the layman likes to know, and enables him to appreciate the significance of the finding by Messrs Brunner and Bertuch. It is re-printed with permission from 'Fur, Feathers and Fins' published in 1971 by the Fisheries and Wildlife Division. Mr Seebeck has made some small alterations to up-date this "re-print" to 1976.

In Victoria, nine species of native rats and mice have survived to the present day. Six of these species belong to the zoologically primitive group called the Pseudomyinae — literally, "false mouse". Despite this strange name, they are true rodents, related to the introduced domestic mice and rats.

The group is characteristically Australian, and for the most part little is known of their habits or distribution. One of the most interesting of the group is the Broad-toothed Rat, so called because of the relatively great width of its molar teeth.

The scientific name of the Broad-toothed Rat is *Mastacomys fuscus* which refers to the jaw structure and the dusky brown colour of the animal.

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Ministry for Conservation.

An adult *Mastacomys* is about 280 mm from nose to tail tip, with the tail being about 130 mm long. Victorian specimens usually weigh about 120 gm. They are fairly stoutly built animals, with quite long fur which is dark brown with an olive tinge. Because the skull is wide to accommodate the large cheek teeth, the head appears broad and relatively short.

Characteristically these animals adopt a very compact stance, and thus look very rounded and fluffy. This appearance is enhanced by the shortness of the legs, which tend to be hidden by the long fur. Broadtooths are gentle in nature and rarely attempt to bite when being handled, although females with young may be aggressive towards males.

Many species of the Pseudomyinae are now uncommon, and *Mastacomys* is no exception. First described in 1882 from Tasmania, a few specimens were later found in Victoria from isolated localities in Gippsland and the Otway Ranges, and in 1946 the species was discovered at Mt Kosciusko in New South Wales. In recent years both the Tasmanian and New South Wales animals have been studied in some detail. In Tasmania it has been found that *Mastacomys* has a fairly wide distribution in the western half of that State.

In Victoria, interest in the Broad-toothed Rat was rekindled in 1960 when Mr R. M. Warneke of this Division found that species at Loch Valley near Noojee in Gippsland. Subsequently we have found that the species has, as in Tasmania, a much wider modern day distribution than was suspected. It is, in fact, the most widely spread member of the Pseudomyinae in this State. The range is now known to extend from the alpine areas around Mt Hotham, into central and south Gippsland, the Dandenong Ranges and west into several parts of the Otways. There are probably many more places where the species has yet to be discovered, as we know from fossil remains that it has once occurred in south western Victoria, the Grampians and East Gippsland.

To effectively plan for the conservation of any wildlife species many facets of the biology of that species must be investigated. Two of the most important factors are the type of country in which the animal lives (the habitat) and the reasons for it living in this habitat.

For the Broad-toothed Rat it is not easy to find out this information. Firstly, while the species is widespread, it is only known to occur in isolated colonies so that specimens are rarely encountered. Secondly, even if it is known to live in a particular locality it is not always possible to locate the animals, because the population density (the number of individuals per hectare) may be very low compared with that of another species. At most Victorian localities, for instance, we find that Bush Rats (*Rattus fuscipes*) are present in very much larger numbers than Broad-toothed Rats. Also, the known habitat varies widely from treeless alpine wet heaths to dense wet eucalypt forest to dry lowland heath country, and even right down to coastal heaths. There are many thousands of hectares of these kinds of habitat left in Victoria but *Mastacomys* only seems to occur in very small pockets within these. The present day distribution may thus be considered as a relic of an earlier more widespread pattern.

As we learn more of the distribution of *Mastacomys* we are better able to relate this to habitat, and the preferences of the species to particular areas. With each specimen collected we learn more about breeding habits and diet, information which is also very important for conservation planning. We still know very little about the behaviour and movements of *Mastacomys* but recently some research workers have begun to study these aspects of the animal's biology.

It is by no means certain that the Broad-toothed Rat will remain for ever on the Australian scene, for it may be that evolutionary processes beyond our control will work against the species — for example, competition for food and housing between this non-aggressive vegetarian rodent and the more aggressive omnivorous Bush Rat. The low breeding capability of *Mastacomys* (average litter 2, gestation period 5 weeks) may put it at a disadvantage compared with the Bush Rat, with an average litter of 5 and gestation period 3-3½ weeks.

Although time may ultimately run out for the Broad-toothed Rat, as it did for dinosaurs, we have the responsibility of ensuring that the species does not become extinct before its time. Our present task is to learn as much and as quickly as possible about the Broad-toothed Rat so that we can plan properly for the conservation of this inoffensive and interesting Australian. The research being carried out by this Division and other biologists is directed towards this end.

Natural History at the Coast

In December we plan to publish a special issue of 'The Victorian Naturalist' consisting almost entirely of articles relating to our coasts.

Science and research workers might have relevant material that they are planning or are already preparing for publication. Such articles will be gratefully received.

And we expect many layman articles from members of the FNCV; in fact we hope to receive at least two items from each Study Group, as well as from other people. Some items might be only a few lines, but others could be more substantial. Geology, land and sea plants, marine creatures, insects etc, birds, tides, whatever — the possibilities are almost unlimited.

It is desirable that material for this special coast issue should be received by the editor by 30 September; it might be necessary to defer later items to the first issue in 1977.

When preparing an article for publication, please have it typed with double line spacing and leave at least 3cm (about 1¼") clear margin at the left.

New Discovery: Upper Devonian Bones near Genoa

BY B. STAINFORTH
A. J. ALSTON
D. J. BENNETT
A. CAMILLERI*

Approximately 4 km upstream from where the Upper Devonian footprints, described by Warren and Wakefield (1952), were found, tangible remains of vertebrates have now been found in rocks of the same age (Genoa River Beds — probably Upper Devonian). Whilst these bones are those of bony fishes the possibility of finding the remains of amphibians in the same rocks is enhanced.

The initial discovery was made by us in March 1975. It consisted of a few fragments of bones which were embedded in float boulders of a tough conglomeratic sediment in the Genoa River. In nearby red shales, plant remains were also discovered (identified by G. A. Thomas as *Leptophloeum australe*).

In January 1976, three of us (Alston, Bennett and Stainforth) returned to the area with the hope of finding in-situ material. Such in-situ material was located and the associated stratigraphy documented (figure 1). With the aid of two University of Melbourne research students, preliminary sampling of the in-situ material was conducted. In addition, the area between this locality and that of the footprints was mapped.

The lack of access into the area makes work difficult. Although the area is one of open forest, the only feasible route into the fossil bone

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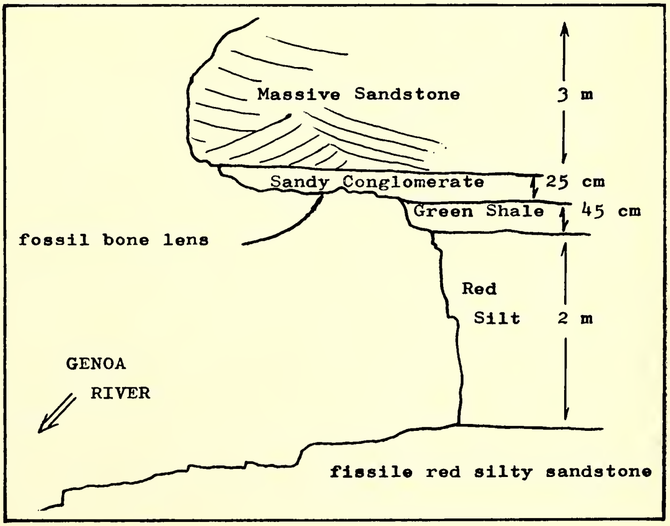
Fig. 1: Sketch showing the stratigraphic sequence at the bone lens locality.



locality involves an arduous walk through the thick scrubby terrain of the deeply entrenched Genoa River, of which several crossings have to be made. (In 1971 a helicopter was used to remove material from the footprint locality.)

The fossiliferous outcrop sampled is on an east bank of the river and is in the form of an overhang. The bones are contained in a 25 cm thick medium grained sand to conglomeratic lens. This lens is overlain directly by 3 m of very massive, coarsely cross-bedded, medium fine grained, red sandstone. Underlying the lens, in order of stratigraphic descent, is 45 cm of green silty shale, approximately 2 m of red silt and then at least 12 m of fissile, deep red, fine silty sandstone.

Associated with the bone bearing lens and the green and red silty sediments immediately underlying it, is a degree of secondary copper enrichment (predominantly malachite). In particular the malachite occasionally lines joints and fractures and fills cores of much of the fossile plant material present.

From the reconnaissance mapping conducted so far, it would appear that the stratigraphic horizon containing the bone material is possibly a lateral equivalent of the unit in which the footprints were found. Douglas

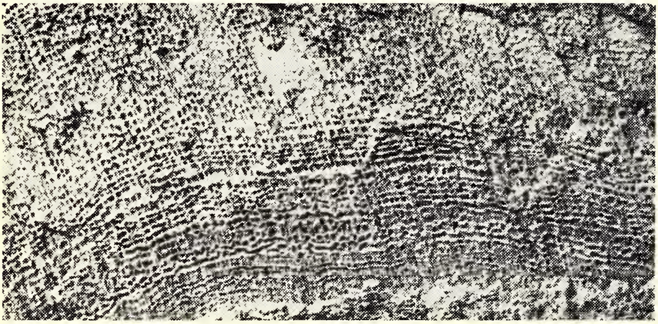


Fig. 2: Broken section of fish bone. Cellular and growth lines are prominent. x2.
Photo: N. Archbold

Fig. 3: Typical pitted surface ornament of the bony plates collected. Chevron pattern (pointed right) on right side of this plate may be form of growth line.
Photo: N. Archbold

(1975) outlined the geology and stratigraphy of the Genoa River Beds.

The fossiliferous lens is believed to be a type of lag deposit. A lag deposit can accumulate a representative sample of faunal remains present at the time of deposition. This discovery may therefore offer an opportunity to locate remains of early amphibians which are known to have occupied a similar position as the fossiliferous lens in space and time (Warren and Wakefield, 1972). Geological mapping and sampling of the fossiliferous material by students of the University of Melbourne is continuing in the area.

The bone material collected to date appears to be that of large bony fishes. It is mostly curved, platey and roughly ovoid in shape (from 10 cm to 20 cm in length, up to 10 cm across and may be up to 2 cm thick). The bones are all fairly robust and should require very little preparation prior to morphological study. Bone structure is very well preserved (figure 2). Fish scales (?) to 5 cm across are also present. Where the bone material is weathered out of the rock matrix, well preserved ornamented impressions of the bone often remain (figure 3).

Early occurrences of Devonian fishes in Australia have been recorded by Hills (1935) who described examples and gave a bibliography of earlier work. Very recently Carter (1975) has noted the discovery near Eden, N.S.W., of Upper Devonian fish attributed to *Bothriolepis* sp. and *Phyllolepis* sp. This discovery is of particular note in view of the proximity to the area now under consideration. Carter also referred briefly to a recent study by Young (1974) on Middle and Late Devonian fishes.

Acknowledgements:

The authors are grateful for the assistance lent by Urangesellschaft of Australia Pty. Ltd. in the above discoveries. We wish to express our appreciation of the assistance and encouragement offered by Dr W. E. Schindlmayr**. We would also like to thank I. R. Duddy and Ms S. A. Reeckmann who assisted in the collection of specimens in January, 1976. We are also indebted to Dr G. A. Thomas, University of Melbourne, School of Geology, for identifying the plant remains and encouraging (on the basis of the little material collected in 1975) the search for further material.

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** Chief Geologist,
Urangesellschaft of Australia Pty Ltd.

FNCV June General Meeting

The June General Meeting will be held on the Queen's Birthday holiday, Monday, 14 June. A vote was taken on 9 February and a majority of the 92 persons who attended that meeting were in favour of retaining the Monday fixture instead of changing to Wednesday.

First Record in Victoria of the Scorpaenid Fish *Maxillicosta scabriceps* Whitely 1935

BY PETER A. MORGENROTH *

Editor's Note: Scorpion fish are so named because many species have a poison gland in the groove of some of the fin spines; they should not be handled carelessly. Gurnard perch and rock cod belong to the same family — *Scorpaenidae.* Many scorpion fish are very colourful and some are well camouflaged. The colourful specimen described below, as well as being the first of its species to be found in Victoria, is also the first of the genus *Maxillicosta* from this State, although there are other genera of scorpion fish in our waters.

On 8 May, 1975 a specimen of the scorpaenid fish *Maxillicosta scabriceps* Whitley, 1935, was obtained near Tortoise Head in Westernport Bay, Victoria (Lat. 38° 25′ 00″ S., Long. 145° 15′ 57″ E.). This species has not previously been recorded from Victoria. It was trawled on a sandy bottom with patches of 'eel-grass' from Fisheries and Wildlife survey vessel 'Melita'. The specimen was preserved in a solution of ethanol : sea-water (7 : 3 vol.). It is held by the National Museum of Victoria (Nat. Mus. Vict. Fish Catalogue Number A505).

Meristic and morphometric observations

Measurement criteria, excepting scale counts, are those of Eschmeyer and Poss (1975). All dimensions are reported in millimetres.

Dorsal fin XIII, $7\frac{1}{2}$ (last split to base, almost 8); Anal fin III, $5\frac{1}{2}$ (last split to base, almost 6); Pectoral fin 25; Ventral fin I, 5; Caudal fin 10 branched, 12 principal; Gill rakers $4 + 9 = 13$, $4 + 8 = 12$; Nasal spines 2, 3; Supraorbital spines 12, 10; Scales in lateral line 44; Scales above lateral line 4; Scales below lateral line 12; Standard length 69.0;

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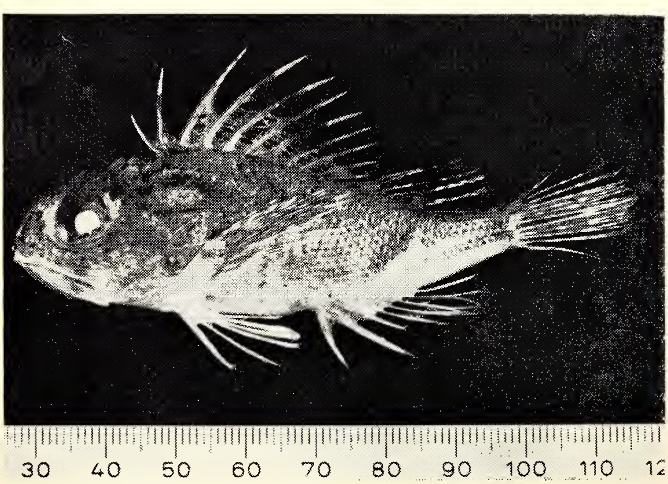

Fig. 1: *Maxillicosta scabriceps.* When alive, was brick red mottled with black and cream spots above, blending into cream below.

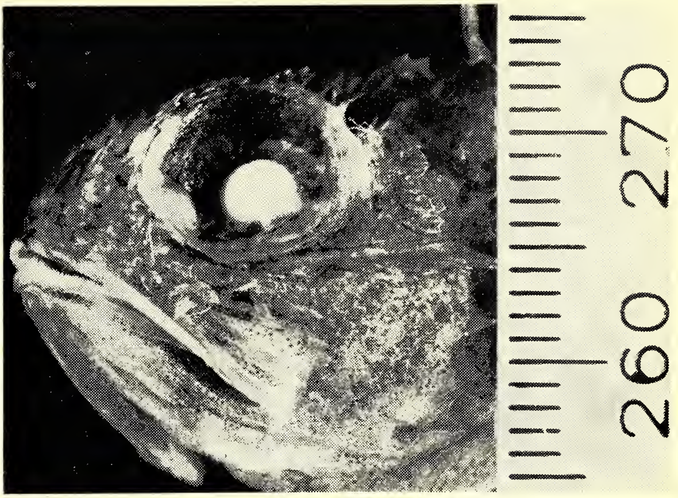

Fig. 2: Head of *M. scabriceps* showing the ribbed maxilla characteristic of the genus.

Head length 29.0; Body depth 22.1; Orbit diameter 10.0; Snout length 5.3; Interorbital width 3.8; Interorbital depth 1.7; Jaw length 14.0; Base spinous dorsal 29; Base soft dorsal 9.5; Base anal fin 15.0; Third dorsal spine 18.2; First anal spine 10.3; Second anal spine 15.0; Third anal spine 11.2; Pectoral fin length 23.3; Pelvic fin length 19.0; Caudal fin length 21.0; Least depth caudal peduncle 7.0; HL/OD 2.9; HL/IW 7.6; OD/IW 3.4; OD/Snout length 1.9; Interorbital width/ Interorbital depth 2.2.

1. A small symphyseal knob is present.

2. Many scales along the back above the lateral line with a very weak ridge or ridges. Many scales bilobed or trilobed with a very weak to moderate third lobe.

3. Colour when alive: Brick red above mottled with black and cream spots, blending into a cream colour below. Anal and ventral fins cream coloured. Pectoral, dorsal and caudal fins cream with brown or black markings as shown in the photograph (fig. 1).

Acknowledgements

I wish to thank Wm. N. Eschmeyer and Stuart G. Poss for permitting me to examine their manuscript (in press), revising the genus *Maxillicosta* and for examining the Victoria specimen. I also wish to acknowledge the assistance of the Fisheries and Wildlife Department, to thank the crew of the survey vessel 'Melita' for their assistance and co-operation and to thank Ms J. Dixon of the National Museum of Victoria for permitting me to examine their records of specimens.

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Gall Flies

NOTES BY KEN STRONG, MICROSCOPY GROUP, FNCV

Galls of various types occur on gum-trees and on various parts of the plant. This one develops on the flower bud, is more or less spherical with a diameter up to 3 cm, and becomes very tough.

It is caused by a small fly. The body of the fly is 3-4 mm long, yellow with brown markings; fig. 1. (Flies belong to the Diptera, an order of insects meaning "two wings". This gall fly is a member of the family Fergusoninidae.)

When the galls are cut open, each is found to contain up to 60 larvae. At an advanced stage, the larvae are somewhat diamond-shaped with a black spot in the centre. Larvae pupate in the gall. Each pupa case is almost black and is attached at the posterior end to the wall of the cavity where the larva has been feeding; fig. 2.

How does the fly emerge?

The mature insect has the same type of sucking mouth as a house fly, and the same type of pads and claws on its feet. There appears to be nothing that would enable the fly to bore its way out from a tough gall, perhaps from the centre of one the size of a walnut. But closer examination revealed that a special tool is developed for the purpose.

When the fly has formed and is about to emerge from the pupa, it develops a sack or bladder between the eyes and above the mouth. The sack bears hundreds of teeth in a rasp-like formation; near the eyes the rasp teeth are quite small, but increase in size and then become smaller again; fig. 3. This tooth-covered sack, the ptilinum, can be inflated and deflated, and develops dimples and wrinkles when the creature is in movement. One assumes that the fly's feet exert pressure in a forward direction; and the combined action of the rasp-like ptilinum cutting the gall tissue and the feet keeping up the pressure enables the fly to bore its way to the surface of the gall.

When the fly emerges, it takes some

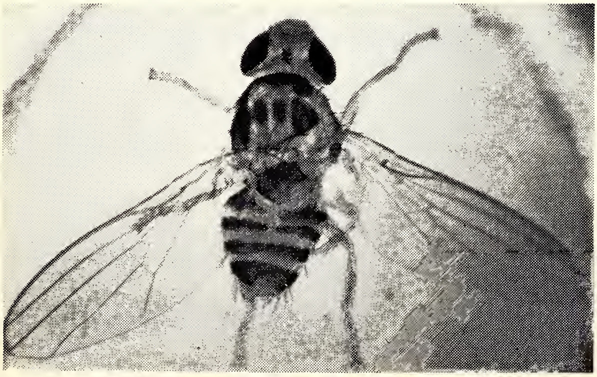


Fig. 1: Gall fly of the family Fergusoninidae. Body length 3-4 mm.

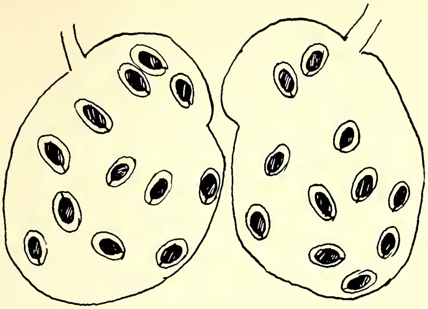


Fig. 2: Gall cut in half to show the many pupa, each attached to the wall of the cavity where the larva had been feeding.

time for the wings to expand, and the ptilinum subsides and disappears within a day or two; fig. 4.

Parasitising wasps

The fly larvae in many of these galls are parasitised by a wasp so that few flies emerge. The wasp larvae that by another, and there might be might be parasitised by another wasp, five or more wasp species in the one gall! The wasps have powerful jaws so there is no problem about how they escape from the tough gall.

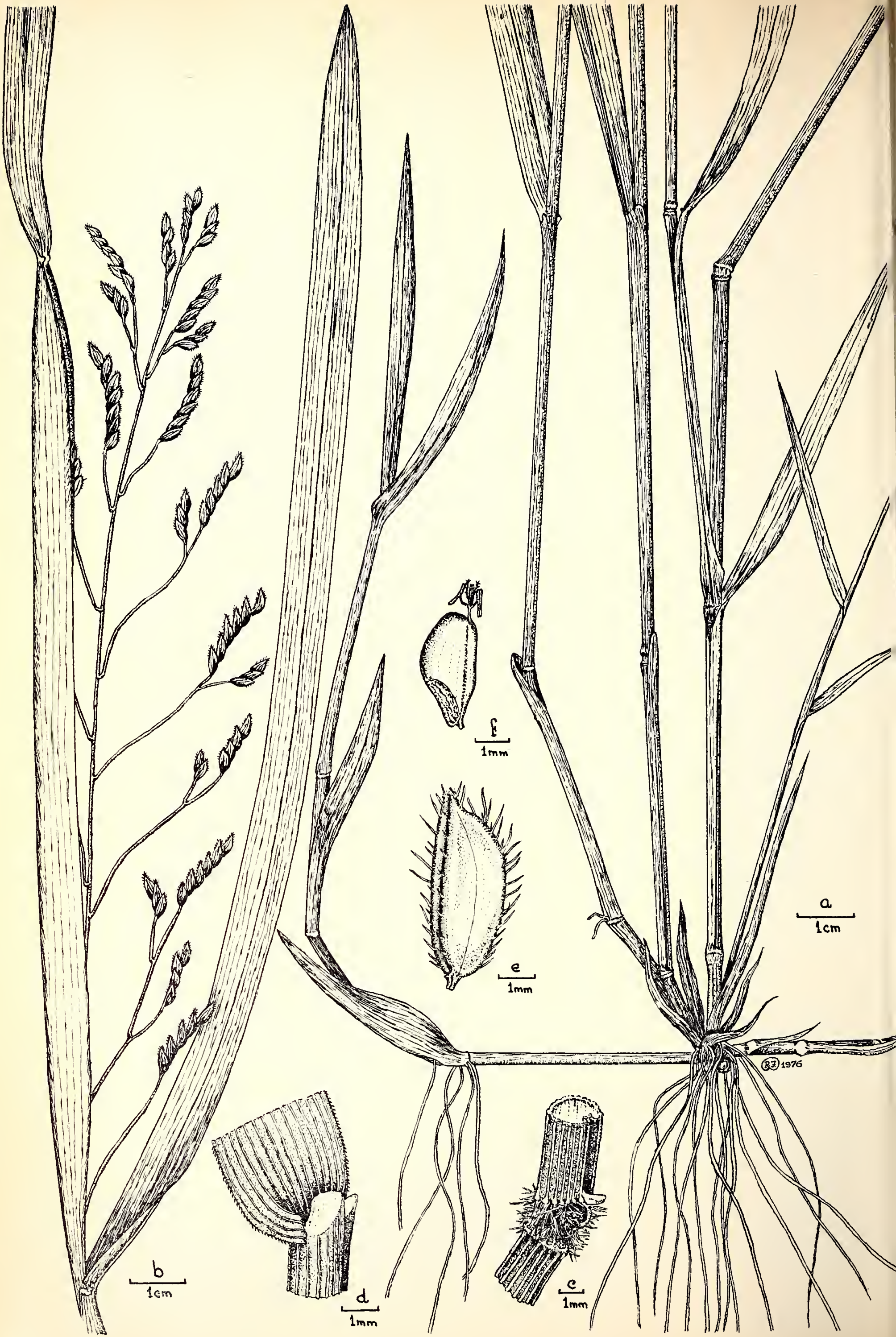
Fig. 3: Simplified drawing of the inflated ptilinum on an emerging fly. It shows some of the hundreds of rasp-like teeth, first small, then larger, and smaller again towards the "drilling nose". Highly magnified.

Fig. 4: Ptilinum deflated. Highly magnified. The two dark areas at bottom left and right are part of the eyes.

Nominations of FNCV Council Members and Office Bearers

FNCV Annual General Meeting will be on Monday, 10 May, and nominations may be received up to that date. Nominations are required for Council members. Council consists of the President, Vice-President, Immediate Past-President, and ten other persons. The following offices are open for nomination: President, Vice-President, Secretary, Minute Secretary, Treasurer, Assistant Treasurer, Subscription Secretary/Bookkeeper, Excursion Secretary, Librarian, Assistant Librarian, Editor. Such office-bearers might be members of Council or not. If you nominate a person for a particular office and he would also like to be a Council member, you must make the additional nomination of him as a Council member.

Think now of the people you would like to see on our governing body, and ask them if they will accept nomination.



a
1cm
b
1cm
c
1mm
d
1mm
e
1mm
f
1mm
BJ 1976

First Record in Victoria of Rice Cut Grass *Leersia orysiodes* (L.) Swartz

by Margaret G. Corrick, Botany Group, FNCV

On 3 March, 1974 two collections of *Leersia oryzoides* (L.) Swartz (Rice Cut Grass) were made from the Yarra River about 2 kilometres downstream from Bend of Islands near the site for the wall of the proposed Yarra Brae Dam. It was also observed on the same day at Bend of Islands.

Vickery (1975: page 276) records this species as a "rare introduction" to Australia, the only N.S.W. collection being from Leeton in 1959. There are no Australian collections of this species in the National Herbarium, Melbourne and apparently it has not been recorded previously in Victoria. It is native to North America, Europe and Japan.

It is a strong-growing, rhyzomic perennial forming large, loose tufts or patches. The culms are up to 1.5 metres long and have conspicuous hairy nodes; the leaves are a bright yellow-green, flat, 8-30 cm long, 5-15 mm wide, with scabrous margins. The upper leaf sheaths are also scabrid, and the whole plant feels rough to the touch. The papery ligule is about 1 mm long. The strong growth habit excludes other plants from the clumps and the bright yellow-green colour contrasts strongly with the duller greens of *Paspalum distichum* (Water Couch) and *Phragmites australis* (Common Reed), which are also plentiful in similar situations in the area. The panicle is loose and open, with slender flexuous branches. Spikelets are one flowered, with glumes reduced to a narrow rim at the tip of the pedicel. The lemma is semi-elliptic-oblong and fringed on the keel with stiff hairs.

Hubbard (1954: p. 347) comments that (in England) with average spring and summer temperatures the panicles remain enclosed within, or become only partially exserted from the leaf sheaths, and under such conditions the spikelets are cleistogamous; in warm seasons the panicles are completely exserted with large anthers hanging from the gaping lemmas so that cross pollination may take place. Ilustrations and descriptions appear in both Hubbard (p. 346) and Hitchcock (1935: p. 559).

On 1 February, 1976, a second visit was made to the site, and the grass was observed to have spread considerably, but was not in flower at this time. There were large patches on both banks of the river and also at several spots in the stream bed. It is apparent that most of the patches observed would be submerged when the river level is high. It is also evidently palatable to cattle, as it has been heavily grazed wherever it was growing within their reach. Small areas were also seen growing downstream near the bridge at Warrandyte.

Considering the popularity of this part of the Yarra it is remarkable

Opposite: *Leersia oryzoides*(L.) Swartz
a — plant; b — panicle; c — node; d — ligule;
e — spikelet; f — grain.
a, d, and e drawn from MEL 503210
b, e, and f drawn from MEL 503209

that this occurrence of *Leersia oryzoides* has not been recorded previously.

Two collections are lodged with the National Herbarium, Melbourne: M. G. Corrick, 3 March, 1974, No. 3914 (MEL503209) and M. G. Corrick, 1 February, 1976, No. 5401 (MEL 503210).

Acknowledgements:

I wish to thank the National Herbarium, Melbourne for permission to check records, and Rex Filson for his fine botanical drawing.

REFERENCES

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Hubbard, C. E., 1954. Grasses. Penguin Books. 2nd edition reprinted 1972, 463 pages.

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Rice Cut Grass
Leersia oryzoides
In the Yarra River
at Warrandyte.

The Origin of Generic Names of the Victorian Flora

Part 2 — Latin, Greek and Miscellaneous

(Continued from page 30)

BY JAMES A. BAINES

ADDENDUM

At the end of the entry for **Machaerina** ('Vic. Nat.' Vol. 93, p. 28), add to 'Willis retains them in *Cladium*', the words 'but in the Supplement to the 2nd edition of 'Handbook to Plants in Victoria' Vol. I, p. 438, he mentions S. T. Blake's adoption (1969) of the name *Baumea* for most Australian species formerly included in *Cladium,* including all Victorian species except. *C. procerum,* and the new combinations are listed; these have now gained general acceptance.

'*Baumea* was named by Gaudichaud-Beaupré in 1829, probably after Antoine Baumé (1728-1904), a French chemist, inventor of a hydrometer. Japanese botanist Koyama's revision (1956) took up *Machaerina,* published by Danish botanist Vahl in 1806 (posthumously, as he died in 1804).'

Menyanthes. Gk menyo, to disclose; anthesis, the flower or full bloom of a plant. *Villarsia exaltata* was collected by Solander and named by him as a species of *Menyanthes*, but that is a monotypic genus of the North Temperate zone, a bog plant that gives its name to family Menyanthaceae to which *Villarsia* belongs. (*M. trifoliata* is Bog-bean or Buck-bean in Europe.)

***Mercurialis.** Originally herba mercurialis, Herb Mercury, named in honour of Mercury, messenger of the gods. Our species is **M. annua*, Annual Mercury; the genus belongs to family Euphorbiaceae.

Mesembryanthemum. A. W. Smith & Wm. T. Stearn have an interesting story on this name, which I quote from their 'A Gardener's Dictionary of Plant Names': 'The etymological tangle of this name began in 1684 when Breyne published it as *Mesembrianthemum*, derived from Gk mesembria, midday; anthemon, flower; in allusion to the fact that the only species then known bloomed at noon. When night-flowering species became known, and this name accordingly seemed inappropriate, Dillenius in 1719 ingeniously renamed the genus *Mesembryanthemum*; by changing the i to y he altered the derivation, to Gk mesos, middle; embryon, embryo; anthemon, flower, with reference to the position of the ovary. The group has now been divided into numerous smaller genera based on habit of growth and fruit-characters.' Victoria's introduced species are now in the different genera **Gasoul* and **Aptenia* (ice-plants), **Psilocaulon* (Wiry Noonflower) and *Carpobrotus* (Angled Pigface and Hottentot Fig), while our native species are in *Carpobrotus* (Inland Pigface and Karkalla), *Lampranthus* (Little Noonflower), *Disphyma* (Rounded Noonflower) and *Sarcozona*. They are in family Aizoaceae.

Metrosideros. Gk metra, core, heartwood; sideros, iron. Those who note the similarity in the flowers of N.Z. Christmas tree or pohutukawa and the ratas of that country's forests to the massed blooms of our scarlet flowering gums do not always realize the relationship between these members of the family Myrtaceae. Described erroneously as species of *Metrosideros* in the very early days of plant collecting in Australasia were such members of the Victorian flora as *Callistemon citrinus, C. macropunctatus* and *C. pallidus, Eucalyptus gummifera, Angophora floribunda* and *Melaleuca armillaris*. The botanists responsible were Solander, J. Gaertner, Curtis, Smith, Dunal and Bonpland. The only Australian species of *Metrosideros* are two endemics in North Queensland and Northern Territory.

Micrantheum. Gk mikros, small; anthos, flower; a name that could have been given to many flowers of similar diminutive size. Our species is *M. hexandrum*, Box Micrantheum; family Euphorbiaceae.

Microcybe. Gk mikros, small; kybe, head; alluding to the small flowerheads. Our two species, both native, *M. pauciflora* and *M. multiflora*, distinguished by their specific names as 'few-flowered' and 'many-flowered', and by their common names as the Yellow and the Red respectively.

Microlaena. Gk mikros, small; laina, cloak; alluding to the two minute outer glumes. Victoria's species, *M. stopoides*, Weeping Grass, is found in all States. The specific name means 'like *Stipa*', though it was originally placed by Labillardière in *Ehrharta*.

Micromyrtus. Gk mikros, small; myrtos, myrtle; because of the tiny flowers of these myrtaceous plants. Our sole species is *M. ciliata*, Heathmyrtle.

(To be continued)

A Plague of Crickets

BY JOAN FORSTER

On the second weekend of February 1976 I arrived at my house at Moggs Creek late in the evening. (Moggs Creek is nine miles south of Anglesea.) As I unpacked I had all the lights on including the outside light. In no time there were black insects bumping against the wall and on the stairway near the light. Each time I opened the door to enter with another package, I had to be careful not to be accompanied by a group of hopping crickets.

That preliminary care was rather pointless. As I unpacked in the kitchen, crickets hopped about me and I realised they had come in before my arrival. I understood why, a year ago, some friends who have a house nearer the beach had given up and returned home the same evening.

I found crickets under the stove, in bathroom and bath, under the bed, in fire-place and broom cupboard. I sprayed and collected.

After going to bed, I listened to the amazingly loud thumps as crickets landed on the roof, scuttled along the gutters, down the drain-pipes and plopped into my water-tank! I lay awake trying to devise plans to defeat this last menace — fishing them out of the tank or fitting wire-netting at the down-pipes. But such plans were futile as my roof is 20 feet up and the tank has a securely fitted lid. I could only hope that I would not be faced with the problem that faced several neighbours last year. Their houses are nearer the beach and their tanks became so full of crickets that the water turned putrid; the tanks had to be emptied and fresh water bought.

There was a strong north wind the night I arrived, but a change came the next day and a south breeze blew from the sea. I walked down towards the beach and noticed a wide black band on our usually clean sand. I thought that the rough sea had brought in seaweed, and flocks of gulls were feeding there, with some crested terns among them. As I walked on to the sand I found, not seaweed, but crickets! They were in heaps in a strip about six feet wide at high tide level, most of them dead. I presume that the north wind had blown them out during the night, they had fallen, and the tide had washed them to shore — providing a surfeit for gulls.

The black band and its crowding gulls extended right along the beach, as far as I could see in each direction. Later in the day, some friends observed that the gulls were so glutted they could rise only a few feet when approached by a dog; and they could not remain air-borne but landed almost immediately. The beach was strewn with their droppings, and much of the droppings included undigested, almost entire crickets.

Travelling to Lorne in March 1975 I found the road covered with crickets, and flocks of gulls feeding on them. There was also a unusual number of herons and egrets about, especially on the flats where crickets crawled from cracks in the parched ground.

For two years crickets have been in plague proportions along this south-west coast. What is the cause of the astonishing increase of these insects?

Field Naturalists Club of Victoria

The Editorial Committee

In our editorial on page 39 we recognised that this Committee should be permanent instead of interim as originally planned. A committee can help but there must still be an editor, and Madge Lester volunteered as acting editor until this time next year. Council has since appointed her editor.

Miss Lester has our whole-hearted support and active co-operation: each of us will undertake such editorial tasks as she chooses to delegate, but she herself will handle all the technical side. During the production of her last two issues, a member of this Committee (if no other editor is forthcoming) will be learning the technicalities ready to take over at the end of Miss Lester's twelve months. This might well happen each year or each second year, and we see this Committee as a sort of training ground for short-term editors so that no person need fear he will be left in the job too long. Any FNCV member will be welcome to join this 'editorial training ground' and share in the immediate editorial tasks.

Another important function of this Committee is the checking of factual matter; we want everything in this journal to be correct.

We have drawn up what we think is a fairly comprehensive plan. One item in this plan requires the support of Club members; please see below. Another is the aim to help readers get more value from everything in each issue, and there will be more Editor's Notes attached to articles, especially to scientific ones. Yet another is that Alan Morrison and Ian (Dick) Morrison have agreed to be our 'bank' for photographs. We hope to use some of their superb shots on the covers, and Club members can apply to them if illustrative material is needed for articles.

Your Help and Support, Please

An important aim in our plan is to gain more contributions, short or long, from Club members.

The short items might be about something unusual or of particular interest that attracted your attention. If *you* were intrigued by it, many other members will be too; send it to the Editor, whether it's only five lines or fifty. Also, some of those chance observations could be more significant than you think. We are not planning to re-introduce a formal 'Nature Notes' page (though we might do so if there are many) but will put your notes in spaces at the end of articles. Book reviews would be welcome too, but keep them brief.

If you have difficulty in writing up your item, contact any member of this Committee and he will help you. One or two of us could even manage simple diagrams; we are *not* expert artists, but are willing to try if you supply the information.

Longer articles or series of short articles from members and other laymen will be greatly appreciated. They might be about a particular species, genus, a life history, area, or other aspect of natural history.

Country members and members of country clubs are especially well situated to help us, and we look forward to receiving many nature notes from them as well as longer articles.

When preparing material for publication, please have it typed with double line spacing and leave a clear margin at the left of at least 3 cm (about 1¼").

BRIAN SMITH, CHAIRMAN.

Reports of FNCV Meetings

General Meeting
Monday, 9 February

Speaker for the evening was Mr. Mark Gottsch. He spoke about north-west Victoria and showed superb slides including many of reptiles and birds; he was knowledgeable about the habits as well as the habitat of all of them. Mr. Gottsch was concerned about the ecology of the area and the impact of the white man, but has hope that more careful use will abate the effect of previous thoughtlessness.

Exhibits. Mr. Jim Baines displayed all the flower paintings of Alison Ashby that have been reproduced as postcards by the S.A. Museum. Mr. Baines keeps the cards in envelopes according to family, and the families were displayed in alphabetical order.

Mrs. Seamons showed a large reproduction of a painting by Neil Douglas. There was an exhibit of what appeared to be gold-filled teeth in a sheep's jaw, but the "gold" was pyrites. Other items included a piece of fossil whale bone from Beaumaris; artificial obsidian; a rock with crystallisation of mineral solution in the fine fractures that gave the appearance of a fern fossil. Some silicified wood, complete with worm holes, carried the question "How is it the holes were not filled during silification, or did the worm make the holes after the wood was silificied? A super worm?" A quarter-inch ball of "cotton wool" was the egg sac of the Red-backed Spider, accompanied by the inumerable young that had emerged from it; we were comfortingly assured all were dead!

An old photo (undated) showed several men standing in the large hollow in the base of a Beech tree (*Nothofagus*); it had previously been used as a dwelling and then as stables.

Bird Study Group. The President announced that it would be desirable to form such a group and those interested should contact Mr. Garnet Johnson.

June Meeting. A show of hands declared preference for retaining the meeting on Monday, 14 June, Queen's Birthday holiday, instead of changing to Wednesday.

**General Meeting
Wednesday, 10 March**

Speaker for the evening was Dr. T. H. Rich, curator of fossils at the National Museum. Dr. Rich gave us a fascinating address on "New News on Old Bones". First he took a brief look at the generally accepted theory of the origin of our marsupials from South America via Antarctica about 65 million years ago — before continental drift drove the continents apart. Then he stated the difficulties of finding fossil evidence in Australia as our rocks are mostly too young or too old! Nevertheless, Dr. Rich then told us something of discoveries at various places in Victoria. Some findings at Cape Paterson, Bacchus Marsh, Lancefield and Morwell presented more questions that contradicted previous theories. Such posers could only be solved by further discoveries.

Exhibits included a collection of seed pods — variety of sizes and shapes, smooth, lumpy or prickly. A cricket carried the label: "What are the conditions that have caused the present cricket plague?" There was a spider with a stout brown body about the diameter of a five cent piece, several graptolites, and ⅛" wasps that parasitise the caterpillar of *Papilio anactus.*

Our Kinglake Property. The Correspondence Secretary, Mr. Garnet Johnson, was present and provided information on this property; it might be called "The Harold Frahm Bird Refuge". Mr. Johnson is chairman of the management committee and has great plans for making best use of the property.

FNCV Property at Kinglake

The FNCV property at Kinglake consists of 10 acres, well fenced and has three gates.

The property has been bequeathed to the FNCV in perpetuity by Mr. Harold Charles Frahm, who died in July 1974. Council has considered various names such as "The Harold Frahm Bird Refuge" and it will be under a committee of management elected annually by Council. The committee will consist of a chairman and five other members. Mr. Garnet Johnson has been appointed chairman.

Mr. Johnson is enthusiastic about the property and its possibilities. As soon as the committee is appointed, we are likely to hear more about the ideas that Mr. Johnson has already developed for immediate action and about his visions for the future. Under his leadership, our property at Kinglake could become a great asset to this Club, as well as a natural reserve for native plants and birds.

Personal

Mrs. Salau, who broke her ankle when at the FNCV outing to Glen Nayook on 15 February, has been moved from Box Hill Hospital to the Kingston Centre at Cheltenham. Apart from her ankle, which cannot be walked on for some months yet, Mrs. Salau says that she feels pretty well. Perhaps she feels even better when she has visitors.

Ian (Dick) Morrison was married to Barbara Hooke on 27 March. Barbara is a daughter of the late Garnsey Hooke who has done so much for this Club in past years. Dick Morrison has won many friends by his unassuming kindness, and both he and Barbara play an active part in the Club, especially in the Botany Group. We wish them great happiness.

FNCV Financial Report as at 31 December 1975

Auditors' Report to the Members of the Field Naturalists Club of Victoria

In our opinion—

(a) The attached balance sheet and profit and loss account are properly drawn up in accordance with the provisions of the Companies Act, 1961 of Victoria as amended and so as to give a true and fair view of:

(i) the state of affairs of the Club at 31 December 1975 and of the results of the Club for the year ended on that date; and

(ii) the other matters required by Section 162 of that Act to be dealt with in the accounts:

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

DANBY, BLAND, PROVAN & CO.,
Chartered Accountants.
R. M. BLAND, Partner.

Melbourne, 30th March, 1976.

Report by Executive Council

The members of the Executive Council submit herewith balance sheet as at 31 December 1975 and income and expenditure account for the year ended on that date, and report as follows:—

1. The Net Surplus of the Club for the year ended 31 December 1975 was \$371 which added to the Surplus brought forward at 1 January 1975 of \$7,847, together with a transfer of \$26 from Club Improvement Account and a credit for Life Membership Subscription of \$200, and a transfer of \$400 to Life Membership Fund, results in a surplus to be carried forward to next year of \$8,044.
2. The members of the Executive Council took reasonable steps to ascertain, before the income and expenditure account and balance sheet were made out, that all known bad debts were written off and adequate provision was made for doubtful debts.
3. The members of the Executive Council took reasonable steps, before the profit and loss account and balance sheet were made out, to ascertain that the current assets, other than debtors, were shown in the accounting records of the company at a value equal to or below the value that would be expected to be realised in the ordinary course of business.
4. At the date of this report, the members of the Executive Council are not aware of any circumstances which would render the values attributable to the current assets in the accounts misleading.
5. No charge on the assets has arisen, since the end of the financial year to the date of this report, to secure the liabilities of another person. No contingent liability has arisen since the end of the financial year to the date of this report.
6. No contingent or other liability has become enforceable or is likely to become enforceable within the period of twelve months after the end of the financial year which in the opinion of the members of the

Executive Council will or may affect the ability of the Club to meet its obligations as and when they fall due.

7. At the date of this report the members of the Executive Council are not aware of any circumstances not otherwise dealt with in the report or accounts which would render any amount stated in the accounts misleading.
8. The results of the Club's operations during the financial year, in the opinion of the members of the Executive Council, were not affected by any item transaction or event of a material and unusual nature.
9. Since 31 December 1975, and to the date of this report, in the opinion of the members of the Executive Council, no item transaction or event of a material and unusual nature, which would affect substantially the results of the Club's operations for the next succeeding financial year, has occurred.
10. No member of the Executive Council, since the end of the previous financial year, has received or become entitled to receive a benefit by reason of a contract made by the Club with the member or with a firm of which he is a member or with a company in which he has a substantial financial interest.
11. 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.
12. The names of the members of the Executive Council in office at the date of this report are as follows—

Mr. P. Kelly
Mrs. M. Corrick
Mr. J. Willis
Mr. T. Sault
Miss M. Allender
Mr. R. Gibson
Mr. B. Callanan
Miss W. Clark
Mr. A. Parkin
Mr. B. Burbage
Miss M. Lester
Dr. B. Smith.

This report is made in accordance with a resolution of the Executive Council dated 30th day of March, 1976.

Alan Parkin, Secretary
Tom Sault

FIELD NATURALISTS CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF INCOME AND EXPENDITURE FOR THE YEAR ENDED 31 DECEMBER, 1975

Year 1974	Receipts			Year 1974	Payments	
	Subscriptions Received—				Victorian Naturalist—	
$89	Arrears	$188		$6,599	Printing	$7,218
6,049	Current	8,983		1,019	Illustrating	948
288	Supporting	208		959	Despatching	892
				12	Editorial	—
$6,426			$9,379			$9,058

276	Sales of "Victorian Naturalist"		464
45	Advertising in "Victorian Naturalist"		106
	Interest Received—		
	Library Fund	$5	
	Bank Account	70	
	Commonwealth Bonds	160	
	Bonds — M. Wright Legacy	416	
	Bonds — C. M. Walker Legacy	80	
	National Mutual Deposit	111	
	Life Membership Fund	18	
$640			860
39	Sundry Income		23
826	Deficit for year		—
$8,252			$10,832

	Less Grants—		
(2,045)	Ingram Trust — 1975 Grant	(1,213)	
	Treasury—		
(450)	1973 Grant (balance)	—	
(1,000)	1974 Grant	—	
$5,094			$7,845
	Working Expenses—		
$222	Postage and Telephone	$219	
257	Printing and Stationery	199	
40	Rent of Room for Storage	40	
79	General Expenses	61	
139	Affiliation Fees, Subscriptions and Donations	134	
22	Preston Junior Club Rent	12	
121	Natural History Medallion Expenses	124	
1,511	Typing and Clerical Assistance	944	
60	Auditors' Remuneration	60	
363	Rent of Hall, Library and Museum Room	366	
260	Rent of Office Space	65	
84	Insurance	81	
—	Legal Expenses for alterations to Memorandum and Articles of Association	311	
$3,158			$2,616
—	Surplus for year		371
$8,252			$10,832

Notes: 1. Auditors' Remuneration of $60, 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 Executive Council.

FIELD NATURALISTS CLUB OF VICTORIA

BALANCE SHEET AS AT 31st DECEMBER, 1975

LIABILITIES

Year 1974				
	Current Liabilities			
$570	Subscriptions paid in advance . .	$667		
238	Sundry Creditors	1,085		
18	M. A. Ingram Trust Grant in hand	18		
$826			$1,770	

ASSETS

Year 1974				
	Current Assets			
$189	Cash at Bank		$493	
2,000	Commonwealth Bonds at Cost .		2,000	
2,115	Sundry Debtors		233	
	Stocks on Hand at Cost—			
122	Badges		102	
58	Microscope Project		69	
598	Books for Sale		1,104	
90	Flower Books		291	
$5,172				$4,292
	Fixed Assets at Cost			
	Library Furniture and Equipment	$6,094		
$6,068	*Less* written off	—		
			$6,094	
141	Land — Cosstick Reserve, Maryborough		141	
$6,209				6,235
	Investment of Funds			
	Library Fund—			
100	Commonwealth Bonds at Cost		100	
	Legacy Estate M. Wright—			
5,200	Commonwealth Bonds at Cost		5,200	
	Legacy C. M. Walker—			
1,000	Commonwealth Bonds at Cost		1,000	
	Wilfred C. Woollard Fund—			
500	M.M.B.W. Debenture at Cost .		500	
	Flower Book Account—			
3,000	Commonwealth Bonds at Cost		3,300	

	Special Funds and Accounts		
$3,646	Building Fund	$3,829	
6,996	Publication Fund	9,807	
100	Library Fund	100	
511	Club Improvement Account	1,032	
200	Excursion Account	200	
5,217	Estate M. Wright Legacy	5,217	
300	P. E. Morris Gift Account	300	
200	Estate Miss I. F. Knox Legacy	200	
1,466	Estate C. M. Walker Legacy	1,466	
20	Estate R. S. Chisholm	20	
633	Wilfred C. Woollard Fund	668	
554	D. E. McInnes Fund	589	
143	Microscope Project A/c	158	
3,599	Flower Book Account	4,219	
13	Trailer Account	13	
52	N. A. Wakefield Memorial Fund	52	
—	Estate Miss Ivy Dixon	200	
—	Life Membership Fund	400	
—	Natural History Medallion Fund	279	
$23,650			28,749
	Surplus of Assets over Liabilities		
	Balance at 1.1.75	$7,847	
	Transfer from Club Improvement Fund	26	
	Life Membership Subscription	200	
	Surplus for year	371	
		8,444	
$7,847	*Less* transferred to Life Membership Fund	400	
			8,044
$32,323			$38,563

	D. E. McInnes Fund—		
500	Esanda Ltd. Debenture at Cost	500	
	Life Membership Fund—		
—	Esanda Ltd. Debenture at Cost	400	
	Natural History Medallion Fund—		
—	Esanda Ltd. Debenture at Cost	400	
	National Mutual Permanent		
—	Building Society Deposit	3,000	
$10,300			14,400
	Building Fund		
1,700	Commonwealth Bonds at Cost	3,200	
—	Esanda Ltd.—Debenture at Cost	600	
546	Cash at Bank	29	
1,000	S.E.C. Inscribed Stock (Redeemed)	—	
400	A.N.Z. Bank Deposit (Redeemed)	—	
$3,646			3,829
	Publications Fund		
$3,800	Commonwealth Bonds at Cost	$3,800	
	Book Stocks at Cost—		
—	Ferns of Victoria and Tasmania	1,408	
67	Toadstools and Mushrooms	5	
34	Vegetation of Wyperfeld Park	2	
	Wildflowers—		
73	Wilsons Promontory	67	
624	Birds of the Dandenongs	562	
683	Sundry Debtors	2,989	
1,715	Cash at Bank	1,005	
$6,996		$9,838	
—	*Less* Sundry Creditor	31	
$6,996			9,807
$32,323			$38,563

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31 December 1974		$3,646
Interest on Investments and Bank Account		183
		$3,829

PUBLICATIONS FUND

Amount of Fund at 31 December 1974		$6,996
Interest on Investment and Bank Account		357
Surplus for the year from—		
Ferns of Victoria and Tasmania	$2,332	
Victorian Toadstools and Mushrooms	55	
Vegetation of Wyperfeld National Park	33	
Wild Flowers of Wilson's Promontory National Park	25	
Birds of the Dandenongs	9	
		2,454
Amount of Fund at 31 December 1975		$9,807

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31 December 1974	$511
Booksales Account Profit	547
	$1,058
Less—	
Purchase Library Books and Equipment transferred to Surplus Account	26
Amount of Account at 31 December 1975	$1,032

Statement by the Members of the Executive Council

In the opinion of the members of the Executive Council of the FIELD NATURALISTS CLUB OF VICTORIA, the accompanying Balance Sheet is drawn up so as to give a true and fair view of the state of affairs of the Club as at 31 December 1975, and the accompanying Statement of Income and Expenditure is drawn up so as to give a true and fair view of the surplus of the Club for the year ended 31 December 1975.

Signed in accordance with a resolution of the Executive Council on 30th March 1976.

Alan Parkin, Secretary
Tom Sault

Statement by the Principal Accounting Officer

I, Daniel E. McInnes, being the officer-in-charge of the preparation of the accompanying accounts of the FIELD NATURALISTS CLUB OF VICTORIA for the year ended 31 December 1975 state that, to the best of my knowledge and belief, such accounts give a true and fair view of the matters required by Section 162 of the Companies Act 1961, to be dealt with in the accounts.

D. E. McINNES.

Signed at Melbourne on the 30th day of March 1976.

(Continued from page 38)

GROUP MEETINGS

(At the National Herbarium, The Domain, South Yarra, at 8 p.m.)

First Wednesday in the Month — Geology Group.
5 May — Subject: "The New Ice Age". Members Discussion.
2 June — Subject: "Lunar Geology" — New Findings. Speaker: Prof. Lovering. All Club members invited.

Third Wednesday in the Month — Microscopical Group.
21 April, 19 May, 16 June.

Second Thursday in the Month — Botany Group.
8 April: "The Story of Linnaeus" by Mr J. A. Baines.
13 May: Address by a member of Bendigo Field Naturalists Club.
10 June: "The Family Proteaceae" by Miss L. White.
Each meeting includes a quarter hour address for beginners — various subjects.

(At the Conference Room, The Museum, Melbourne, at 8 p.m.)

First Monday in the Month — Marine Biology and Entomology Group.
3 May, 7 June, 5 July.

Fourth Thursday in the Month — Field Survey Group.
22 April, 27 May, 24 June.

(At the Arthur Rylah Institute for Environmental Research, Brown Street, Heidelberg, at 8 p.m.)

First Thursday in the Month — Mammal Survey Group.
6 May, 3 June, 1 July.

GROUP EXCURSIONS

Day Group — Any Member is Welcome — Third Thursday in the Month.
No meeting in April as Easter holidays intervene.

Thursday, 20 May — Institute of Archaeology of Australia. Meet at Fitzroy Gardens Kiosk at 11.30 a.m. After lunch proceed to Ancient Times House, 116 Little Bourke Street, for a guided tour for which there will be a 50 cent charge.

Thursday, 17 June — Seeing Eye Dog School, Thanet Street, Malvern. Meet at Central Park, corner Wattletree and Burke Roads, East Malvern, at 11.30 a.m.

Thursday, 15 July — New Biological Display, National Museum. Details later.

Geology Group — Any Member with their own car invited to excursions.

Sunday, 9 May — Beveridge — "Minerals in a Volcano". Meet at left-hand turn-off to Beveridge from the Hume Highway at 10.00 a.m.

Sunday, 13 June — "Royal Park Fossils" (afternoon only). Meet at Royal Park Station, 2.00 p.m.

Botany Group — All Club members welcome — Last Saturday in the month.

24 April: FNCV Kinglake property; leader Miss M. Allender.

29 May: Fungi; leader Mr B. Fuhrer.

26 June: Ferns; leader Mrs Webb-Ware.

GROUP CAMP NOTICES

Field Survey Group — 10-11 April. 8-9 May. (Details, Robin Sandell, 83 8009, home.)

Mammal Survey Group — 16-19 April. 15-16 May. (Details, Ray Gibson, 62 4007, business.)

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1975-1976.

President:

Mr. P. KELLY, 260 The Boulevard, East Ivanhoe, 3079.

Correspondence Secretary: Mr. GARNET JOHNSON, 20 Sydare Avenue, Chadstone, 3148.

Treasurer — Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145.

Hon. Editor: Miss M. J. LESTER, 4/210 Domain Road, South Yarra, 3141. (26 1967.)

Hon. Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3151. (52 2749.)

Magazine Sales Officer: Mr. D. E. McINNES.

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

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Day Group: Miss D. M. BELL, 17 Tower Street, Mont Albert, 3127. (89 2850.)

Field Survey: R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126. (83 8009)

Geology: Mr. T. SAULT.

Mammal Survey: Miss Wendy CLARK, 97 Faraday Street, Carlton, 3053.

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
Junior with "Naturalist"	$8.00
Individual Magazines	$0.75

All subscriptions should be made payable to the Field Naturalist Club of Victoria and posted to the Subscription Secretary.

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Vol. 93, No. 3 May/June, 1976

F.N.C.V.

Published by the

FIELD NATURALISTS CLUB OF VICTORIA

in which is incorporated the Microscopical Society of Victoria

$1·20

Category "B"

Registered in Australia for transmission by post as a periodical

F.N.C.V. DIARY OF COMING EVENTS

At the National Herbarium, The Domain, South Yarra.

GENERAL MEETINGS

Monday, 14 June (8.00 p.m.)— **Queen's Birthday Holiday.**

Speaker—Mr. Ian Morrison.
Subject—"Nature Walkabout".

Monday, 12 July (8.00 p.m.)—

Speaker—Mr. S. J. Cowling, Assistant Director, Wild Life Branch, Fisheries and Wild Life Division.
Subject—"The Objects of the Wild Life Branch".

Monday, 9 August (8.00 p.m.)—

Speaker—Dr. Peter Attiwill.
Subject—"Plants and the Atmosphere".
New Members—June General Meeting:

Ordinary:

Mr. Geoff Bird, 7/28 Mentone Parade, Mentone, 3194.
Miss Betty Berrett, 11/321 Beaconsfield Parade, St. Kilda, 3182 (*Ecology*).
Mr. Andrew Calder, 8 Oak Street, Canterbury, 3126 (*Mammal Survey, Entomology*).
Mrs. Elizabeth A. Jacka, 5 Westminster Street, Balwyn, 3103 (*Botany and Marine*).
Ms Jean A. Kerle, 10 Cressy Street, Malvern, 3144.
Mr. Cleve W. Lyster, 47 Royal Parade Reservoir, 3073 (*Microscopy*).
Mrs. Marjorie Oates, 14/108 George Street, East Melbourne, 3002.
Miss Desley K. Soden, 6/161 Wellington Parade South, Jolimont, 3002 (*Mammal Survey and Botany*).

Joint:

Mr. Brian Dwyer and M. L. McDonald, 166 Powlett Street, East Melbourne, 3002.
Mr. Nigel H. Sinnott and Mrs. Kathy H. Sinnott, 45 Lincoln Road, Essendon, 3040 (*Mycology and Botany*).
Mr. John D. Miller and Mrs. Jillian M. Miller, 10/26 Garton Street, North Carlton, 3054.

Country:

Mr. John Linder, Stumpy Gully Road, Balnarring, 3926.
Mr. David J. Stewart, 15 Wynne Street, West Rosebud, 3940.
Mr. P. Rush, Lindenow South, Vic., 3866.

F.N.C.V. EXCURSIONS

Sunday, 20 June—Keith Turnbull Research Station, Bullato Road, Frankston. The coach will leave Batman Avenue at 9.30 a.m., fare $3.40, bring one meal. Any Members travelling by private car should be at the Research Station by 1.00 p.m. This Station is part of the Department of Crown Land and Survey and carries out research on weeds and pests.

Sunday, 18 July—Yarra Bend National Park. This will be a follow-up of the Boneseed weeding day held last year, and the plan is to go over the same area pulling up plants missed on the previous excursion and seedlings which have grown since. After lunch there will be a nature ramble through the Park. Meet at the Pioneer Monument at 10.00 a.m. Transport by private car or Kew Tramway Bus from Flinders Street. Lunch at the boatshed picnic area. Bring gardening gloves as young plants are easily pulled out.

Sunday, 15 August—Cardinia Reservoir and visit to Jells Road M.M.B.W. Park on the way. Leader, D. E. McInnes. Details next issue.

Saturday, 21 August-Sunday, 5 September—New South Wales. The itinerary for this proposed excursion is to leave Saturday, 21 August, stay overnight at Orbost, travel to Bateman's Bay for the second night, then on to Cronulla where the party will stay until 28/8/76 with day trips to Royal National Park, Heathcote State Park and other areas of natural history interest. On the 28/8/76 the party will proceed to Gosford which is well placed for visits to Brisbane Waters National Park, Kuring-gai Chase, The Australian Reptile Park, Floraland, Bouddi State Park, Dharug National Park, etc., remaining there until 2/9/76, when the return journey will commence, returning home by an inland route. The trip will occupy 16 days and the cost for the coach and accommodation, hotel and motel, mostly room only, will be approximately $265.00, plus meals. Bookings accompanied by $20.00 deposit should be made with the excursion secretary as soon as possible.

(Continued on page 123)

The Victorian Naturalist

Volume 93, Number 3 9 July 1976

Cover illustration: Little Grebes nesting on Miss Rossiter's dam at South Wangaratta; see page 84-85. Photograph by Len Robinson.

Observations on the Nesting Habits of the Little Grebe *Podiceps ruficollis*

BY N. T. ROSSITER*

For two successive years I have been able to observe a pair of Little Grebes nesting and rearing their young on my dam. The dam is about 100 yards in front of the house from which I get an uninterrupted view of their activities.

1974

In both years there was a remarkable similarity in the timing of major events in the domestic life of the Little Grebes. In 1974, the first grebe arrived on October 2nd (1975 — Oct 3rd). On October 4th (1975 — Oct 5th) another one appeared, and very soon it was apparent they were making a nest.

The Nardoo (Marsilea sp) which is very plentiful in the dam seemed to be pushed into a clump, and the birds built on top of it. The nest consisted of long pieces of Nardoo that they obtained by diving and bringing to the surface about foot-long stems which were placed across the platform of Nardoo leaves. They worked very busily on the nest for several days until the platform was about three inches high.

On October 8th (1975 — Oct 9th) the first egg was seen and on the tenth there were two. The male continued to bring stems of Nardoo and place them on the nest, perhaps to maintain its height above water level as it subsided under the weight of the female bird and eggs.

For four weeks from October 10th, a bird was sitting on the eggs almost constantly, but when danger threatened (people, shags, or other predators) it would cover the eggs in a frenzy of haste with loose Nardoo, hop off into the water and usually submerge.

On November 4th a tiny chick was seen; next day there were two and finally three. These are striped, and at first ride on the back of either of the parent birds, slipping off frequently for very brief swims but never far from the adults.

Very soon this family of five was depleted. On the morning of November 11th two adult birds were seen but, later in the day, two observers were certain there was only one adult and one chick left on the dam. The remaining chick was quite often away from its mother now, but what happened to the other two is a mystery — taken by a predator perhaps, or entangled in Nardoo and drowned? The chick grew rapidly and was still being fed by the mother three weeks after hatching but becoming increasingly independent.

On December 15th and 16th the female seemed to be building up the nest again, and on the 17th another adult appeared, presumably a male. Emitting a whirring noise, this bird chased the young grebe whenever it approached either adult. Because of the nest preparation on 15th and 16th, I had expected another brood to be started, but the second adult stayed only two weeks — keeping up its hostility to the young grebe throughout.

Both the older birds were seen on December 29th, but on the 30th only

* "Nakkala," South Wangaratta

one adult and the chick were sighted; the next day the latter was on its own and remained until January 11th when it too departed.

Because I could not distinguish between the male and female, I have assumed that the more active nest-builder was the male, and that the bird mostly on the nest was the female; also that it was the female which remained with the chick. I am not sure whether both birds shared the job of sitting on the eggs, but both certainly fed the chicks and both carried them on their backs.

1975. Repeat performance but with extras

In 1975 the whole programme was repeated one day later in the dates. This time there were four eggs, although only two hatched, and again only one chick survived more than a few days. The male bird was not sighted after the morning of the day the chicks were first seen, so the female was left to look after the solitary chick.

On November 28th another grebe appeared (or the other re-appeared). Again the new arrival showed hostility to the young bird which kept a respectful distance, but the female still seemed to have an interest in junior.

This time, immediately the adult male arrived, the nest building began and eggs were seen in the nest about December 1st. Now the male became very aggressive towards the first brood chick, chasing it right out of the water on several occasions; it was not seen after December 12th.

On December 25th two second brood chicks were sighted; the next day there were four, all swimming strongly so they may have hatched several days before they were first noticed on Christmas morning. The male stayed for over a week helping with the family, but was not seen after January 2nd. The female left about the 16th when the four young were almost full grown and able to fend for themselves. All four stayed on the dam for another month and then left singly, the last one about March 6th.

I think it is interesting to note that, although the male is an indefatigable nest-builder working literally from dawn to dusk collecting nesting material from all over the dam until it was no longer needed, he does not take equal responsibility in feeding and caring for the young; he performed this chore when there were four chicks but only for the first week, after which he left his mate to cope on her own.

Rising water

An event of interest occurred when the level of the dam was rising rapidly due to prolonged heavy rain. As the nest appeared to be attached to the growing Nardoo plants, this change in water level must have presented a problem to the grebes. Although in these circumstances of rising water level the Nardoo grows until the leaves are again on the surface, there might be a time lag of several days before it catches up — too long for a nest in danger of submersion. On returning home after a day's absence during this period, I found the nest floating freely at the other end of the dam, presumably cut adrift by the grebes to save it from being flooded. Thereafter it drifted up and down the dam with the changing wind, until it blew against the bank facing the prevailing wind and stayed there.

I am looking forward to another repeat performance by the grebes next spring, hoping for further interesting sidelights on their nesting habits.

Behaviour and Larvae of two Rose Chafer Beetles *Eupoecila australasiae* (Don), *Diaphonia dorsalis* (Don) (Coleoptera: Scarabaeidae, Cetoniinae)

BY J. ALDERSON *

Introduction

About 120 species of Cetoniinae occur in Australia, and all are diurnal and feed on nectar. Most species are attractively patterned or have metallic colouring. They are well represented in collections but, as far as I am aware, little is known of their behaviour and their predators, and no descriptions of their larvae have been published.

In this paper observations on the behaviour and the predators of the two rose chaffer beetles, *Eupoecila australasiae* (Don) and *Diaphonia dorsalis* (Don), are reported. Descriptions of the mature larvae of the two beetles are also presented.

Distribution

The two species occur in the coastal region from Queensland to the South Australian border. The specimens of mature larvae described here were

* Fisheries and Wildlife Division, Arthur Rylah Institute for Environmental Research, Victoria.

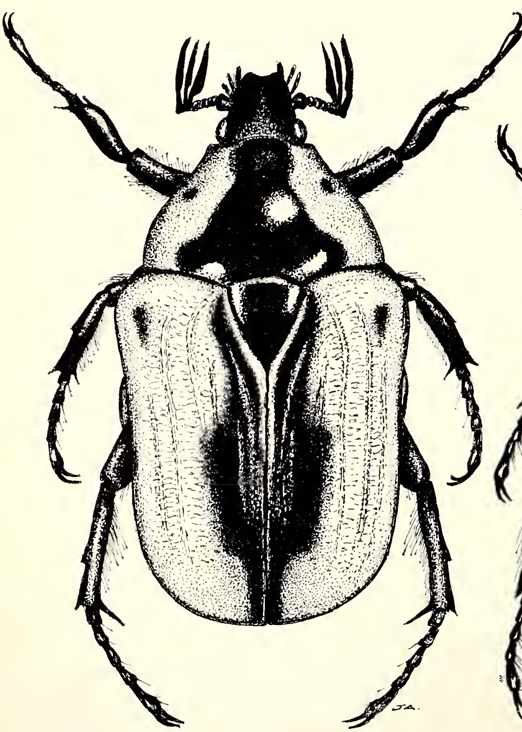

Plate I:
Below — *Eupoecila australasiae*
At left — *Diaphonia dorsalis*

collected on hillsides north-east of Melbourne.

Adult *Eupoecila australasiae* (plate I) ranged in length from 12 to 22 mm and from late December to early February are often seen feeding on the flowers of Austral grass-tree (*Xanthorrhoea australis*), sweet bursaria (*Bursaria spinosa*), prickly tea-tree (*Leptospermum juniperinum*), *Angophora* and a variety of *Eucalyptus* spp.

Adult *Diaphonia dorsalis* (plate I) ranged from 23 to 28 mm but appeared to feed only on the flowers of eucalypts.

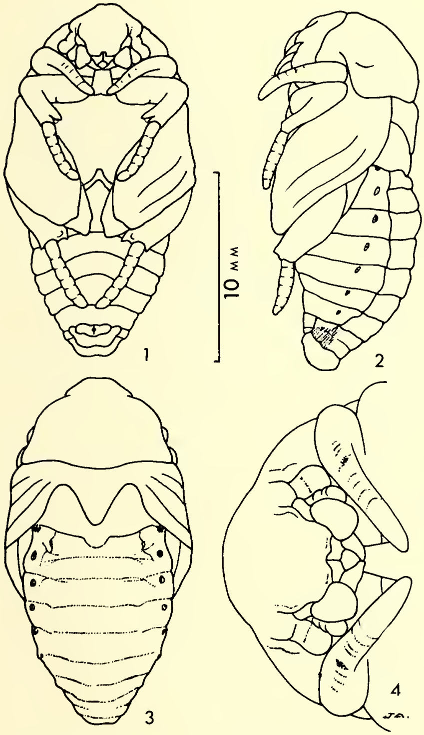

Plate II:
Pupa of *Eupoecila australasiae*
1. Ventral view. 2. Lateral view. 3. Dorsal view. 4. Head enlarged — dorsal.

Behaviour and predators

These fast-flying beetles fold their elytra down in direct but somewhat zigzagged flight which, combined with their habit of feeding concealed deep in blossom, tends to protect them against air-borne attack from birds. After prolonged feeding on eucalypt flowers on hot days (Jan-Feb) individuals from both species have been seen to collide with rocky outcrops or to fall out of trees. Once on the ground the beetles move about in a seemingly intoxicated manner and their feeble unsuccessful attempts to take flight suggests that they are more vulnerable to predation at this time. Black-faced cuckoo-shrike (*Coracina novaehollandiae*) and Australian noisy miners (*Manorina melanocephala*) were seen to prey on beetles on the ground. Examinations of fox (*Vulpes vulpes*) scats have also shown evidence of predation; this may have occurred when the beetles were intoxicated, when they had landed on the ground as the air became too cool for flight, or when they were laying eggs. The remains of *E. australasiae* have been found in trout stomachs examined in the laboratory at the Arthur Rylah Institute.

Larvae

The larvae of *E. australasiae* feed only on woody fibre and are known to inhabit the root systems of grass-trees (Froggatt). During the present study, larvae were found under bark at the butts of dead trees and in fallen eucalypt logs (about 10 years old) which were at the stage of being broken down by cockroaches (Blattidae). The larvae were found to inhabit the old cockroach galleries and to live on the cockroaches discarded wood chewings.

D. dorsalis larvae were found often in association with cockroaches, centipedes or passalid beetles in soil under eucalypt logs. Both mature and immature larvae migrated to the soil surface on the underside of eucalypt logs during winter months, when the larvae were totally encrusted with particles of soil agglutinated to the body setae. This apparently gives protection against soil-dwelling predators, such as mites. Mites (unidentified) were frequently found feeding on the prespiracular sclerites when larvae were not encrusted with soil particles.

The mature larvae of *E. australasiae* were found to construct pupation cells in autumn (Mar-April) and to pupate in spring (Sept-Oct), the beetles emerging in summer (Jan-Feb). The mature larvae of *D. dorsalis* often dig to a depth of 10 cm to construct pupation cells and the timing of their pupation and emergence of the beetles is similar to that of *E. australasiae*.

The cells of both species are constructed from faecal material; the cell of *E. australasiae* consisted of woody fibre and was oval, about 23 mm long and 15 mm wide; the cell of *D. dorsalis* yielded little evidence of root fibre having been consumed. The method of cell construction was the

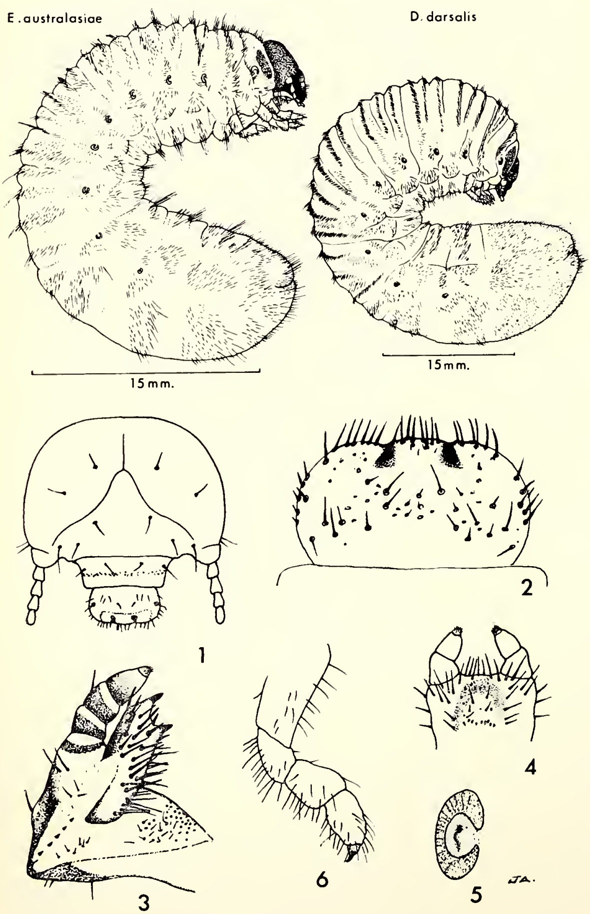

Plate III:

Above left, larva of *Eupoecila australasiae*.

Above right, larva of *Diaphonia dorsalis*.

Fig. 1. Head — dorsal, without mandibles.
2. Labrum — dorsal.
3. Left maxilla.
4. Labium — dorsal.
5. Sclerite.
6. Leg.

same for both species. The larvae induced defecation by stimulating the area above the anal lip with closed mandibles and then worked the faeces into position with the mandibles to form the cell wall. The inner surface of the cell is then trowelled smooth with an up and down movement with the closed mandibles.

General appearance of Larvae of the two species

The structures of ten larvae from each collecting site were examined. Five specimens from each group were preserved and the remainder were bred out.

PLATE III

The larvae of both species vary in size and of 10 specimens of each species examined, *D. dorsalis* ranged from 70 to 95 mm and *E. australasiae* from 55 to 68 mm on the dorsal aspect.

The larvae of *D. dorsalis* is more robust and the head is considerably more retracted than the head of *E. australasiae.*

The larvae of both species are C-shaped, cylindrical, near white in colour, with 10 abdominal segments and a slightly curved, transverse anal opening. Three dorsal plicia occur on segments 1-7 and transverse rows of long setae and more scattered smaller setae, on the dorsum of most segments. Crescent shaped, cribriform spiracles (fig. 5) situated on abdominal segments 1-8 and those of prothorax are dark brown in colour on *D. dorsalis,* light ochraceous on *E. australasiae.*

Head (fig. 1) ochraceous in colour, smooth, broad; half the width of prothorax. Clypeus short, broad, punctate medially, transversely; dark ochraceous on the upper half, creamy on the lower half.

Labrum (fig. 2) dark ochraceous, ovate in shape, tri-lobed, symmetrical and setaceous on apical margin with pigmentation each side of middle lobe. Antennae light ochraceous, four-segmented. First segment longest, cylindrical, narrow basally. Second segment similar but half the length of first segment. Third segment slightly shorter than second segment; somewhat cluvate, exserted antero-ventrally. Fourth segment conical, narrow basally. Mandibles black, asymmetrical; left mandible with four teeth on mesal distal aspect. Stridulating organs occur on ventral mesal aspect of each mandible. Each mandible with pencillus tuft between stridulatory area and pencillus comb on inner base.

Maxilla (fig. 3) consists of cardo, stipes, three-segmented palp and mala with two terminal unci. Maxillary stridulatory area consists of 5-6 stout teeth.

Labium (fig. 4) with a pair of two-segmented palps.

The three thoracic segments each carry a pair of moderately short, four-segmented legs (fig. 6).

PLATE IV

Different characters were found in the epipharynges (underside of labrum); antennae; stridulating organs; tarsungulus (terminal segment of leg) anal segments.

Eupoecila australasiae.

Epipharynx (fig. 1). Epipharynx trilobed, symmetrical, with pigmentation each side of middle lobe and a chitinous semicircular carina near distal margin of median lobe. Distal sensory area with a transverse row of 11-12 truncated spines which merge into pointed setae medially and generally form inner margin of paria extending beyond the tormae. Proximad of the anterior transverse row of spines are 7-8 scattered spines. Pedium distinctly scleriotized, devoid of setae. Proximal sensory area with medial, somewhat triangular black sense cone; several fine spines are situated anterior to the sense cone. Pternotorma short and keeled. Dexiotorma long, about one-third the width of epipharyngeal suture. Plegmatium with 5-8 short stout spines. Some 5-8 setae occur on margin of each lateral lobe and some 15 setae are situated on anterior margin of the epipharynx.

Antennae (fig. 2). Terminal segment usually with 6-7 sensory spots on apical half.

Stridulating organs (fig. 3). Stridulating area, ovate in shape.

Tarsungulus (figs. 4, 5). Legs terminate with a strong curved claw, broad basally, with a strong downward directed spine on each side near the base.

Anal segment (not illustrated). Radular with short spetula extending beyond anal lip fold; without a row of pali on each side.

Diaphonia dorsalis

Epipharynx (fig. 6). Epipharynx trilobed, symmetrical, with pigmentation each side of middle lobe and a chitinous semicircular carina near distal margin of median lobe. Distal sensory area with a transverse row of 9-12 truncated spines which merge into a more scattered field of spines and pointed setae medially (inner paria margin ill-defined). Scattered truncated spines proximad of anterior transverse row almost formed into second and third rows. Spines and setae on right side of inner paria thicker than those on left side.

Proximal sensory area (without sense cone) consists of a somewhat quadrate, lightly pigmented medial patch, with four small black sense spots. Some 8-10 small scattered spines are situated transversely, anterior to sense spots on proximal sensory area. Several fine spines are situated on the left side mesal aspect of the pedium. Pternotorma short and keeled. Dexiotorma about ¼ the width of epipharyngeal suture. Plegmatium with some 8 short stout spines. Some 15 setae are situated on anterior margin of the epipharynx.

Antennae (fig. 7). Third segment with one dorsal spot and one spot anteroventrally. Terminal segment with 14-16 spots covering most of apical half.

Stridulating organs (fig. 13). Stridulating area, elongate in shape.

Tarsungulus (figs. 9, 10). Legs terminate with a stout tubercle, broad basally, somewhat longer and conical on inner distal aspect from which one spine is situated medially; directed downward. Another spine situated on distal, lateral, aspect is directed forward and slightly downward.

Anal segment (fig. 11). Radular inconsistent in form often with short septula, extending to above anal lip fold and with two rows of 8-12 short, stout, compressed pali, or with 3-5 pali of palidium on basal end of septula.

Acknowledgements

I am indebted to Lorraine Alderson, Susan Beattie and Fabian Douglas for their assistance in collecting data, Peter Kelly for his assistance in providing

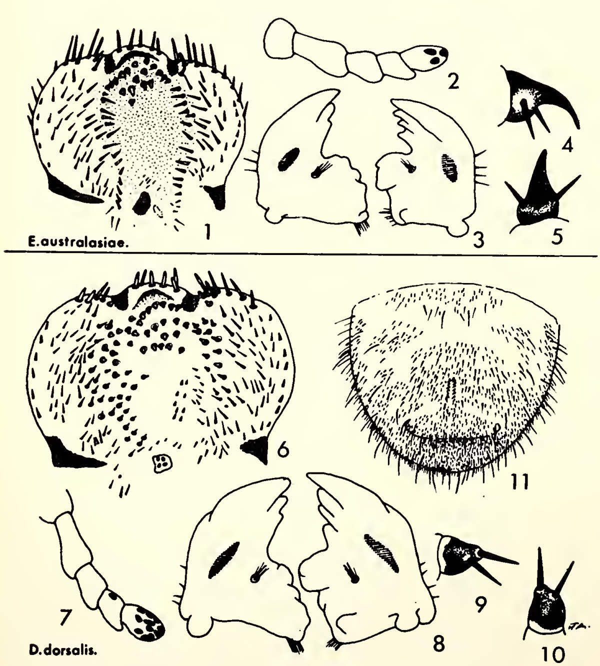

Plate IV:

Above — structures of *Eupoecila australasiae*

1. Epipharynx.
2. Antennae.
3. Mandibles.
4. Tarsungulus, lateral.
5. Tarsungulus, ventral.

Below — structures of *Diaphonia dorsalis.*

6. Epipharynx.
7. Antennae.
8. Mandibles.
9. Tarsungulus, lateral.
10. Tarsungulus, ventral.

specimens and literature and Mr. C. G. L. Gooding for allowing me to examine his collection. Also I am grateful to the following members of the staff: Dr. D. Evans for reading the draft, J. Cooper (photographer) for Plates II-IV and K. Beinssen, J. Seebeck, J. Bacher and R. Warneke for assistance in many ways.

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Aldo Massola
Italo-Australian Anthropologist of the Aborigines

When, on 11 November 1975, four months after his death, an obituary appreciation of Aldo Massola appeared in the Melbourne 'Herald', it came as a surprise to many of our members. He was a valued, regular contributor to 'The Victorian Naturalist' and we record this summary of his life.

Aldo Massola was born in Rome and came to Australia, aged 13, when his father was sent out here on business and decided to stay. At Melbourne University, Aldo studied anthropology under Professor Leonhard Adam, from whom he learned the fascination of South-east Asian cultures. Then he undertook the self-imposed task, pursued persistently and lovingly over many years, of rescuing from oblivion what remained of the lore of the Australian aborigines. He was just in time; many of his dark-skinned informants have now passed from this world, and their descendants have little real knowledge of the ancient traditions, languages, customs, etc., and will need to study what has been recorded in the white man's printed books, such as those of Massola.

For ten years Massola was Curator at the National Museum of Victoria, but most of his working life was spent as head waiter at Mario's, Melbourne's best-known restaurant in its heyday when owned by the Vigano family.

Aldo Massola contributed more than 100 papers to scientific and natural history journals; many were published in 'The Victorian Naturalist' during the years 1956-75, most of them reporting discoveries of previously unknown cave shelters and rock paintings. His books include 'Bunjil's Cave' (1968), 'Aboriginal Place Names of South-east Australia' (1968), 'Journey to Aboriginal Victoria' (1969), 'The Aborigines of South-eastern Australia As They Were' (1971), 'Aboriginal Mission Stations in Victoria' and 'Coranderrk: a History of the Aboriginal Station' (1975).

J. A. BAINES

Preparing material for 'The Victorian Naturalist'

When preparing material for publication, please have it typed with double line spacing and leave at least 3 cm (about $1\frac{1}{4}''$) clear margin at the left. Captions to figures should be typed on a separate page. It is desirable for editor to receive two copies of material, at least of the text matter.

Large Waves at Lorne, Victoria

BY EDMUND GILL

On 16-17 May, 1975, there were extra large waves along the Otway coast. These were studied at Lorne and at various places between there and Apollo Bay. A storm was running at the time, and this was thought by most to be the cause of the waves, but it was not so.

At Lorne where the coast runs NNE-SSW the winds were coming over the hills from the NW and W, and indeed were working against the waves, tending to flatten them. The wind was blowing trails of spray seawards from the tops of the landward-moving waves creating "horses' manes" as they are popularly called. The large waves were swell waves from the Southern Ocean, the stormiest ocean in the world. Because this ocean surrounds Antarctica in the stormy latitudes, the winds have almost limitless fetch. So powerful are its swell waves that they cross the entire Pacific and break on the shores of Alaska.

A large horizontal shore platform occurs at North Lorne just NE of Stony Creek in greenish-grey arkose or greywacke, locally called Jump Rock. Having already surveyed this platform, we could quantify the amount and speed of the water being deposited on it. The platform is supratidal, standing 1.5 m above HWL. From the outermost edge of the platform to the original cliff now covered with rockfalls from road works, the platform is 212 m long and 57 m wide.

Wave base is half the distance between crests, so the waves broke seaward of the platform at varying distances according to their dimensions.

Final seconds of a wave's life

The waves were reaching the shore at about three per minute. As a wave came into shallow water, it steepened and at the same time snatched up sand covering the rocky seafloor. Thus the wave changed colour (because of the yellow sand) and changed from mere water to a 'cutting compound' of sand and surf. It scrubbed the shore platform clean, just like the wooden decks of sailing ships were scrubbed clean with sand and sea water. Its high energy also quarried out blocks of rock and hurled them to the back of the platform.

A broken wave took 5 seconds to travel from the top of the rampart to the rockfall at the back of the platform, a distance of 30 m, so the speed was about 20 km/hr.

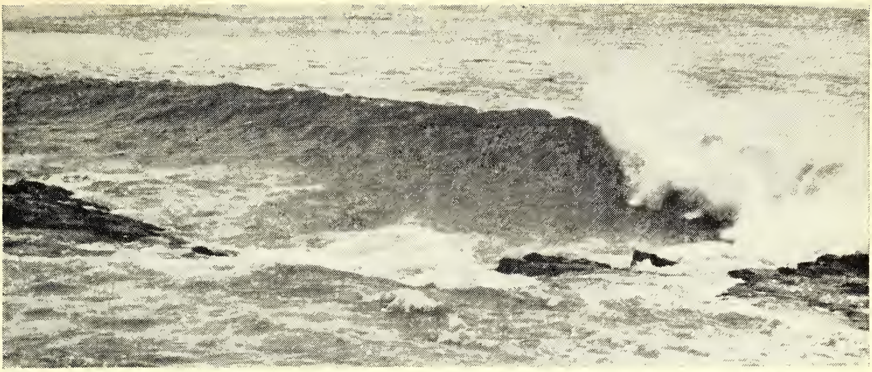
As shown in the photographs, the surf covered the platform generally to the height of the rampart = 1 m. As a m^3 of water weighs one tonne, the

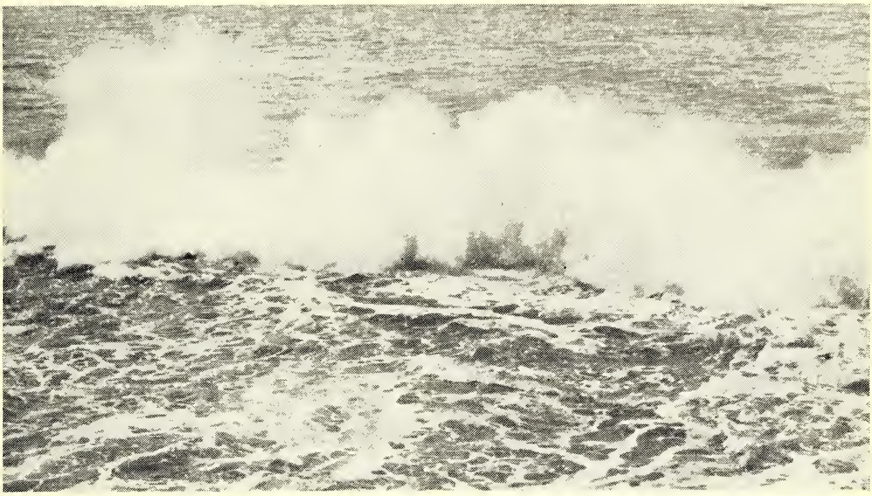
Description of the photographs

Top. A large swell wave breaks seaward of the rampart which stands up to 1 m above the shore platform which is 1.5 m above HWL. The foaming surf from the previous wave is still retreating. Photo from Ocean Road at top of cliff above platform at Jump Rock, North Lorne.

Middle. A breaking wave crashes on the rampart with tremendous impulsive loading. The turbulent surf of the previous large wave has not yet all drained away. The wave rushes across the platform at 20 km/hr loading it with 12,000 tonnes of water.

Bottom. Water rushes with a sound like a waterfall down the 3 m deep channel at the NE end of the platform: it is full to the brim.





Photos: Author.

platform was loaded about 3 times per minute with 12,000 tonnes of water. The water was lighter because of the air in it, but also heavier because of the sand in it, so the weight of a m^3 of water is near enough for our purpose.

In the 20 seconds before the next wave came, the water poured tumultuously from the supratidal platform. The heaviest return flows were down the channels. This extra long platform has a channel at the Stony Creek end, and another at the NE end. The cataracts of returning waters made a noise like a waterfall, and washed back into the sea the sand that the waves had dumped on the platform.

The return currents through the rampart were not as powerful as those down the channels, so a narrow zone of sandy water skirted the platform, while opposite the channels masses of sandy water were jetted much farther into the sea. When the next wave arrived, some of this sand in suspension was caught up and recycled to the platform, abrading and being abraded. So large a load of water was sometimes hurled on to the platform, that it could not be cleared before another arrived. Conversely, when a smaller wave arrived, the platform was well drained.

Wave as deck-scrubber

When the fury of the swell waves had abated, we returned to see what changes had been wrought. We noticed first that the rock surface had been scrubbed clean, all the algae having been stripped away. The platform surface was slightly reduced.

Thousands of the little marine snail *Melarapha* live on this platform, and apparently feed on the algae there. I wondered what they would do without this food source. But I took a couple home and they were on my desk for over two months yet were still alive, so apparently they remain on the platform until the algae grow again. What we did notice was that the population was greatly reduced. There were none on the broad flat areas of the platform, but many were crowded along joint places and in other protected places. Reduction of population would lessen the strain on food supplies. Apparently all these things are just part of the normal melaraphan way of life!

Wave as weight-lifter

Large pieces of rock had been quarried by the waves and carried across to the rear of the platform. They were slabs 20-30 cm thick ripped from the vicinity of the rampart. Some lay flat, while others were left leaning against rockfall boulders. Some still had *Melarapha* on them, and the absence of this snail in the vicinity suggested they had travelled with the rock. The rock dimensions and their pattern of oxidation colours made it easy to trace whence they had come.

Archimedes' principle states that a rock is lightened in water to the extent of the weight of the water displaced. It was not difficult for these fiercely energetic waves to remove these slabs and sweep them across the platform. The largest pieces were measured, and taking their specific gravity as 2.7, they were calculated to weigh from 1 to 1.5 tonnes.

Still larger waves

West of Cape Otway, beyond Bass Strait, still bigger waves are encountered, because the sea is open from Australia to Antarctica.

I once stood during a storm on the top of a 45 m (150 ft) cliff at Port Campbell, when a really big sea was running. A local storm from the SW was adding to the energy of an exceptionally powerful SW swell. When a big wave struck the cliff, the whole ground trembled at least to 100 m back where I was standing. It impressed us that these millions of tonnes of rock could be made to vibrate by the impulsive loading of one wave. Then the splash from the wave shot 15 m higher than those tall cliffs, and the fierce wind whipped the water back over any bystanders!

If the power of the SW swell could be harnessed, Australia would have all the energy it needed. Waves are solar energy mediated through the winds. Two scientists studying the Bikini Atoll calculated that the 2 m (7 ft) waves pounding the reef at that time, were working continuously at the rate of half a million horsepower. And most of that energy was coming all the way from the Southern Ocean!

Alison M. Ashby
1975 Australian Natural History Medallionist

The award of the 1975 Australian Natural History Medallion to Alison M. Ashby was announced in September, 1975 (Vic. Nat. 92: 9); the presentation was made at the March, 1976 meeting of the Society for Growing Australian Plants (South Australian Region), who first nominated Miss Ashby for the Award.

Alison Marjorie Ashby was born in South Australia and has lived there all her life. Her father, the late Edwin Ashby, was himself a dedicated naturalist with particular interest in malacology, ornithology and botany, and many of his collections are in the South Australian Museum. He was also very interested in native plants and achieved remarkable success as a propagator. Early in Alison Ashby's life the family moved to Blackwood in the Adelaide hills, where several acres of their property were devoted to the cultivation of native plants. The remaining thirty acres of this land were eventually given to the Adelaide Botanic Gardens Trust by Edwin Ashby's son, A. K. Ashby.

At the age of twelve, Alison Ashby sat down during one of the school holidays to paint all the Australian wildflowers. Although her enthusiasm at the time soon waned, it has remained her ambition. After leaving school she had some lessons from Rosa Fiveash and soon developed her own individual style. For some years family responsibilities kept her at home, but from the early 1940's onward, in spite of ill health and increasing difficulty in walking, she has been able to devote most of her time to the growing and painting of wildflowers, travelling widely throughout Australia in search of material. It is reported that on one occasion she returned from Western Australia with three thousand plants in her suitcase, having buried all her clothes in the bush to make room for them.

All the wildflower paintings are donated to the South Australian Museum, a collection now numbering over one thousand. The collection is growing annually as she continues to paint in Western Australia in the spring, and in Kosciusko National Park in the summer.

In 1950 a donation of money to the South Australian Museum enabled a start to be made on post card reproductions of some of the paintings and 162 have so far been issued.

Alison Ashby is a tireless campaigner for the conservation of native bushland and for the preservation of native species through cultivation. She is an extremely skilful propagator and is always ready to back up her recommendations with practical help and advice, and often with financial assistance as well.

In 1957 she gave "Watiparinga", a 77 acre property at Sleep's Hill left to her by her father, to the National Trust of South Australia. She also undertook to stock almost half of it with native plants of her own raising. In addition, she has planted reserves in the National Park at Belair and two reserved enclosures on a nephew's property in the Inman Valley.

Miss Ashby's work has been widely recognised; she is a foundation Honorary Life Member of the Society for Growing Australian Plants, an Honorary Life Member of the Tree Preservation and Gardening Society, a Life Member of the Field Naturalists' Society of South Australia, and an Honorary Associate in Botany of the South Australian Museum; in 1960 she was honoured with the award of M.B.E.

M. G. CORRICK.

Natural History at the Coast

In December we plan to publish a special issue of 'The Victorian Naturalist' consisting almost entirely of articles relating to our coasts.

Science and research workers might have relevant material that they are planning or are already preparing for publication. Such articles will be gratefully received.

And we expect many layman articles from members of the FNCV; in fact we hope to receive at least two items from each Study Group, as well as from other people. Some items might be only a few lines, but others could be more substantial. Geology, land and sea plants, marine creatures, insects etc, birds, tides — the possibilities are almost unlimited.

When preparing an article for publication, please have it typed with double line spacing and leave at least 3 cm (about $1\frac{1}{4}''$) clear margin at left. Captions to figures should be typed on a separate page. It is desirable for the editor to receive two copies of material, at least of the text matter.

Material for this special coast issue should be with editor by 30 September.

Natural History Medallion Trust Fund

We will be pleased to receive donations from organisations that feel this Fund is worthy of their support.

The following donations have been received and we thank the donors:

Amount invested as at 10 March 1976	$299
Peninsula Field Naturalists Club	5
Total	$304

GARNET JOHNSON, ASSISTANT SECRETARY

NEW PUBLICATION AVAILABLE FROM FNCV SALES OFFICER

In the Australian Natural History Series by Collins: "Frogs" by Michael J. Tyler. 256 pages. $12.95, discount to members. Postage 90c within 50 km, $1.20 within Victoria.

Zonation at Flinders Reef, Westernport Bay

An introduction to Victorian intertidal ecology with specific reference to the Flinders Reef, Westernport Bay

BY R. N. SYNNOT AND G. C. WESCOTT*

Few descriptions of patterns of intertidal zonation are available for the flora and fauna on Victorian rocky shores. There is some information on sheltered areas in bays, e.g. King, Black & Ducker (1971) for Port Phillip and Smith, Coleman & Watson (1975) for Westernport Bay. Dakin (1952), Bennett & Pope (1953), Knox (1963), Stephenson & Stephenson (1972) and King (1972), have discussed the general features of zonation and biogeography of the organisms present on exposed coastlines.

Among more general works on intertidal ecology, Dakin (1952) remains the only comprehensive Australian work in this field. Unfortunately it deals mainly with New South Wales shores and it is also taxonomically obsolete. Morton and Miller (1973) give an excellent account of the ecology of organisms on all shore types in New Zealand; many of the organisms discussed are closely related to Australian ones. The only book which is concerned wholly with the marine fauna of Victoria is MacPherson and Gabriel's (1962) "Marine Molluscs of Victoria".

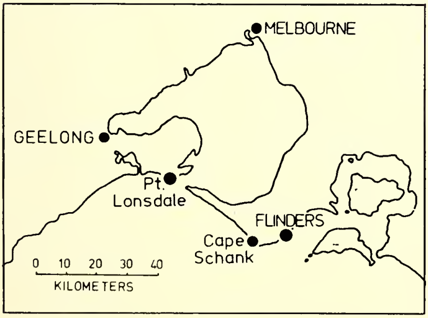


Figure 1. The location of the Flinders Reef.

This paper describes the ecology of the Flinders reef at the heads of Westernport Bay (Figure 1). This locality is an example of a semi-exposed reef (*sensu* Bennett & Pope, 1960), and the fauna and flora found here are typical of the southern Victorian coastline. It also provides an introduction to the basic physical and biological features of intertidal ecology. For this purpose a few general points are presented before the fauna and flora of Flinders are described in detail.

Intertidal Zonation

Zonation, the distribution of animals and plants in distinct bands along the shore, is most easily observed on rock platforms which slope gently towards the sea. The bands are termed intertidal (or vertical) zonation patterns. The causes of zonation are not yet completely clear. Doty (1946) proposed that the zones are determined by fluctuations in sea level resulting from tidal cycles. That is, the higher an organism occurs on the shore, the greater is the time it will be exposed to air (and consequently to desiccation stress during low tides). Therefore the limit of distribution above which individuals of a particular species cannot survive is controlled by the ex-

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treme and mean heights of the low and high tides. Hence each species occurs in a distinct region, with the more distinctive bands, usually those of the commoner organisms, combining to give an overall zonation pattern.

However, detailed study of the biology and ecology of a number of intertidal species has now shown that the physical features of the shore zone (such as tidal heights) do not fully explain the patterns of zonation observed. Connell (1970, 1972) and Paine (1966) have emphasised that biological factors, such as predation, and competition for food or space, may control the lower limit of distribution of organisms. Thus in general it seems that the upper limits of intertidal distributions are physically controlled while the lower limits are biologically determined.

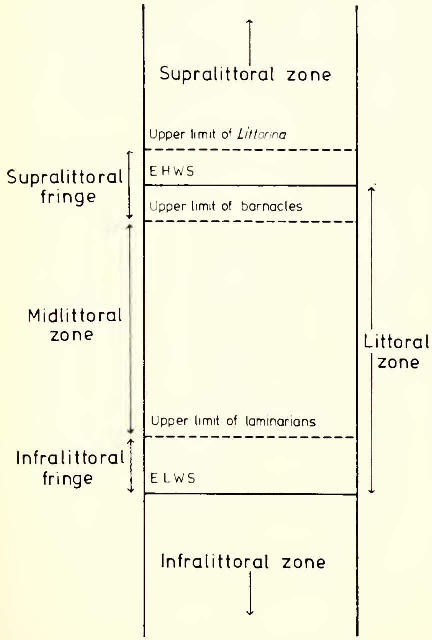


Figure 2. A universal descriptive scheme of intertidal zonation (after Stephenson and Stephenson, 1972; E.H.W.S.: Extreme High Water of Spring tides, E.L.W.S.: Extreme Low Water of Spring tides).

Stephenson and Stephenson (1949, 1972) concluded from their investigations of intertidal rocky shores on all continents that even though patterns of intertidal zonation vary considerably from shore to shore, a number of common features may be observed. They have provided a universal descriptive scheme (Figure 2) which is followed in this paper.

There are five main regions envisaged.

1) The Supralittoral Zone: This is the maritime region immediately above the supralittoral fringe. It may extend many miles inland.

2) The Supralittoral Fringe: This area receives moisture from extreme high tides and wave splash. In areas under the influence of strong wave action it can be quite wide (up to several metres, e.g. on Wilson's Promontory) while in protected areas it may be very narrow (e.g. less than ten centimetres at Corinella, Westernport Bay). The upper limit of this zone is marked by the maximum height at which littorinids (periwinkles) occur. These are species of the prosobranch molluscs of the genus *Littorina* (formerly *Melaraphe*). The lower limit of this fringe is delineated by the upper edge of a prominent "barnacle zone".

3) The Midlittoral Zone: This area is completely exposed during most low tides. It contains a high diversity of organisms, and extends from the barnacle zone down to the upper limit of large brown algae — kelps (Figure 3). This zone is often subdivided into upper and lower midlittoral to aid discussions of animal and plant distributions.

4) The Infralittoral Fringe: This area extends from the upper limit of kelps to the extreme low water of spring tides and represents the lowest area which is exposed by tides.

5) The Infralittoral Zone: This zone lies below low tide mark and is permanently submerged.

While all these zones are easily discernible on sloping rock platforms, they are often difficult to recognise in areas which contain rock rubble, or are dissected into crevices and rock pools. Under these circumstances the basic patterns still exist, but are substantially modified by local environmental effects. For example, an organism which lives in a rock pool is not exposed to desiccation, no matter what the height of the pool; but it is subject to other stresses, such as changes in salinity and higher water temperatures. Similarly in an area of rock rubble, moisture is held by surface tension beneath the rocks and consequently animals and plants are able to survive at heights above those that they could tolerate on open rock surfaces.

The Flinders Reef

The general appearance of the reef at Flinders is shown in Figure 4.

Physical characteristics

The geology of the area is complex (Jutson, 1950). A general account of the formation and characteristics of coastal platforms is given by Bird (1972).

Air temperatures recorded at Cape Schank show a mean monthly range from 7.3°C to 21.5°C. However, an extreme range of 0.5°C to 40.0°C has been recorded (Bureau of Meteorology, 1968).

Sea water temperatures are presumed to be similar to those at Port Phillip Heads (King, 1970). King found an annual range of 8°C with a maximum of 20°C in January and a minimum of 12°C in August, thus classifying the region as cold-temperate mixed-waters (*sensu* Knox, 1963).

Very little information is available on the currents in Bass Strait (King, 1972), except that they are predominantly westerly in the summer and possibly easterly in the winter (Vaux and Olsen, 1961).

Figure 3. The large kelps (foreground) whose upper reaches mark the lower limit of the mid-littoral zone.

Figure 4. An overall view of Flinders Reef, looking towards West Head.

The tides in the area show diurnal inequality, i.e. the two low and two high tides in a 24-hour cycle are of differing heights (Chapman, 1938). Pollock (1971) discusses the tides of Bass Strait.

Intertidal Zonation

The Flinders Reef is predominantly a solid rock platform, somewhat modified by rock pools and rock boulder areas. The overall pattern of zonation on solid rock areas is summarised in Figure 5, and in rock rubble areas in Figure 6 (Synnot, 1974; Wescott, 1974; Ryland, 1975).

The following account includes only the more conspicuous organisms of each zone. Details of algal distributions are given by King (1972). Molluscan taxonomy follows that of MacPherson and Gabriel (1962) and crustacean taxonomy that of Campbell and Griffin (1966).

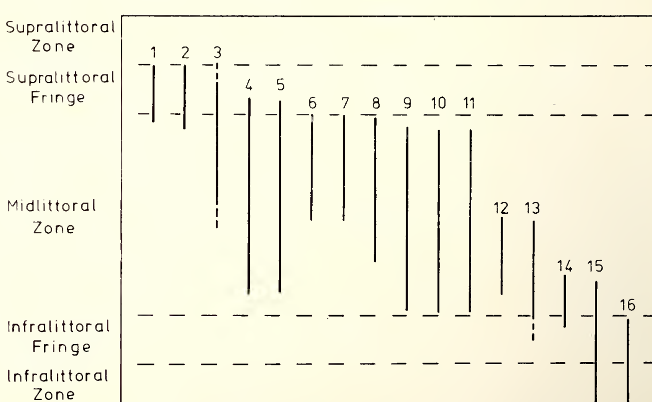


Figure 5.
A summary of the zonation patterns on the main rock platform at Flinders reef.

1. *Lichinia confinis*, 2. *Littorina unifasciata*, 3. *Nerita atramentosa*, 4. *Lepsiella vinosa*, 5. *Bembicium nanum*, 6. *Chamaesipho columna*, 7. *Tetraclita purpurescens*, 8. *Chthalmus antennatus*, 9. *Austrocochlea constricta*, 10. *Cellana tramoserica*, 11. *Siphonaria diemenensis*, 12. *Galeolaria caespitosa*, 13. *Hormosira banksi*, 14. *Patelloida alticostata*, 15. *Dicathais orbita*, 16. *Subninella undulata*.

The Supralittoral Zone

This zone is absent at Flinders. Usually, for instance at Wilson's Promontory, the zone is recognisable in rocky areas by belts of the black lichen *Verrucaria* sp.

The Supralittoral Fringe

Clusters of the small blue periwinkle *Littorina unifasciata* (Banded Australwink) are very common in the higher rock areas. *Littorina praetermissa* (Checked Australwink), a closely related species discernible by its zig-zag stripes, can be seen with more careful inspection.

Both species browse on microscopic algae found on the rock surfaces. The lower reaches of this zone are characterised by tufts of the black-green lichen, *Lichinia confinis*.

The Midlittoral Zone

In exposed sites the upper limit of this zone is formed by a belt of the barnacle *Chthalmus antennatus*. On very sheltered rock faces this species is often replaced by the common rock barnacle *Tetraclita purpurescens*. Amongst these species the tiny rock barnacle *Chamaesipho columna* is found in scattered rosette-like groups.

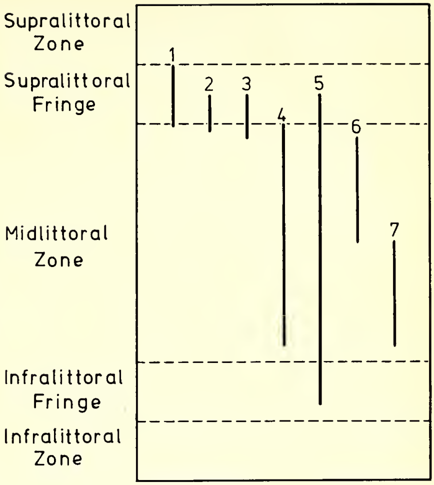
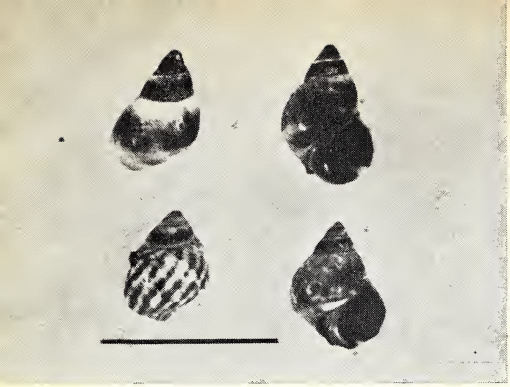


Figure 6. A summary of the zonation pattern on rock rubble areas at Flinders reef .
1. *Leptograpsodes octodentatus,*
2. *Cyclograpsus audouini,* 3. *Carcinus maenas,* 4. *Brachynotus spinosus,*
5. *Patiriella exigua,* 6. *Cyclograpsus granulosus,* 7. *Paragrapsus quadridentatus.*

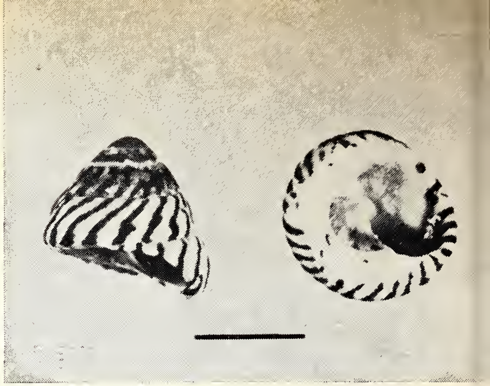
Figure 7 illustrates a number of these species of barnacle. Barnacles feed at high tide by opening their "beaks" and waving their feather-like appendages to catch any small planktonic organisms.

Figure 7.

Two species of barnacle which occur at Flinders: *Tetraclita purpurescens,* the larger species and *Chthalmus antennatus,* the smaller. Usually these two species are found in different areas.

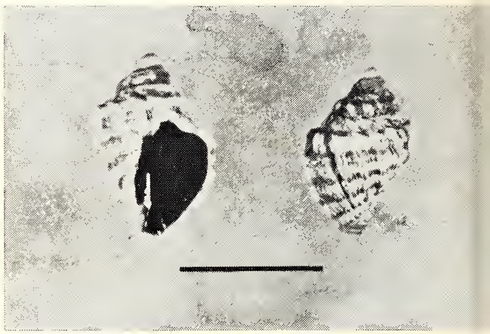


Littorina unifasciata (upper pair), *L. praetermissa*



Bembicium nanum

Austrocochlea constricta



Lepsiella vinosa

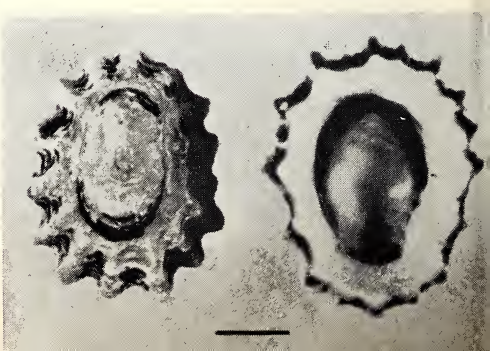
Siphonaria diemenensis

Nerita atramentosa

Figure 8. The more common gastropod molluscs of the intertidal zone. (Scale line = 1.0 cm.)

Cellana tramoserica

Patelloida alticostata



The most conspicuous animals in the midlittoral zone are the gastropod molluscs (Figure 8). *Austrocochlea constricta* (Ribbed Top Shell) and *Bembicium nanum* (Striped Mouth Conniwink) are most common and occur throughout this zone and in rock pools. The striking black nerite or crow shell, *Nerita atramentosa*, formerly *Melanerita melanotragus*, is also abundant, with highest densities in crevices sheltered from direct wave action. These gastropods feed by browsing on encrusting algae in the midlittoral zone. *B. nanum* and *N. atramentosa* are a common food source for the small predatory gastropod *Lepsiella vinosa* (Wine-Mouth Lepsiella). *Lepsiella* occurs throughout the midlittoral zone, but in winter moves into the lower reaches of the supralittoral fringe where it feeds on *Littorina* spp. *L. vinosa* preys on various molluscs and barnacles, eating their flesh after boring a hole through their external shells. This species is a good example of an organism whose intertidal distribution is controlled by biological factors; in this case, the distribution of food sources.

Scattered amongst these animals in the midlittoral areas are a number of limpets, the most striking of which is the Variegated Limpet *Cellana tramoserica.* Another conspicuous limpet-like gastropod is the air breathing *Siphonaria diemenensis* (Van Diemen's Land Siphon Shell). Both *C. tramoserica* and *S. diemenensis* move slowly over the rock surface grazing on encrusting algae.

The lower sections of the midlittoral zone are covered by either the serpulid polychaete worm *Galeolaria caespitosa* or the brown alga Neptune's Necklace (*Hormosira banksi*). *G. caespitosa* forms encrusting masses of calcareous tubes on vertical rock faces which are sheltered from direct wave action (Figure 9). The masses of tubes provide many microhabitats which support a varied community of crabs, worms, molluscs and amphipods.

The gently sloping areas are typically covered by *H. banksi* and mats of coralline algae, e.g. *Jania* sp. The Tall Ribbed Limpet *Patelloida alticostata* (Figure 8) is found in these areas, feeding predominantly on these mats.

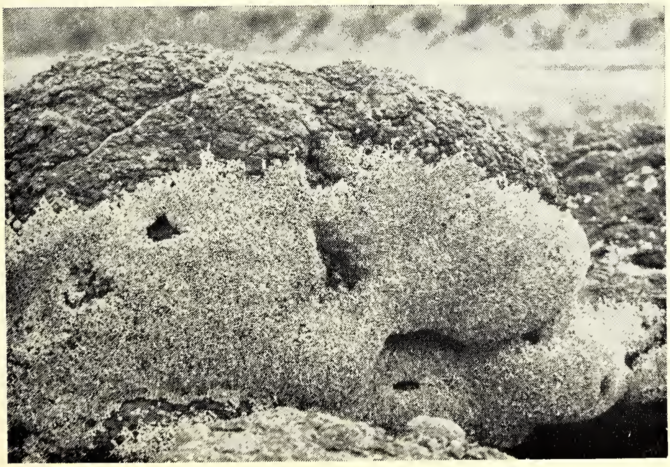


Figure 9.
A mass of the calcareous tubes of the polychaete worm *Galeolaria caespitosa.*

The Infralittoral Fringe

At Flinders this area is easily recognisable by the presence of several species of *Cystophora,* a brown alga, and of the green alga *Caulerpa browni* (Figure 10).

Several animals occur among these algae, the most conspicuous being the predatory Dog Winkle *Dicathais orbita* (Phillips and Campbell, 1974). The Wavy Turbo *Subninella undulata,* and the chitons *Poneroplax albida* and *P. costata* are also common.

Rock Rubble Areas

The Flinders shore platform possesses extensive areas of rock rubble which provide shelter for many animals. These animals are also zoned but not as conspicuously as on open rock surfaces. The most abundant animals in the rock rubble are three species of grapsid crabs (Figure 11) which shelter under the boulders during low tide, and feed at high tide on algal fragments. *Paragrapsus quadridentatus* (the notched shore crab) occurs in the lower midlittoral area immediately below *Cyclograpsus granulosus* (the purple mottled shore crab). These two crabs can be distinguished by the presence of a notch on the carapace of *P. quadridentatus* (Campbell and Griffin, 1966).

In isolated areas higher up in the intertidal zone the closely related species *C. audouini* occurs in moderate numbers. It can be distinguished from *C. granulosus* by the presence of hairy tufts at the base of its walking legs.

Other grapsid crabs which occur in the rubble are *Brachynotus spinosus,* a small crab with many notches in the carapace, found in or near rock pools throughout the midlittoral; and *Leptograpsodes octodentatus,* which has a ridged carapace and is found in small numbers in the supralittoral fringe. *Carcinus maenas,* an introduced species (Fulton and Grant, 1901) of the family Portunidae (swimming crabs), also occurs in the upper midlittoral area. This is one of few crabs which has been observed to eat small molluscs.

Also occurring throughout the midlittoral is the small green sea star *Patiriella exigua* (Ryland, 1975). *Nerita atramentosa, Austrocochlea constricta* and *Lepsiella vinosa* also occur in the rock rubble.

Discussion

Morton and Miller (1973) state that rocky shores which are neither

Figure 10.
An overall view of the infralittoral fringe at Flinders dominated by *Caulerpa* spp. and *Cystophora browni.*

fully exposed nor very sheltered are the best areas in which to begin the study of littoral plants and animals. Although on these shores clear cut zones may not be immediately visible they become evident on closer inspection.

The dissected nature of the Flinders reef is an excellent example of the type of shore to which Morton and Miller refer. The zonation at Flinders differs in a number of ways from the previously described patterns seen on exposed Victorian coastlines (e.g.

Figure 11.
The three most common seceies of crabs found in the rock-rubble at Flinders. From top to bottom: *Paragrapsus quadridentatus*, *Cyclograpsus audouini* and *C. granulosus*. (Scale line = 1.0 cm.)

Bennett and Pope, 1953). The differences are: 1) the principal zones are narrower; 2) an extensive band of laminarian kelps is lacking; and 3) there is a marked increase in densities of certain animals. This third point is particularly evident in the rock rubble where the densities of crabs and asteroids are very much higher than on exposed shores. This decrease in exposure also contributes to the higher densities of the predatory snail *Lepsiella vinosa* in the mid-littoral zone. Hence this animal may exert a greater influence on the lower limits of some mollusc species at Flinders than it does on more exposed shores.

This description of the ecology of the Flinders reef provides an introduction to the physical and biological processes which interact on rocky shores, and gives some idea of the complexity of the communities present. It should be stressed that if these communities are disturbed or disrupted, e.g. by the removal or displacement of organisms from their microhabitats, there may be serious repercussions on the intertidal ecosystem as a whole. Common sense, careful collecting methods, and the removal for identification of as few individuals as possible will ensure the minimal disturbance to Flinders and other reefs which are already being extensively used as areas for scientific teaching and research as well as for recreational pursuits.

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All photographs were taken by the authors.

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Sea Urchin Spines
Cutting thin sections for microscope slides

BY H. H. BISHOP, MICROSCOPY GROUP, FNCV

Sea Urchin spines, although uninteresting outwardly, are objects of beauty when cut into thin sections, mounted on a microscope slide, and observed under a low power microscope with dark ground illumination. The microscope reveals the radiating pattern of astonishingly brilliant and varied colours that are wholly natural.

Slides prepared by FNCV members have created a lot of interest when exhibited at nature shows, and as enquiries have been received regarding the method for making these slides, this article gives details of the method used by the writer which has proved very satisfactory, and a description of the equipment required.

Equipment required

Sea Urchin spines, shellac, cellosolve (otherwise ethylene glycol monoethyl ether, and obtainable from suppliers of scientific equipment), metal mould for shaping shellac sticks, timber mould for holding spines when setting in shellac, mitre box, Eclipse junior saw J14, silicone carbide paper grades 180, 400 and 600, glass slips 3″ x 1½″ x ¼″, 3″ x 1″ microscope slides, cover glasses, fine camel-hair brushes, canada balsam, zylol, and ringing cement (clear nail poish is satisfactory).

A low power microscope (preferably a stereo microscope) or a large magnifying glass on a stand is required for selecting and mounting the spine sections on the slide.

After collecting the spines, they must be washed in several changes of fresh water to remove all trace of salt and small particles of sand.

The method

(a) Preparation of equipment

1. Make a metal mould from any light metal about 4″ long, formed into a channel section ¾″ wide by ½″ high.

2. Melt sufficient shellac in the metal mould to make into sticks. This is done by filling the mould with shellac flakes, placing the mould on a sheet of metal, and heating on a stove until the shellac flakes melt. When completely melted, remove from the stove and allow to cool. (Do not use excessive heat.) When cooled, remove the stick from the mould.

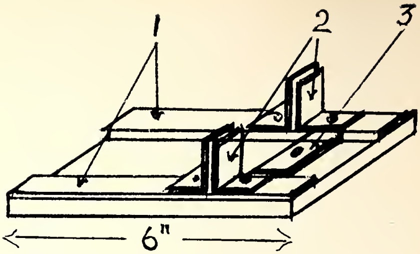
3. Make the timber mould from 3-ply — an oblong box open at the top and at both ends, about 4″ long, 1″ wide and sides ¾″ high. Glue the pieces together (do not use wire brads or panel pins). This mould is for holding the spines while setting in shellac.

4. Having made the mould, you now require a mitre box to hold the mould while cutting into sections. This can be made from scrap timber and must have the following:— (1) guides to hold the mould neatly, (2) guides to hold the small saw, and (3) a stop to control the width of sections; see sketch. It is important that there is no side play of the saw blade when cutting sections.

5. Make a thick cement (about the consistency of syrup) with some of the shellac dissolved in cellosolve. This is the shellac cement.

(b) Sectioning procedure

Having prepared all the equipment, you are now ready to start the sectioning procedure which is as follows.



Mitre box about 6″ long by 3″ wide.
1. 3-ply guides. 2. Metal guides for saw.
3. 3-ply stop.

6. Melt the shellac stick on to one end of the timber mould, covering the full width of the mould, and long enough to take the longest spine you are going to mount.

To melt the shellac stick, the writer uses an electric soldering iron with a copper element ⅜″ diameter. The end of the element is filed flat, and this surface is used to melt and spread the shellac.

Having melted the shellac to about ⅛″ thick, press down flat with a knife or piece of metal.

7. When the shellac has cooled and hardened, spread a thin layer of shellac cement on the surface. You now place the spines on the cement. It is advisable to reverse each alternate spine, i.e. the tip to the right, then next one with tip to the left, leaving a space between each spine.

8. Having filled the space with a layer of spines, melt more of the shellac stick on top of the spines to about ⅛″ thick. Make sure the shellac is thoroughly melted, and that the first layer of shellac and second layer are fused together. Press the layers firmly together with a knife.

9. Repeat this procedure until you have used all the spines or as many as you wish to mount. The final layer of shellac needs to be about ⅛″ thick. Allow the whole mass to cool thoroughly, when it will be ready for cutting into sections.

If you have been careful with this procedure, the ends of all spines will be level with the end of the mould. Every part of the spines must be covered with shellac, otherwise they will crumble when cutting.

10. Place the mould in the mitre box up to the pre-set stop, and cut into sections with the small saw, cutting through the mould also. With care and practise, it is possible to cut sections 0.6 mm thick. Having cut all the sections, remove the pieces of 3-ply mould from the sections with a razor blade, being careful not to break the sections.

11. Using the 400 grade silicone carbide paper, rub down one side of the sections to remove any saw marks and to obtain a smooth surface.

12. Cement the smoothed side of the sections to a glass slip, using some of the shellac cement thinned down with cellosolve. Allow the cement to dry thoroughly.

13. When dry, the sections are ready to grind down to the desired thickness which, in the writer's experience, is 0.2 mm. Commencing with the 180 grade paper, grind down to approximately 0.4 mm thick; then with 400 grade, and finish with 600 grade. When grinding down the sections, place the silicone paper on a piece of flat board or plate glass so as to grind down evenly.

It is important to continually check the thickness of sections when grinding down: use a vernier gauge and inspect under the microscope. When doing this, moisten the spines with water (saliva serves well!) as moist material looks clearer when viewed under the microscope. If ground too thin, sections lose their colour and have a tendency to break.

14. Having ground down to the desired thickness, place the glass slip in a shallow container and cover the sections with cellosolve. When the shellac has dissolved, the spine sections can be floated off or lifted off with a fine brush.

The spine sections are then washed in cellosolve to remove any trace of shellac or particles of dirt. They are now ready for mounting on the microscope slide.

(c) Mounting the spine sections

15. The method of mounting the spine sections is to pick up each section with a fine brush and place them on one end of the microscope slide in the position that you intend to finally mount them.

16. Canada balsam is spread thinly on the centre of the slide, and the spines lifted from their temporary position and placed on the canada balsam in their final position. If the canada balsam dries out, dip a brush in the zylol and allow a small drop to run on the balsam.

17. When all the sections are in position, cover with balsam and place the cover glass in position. (Should air bubbles occur when mounting the sections, a drop of zylol on the bubble usually eliminates the problem.)

18. When the canada balsam has set firmly, the cover glass is sealed with the ringing cement.

The collection of Sea Urchin spines and the making of microscope slides is an interesting and satisfying hobby. With the variety of colours and shapes of spines from the different species, numerous slides with different patterns can be made.

Information dealing with the colour and shape of spines from the different species will be presented in a future article.

Rabbits on Gippsland Islands

BY J. W. EDMONDS, I. F. NOLAN, ROSAMOND C. H. SHEPHERD, J. R. BACKHOLER AND R. JACKSON.*

It has been generally accepted that the wild rabbit populations in mainland Australia originated mainly from the famous "Barwon Park" rabbits which arrived on the barque *Lightning* in 1859, and that the rabbits on Victoria's offshore islands originated from releases by sealers and sailors in attempts to provide food.

It is regrettable that the details of the colonisation of south eastern Australia by the wild rabbit may never be well documented. However it is still possible to find and sift information on the origins and evolution of the rabbit populations on the Gippsland offshore islands. This paper reports information collected by officers of the Vermin and Noxious Weeds Destruction Board during the course of other work. We hope that it will stimulate interest in the history of our less well known rabbit populations.

Islands in Westernport (Fig. 1)

FRENCH ISLAND

The rabbit population on French Island appears to be typically wild. We have no information on its origins but our limited collections have not included any domestic characteristics.

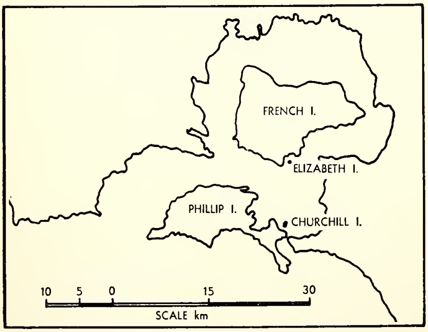


Figure 1.

PHILLIP ISLAND

The population on Phillip Island is generally of the wild type but we have found some domestic characteristics in rabbits on Phillip Island near to Churchill Island. Again we have no information on the origins of the Phillip Island population.

CHURCHILL ISLAND

The Churchill Island population was probably originally of wild type rabbits. However, following devastating epizootics of myxomatosis during the early 1950's an attempt was made to restock the island with domestic type rabbits. Six were released; two black which are thought to have come from Phillip Island, two albino and two cinnamon of unknown origin (Stott, personal communication).

Wild type rabbits may have been present when the domestic type rabbits were introduced. The present occurrence of the agouti gene suggests that they were, but the absence of one immunoglobulin structural gene which is present in every other rabbit population sampled in Victoria (35 in all) suggests that they were not (Edmonds and Shepherd unpublished data).

The coat colours now present are: agouti 60%; black 25%; cinnamon 15%. One albino was sighted in December, 1974 but no albino has been collected in a total collection of

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about 300. Details of the genetic constitution and evolution of coat colour in this population will be presented elsewhere.

Elizabeth Island

We have no information on the origins of rabbit populations on, nor have we collected from, Elizabeth Island where there has been a rabbit population for many years.

South Gippsland offshore islands (Fig. 2)

Doughboy Island

A small population (estimated at about 20) of small black rabbits was present at least fifty years ago. The local belief is that there have been rabbits on the island for a much longer period and that they were released as a source of food for shipwrecked sailors. This population apparently was severely restricted by poor nutrition and may now be extinct.

Sunday Island

It is believed that rabbits have been on the island for more than 100 years. We know that the population was multi-coloured at least sixty years ago and remained so until the population was decimated by myxomatosis.

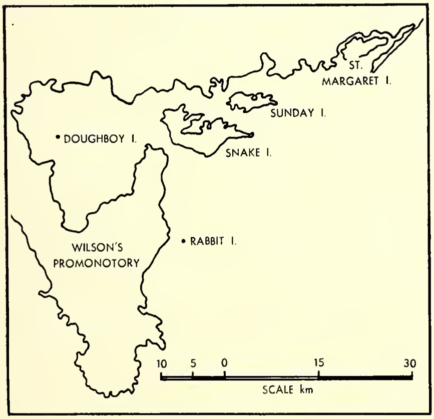

Figure 2.

Since about 1953 most of the population have been agouti in colour. However they have maintained their size and are generally bigger and heavier than mainland rabbits. Rabbits from Sunday Island were released on the mainland near Port Albert 70-80 years ago (Palmer, personal communication).

St. Margaret's Island

There were large numbers of rabbits on the island shortly after the first World War (Mitchell, personal communication). They included some blacks and some described as 'pinkish', and were bigger than mainland rabbits. We have not collected from this island but it seems very likely that domestic type rabbits were among the founding population. Rabbits can cross between the mainland and the island at low tide so there has probably been an interchange between island and mainland populations.

Bass Strait islands

Some of the releases on Bass Strait islands are well documented. The information presented here is summarised from other publications and included to give as complete a record as we can.

The first documented releases were made by Commander Stokes in H.M.S. *Beagle* in June 1842 (Stead 1935, Rolls 1969). Stokes released about 12 rabbits on Deal Island "for the benefit of any unfortunate voyagers who might be thrown hungry ashore". He later named Rabbit Island (Fig. 2) from the abundance of rabbits which he understood had originated from a pair of rabbits released by "a praiseworthy sailor" in about 1836.

Matthams (1921) says that the rabbits on Rabbit Island were numerous in the early forties. The rabbits were harvested to supply food to the aborigines on Flinders Island, and by whalers. Matthams describes Rabbit Island as "near Queenscliff". This is presumably a geographical error. Although there may have been rabbits on islands in Port Phillip during the 1840's we have no evidence that they were harvested.

The present population is very low and we have no reports of recent rabbit sightings. The population was estimated at 300-400 in about 1935 and described as long-eared, blackish-blue and larger than mainland rabbits. There were a few grey rabbits, also long-eared and larger than mainland rabbits.

The severe damage caused to the flora and fauna on Rabbit Island and the effects of sharply reduced numbers of rabbits after myxomatosis and a control programme have been described by Norman (1967, 1970).

Rabbit populations on other Bass Strait islands have also severely modified the flora and fauna of the islands e.g. on Citadel Island (Gillham 1961, Norman 1967). Probably these islands were the unfortunate sites of releases during the 1830's and 1840's.

Acknowledgements

We wish to thank Mr. K. Stott, Beaumaris, for his help on the origins of the Churchill Island rabbits and Messrs. J. Sparkes, Foster, and D. Mitchell, Yarram, both formerly of the Department of Crown Lands and Survey and Mr. D. L. Palmer, Department of Crown Lands and Survey, Yarram, for their help and interest in the origins of Gippsland rabbits.

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Erratum

In the headline to the article by Margaret G. Corrick on page 67 of the April issue (Vic Nat 93:2) the specific name should read "*Leersia oryzoides* (L.) Swartz".

Vegetation in the south-eastern suburbs, Melbourne

2. Native and introduced plant communities in a Mount Waverley reserve

BY P. B. BRIDGEWATER* AND B. WELLINGTON.†

Editor's Note. In his letter accompanying this article, Dr. Bridgewater reported that his article on Clayton South aroused some local interest and eventual pressure on the Oakleigh Council to purchase the area for a reserve. "Vegetation of SE Suburbs, No. 1, Clayton South" was published in this journal May 1975.

Introduction.

Much of the native vegetation in the Waverley area has been cleared for urban settlement and industry. Damper Creek reserve (grid reference on Melbourne 1:250,000 map, 316330) is one such area, which has a mixture of native and introduced plant communities. A floristic analysis shows the native vegetation to be variously affected by introduced species. Two native plant communities and one introduced community were identified in the reserve, and are described below.

Vegetation description.

Full details of the plant communities are contained in Tables 1-3. Species which characterise the associations are enclosed in the 'boxes' of these tables. Values in the table are quoted in Bridgewater (1971). Both native plant communities are linked by the presence of *Bursaria spinosa* (Sweet Bursaria), *Microlaena stipoides* (Weeping Grass) and the introduced *Agrostis stolonifera* (Creeping Bent).

Association 1 is characterised by *Lomandra filiformis* (Wattle Mat-rush), *Poa australis* (Tussock Grass) and the introduced species *Briza minor* (Shivery Grass) and *Hypochoeris radicata* (Cat's-ear). Although both these species are introduced they are very widespread and now form part of many plant communities throughout the State.

Within this association is a major sub-group, recognised by many native species, e.g. *Leptospermum juniperinum* (Prickly Tea-tree), *Platylobium obtusangulum* (Common Flat-pea), *Gahnia radula* (Thatch Saw-sedge), *Haloragis tetragyna* (Raspwort), the mosses *Campylopus introflexus, Thuidium furfurosum*, and the liverwort *Lophocolea semiteres.* More open sites within this sub-group are characterised by *Themeda australis* (Kangaroo Grass). The tree cover is provided by *Eucalyptus obliqua* (Messmate) and *E. cephalocarpa* (Silver-leaf Stringybark) and, occasionally *E. ovata* (Swamp Gum) in the wetter areas.

Introduced species characteristic of maximum disturbance to the vegetation include *Holcus lanatus* (Yorkshire Fog), *Rubus ulmifolius* (Blackberry), *Galium aparine* (Cleavers) and *Pteridium esculentum* (Bracken). This last species is native to the area, but its numbers markedly increase on disturbance. These species occur sporadically throughout the samples that make up this sub-group, usually with a concomitant reduction in the number of native species for those samples.

A second sub-group may be distinguished by a lack of the native

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species mentioned above, and the presence of *Themeda australis*. Sites that make up this sub-group are also often disturbed, but more usually by invasion of *Ulex europaeus* (Gorse) than the *Holcus-Rubus* group described above. Tree cover in the sub-group is sparse, and the native lily *Tricoryne elatior* (Yellow Rush-lily) is often abundant.

Association 2 is characterised by a native species — *Lomandra longifolia* (Spiny-headed Mat-rush), and an introduced South African species — *Ehrharta erecta* (Panic Veldt Grass). Tree cover is chiefly *Eucalyptus ovata*. Sites forming this association are usually associated with steep banks near the creek. In two of the sites the shrubs *Melaleuca ericifolia* (Swamp Paper-bark) and *Acacia melanoxylon* (Blackwood) are present. Before the clearing and disturbance to the creek bed, carried out in recent years by the MMBW, the vegetation of the creek sides would have been dominated by these two shrubs. All sites associated with this association have been disturbed, as evidenced by the constant presence of the *Holcus-Rubus* species group.

Some parts of the reserve are almost devoid of native species, and their vegetation consists of an association characterised by *Bromus unioloides* (Prairie Grass), *Plantago lanceolata* (Ribwort) and *Rumex crispus* (Curled Dock), together with *Holcus-Rubus* species group.

Discussion.

Although considerable invasion by weed species has occurred in this area the original vegetation pattern is still apparent. Association 1 represents the typical dry sclerophyll forest with "heathy shrub" understorey, formerly very common on the Silurian mudstones and sandstones in the central and north-east of greater Melbourne.

	ASSOCIATION 1																														
	SUB-ASSOCIATION A																					SUB-ASSOCIATION B									
SAMPLE NUMBER :	36	37	35	13	12	4	39	6	5	3	17	43	23	38	8	7	33	9	10	20	29	22	18	25	26	21	45	24	19	41
Eucalyptus obliqua	2	3	3	2	3	1		2	+	2																				
E. cephalocarpa	+		1											2	2	1	2	1	2		2			2			+		3	2
Hovea heterophylla	+									+				+	+	+					+									
Themeda australis							1	3	+	+	2	+	3	2	+	+	+					3	3	1	3	2				+
*Anthoxanthum odoratum**										2	+	1	+	+	+	+	+			1	+	1	+	1	1		+	+	+	
Lepidosperma laterale							+			+	+									2	1	+	1					1		
Acacia armata			+		+				+					3						3	2								1	

*Ulex europaeus**	+	+	+					4							1	2								1	1	1	5			
*Romulea rosea**																								+	+	+	+			
Leptospermum juniperinum	+	+	+	2	1		2		+	1	+				2			2	2	1			+		1					
Platylobium obtusangulum	1	1	+		+	+		+			2				1	+	+	1	+											
Haloragis tetragyna	1	1	1	1		+	+		+	1	+	+	+	1	+	1					+		+			+				
Campylopus introflexus		+	+	+	+			+		+	+		1	+		+	+			1	+								+	+
Lophocolea semiteres	+	+	+	3	+	1	+	1	+	+		1	1	+	2	1		1	1	1	+						+			2
Gahnia radula	2	2	2	2	3	3	2	2	2	2	+	3		4	1	1	2	4	4								1		+	3
Thuidium furfurosum	+		+	+		+	+	1		+	+	2	+		2			1	+	+	+	+			+	+	1			
Lomandra filiformis	+	+					1	+	+	+	+	+	+	+	+		+	+	+	1	2	+	+	+	1	+	+	+		+
Poa australis	+	+	+	+			+	1	3	1	+		1	1	+	+	+	2	+		+	+	+	+	+		1	+		+
*Hypochoeris radicata**	+	+	1	+	+	+		1	+	1	+	+	1	+	1	2	1	+	1	2		1	+	+	+	+	+		+	+
*Briza minor**	+	2	1	2	2		1	1		+	1	2	3	1	1	+	+			1	+	+	2	+			+	+	1	+
*Agrostis stolonifera**	+	2		+	2	1	3					2	4	2	3	1	+	2	1	2	2	3	2	1	+	2	1	2	2	+
Microlaena stipoides	+	2	1	+	+	+	1	1	2	2		+	+	+			+	1	2	1	+	+	+	+		3	1	1	1	+
Bursaria spinosa	1	3	3	2	2	2		2	4	2	3	1			2	+	2	3	4	1	2	2	2	2		1	1	2	2	3
*Holcus lanatus**					+	1	+	1	2			+	+	+	2		+	+	1	1	+	+		3	2			1	+	1
*Rubus ulmifolius**	+			+		3	2	1	2	+		+		+			+		1	+	+						+	+		+
*Galium aparine**						1	+	+	1	+		+		+	+	+	+	+	1					+						+
Pteridium esculentum	2		2			+		+	1		+				+			+	1					1					+	
Eucalyptus ovata				3			3		1		+					+		2			2			+				+		
Lomandra longifolia		+		+							1		+				+			+		+							3	
*Plantago lanceolata**										+		+	+									1	+	1						
*Ehrharta erecta**					3									+					1											+

Table 1 — Major species of Association 1.

Table 2 — Major species of Association 2.

ASSOCIATION 2												
SAMPLE NUMBER :	1	44	2	28	31	30	32	14	16	47	27	11
Melaleuca ericifolia						2	3					
Acacia melanoxylon						2	1					
*Fumaria officinalis**								3	3	1		
Lomandra longifolia			+	2	1	+	1	1	3	+		
*Ehrharta erecta**			+	+	+	3	+	+	+	4	3	3
*Agrostis stolonifera**	+	2		2	+	+	2	3	+	+		3
Microlaena stipoides		+		1	+	+	+		+			2
Bursaria spinosa	2	+	1	3	2	3	1	2	2	1	3	
*Holcus lanatus**	+	4	1	1		1	+	3	3	3	+	+
*Rubus ulmifolius**	2	+	+	+	2	1	1	+	2	+	+	1
*Galium aparine**	+		+	+	+	1	+	2	2	+	2	+
Pteridium esculentum	4	3	5	+	1			+	+		+	
Adiantum aethiopicum		+	1		2							
Eucalyptus ovata			+	2	3			3				
*Briza minor**				2		2		1	1			+
*Hypochoeris radicata**	1		+			+						+
Poa australis		1	1	+		+		+				
Gahnia radula			1		+			1	1			2
Lophocolea semiteres	1	1	+						+			
Themeda australis	+			3					+			
*Anthoxanthum odoratum**			1		+	+					+	
Lepidosperma laterale				+	+				+			
Leptospermum juniperinum				1	+							
*Bromus unioloides**			+				+			1		
*Plantago lanceolata**						+						

Such forests were dominated by *Eucalyptus obliqua, E. cephalocarpa, E. goniocalyx* (Long-leaf Box), *E. macrorhyncha* (Red Stringybark). Increasing invasion of non-native species often results in an understorey with fewer shrubs and a greater number of grass species (e.g. sub-group b of Association 1). The moister slopes and creek bed were characterised by a woodland with *Eucalyptus ovata* and *E. viminalis* (Manna Gum) as the dominant tree species. Such woodlands were often quite poor species.

Across this pattern of vegetation, the introduced species group *Holcus lanatus, Rubus ulmifolius* and *Galium aparine* together with the native *Pteridium esculentum* have become established in partially cleared or disturbed areas. If one examines the distribution of those introduced species in their native countries (W. Europe) the following emerges: *Rubus* and *Holcus* (together with *Agrostis stolonifera*) are all characteristic of a vegetation type described as Prunitalia spinosae (Westhoff and den Held 1969). This vegetation is found in situations such as hedgerows, borders between woodland and pasture and other areas of transition between vegetation types. *Ulex europaeus* is characteristic of the vegeta-

ASSOCIATION 3

SAMPLE NUMBER :	48	49	50	42	34	15	46	40
*Bromus unioloides**	3	3	2	1	1	3	5	
*Plantago lanceolata**		2	+	+			+	+
*Rumex crispus**	+	+				+	+	+
*Holcus lanatus**	3	3	4	1	4	4		
*Rubus ulmifolius**	+	+	+	+	+	1		+
*Galium aparine**	2		+	+	1	2	1	2
Pteridium esculentum		+	1	1		+		
Bursaria spinosa			+	3				
*Agrostis stolonifera**			+		3			
Microlaena stipoides				+				
*Ehrharta erecta**				+		+		
Eucalyptus ovata			+	+				3
*Fumaria officinalis**	2					2		
*Briza minor**			+		1			
*Hypochoeris radicata**		+	+		+			
Poa australis	+	+	+	+		1		
Gahnia radula			+	2	1			
Lophocolea semiteres		1	+					
Campylopus introflexus		+	+					
Lomandra filiformis				+				
*Anthoxanthum odoratum**					2			
Themeda australis					+			
Eucalyptus cephalocarpa					3			
*Agropyron repens**	+						3	
*Oxalis pes-caprae**			+	+				3

Table 3 — Major species of Association 3.

tion type Sarothamnion, which is found in similar situations, but usually on more nutrient-poor soils.

All of these situations are subject to disturbance from time to time (clearing, cutting, trampling, etc.) and so it is not suprising to find these species occurring in disturbed areas of native vegetation. What is interesting is the fact that there appears to be a coexistence between fragments of native plant communities and introduced plant communities. Understanding this coexistence and balance is clearly of importance in devising management strategies for such areas so that the maximum quality and quantity of native vegetation is maintained. Understanding the role of introduced species in native plant communities is likely to be of increasing importance in this area, perhaps particularly in studies of the Dandenong Valley Park proposed by the MMBW and outlined by Jones (1975).

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The Origin of Generic Names of the Victorian Flora
Part 2 — Latin, Greek and Miscellaneous

(Continued from page 68 In the last issue)

BY JAMES A. BAINES

Microseris. Gk mikros, small; chicory (Black), lettuce or endive (Jaeger) were plants called seris in Greek. *M. scapigera*, Yam, or Yam-daisy as given by Willis, is the tuberous-rooted composite that provided the staple food of Australian Aborigines, obtained by the women with their yam-sticks. The true yams are members of the tropical genus *Dioscorea*, with 600 species, of the monocotyledonous family Dioscoreaceae, only three of which are Australian and none Victorian. The epithet *scapigera* means bearing a stalk or scape.

Microsorium. Gk mikros, small; soros, a heap, mound (hence Lat sorus, a sporecase); the sori being small individually but prominent collectively. Our two species are *M. diversifolium*, Kangaroo Fern (so-named from the shape of *some* of the fronds) and *M. scandens*, Fragrant Fern or Scented Polypody, the latter name coming from *Polypodium* (= many-footed), the genus to which these ferns formerly belonged, in family Polypodiaceae.

Microtis. Gk mikros, small; ous, otos, ear; from the general appearance of each individual in the flowering spike of these onion orchids. Three of our eight species are alternatively known as leek orchids, a name better kept for species of *Prasophyllum*.

Mimosa. Gk mimos, mimic; referring to the sensitive collapse, when touched, of the leaves of *M. pudica*, Sensitive Plant. **Albizia lophantha*, Cape or Crested Wattle, was formerly *M. distachya*, and *Acacia botrycephala* was classified in *Mimosa* from 1800-1829. Europeans persist in calling cultivated pinnate species of our acacias mimosa, ignoring the word wattle that is universal throughout Australia. No *Mimosa* species are native to Australia, but one species has become naturalized in Queensland. The common name Prickly Moses used in Victoria for *Acacia verticillata* and in W.A. for *A. pulchella*, is a corruption of Prickly Mimosa.

Mimulus. Lat diminutive of mimus, a mimic; because the corolla looks like the face of a monkey, hence the common name monkey-flowers for these plants. Victoria has two introduced species, **M. moschatus*, Musk Monkey-flower or Monkey Musk, and **M. luteus*, as well as three native species. They belong to family Scrophulariaceae. (*M. repens*, also in N.Z., is called Maori Musk in that country, and Creeping Monkey-flower here.)

Minuria. Gk minyros, in the sense of small, thin (though its primary meaning is whining, complaining); probably alluding to the leaves of *M. leptophylla*, Minnie Daisy, which is one of our five species, all native. They belong to the Astereae tribe of family Compositae.

***Mirabilis.** Lat word for wonderful, hence the common name Marvel of Peru for **M. jalapa*, which becomes like a weed in some gardens and occasionally escapes — also known as Four-o'clock, or False Jalap, the purgative jalap coming not from this plant but from convolvulaceous plants growing originally at Jalapa in Mexico. (Jalapa is from Aztec, meaning sand by the water.) *Mirabilis* genus is in family Nyctaginaceae.

Mitrasacme. Gk mitra, head-dress, used in the sense of an ecclesiastical mitre; akme, summit (hence English acme); because of resemblance of the corolla *M. pilosa* to a bishop's mitre, hence its common name, Hairy Mitrewort. Victoria has six species, all native, and all known as different kinds of mitreworts. The genus is in family Loganiaceae.

Mniarum. Gk mniaros, mossy, soft as moss. *Scleranthus mniaroides* was Mueller's amended name for a caryophyllaceous plant he had described seven years before as *M. singuliflorum*, but the correct combination of *S. singuliflorus* was adopted in 1938. All species previously in *Mniarum* are now in *Scleranthus*. Knawel is the common name.

*__Modiola.__ Lat modiolus, the nave of a wheel; alluding to the shape of the fruit. This is a monotypic American genus of family Malvaceae. **M. caroliniana*, Carolina Mallow, is also known as Wheel or Creeping Mallow.

Mollugo. Lat name of a plant believed to be *Galium mollugo* (from mollis, soft). Our two species of *Glinus* were once classified in *Mollugo, G. lotoides* being first *M. hirta* then *M. glinus*. Hutchinson separated Molluginaceae from Aizoaceae, naming it from the genus *Mollugo*.

*__Moluccella.__ Molucca Islands or the Moluccas (formerly known as the Spice Islands, now part of Indonesia), with diminutive -ella added. **M. laevis*, Molucca Balm, is also known as Bells of Ireland, though not native to either region, as J. C. Willis gives the habitats of the four species as ranging from the Mediterranean to N.W. India. The genus was named by L. in 1753, when knowledge of the source of 'spices' was rather vague. (Cf. the word turkey, this American bird being thought by the English to have come from Turkey, and by the French from India (d'Inde), hence their word dinde for turkey.)

(To be continued)

Field Naturalists Club of Victoria

The Botany Group, FNCV

Editor's Note. This is the first in a series on the FNCV Study Groups. In each of the next five issues there will be an account from one Group so that Club members can be aware of the purpose and activities of the various Groups. All FNCV members are welcome at any of the Groups and, as meetings and excursions are more informal than the large Club affairs, people get to know each other more quickly. There is no extra subscription. Many of our most active and enthusiastic members are also members of one or more of the Groups. All meetings, etc., are on page 123.

Botany is a fascinating and absorbing study. Whether you want to know a few of the more common plants found in the bush or the type of plants in a particular area, to photograph native plants or to learn more of the structure and function of plants — come to the Botany Group. The main interest of the Group is with Australian plants living in their natural environment. The broad purpose is to provide opportunities and encouragement to observe, study and enjoy plants.

Excursions

The Botany Group meets each month and has an excursion each month. An excursion might be simply to a particular area, or it might be for a particular subject such as fungi or ferns or eucalypts. Each is led by a person knowledgeable about the chosen area or subject, so the excursions provide excellent opportunities to identify and study plants in the field. But they are informal affairs and individual members take from them what they most enjoy. Occasionally we have a week-end trip. On these excursions we travel by private car, but we try to even out the expenses.

Last year our excursions included a project that was new to us. We were asked to make a plant survey of part of the proposed Dandenong Valley Park. The survey was arranged and carried out in haste, yet we derived great satisfaction from it. It was a severe test of the knowledgeable members, but the less knowledgeable and the merest beginners were a necessary part of the survey teams and all learned quite a lot. It was reported in this journal in October 1975, page 216.

Most areas are too far afield for such a project, but it is likely we will make a plant survey of the new FNCV property at Kinglake.

Meetings

At Botany Group meetings there is a 45-minute address on some aspect of Australian plants or on a particular area. Like the excursion leaders, the speaker might be a member of the Group or an outside specialist. These addresses are usually illustrated with colour slides and are followed by questions to the speaker. Our programme this year includes an address on a plant family at several of the meetings; the other addresses have yet to be arranged.

In addition, at each meeting there is a 15-minute talk for beginners. Although this Group does not study academic botany as such, some basic botanical knowledge is necessary if we are to understand plants, and these 15-minute talks provide some of that necessary background; they are usually illustrated with easy-to-follow diagrams. These short talks were instituted last year and proved very popular — and not only with beginners! Duplicated take-away sheets were often available but they are less likely this year as duplication costs have sky-rocketed; members will need to take notes, and diagrams can be copied after the meeting has ended.

Several members bring plant specimens to each meeting and these are discussed. Often, much can be learned from a simple exhibit, so the more the better. Books on plants are usually displayed, some for borrowing.

Our meetings end at 10 p.m., but many people stay longer — looking at exhibits, copying diagrams or just talking. We really get to know each other.

Members

We are a pretty mixed group of people. Some of our members are very knowledgeable indeed about plants, several have a moderate knowledge and some are real beginners. Similarly, we are mixed regarding age. Mostly our members are middle-aged or more, but we have some keen young members who add liveliness to meetings and are a great asset at excursions. There is a place in our Group for people at all levels and all ages. Any FNCV member or other person is welcome — as a regular member, or as an occasional visitor to hear a particular address or for a particular excursion . . . or just to find out what we are like.

Botany Group meetings are held on the second Thursday of each month at the Herbarium, The Domain, South Yarra at 8 pm; excursions are on the last Saturday. For specific programmes, see "Diary of Coming Events" on page 123 of this journal.

Volunteers Wanted for Small Jobs

Typist/Duplicator operator. The minute-taker makes hand-written records of proceedings at Council and General meetings. These need to be typed, duplicated and despatched to Council Members before the next Council meeting. The Club owns a spirit duplicator that takes little space and is fairly easy to operate. Usually there are three foolscap pages of typing, occasionally more, and 15-20 duplicates. Total time per month is 1-2 hours and the worker is up-to-the-minute on everything that is happening in the Club.

Please see the minute-taker (Madge Lester) or the President.

Library Monitors. At General meetings a person is required to be present in the library at 7.30 p.m. and after the meeting has ended. He/she would show borrowers how to fill in a borrowing slip and advise when to return the book, file the slips, receive returned books and check out the slips. If there is more than one Monitor they could devise a roster system.

Please see the Librarian or President.

Subscription Reminder Notice

FNCV members are asked to check whether they have paid their subscription for 1976; if not, please forward to the Treasurer. Subscriptions were due on 1 January.

Reports of FNCV Meetings

General Meeting Monday, 12 April

Speaker for the evening was Miss Mary Doery. Miss Doery gave a naturalist's view of a Pioneer coach trip from Darwin to Perth that several FNCV members had joined. The trip was in August last year. They covered 3,800 miles in 17 days, yet many aspects of natural history were observed, enjoyed and photographed. It was an absorbing address and effectively demonstrated that even when travelling by a public vehicle the naturalist can find much to interest him.

Water in Wyperfeld. Mr. Ros Garnet showed photographs of creeks and lagoons that are at present in Wyperfeld National Park. He speculated on the revitalisation it would bring to the eucalypts and other vegetation. Such water has not been seen in Wyperfeld since 1918.

Exhibits. There was an extensive display of lignite and coal from various Victorian sources. A piece of wood (or was it lignite?) obtained at Yallourn was formed from the Queensland Kauri Pine *Agathis robusta* 30 million years ago. Also from Yallourn was another piece of wood still with its bark — *Callitris cupressinoxylon*. A lump of brown coal was thought to be fossil pollen.

In a small bottle were some Indian Meal Moths *Plodia interpunctella*. The moths were about 1 cm long, grey with a white band on each wing. It is an introduced pest as the larvae attack stored food. Also in the bottle was another moth the same size but white with black bars — *Philobota contentella*. The genus *Philobota* is Australian and has about 300 species but, Tillyard says, "in no case has the larva been discovered". Under a microscope was a wasp that is parasitic on the egg mass of the praying mantis.

A species of Dodder bearing many of its small flowers and fruits was firmly entwined on a sprig of Basil. Leaves (phyllodes) of *Acacia dunnii* from Wyndham W.A. were about 12″ long by 8″ wide. A sedge, found growing abundantly in a drain, carried the query "what is it?". It was the introduced Drain Sedge or Umbrella Sedge *Cyperus eragrostis* and is a considerable pest.

Subscriptions. The Treasurer asked members to be prompt with their subscriptions. Many have not yet been paid, but they were due at the beginning of the year. In 1975, more than $50 was spent in reminder notices!

Annual General Meeting Monday, 10 May 1976

Annual Report for 1975* was read by the Vice-President, and here are the main items.

Membership has increased slightly.

All Study Groups have continued actively, and the Mammal Survey Group has made some significant range extensions. But the Preston Junior Field Naturalists Club has gone into recess.

A full programme of Sunday bus trips was continued, with a longer trip to the Grampians in October and to the Orbost area over the Christmas period. In May, the Sunday outing was replaced by a working bee at Studley Park to help eradicate boneseed. The organiser, Mr Ian Cameron, estimated that several thousand plants had been removed.

Eleven issues of 'The Victorian Naturalist' were published, and life membership was conferred on Mr Grif Ward for his service as editor during ten years. Publication of 'Ferns of Victoria and Tasmania' by the late Norman Wakefield and revised by Dr J Willis, has been very successful.

Amendments to the Constitution were adopted; the result is a smaller Council, and certain office-bearers may be Council members or not as they wish. For family reasons, our new Secretary, Mr Garnet Johnson, was forced to resign but, at his suggestion, he continued as Correspondence Secretary.

A ten-acre property at Kinglake was bequeathed to this Club by Mr Harold Frahm, and a management committee is to be appointed.

The Natural History Medallion for 1975 was awarded to Miss Alison Ashby of South Australia. A Medallion Trust Fund has been established with the hope it will finance the award which costs about $120 a year.

Arrangements have been made with the National Herbarium for plant identifications free of charge under certain conditions.

In 1980 this Club will reach its centenary. Club archives contain considerable material and members were asked to bring forward anything they might have. It is hoped to publish some historical material during the centenary year.

Mrs Corrick thanked Office-Bearers, Council Members and other persons for their services to the Club. Her final words were: "We are a large and well-established Club with considerable assets, but the management of our affairs . . . falls on too few people. . . . If we are to continue to exist as a Club we need the active help and interest of more of the general membership."

Treasurer's Report for 1975.† Mr McInnes announced that a deficit of $826 at December 1974 had been turned to a credit of $371 in 1975 despite the reduction of outside grants from $3500 to $1200. This successful result was largely due to the increased subscription fee which gained another $3000, and to advertising in and overseas sales of the 'Naturalist', increased interest on investments, and to economies in clerical costs and rents. Other items of interest were the Ivy Dixon legacy of $200, and a profifit of $547 from book sales for the Club Improvement Fund. Publication of the revised 'Ferns of Victoria and Tasmania' had been very successful with a profit of more than $2000 and a second printing has been ordered.

Election of Council Members and Office-Bearers. Council consists of the President, Vice-President, Immediate Past President and ten other members. Nominations were: President — Mrs M. Corrick; Council Members — M. Allender, B. Callahan, W. Clark, M. Lester, J. Martindale, A. Parkin, R. Sandell, T. Sault, B. Smith; Office-Bearers — Secretary A. Parkin, Assistant-Secretary Garnet Johnson, Excursion Secretary M. Allender, Librarian J. Martindale, Editor M. Lester. The Chairman declared all nominees elected.

Speaker for the evening was Mrs Corrick who visited Lake Eyre in August last year when it was full of water. It is only the second time this century that water has remained in the lake for more than a few days. In 1975 it was more than 18 feet deep, and the exceptional conditions had brought an influx of birds. We hope to hear more of this in a later issue of the 'Naturalist'.

Exhibits included various rocks from Mt Frazer — tuff, scoria, olivine crystals, secondary quartz crystals, and some secondary crystals of solutions formed by weathering of scoria carried the query "magnesite?". Olivine crystals were shown under a microscope x 8½.

Bark of *Eucalyptus aromopholia* called for rubbing bits of bark in the hand, much sniffing and speculation as to what it really smelled of, but complete agreement that the common name of Scent Bark was very appropriate.

Blady Grass *Imperato cylindrica* is host plant for the Small Skipper Butterfly.

Dozens of the Ribbed Case Moth were on a small sprig of what had been gum leaves, but the leaves had been entirely eaten away. Each case had three or four vertical ridges, and was cone-shaped up to 1½ cm long by ½ cm at its widest part. The exhibit came from Cheltenham, and entomologists said they had never seen so many together.

Discussion was lively concerning the reasons for few nominations and poor attendance at meetings. And our centenary coming up in 1980 caused more discussion.

Our Kinglake property. Mr McInnes displayed a plan of the area with city blocks to same scale to give an idea of size, urged us to make full use of this asset and said that interested members are wanted for the management committee of this property.

People are inclined to think that annual meetings are dull affairs. This meeting was certainly **not** dull, and some members declared it one of our most enjoyable and stimulating evenings.

* The complete report is filed with the Secretary's minutes.

† Financial matters were printed in the April 'Naturalist'.

(Continued from page 82)

GROUP MEETINGS

At the National Herbarium, The Domain, South Yarra, at 8.00 p.m.

First Wednesday in the Month—Geology Group.
7 July—"Looking at Geology under the Microscope". Mr. E. Sault.
4 August—"The Geology of Euroa". Mr. G. Love.

Third Wednesday in the Month—Microscopical Group
16 June, 21 July, 18 August—Members' exhibits with a variety of objects shown under microscopes and discussion of subjects and methods.

Second Thursday in the Month—Botany Group
10 June—"The Family Proteaceae". Miss L. White.
8 July—"Mapping the Distribution of Plants in Victoria". Mr. Paul Gullan.
12 August—"Native Pea Flower Plants". Dr. R. G. MacDonald.
9 September—"The Grampians". Mrs. I. Dunn.
Each meeting includes a quarter-hour address for beginners—various subjects.

At the Conference Room, The Museum, Melbourne, at 8.00 p.m.

First Monday in the Month—Marine Biology and Entomology Group
5 July—"History of Naming and Classifying Insects". Mr. H. B. Wilson.
2 August—"Members' Exhibits".

Fourth Thursday in the Month—Field Survey Group
24 June, 22 July, 26 August.

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.

First Thursday in the Month—Mammal Survey Group.
1 July, 5 August, 2 September.

GROUP EXCURSIONS

Day Group—Any member is welcome—Third Thursday in the Month

Thursday, 17 June—Seeing Eye Dog School, Thanet Street, Malvern. Meet at Central Park, corner Wattletree and Burke Roads, East Malvern, at 11.30 a.m.

Thursday, 15 July—New Animal Kingdom Display, National Museum (guided tour). Meet at Princes Gate 11.30 a.m., or at 1.00 p.m. at the Swanston Street entrance of the National Museum.

Thursday, 19 August—National Gallery of Victoria (guided tour). Meet at Gallery entrance, St. Kilda Road, at 1.30 p.m.

Geology Group—Any member with their own car invited.

Sunday, 13 June—"Royal Park Fossils" (afternoon only). Meet at Royal Park Railway Station, 2.00 p.m. (cars not needed this excursion).

Saturday, 10 July—"Geological Features close to Melbourne". Meet 2.00 p.m. at corner of Williams Road and Alexandra Avenue, South Yarra.

Sunday, 8 August—"A Beginner's Look at the Fossils and Geology of Beaumaris". Meet at Cheltenham Railway Station at 2.00 p.m.

Botany Group—All members welcome.

Saturday, 26 June—"Ferns". Leader, Mrs. Webb-Ware.

Saturday, 31 July—"Excursion to demonstrate Plant Mapping". Leader, Mr. Paul Gullan.

Saturday, 28 August—"Wattles". Warrandyte and Wonga Park. Leader, Mr. Ian Morrison.

Saturday, 11 September—"Cranbourne New Botanical Gardens". Leader, Mr. Ian Morrison.

Saturday, 25 September—"Survey of F.N.C.V. Land at Kinglake".

GROUP CAMP NOTICES

The Field Survey Group and the Mammal Survey Group will hold a combined camp at "Gellion's Run in the Yarram District" during 12-13-14 June. (Details, Robin Sandell, 83 8009 home, or Ray Gibson 62 4007 business.)

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency the Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

Key Office-Bearers, 1975-1976.

President:

Mrs. MARGARET CORRICK, 7 Glenluss Street, Balwyn, 3103. (857 9937.)

Secretary: Dr. ALAN PARKIN.

Assistant Secretary (correspondence): Mr. GARNET JOHNSON, 20 Sydare Avenue, Chadstone, 3148. (56 3227.)

Treasurer — Subscription Secretary: Mr. D. E. McINNES, 129 Waverley Rd., East Malvern, 3145. (211 2427.)

Hon. Editor: Miss M. J. LESTER, 4/210 Domain Road, South Yarra, 3141. (26 1967.)

Hon. Librarian: Mr. J. MARTINDALE, c/o National Herbarium, The Domain, South Yarra.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield, 3151. (527 2749.)

Sales Officer: Mr. D. E. McINNES, 129 Waverley Road, East Malvern, 3135. (211 2427.)

Archives Officer: Mr. CALLANAN, 29 Reynards St., Coburg, 3058. Tel. 36 0587.

Group Secretaries

Botany: Mrs. RUTH ANDERS, 7 Barrington Drive, Ashwood, 3137. (25 3816.)

Day Group: Miss D. M. BELL, 17 Tower Street, Mont Albert, 3127. (89 2850.)

Field Survey: R. D. SANDELL, 39 Rubens Gve., Canterbury, 3126. (83 8009)

Geology: Mr. T. SAULT.

Mammal Survey: Mr. STEPHEN HARWOOD, 5 Prentice Street, Elsternwick, 3185. (53 1317.)

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
Joint Metropolitan	$12.50
Joint Retired Members	$10.00
Country Subscribers, and Retired Persons over 65	$8.00
Joint Country	$10.00
Junior	$2.50
Subscriptions to Vict. Nat.	$8.00
Overseas Subscription	$10.00
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F.N.C.V. DIARY OF COMING EVENTS

At the National Herbarium, The Domain, South Yarra.

GENERAL MEETINGS

Monday, 9 August (8.00 p.m.)—

Speaker—Dr. Peter Attiwill.
Subject—"Plants and the Atmosphere".

Monday, 13 September (8.00 p.m.)—

Speaker—Mr. S. J. Cowling, Assistant Director, Wild Life Branch, Fisheries and Wild Life Division.
Subject—"The Objects of the Wild Life Branch".

Monday, 11 October (8.00 p.m.)—

Speaker—Dr. M. Joshi.
Subject—"The Grand Canyon, U.S.A."

New Members—August General Meeting:

Ordinary:

Mrs. Loree Allen, 2 Griffiths Grove, East Brighton, 3187 (*Birds and Plants*).
Mr. D. A. Cooke, 9/51 Marne Street, South Yarra, 3141 (*Botany*).
Mr. Graham Milledge, 984 Lygon Street, North Carlton, 3054.
Mrs. M. C. Minty, 3/49 Wandsworth Road, Surrey Hills, 3127.
Mr. Warren H. Platt, 7 Shirley Court, Boronia, 3155 (*Birds and Mammals*).
Mrs. Margaret Sandiman, 65 Union Road, Surrey Hills, 3127.

Joint:

Mr. L. A. Fell, P.O. Box 4, Metung, 3904.
Mr. M. Taylor and Mrs. H. Taylor, 36 Park Avenue, Sandringham, 3191 (*Botany*).

Country:

Mr. Ray Bolwell, 3 Woodlands Avenue, Mt. Eliza, 3930 (*Mammals*).
Mr. Russell P. Cook, 2 Warwick Street, Largs North, S.A., 5016.
Mr. M. J. Dadds, 16 Coghlan Street, Chifley, A.C.T., 2606.
Mr. Stephen J. Berrigan, 9 Braddon Street, Queenstown, Tasmania, 7467 (*Forestry*).

F.N.C.V. EXCURSIONS

Sunday, 15 August—Cardinia Reservoir and visit to Jells Road M.M.B.W. Park on the way. The coach will leave Batman Avenue at 9.30 a.m. — fare $3.50, bring one meal. Leader: Mr. D. E. McInnes.

Saturday, 21 August-Sunday, 5 September—New South Wales. The coach will leave Flinders Street, outside the Gas and Fuel Corporation at 8.00 a.m. on Saturday, 21 August. Bring picnic lunches for Saturday and Sunday. Itinerary will be Orbost, Bateman's Bay, Cronulla (5 nights), Gosford (6 nights), Bathurst, Albury, Melbourne. The balance of the payment ($265.00 including deposit) should be paid to the excursion secretary by 12 August.

Sunday, 19 September—Langwarrin. The coach will leave Batman Avenue at 9.30 a.m. Fare $4.00, bring one meal.

Sunday, 17 October—Kinglake. See next issue.

Tuesday, 2 November—Cup Day Picnic. Wombat Forest under the leadership of Mr. J. Myers. A special invitation is issued to Juniors for this excursion. Further details next issue.

Saturday, 1 January-Sunday, 9 January, 1977—Burnie, Tasmania, with members of the Burnie F.N.C. leading. Details later.

(Continued on page 167)

The Victorian Naturalist

Volume 93, Number 4 4 August 1976

Cover illustration: Sugar Glider, *Petaurus breviceps*; see page 143 for an interesting observation. Photograph by John Wallis.

Life History and Biology of a Snail

Part 1. Aestivation and Reproduction

BY BRIAN J. SMITH*

This article is an attempt to answer the many questions about the amazing success in a hostile environment, of such a soft-bodied animal as the land snail.

Terrestrial molluscs are a very successful group of animals being found in desert areas, in tropical forests, and even on open sand-dunes within the spray zone from the sea. Evolving from aquatic ancestors, the land snail has many unique problems to overcome in its new environment and it has solved these in a very original way.

Contrasting environments of marine and land molluscs

The ancestral molluscs lived in the sea, where they were bathed in a weak salt solution, could liberate their eggs and sperm into the water for external fertilization and where the resulting planktonic larva, the veliger, could survive and spread the species. The animals could move about fairly freely and the population density was usually high, so finding a partner for breeding was no problem.

On land the environment is hostile, with the constant threat of desiccation. Favourable niches can be few and the sizes of populations and opportunities for breeding can be limited. (Introduced species in suburban gardens have a highly artificial environment ideal for the culture of snails. Go into the bush and try and find a native snail and the problem of individual isolation becomes apparent). Fertilization must be in the body of the snail, and the developing embryo must be protected until it is able to withstand the rigours of the environment.

The methods of protection against desiccation in land molluscs are mainly behavioural. The snails seek out damp sheltered places under rocks or logs or buried in the ground, and only emerge when the conditions are cool and wet and the evaporation rate is practically nil. Thus snails emerge mainly at night or only on wet, overcast days.

Aestivation

In hot dry weather the snails go into a period of dormancy or aestivation, very similar in some ways to the hibernation of some vertebrates in cold climates.

When conditions start to become unfavourable for the snail, hot and dry with little moisture, it is forced into places of shelter away from the extremes. (One or two species do not do this and they will be discussed below.)

The snails either seal themselves down to a hard surface or secrete calcareous membranes over the shell

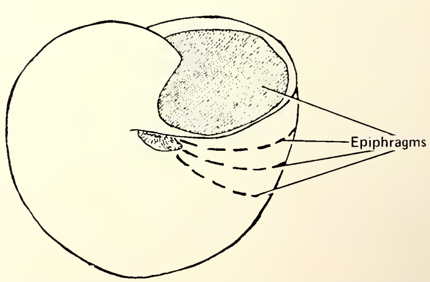
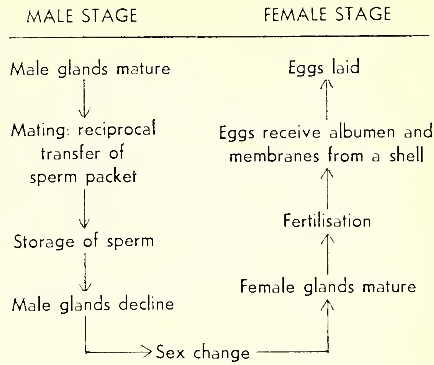


Figure 1. Ventral view of desert snail showing position of a series of epiphragms.

*Curator of Invertebrates,
National Museum of Victoria.



Sequence of reproduction in a land snail.

aperture. These membranes are called epiphragms and in some desert snails several epiphragms are secreted (Fig. 1). The membranes or sealing substance is a special mucus-type substance which hardens in air to an impervious layer.

These protective measures are designed to minimize water loss. Internal body processes such as respiration, heart-rate, excretion and others are slowed right down to practically nothing, probably under hormone control.

Some desert snails have the ability to remain in aestivation for years, only "coming back to life" when sufficient water is present to dissolve the epiphragm and provide the initial stimulus to the animal. This facility of desert snails to undergo extended aestivation is a special adaptation to desert life.

Ordinary garden snails can only survive aestivation for a few months and even then may require brief periods of activity.

A few snails, principally *Theba pisana* and *Cernuella virgata*, appear to aestivate in the worst possible places. These are species of white helicoid snails seen in large numbers up posts and on the outer parts of vegetation in southern Victoria and South Australia. Both these species are found in aestivation in the direct summer sun. However, they are always sealed down firmly to a hard surface; presumably in this species it is the sealing down process that is important, and being in direct sunlight is no problem to them.

Reproduction

It is in reproduction that the greatest differences between terrestrial and marine molluscs occur. To increase reproductive success the land snails are hermaphrodite, with each individual having both male and female organs. This means that every individual in a population can lay eggs, not just half the population, the females, as in most groups of animals.

The anatomy of the reproductive tract of a snail is shown in Fig. 2. The gonad produces both sperm and eggs which are passed in turn down the common duct and out through the genital atrium.

The snail commences its breeding activity as a functional male with the gonad producing sperm and the auxiliary male glands maturing. As sperm is passed down the common duct it is enclosed in a protein envelope secreted by these male auxiliary glands into a kind of sperm parcel called the spermatophore.

At mating two individuals come together, both physiologically in the male stage of reproductive activity. Copulation takes from 5 to 60 minutes and usually occurs at night; it consists of the reciprocal transfer of spermatophores from one snail to the other. The spermatophore from the partner is taken and stored in a special sack, the spermatheca, where the wall of the spermatophore is broken down and the sperm stored.

The animal then undergoes a sex change. The gonad no longer produces sperm, but the many egg cells mature and start their passage down the reproductive tract. During this sex

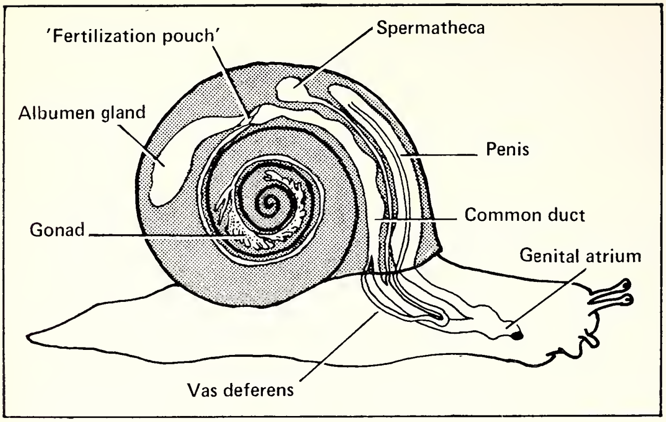


Figure 2. Diagram of snail to show the position of the reproductive tract.

change the male accessary glands are reduced and the female ones expand and mature.

When the eggs are released from the gonad into the top part of the reproductive tract, the stored sperms are passed from the storage sack or spermatheca down the tract to meet and fertilize the eggs. These fertilized eggs are then surrounded by a layer of "albumen", a protein food for the egg from the albumen gland. This enlarged egg is then surrounded by a series of egg membranes and finally with a calcareous shell from the female auxiliary glands of the common duct. The eggs are then layed in clutches of 20 to 30 in shallow holes in damp ground where they take several weeks to develop into miniature snails.

This process of laying large eggs with plenty of food for the developing embryo inside a thick impervious shell, enables the young snails to develop successfully away from water. It was the development of this facility which enabled the terrestrial molluscs to successfully conquer the land.

Movement and feeding in snails will be described in a later article.

Victorian Non-Marine Molluscs, No. 15

BY BRIAN J. SMITH*

The largest and most widespread family of land snails in Australia, speaking either from the point of view of species diversity or family distribution, is the family Camaenidae. This is the dominant family of snails in the faunas of Queensland, Northern and Central Australia. However, this dominance does not extend into the south-eastern Australian faunal region where the family is confined to a single species endemic to the region, together with several species characteristic of adjacent regions which encroach over the boundaries into this region.

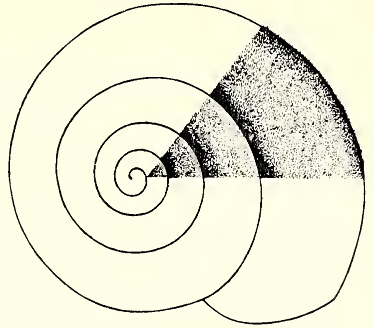
* Curator of Invertebrates, National Museum of Victoria

Chloritobadistes victoriae (Cox 1868)

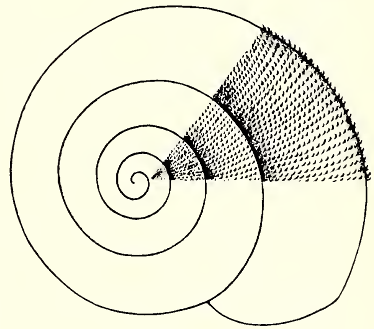
This species has a dark brown globose shell, an average diameter being 8-12 mm. It is characteristed by very fine, dense, periostracal 'hairs' on the outside of the shell, these hairs being irregularly placed giving the appearance of the shell covered with a fine brown velvet. On dead shells, where the periostracum has been removed, evidence can be seen for the presence of the hairs in the form of minute hemispherical pustulae on the surface of the shell. These are thickenings of the shell at the base of each hair.

C. victoriae is confined to southern and central Victoria and Northern Tasmania where it is found in both wet and dry sclerophyll forest areas and in marginal woodland scrub. It is found in damp situations under logs, fallen bark or in litter and in many areas is very common.

In south-eastern Australia there is only one other species of snail bearing periostracal hairs with which *C. victoriae* could be confused. This is a closely related species, belonging to the same genus, *Chloritobadistes brevipila* (Pfr. 1849). This species occurs in southern Queensland, through New South Wales and into far eastern Victoria. The shell shape and form is generally similar to *C. victoriae,* but the periostracal hairs are large, widely spaced and in regular rows. On dead shells the raised pustulae are also large and arranged in regular rows.



C. victoriae



C. brevipila

It is not known whether the two species occur together in East Gippsland.

Drawings by Miss Rhyllis Plant

Preparing material for 'The Victorian Naturalist'

When preparing material for publication, please have it typed with double line spacing and leave at least 3 cm (about $1\frac{1}{4}''$) clear margin at the left. Captions to figures should be typed on a separate page. Monochrome illustrations should be supplied, as it is costly and rarely satisfactory to reproduce from coloured material. If article is of a scientific nature, it is desirable to supply two copies of text matter.

The Spines of Sea Urchins

BY H. H. BISHOP, MICROSCOPY GROUP, FNCV

In the previous journal, Vol. 93, No. 3, an article was published giving details for making microscope slides from the spines of sea urchins. This article deals with the collecting of sea urchins, and describes the spines from some different species.

Collecting

As most sea urchins are vegetable feeders, living on seaweeds or on the green algal scum that covers rocks, the most likely place to find them is where these conditions prevail.

In Victoria, specimens of our most common sea urchin, *Heliocidaris erythrogramma*, can be found on rock platforms around Port Phillip Bay. Other areas for collecting are sheltered bays on the Victorian and New South Wales coast. Specimens may also be found on less sheltered coasts after severe storms.

Description

Spines of the various species differ considerably in shape, size and colour, and the colour of individuals varies according to the condition of habitat. Under natural conditions, dark specimens are usually found in bright light and clear water, while pale individuals are found in darker and more turbid conditions. Many sea urchins living in shallow water are nocturnal, avoiding the light in daytime by moving under rocks.

When viewed under the microscope the different patterns and brilliant colours of the spine sections are revealed. Although the external colour of individuals of a species may vary, the colour pattern of a cross-section of spines is the same for that species.

A description of the spines of the sea urchins collected by the writer is as follows; they are members of four different families.

ECHINOMETRIDAE

Heliocidaris erythrogramma is the most common sea urchin on the Victorian and New South Wales coast. Spines are solid and round, tapering to a point. Length of the spines depends on age, and range from one to two inches when fully grown. Colours of individuals range from a light olive green to dark purple. Spines also vary in colour throughout their length, tending to a lighter shade at the tip.

Sections cut from spines of this sea urchin make very attractive microscope slides. They have rings radiating out from a centre core, and there are microscopic perforations over the entire area which give the appearance of a circular piece of lacework in different colours.

CIDARIDAE

Goniocidaris tubaria. The spines of this sea urchin are unusual, having horny protrusions along their length and terminating with a broad flat end. Spines are a creamy colour, with the horny protrusions tipped with brown.

Phyllacanthus parvispinus is commonly known as the slate pencil sea urchin. This is a remarkable looking sea urchin with a small number of large, thick round primary spines surrounded by numerous small secondary spines. It is found on the New South

Wales coast at low water level, and usually in small numbers as they prefer deeper water.

Another member of this family is *Heterocentrotus trigonarius*, which has large triangular spines; colour of the spines varies from fawn to dull red, with a band of white.

Spine sections of members of the family Cidaridae do not have rings like those of *Heliocidaris erythrogramma* and are more compact, but they do have the overall microscopic perforations.

TEMNOPLEURIDAE

Holopneustes inflatus is a small, nearly spherical sea urchin with short delicate spines, usually a pale flesh tint in colour. These sea urchins live among the large brown seaweeds and are only found on the beaches on rare occasions.

DIADEMATIDAE

Centrostephanus rodgersii, a large sea urchin, is found on the New South Wales coast. It has long hollow spines finely sculptured, colours ranging from a deep purple to almost black. Sections cut from the spines have the appearance of rubies.

The species mentioned here are only those which the writer has been fortunate enough to collect. There are numerous other species on the Australian coast and elsewhere which he would like to have and would be glad to receive from other collectors.

Why I enjoy Microscopy

To an enquiring mind, trained to observe, and search for the "why" and "how", microscopy reveals a whole new world that the unaided eye cannot perceive.

Until the end of secondary school years I lived on a farm where my parents encouraged an interest and appreciation of nature in its variety of forms, animal, vegetable and mineral. Tertiary education added some knowledge of mechanics, electricity, optics and illumination; but not one microscope to see through.

My first "microscope" was a 12/6 Japanese instrument, 200X, 400X, 600X in a neat wooden box, but it did not (and could not) give much satisfaction. Later my interest was aroused by an article in "Victorian Naturalist" on making a microscope with standard lens, and by microscopy exhibits at an F.N.C.V. nature show.

Now that accumulated years have released me from the rat race and left me with good sight and health, I can enjoy the pleasures and wonder of seeing the "invisible" but all-important details of life in their infinity of form and complexity. I also enjoy the fellowship of like-minded folk wiser than I in the realm of the "invisible".

It is gratifying, too, to see how friends and acquaintances appreciate what they see through my microscopes; worlds they did not know existed in plant forms, acquatic life, insects and the beauty of crystals.

U. BATES.

Notice to Authors concerning first proofs

If authors wish to see galley proofs, please enclose a stamped addressed envelope with your material and proofs will be sent to you as a matter of routine. But time is critical, and the editor should receive checked and OK'd proofs by return mail or such material could be delayed to a later issue.

Stone Age Camp Site at Frankston

BY A. E. SPILLANE*

Frankston is a large thriving city on the shores of Port Phillip Bay and has the distinction of being the main gateway to the Mornington Peninsula. Seeing the area today, it is hard to imagine that not so many years ago, a tribe of Aborigines had an important camp site about three kilometres from the heart of the present city.

The camp site

The camp site was situated just off the south side of Cranbourne Road, on a property known until recently as Ridout's Sandpits. The Aborigines had their camp high up on a sand dune. From the top of the dune they would have had a very picturesque view of the surrounding countryside. Looking north, they would have seen the mountains of the Dandenongs, to the west the waters of Port Phillip Bay, while a large amount of the flat country in between contained the large Carrum-Carrum Swamp.

From the Aborigines viewpoint, the site would have been in an ideal position. The sandy ground was comparatively dry and warm in the winter; it was near the Bay for fishing and the gathering of shellfish; the surrounding bush would have supplied mammals for food, while the extensive Carrum-Carrum Swamp would have harboured thousands of water birds in good seasons. Most important of all, just to the south of the site were swamps containing water for the needs of the camp.

When the Peninsula was first settled, the Bunurong tribe of Aborigines inhabited the area. In all probability, it was people from that tribe who occupied the site.

In 1908, the property containing the camp site was acquired by the Ridout family and used for the extraction of sand for the building industry. Originally, the area was covered by the heathland flora which was typical of this part of the Peninsula.

*President, Peninsula Field Naturalists' Club.
Photographs by author.

Plate 1. Ground-edge axe from the site; 22.1 cm long.

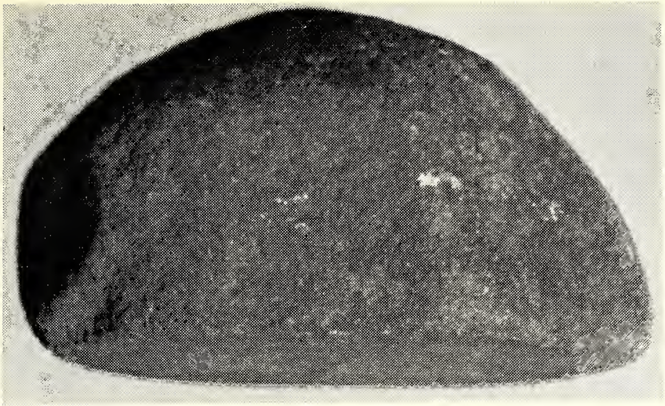


Plate 2. Muller found at the site; 6.5 cm long.

Stone implements

Several years ago when Mr. M. H. Ridout was removing sand from a locality on the property close to a large reed-covered swamp, he uncovered a ground-edge axe resting on marl. The soil covering the axe contained charcoal. The axe (Plate 1) is the largest and one of the finest specimens from the Peninsula that the writer has examined. The stone from which it was manufactured is "greenstone" (metabasalt), possibly from one of the Aboriginal quarries at either Mount William or Mount Camel in Victoria. Its dimensions are 22.1 cm long by 9.2 cm by 4.3 cm.

Another interesting find made by Mr. Ridout on the property was a muller (Plate 2); it is 6.5 cm long by 4 cm by 3.8 cm. Mullers were used in conjunction with millstones for grinding seeds from wattles and other plants for food; they are rarely found on the Peninsula.

Over the years, some very interesting microliths — the "pygmy" stone implements of the Aborigines — have

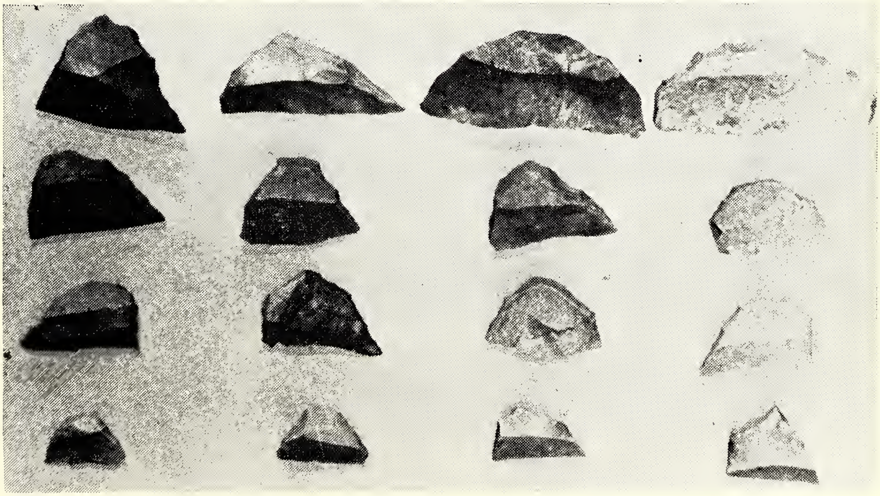


Plate 3. Microliths from the site; actual size.

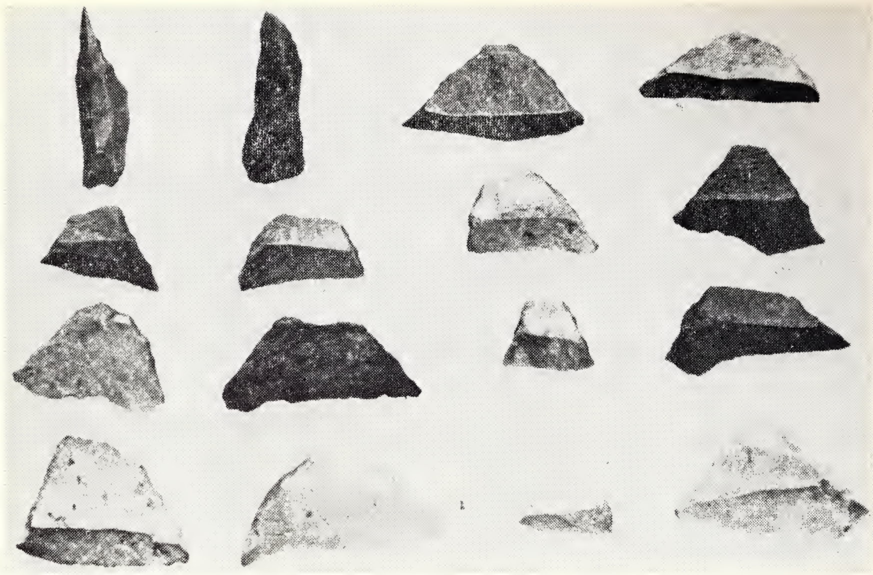


Plate 4. Trapezes, points, and triangle from the site; actual size.

been found at the site. They include segments, trapezes, scrapers, flakes, and Bondi points. The main types of stone materials used in their manufacture were fine and coarse-grained quartzite, quartz and chert.

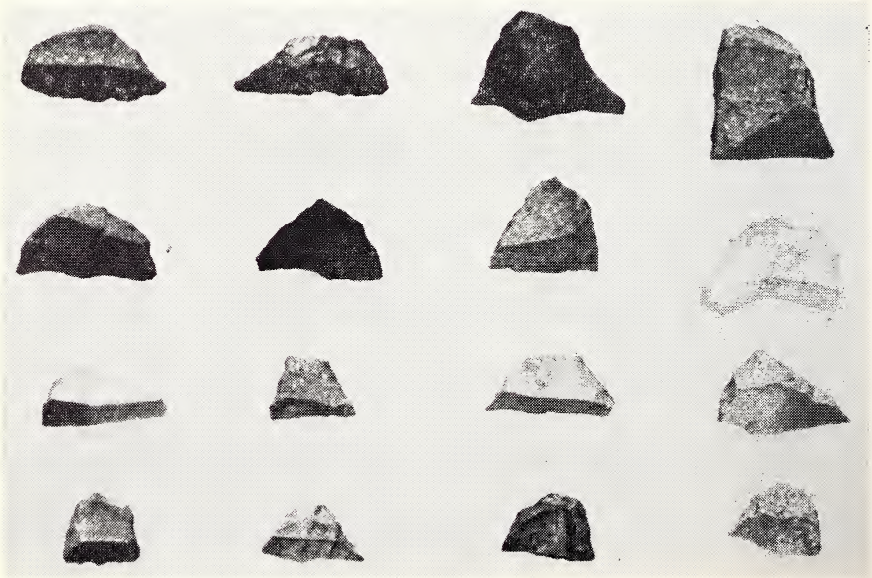


Plate 5. Microliths from the site; actual size.

The microliths from the site are particularly interesting as they cover a large range of types and sizes. Plate 3 shows a group of segments. On the extreme right, top row, is a sturdy specimen 30 mm long, while another example at extreme left, bottom row, is only 11 mm long.

The trapezes in Plate 4 range in length from 29 mm to 12 mm. An interesting microlith in this group is the triangle, extreme right, bottom row; triangles are seldom found on the Peninsula. Top left is a fine example of a Bondi point; it is 24 mm long.

Plate 5 illustrates the disparity in the sizes of geometric microliths. Top right, is a very chunky type of segment, 17 mm high. The specimen on the extreme right, second row, is 18 mm long and only 2 mm thick; it shows signs of great age. The segment on the left, bottom row, is only 10 mm long.

Conclusion

The sand dune upon which the main "workshop" area of the camp was situated has now gone; the urbanization of this part of Frankston is proceeding rapidly and is removing all tangible evidence of the Stone Age people who used to roam over this region of the Peninsula.

Acknowledgement

I am indebted to Mr. M. H. Ridout for his kindness in making his axe and muller available to me for inspection and photography, also for his valuable information regarding the history of this very interesting site.

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Natural History Medallion Trust Fund

The Natural History Medallion was instituted in 1939 as an annual award in recognition of outstanding service to Australian natural history. For many years it has been financed solely by the Field Naturalists Club of Victoria.

Why is the FNCV now asking for contributions to this Medallion Fund?

Over the last five years the FNCV has paid out \$520 to maintain the Medallion award. Back in 1960 the cost was £9/10/6 and a member's subscription was £2; in effect, the cost was equal to five members' subscriptions. In 1975 the cost was \$123 and a member's subscription was \$10, so last year it took more than twelve subscriptions to meet the cost.

The purpose of the Natural History Medallion Trust Fund is to have an investment that will provide an annual contribution to help finance the award. We appeal to public institutions interested in natural history to assist in building up this Fund.

The following donations have been received and we thank the donors:

Amount invested as at 31 March 1976	\$304
Peninsula Conservation League . .	5
Mr Tom Sault	10
Total	\$319

GARNET JOHNSON, ASSISTANT SECRETARY

Mammals in the Pomonal area, The Grampians

BY J. H. SEEBECK*†

Introduction

Between 24 December 1970 and 3 January 1971 members of the Mammal Survey Group of the Field Naturalists Club of Victoria carried out a survey of the mammals of the Pomonal area of The Grampians, Western Victoria. In this paper the results of that survey and some additional data collected by the author are reported. The names of the members of the Group whose work provided the data for this paper are listed in the acknowledgements.

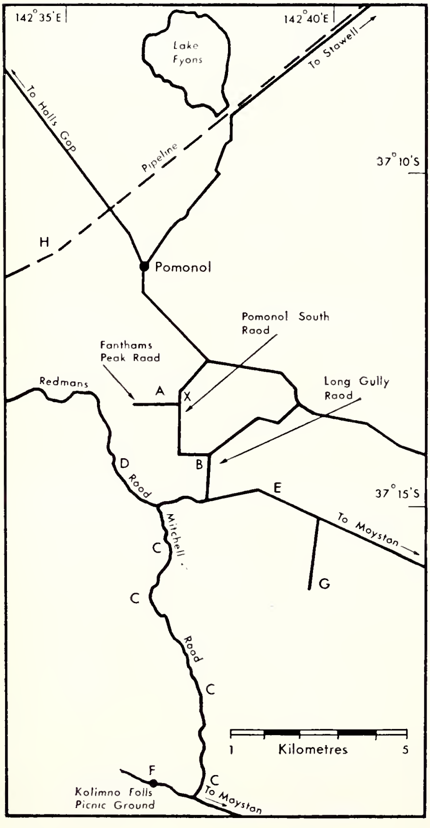

Figure 1. Survey area, Pomonal. A-H Trapping sites. X Camp.

Description of the area

The area surveyed (Figure 1) was about 3.5 km south of Pomonal township, in the eastern foothills of the Mt William Range, almost directly below Mt Cassel. Traps were set at eight sites (Figure 1) referred to as:

A. Camp area and Fanthams Peak Road
B. Jones' property
C. Mitchell Road
D. Redmans Road west
E. Redmans Road east
F. Kalimna Falls Picnic Ground
G. Moyston West
H. Stawell Water Supply pipeline.

These sites were chosen because they were representative of the different vegetation formations present in the area, and at a more detailed level, contained most of the alliances within those formations (as defined by Sibley 1967). Table 1 indicates the vegetation formation at each site.

Spotlighting was carried out near the camp in area A and at three other sites: The Black Range (Bunjils Cave Reserve); Mount Zero Road north of Halls Gap; and a part of the Serra Road and Victoria Valley Road in the northern Victoria Valley.

Incidental observations were made

*Mammal Survey Group of Victoria, C/o Secretary, 3 Harold St, Blackburn 3130.
†Fisheries and Wildlife Division, Arthur Rylah Institute for Environmental Research, 123 Brown St, Heidelberg 3084.

of mammals in other parts of The Grampians.

Land Use

Freehold land in the area is used for grazing of sheep and cattle and for growing vegetables, particularly potatoes. Most of the farms adjoining public land had uncleared or partially cleared areas abutting the uncleared public land. These farms have existed in their present form for many years but earlier had formed part of the large grazing properties of the original European settlers in the district.

Public land investigated during the survey was mostly Reserved Forest forming a part of The Grampians State Forest which is administered by the Forests Commission, Victoria.

Geology and Soils

The geology of the Grampians has been described in detail by Spencer-Jones (1965) and the soils by Sibley (1967). The area surveyed comprised two different categories:

(a) that north of Redmans Road, which is part of the Grampians Plains land-system outwash slopes, with deep sandy nomopodsolic soils developed on siliceous sands derived from the carboniferous sandstones of the ranges, and

(b) that along Mitchell Road, south of Redmans Road, which is part of the Grampians Ranges land-system, composed of coarse to medium quartzose sandstones. The soils developed on this base are rocky, iron nomopodsols.

Vegetation

Vegetation formations varied from dry sclerophyll forest through scrub to heathland.

The dry sclerophyll forest in the northern section was intermingled with heath-woodland. Along Mitchell Road on the more skeletal soils, most of the area was covered with dry sclerophyll forest and heath-woodland, open heathland and some wet creek gullies where the understorey vegetation was typical of the wet sclerophyll forests in The Grampians.

The major plant alliances in the dry sclerophyll forest and heath-woodland were the messmate-scentbark alliance and the brown stringybark-messmate-scentbark alliance. The main differences between the two alliances were in the spacing and form of the trees which reflected the comparative dryness or wetness of their respective sites. The heath understoreys present in both alliances were 1-2 m high and included several species of *Acacia, Banksia marginata, Leptospermum juniperinum* and *Xanthorrhoea australis* as major components.

The dry scrub along Mitchell Road was composed largely of heath understorey species with scattered, stunted eucalypts — long-leaf box (*Eucalptus goniocalyx*) and brown stringybark (*E. baxteri*) being the most common.

The heathland in the area was mainly that included in the prickly teatree-silver banksia alliance. Many other species including *Casuarina paludosa* and various species of *Xanthorrhoea, Hakea, Acacia, Pultenaea, Dillwynia, Melaleuca, Leucopogon* and *Epacris* were present.

Climate

Sibley (1967) has described certain elements of the climate of The Grampians in some detail, particularly rainfall and temperature. The survey area lay mostly between the 650-700 isohyets, but the southern area along Mitchell Road lay between the 750-900 mm isohyets. There is a late winter maximum and a summer minimum distribution of rainfall.

Temperature records for The Grampians area are available only for Horsham, Ararat and Hamilton and

Table 1.
Trapping and spotlighting effort.

Site	Vegetation formation*	Number of trap nights	Number of spotlight hours
A	HW	385	8
B	HW	58	—
C	S	190	—
D	DF	24	—
E	DF	11	—
F	DF	29	—
G	HW	14	—
H	DF	10	—
Black Range		—	—
Victoria Valley		—	6.5
Mount Zero Road		—	4
Total		721	21.5

*HW = heath-woodland, DF = dry sclerophyll forest, S = scrub.

show that July is the coldest month with a mean maximum temperature of about 8°C, and February the hottest month with a mean maximum temperature of about 19°C.

During the period of the survey the weather ranged from very hot and dry to cold, wet and windy.

Methods

Trapping was carried out with wire mesh cage traps, 360 x 200 x 165 mm, and some folding aluminium traps, 450 x 160 x 150 mm, baited with a mixture of peanut butter, rolled oats and honey. Traps were set for only one night at each site except those near camp, where traps were set for up to three nights.

Along Fanthams Peak Road a grid of 95 trap stations was set out in conjunction with Miss M. Stanley (now Dr. M. Happold) of the Department of Zoology, Monash University. This grid system covered an area of approximately 3.5 ha, and traps were set for three nights for a total of 182 trap nights.

Mist nets were set on two occasions to catch bats. Spotlighting, using 6-volt portable spotlights, was carried out on foot and from motor vehicles. Chance sightings of mammals were recorded and skeletal material found was collected.

Table 1 gives a summary of the trappings and spotlighting effort.

Results

During the survey 15 native species and 4 introduced species of mammals were recorded in the Pomonal area. Details of trapping and spotlighting results are given in Tables 2 and 3.

Table 2. Trapping results. Number of animals caught.

Species	Number of each species caught at 8 sites: A	B	C	D	E	F	G	H	Total number of each species caught
Antechinus flavipes	9	1							10
A. stuartii			9	1		3			13
A. swainsonii	2		3						5
Isoodon obesulus	22	2							24
Trichosurus vulpecula				1				1	2
Potorous apicalis	16								16
Rattus rattus		1				1		1	3
R. lutreolus		8	4	1		1			14
Mus musculus	1	4							5
Pseudomys shortridgei	25		2						27
Total number of animals trapped at each site	75	15	19	3	0	5	0	2	
Number of species at each site	6	4	5	3	0	3	0	2	
% Trapping success	19.48	25.86	10.00	12.5	0	10.35	0	20	

Records of a further two native species collected by the author are included and the presence of one further species of macropod in the areas is considered possible.

Notes on the Species Recorded

Voucher specimens which have been retained form a part of the collection of the Fisheries and Wildlife Division, Ministry for Conservation, Victoria.

Echidna, *Tachyglossus aculeatus*

Only three individuals of this species were seen during the survey. Two were observed in daylight near the camp and one by spotlighting along the Victoria Valley Road. In March 1968 the author observed two animals, one on Fanthams Peak Road, the other on Redmans Road within the Reserved Forest. No specimens were collected.

Yellow-footed antechinus, *Antechinus flavipes*

This species was encountered only in the heath-woodland areas close to the campsite and in similar habitat near the Long Gully Road junction. The author also recorded this species at Moyston West in March 1968.

Echidna, *Tachyglossus aculeatus*. Photo by John Wallis.

Of the 10 individuals trapped, two were juvenile males, one was an adult male, one was a juvenile female and three were adult females. The sex of three animals was not determined. One of the adult females was lactating.

Traps were usually collected in the morning so it is not known at what time animals were trapped; however, two animals were trapped during daylight. Diurnal activity is not uncommon within the genus *Antechinus*.

Specimen: 5641.

Brown antechinus, *Antechinus stuartii*

A. stuartii was trapped only in the southern section of the survey area, along Redmans Road and Mitchell Road, in the Grampians Ranges land-

Table 3. Spotlighting Results.

Species	No. of each species seen at 4 sites				Total no. of each species seen
	A	Black Range	Mt Zero Road	Victoria Valley	
Tachyglossus aculeatus				1	1
Phascolarctos cinereus	2		2		4
Trichosurus vulpecula	2	3	2	6	13
Pseudocheirus peregrinus	4		1		5
Petaurus breviceps	6		1		7
Macropus giganteus	2			53	55
M. fuliginosus					
M. rufogriseus	4			4	8
Vulpes vulpes				1	1
Total number of animals seen at each site	20	3	6	65	
Number of species at each site	6	1	4	5	

Swainson's antechinus, *Antechinus swainsonii*. Photo by Leigh Winsor.

system. Capture sites varied from the dry rocky bed of a creek to heathland, but most were near creeks in very dense ground-cover.

The ratio of female to male captives was about 2:1 with most animals (9 of 13) being juvenile or sub-adult. The only adult animals recorded were female.

Specimens: 5639, 5646.

Swainsons antechinus,
Antechinus swainsonii

Two female and three male animals were trapped. All were adult. The species was found in heath-woodland near the camp, but along Mitchell Road creekside vegetation appeared to be the preferred habitat.

Specimens: 5633, 5643.

Short-nosed bandicoot,
Isoodon obesulus

Most of the specimens were taken in the heath-woodland along Fanthams Peak Road. Two animals were trapped in dense bracken beside a creek about 2 km south of the camp site.

The trapping records indicate a sex ratio of 1:1, but a number of animals were recaptures. About 50% of males and 75% of females were adult. Three females had pouch young litters of 1, 2 and 3. The single young and 1 of the litter of 2 were rejected by their mothers whilst in the trap.

On the grid area along Fanthams Peak Road, *I. obesulus* was trapped on two successive nights. Eight animals were trapped on the first night and seven of these were marked at that time. Eight animals were trapped on the second night. Of these, two were confirmed recaptures and one, a juvenile, probably a recapture. No bandicoots were trapped on the grid on the next night.

Specimens: 5643, 5653.

Koala, *Phascolarctos cinereus*

All animals seen were detected by spotlight. An adult female and associated juvenile were seen along Fanthams Peak Road and two adults were seen along Mt Zero Road north of Halls Gap. Many animals were heard calling in the general vicinity of the camp. No specimens were collected.

Brush-tailed possum,
Trichosurus vulpecula

Brush-tailed possums were encountered in all areas surveyed. Two adult animals were trapped, one on Redmans Road, the other at the pipeline tunnel. Spotlighting near the camp, north of Halls Gap, in the Bunjils Cave Reserve and along the Victoria Valley Road revealed low numbers of the species.

The sex of only a few animals was determined and no juveniles were reported. Road-killed specimens were seen along roads in the area.

Specimen: 5636.

Ring-tailed possum,
Pseudocheirus peregrinus

Few ring-tailed possums were observed by spotlighting. Most of those seen were along Fanthams Peak Road and they included two animals which were disturbed at a nest hollow some 5 m above ground level. The mummified remains of a juvenile and an old, weathered skull were found near the camp area. In 1968 the author found, by spotlighting, that the species was very common along Fanthams Peak Road and near the camp.

Specimens: 5660, 5661.

Sugar glider, *Petaurus breviceps*

Four animals were seen along Fanthams Peak Road in one evening's spotlighting. One was feeding on flowers of a *Banksia marginata*. In addition to one animal being seen, two others were heard calling in the Mt Zero Road area, north of Halls Gap.

On 30 December, while watching mist nets strung across a small dam in a paddock near the camp, three animals were observed in a tree alongside the dam. After the initial sighting the animals disappeared and it was some time before they were again located, by careful listening. No other trees were within gliding distance. Finally one animal was observed from a distance of about 1 m; it was licking sap that had collected in a pocket where a branch joined the main trunk. Subsequent investigation showed that at the pocket and elsewhere, the bark had been incised in a small "v" so that the sap was diverted into the branch-trunk pockets. No specimens were collected.

Feather-tailed glider,
Acrobates pygmaeus

In 1968 the author was shown a photograph of an *A. pygmaeus* which had been collected at Fyans Creek (14 km north of Pomonal township) in March 1967. Another specimen found in a house at the junction of Redmans Road and the Pomonal South Road was also reported to the author in 1968.

Potoroo, *Potorous apicalis*

This species was found only near the camp in the heath-woodland along Fanthams Peak Road. Thirteen potoroos were caught on the grid and three nearby. The 13 were marked with ear-tags and comprised 5 adult males, 5 adult females and 3 animals whose sex was not determined. One of these was an independent juvenile. Four of the five females were carrying pouch young.

Specimens: 5642, 5655.

Grey kangaroo, *Macropus* sp.

Near the camp during the survey two animals were spotlighted, a mob of 12 was seen in daylight in open paddocks and two skulls were collected. On 2 January 1971, 53 individuals were seen by spotlight along the Victoria Valley and Serra Roads. Grey kangaroos are regularly seen in Halls Gap township and road kills are not uncommon along the Grampians Road.

At the time of the survey, members of the Group did not distinguish between the two species of grey kangaroo — *Macropus giganteus* and *M. fuliginosus* — that occur sympatrically in parts of The Grampians. Records kept at the time refer only to "grey kangaroo". From observations by the

Feather-tailed glider, *Acrobates pygmaeus*. Photo by courtesy Fisheries and Wildlife.

author and others since the survey it seems probable that most of the animals seen on the eastern side of the Mt William Range were *M. giganteus.* However, the species composition of the 53 grey kangaroos observed in the Victoria Valley cannot be established since both species occur there with *M. fuliginosus* present in greater proportion (K. Norris, Fisheries and Wildlife Division, Victoria, pers. comm.).

Red-necked wallaby
Macropus rufogriseus

A few of this species were seen during spotlighting near the camp, along Mt Zero Road north of Halls Gap, and in the Victoria Valley. Five animals were also reported as daylight sightings, and two skulls were collected.

In 1968 the author observed red-necked wallabies in the camp area, along the Grampians Road, at Silverband Falls and at Watgania Gap. The species appears to be widespread in The Grampians.

Specimens: 5657, 5659.

Chocolate bat, *Chalinolobus morio*

A mist net set partly over the water of a dam and partly among trees trapped an individual of this species close to the surface of the water.

Specimen: 5656.

Rabbit, *Oryctolagus cuniculus*

Moderate numbers of rabbits were seen in cleared paddocks, near the camp. No specimens were collected.

Black rat, *Rattus rattus*

Only three animals were trapped, all in widely separated localities. Two were taken in very rocky terrain, and from later observations by the author and others (K. Norris, pers. comm.) it appears that *R. rattus* has successfully occupied many of the rocky areas in The Grampians. All animals trapped were adult, two were males and the sex of the third was not determined.

Specimens: 5637, 5644.

Swamp rat, *Rattus lutreolus*

Swamp rats were captured in most areas where traps were set, although not in large numbers. Most were taken near creeks or swampy areas in dense vegetation — bracken, waterfern or wiregrass with teatree or paperbark shrub cover. In 1968 one swamp rat was captured in the kitchen garden of the farm-house near the camp. All animals examined were adult. Of 13 animals, 8 were males and 5 were females. There were no obvious external signs of recent breeding.

Specimens: 5640, 5645, 5647.

Heath rat, *Pseudomys shortridgei*

Most specimens were caught in heath-woodland along Fanthams Peak Road, on the grid set out by M. Stanley. A total of 13 animals were caught at this location and were marked.

The sex ratio was about 1:1. Eight animals, mostly males, were recaptured during the trapping period. One animal was recaptured twice in one day. Most animals were adult or

Heath rat, *Pseudomys shortridgei.*
Photo by J.H.Seebeck.

nearly so, but at least three were juveniles.

A further specimen was caught on the Pomonal South Road about 1 km south of the grid and two others were taken some 11 km south near the junction of Mitchell Road and Moyston Road.

In 1968 the author obtained two specimens from heath-woodland south of Redmans Road, 6 km south-west of the camp but although this site was re-trapped during the present survey, no animals were captured.

Specimens: 5638, 5649.

House mouse, *Mus musculus*

Four of the animals trapped were taken along a creek running through open farmland south of the camp. *Rattus lutreolus* was also present at this site. The remaining animal was collected on the perimeter of a paddock near the camp.

Specimens: 5648, 5650, 5654.

Water rat, *Hydromys chrysogaster*

No specimens were encountered during the survey. However, A. E. Howard, a member of the Group, has seen and photographed the species in Lake Fyans, and in March 1968 the author trapped an adult male on a creek bank adjoining Mitchells Road about 1 km south of Redmans Road. In April 1968, specimens were collected at Silverband Falls (south-west of Halls Gap) and in a creek 2 km east of Grampians Road along Redmans Road. In February 1969 a further specimen was taken in Fyans Creek at Borough Huts. It therefore appears that the species is present in many waterways in The Grampians but the population density is low.

Specimens: R3398, R3431, R3432, R3734.

Fox, *Vulpes vulpes*

Apparently foxes are present in low density in the forest and farmland. One was seen near camp in daylight, one was spotlighted in the northern Victoria Valley and two skulls were retrieved from the carcasses of shot animals.

Specimens: 5662, 5664.

Discussion

The Grampians have long been known for the diversity and the unusual character of their flora, and are shown by the results of this survey to support a wide range of mammal species.

Three dasyurids, all species of *Antechinus,* were encountered. *Antechinus stuartii* was restricted to the dry forest in the southern and western parts of the study area, particularly along creeks, while *A. flavipes* was found only in the heath and heath-woodland. *A. swainsonii* was found in heath-woodland and also in streamside vegetation. From our observations there does appear to be a general separation of *A. stuartii* and *A. flavipes* on habitat selection, but Wakefield & Warneke (1967) reported sympatry between *A. stuartii* and *A. flavipes* at Glenlofty in The Pyrenees (about 50 km to the east of The Grampians) where the habitat is dry sclerophyll forest and woodland.

Isoodon obesulus, the only peramelid recorded from The Grampians, was taken only in areas of sandy soil. I. McCann of Stawell (pers. comm.) reported that the numbers of *I. obesulus* in the Pomonal district seem to

Table 4. Trapping success in different vegetation formations.

Vegetation Formation	Number of trapnights	Number of animals caught	Success %
Heath-woodland	453	90	19.9
Dry sclerophyll forest	78	10	12.8
Scrub	190	19	10.0

have increased since myxomatosis was introduced in the early 1950s and the consequent reduction in rabbit numbers. This may have been because of reduced disturbance of the soil allowing more availability of food for the bandicoots, or just the removal of physical conflict between the two species.

This survey indicates that the koala population is low in the eastern foothills. It is possible that these animals are descendants of those released at Halls Gap in 1957, when 611 animals were transferred from French Island (Fisheries and Wildlife Division records). However, koalas were rare and restricted to uninhabited regions of The Grampians (Audas 1925), so it is possible that the present population levels in the Pomonal district are similar to those existing before the re-introduction programme commenced.

Only four species of possums (representing three families) were recorded during the survey and their numbers were low. This is in accord with previous and subsequent experience that most of the stringybark forest in The Grampians generally supports only sparse possum populations (K. Norris, pers. comm.). Most of the ring-tailed possums were seen in the heath-woodland area but they occur in the dry foothill forest and in the remnants of roadside woodland near Pomonal itself.

Wakefield (1963) reported the presence of *Potorous* in an Holocene sub-fossil assemblage from the northern end of the Victoria Range, some 40 km to the west, but the Pomonal area is the only part of The Grampians where potoroos have been collected recently. Pomonal now supports the only known inland population of this species in Victoria, all other populations being coastal (Portland district, Otway Ranges, French Island and East Gippsland).

The difficulties of determining the species of grey kangaroos recorded has already been mentioned. The other large macropod present in the surveyed area, *Macropus rufogriseus,* was found to be widespread and common in The Grampians.

Although only one bat species was identified, it is very likely that a number of other species are present.

Rattus lutreolus was found to be widespread and common, but *Pseudomys shortridgei* was much less widespread, and was restricted to heath-woodland. *P. shortridgei* has been found only in The Grampians and in the Portland-Nelson-Casterton area, although it was originally found in Western Australia (Thomas 1906) where it is now apparently extinct. It is of interest that *Rattus fuscipes,* the most abundant native mammal in Victoria is not found in The Grampians. Wakefield (1963) reported Holocene sub-fossils of *R. fuscipes greyi* at two sites in The Grampians but this is the only indication that the species may have once occurred there.

The heath - woodland vegetation formation appeared to suppport the greatest variety of species (Table 2) and also had the greatest numbers of animals present, as shown by the trapping successes (Table 4). At heath-woodland sites trapping success was nearly twice that of dry sclerophyll forest and scrub. In addition, several species were collected only in heath-woodland—*Antechinus flavipes, Isoodon obesulus, Potorous apicalis* and *Pseudomys shortridgei.* These last two species have a restricted distribution in Victoria (as outlined earlier) and the populations in the Pomonal area are of importance in their State-wide conservation.

In view of this, it is regrettable that a large part of the heath-woodland in the surveyed area was and still is freehold land, potentially subject to drastic habitat alteration at any time. This vegetation formation, developed on the Mt Cassel sub-unit of The Grampians Plains land-system is very restricted and mostly cleared (Sibley 1967). The diversity of the mammal fauna present within it, as reported here, adds weight to the consideration that the conservation of its remaining natural sections is urgent.

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Feral Cats in the Western District

Recently there was an account in the Melbourne "Herald" of a cat "as big as a fox" that had killed several sheep near Geelong. It encourages me to report the following incident which occurred three years ago, off Wild Dog Road near Apollo Bay.

Just before sunset I left camp and wandered along a track on the chance of getting a rabbit, although the surroundings were mostly scrub and forest. But the track opened on a clearing and there was my rabbit. As I raised the rifle, something else caught my eye. A little to the left of the rabbit was a huge tabby cat, perched on its hindquarters and gazing straight at me. It was as big as a full-grown Alsatian dog, with a round face and a particularly thick neck, but in other respects just an ordinary cat.

Realising that few would credit my report without evidence, I transferred my aim to the cat, fired — and missed. The beast merely turned its head to look at where the bullet had struck.

My brother was some distance behind me and I shouted excitedly to him to come quickly. This sent the cat bounding off. With typical cat-like lope it moved into the surrounding bracken. My brother was in time only to see a dark shape disappearing in the bush and asked if it were a wallaby. At least he was close as to size, and the movement of a wallaby through scrub with head down would not be so dissimilar.

There is little doubt in my mind that some feral cats have grown to giant proportions and possibly could account for the occasional sighting of "panthers". Incidentally, this cat would have had no trouble in bringing down a healthy sheep or even bigger game.

Perhaps other members have a similar story to tell?

COLIN DOUGLAS, GLEN WAVERLEY.

Water in Lake Eyre

BY M. G. CORRICK

While travelling in South Australia in July and August 1975, a visit was made to Lake Eyre which then contained water. It is the second time this century that Lake Eyre has filled.

Conditions in past ages

The history of Lake Eyre may be traced from Cretaceous times when Central Australia contained an extensive sea.

This was followed by a period of great lakes when rainfall was high and water probably covered many thousands of square miles to depths of some hundreds of feet. The warmer, moist climate produced luxurious vegetation, such as gave rise to the Leigh Creek coalfields. Fossil discoveries at Lake Callabonna and similar areas give evidence of the presence of large herbivorous marsupials.

By the time man appeared in Australia the climate was arid and the inland lakes were drying out.

The first explorers suspected that there might be a great sea in the interior of the continent. E. J. Eyre, after whom the lake was named, found water in an arm of Lake Eyre South in 1840, but he did not go on to find Lake Eyre North.

In the present century there have been several scientific explorations; all those prior to 1949 found the lake to be a dry salt pan, and it was generally believed, at least until the early 1930's that the lake could never fill.

Most arid region in Australia

The present Lake Eyre has a total area of 8,000 km^2 (3,000 sq miles) and is a drainage basin for approximately 1,300,000 km^2 (500,000 sq miles) of inland Australia, a region about eight times the size of Victoria. Much of the catchment has a very low rainfall and in normal years the drainage from south-eastern Queensland into the Warburton and Coopers Creek is dissipated before reaching the lake. The Lake Eyre region itself is the most arid in Australia, having an annual fall of less than 127 mm (5 inches), whereas the evaporation rate is 2.54 metres (100 inches) per year.

The lake bed is gently tilted from north to south, falling approximately 4 metres in 120 km from the northern shoreline to the lowest area in Madigan Gulf in the south-east, which was calculated in 1972 as 6.35 metres below sea level (Roma Dulhunty, 1975).

Records of water in Lake Eyre

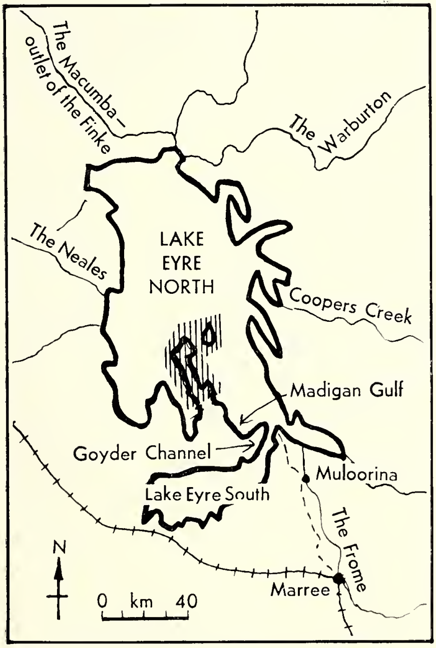
A study of early rainfall records suggests that there would have been considerable water in the lake in 1890-91, but the first filling to be observed since white settlement was in the period 1949-52 and is well documented (Bonython and Mason 1953; Bonython 1955 and 1960; Mason 1955). The peak of this flood was between September 1950 and August 1951, when water in Lake Eyre North reached a depth of 3.6 metres (12 feet); this was not deep enough to cause it to flow down the Goyder Channel to Lake Eyre South.

The present flood reached a peak in May 1974, when a maximum depth of 5.7 metres was recorded in the southern part of Madigan Gulf and 3.6 metres along the shoreline (R. Dulhunty). This was sufficient to allow water to flow into Lake Eyre South.

At the time of the visit in August 1975, 15 months after peak height, there was still considerable water in both parts of the lake, with a depth of two metres along the southern shore.

Early in 1976 further heavy rain fell over the lake and its catchments. A newspaper report on 23 April 1976 stated that the lake was filling again and was only one metre below the record level of 1974.

Some evidence of floods in the recent past has been obtained from the study of the shingle terraces round the southern parts of the Lake (J. A. Dulhunty 1975). These terraces are formed from deposits of gravel washed up round the shore by wave action. Measurements suggest that there have been three prehistoric fillings of the lake which exceeded the 1974 level. These were 2.8 metres above 1974 approx 3,000 years ago; 1.6 metres above 1974 1,500 years ago, and .7 metres above 1974 500 years ago.



||||||||||| Elliot Price Wilderness National Park.

On the way to Lake Eyre

A road to Lake Eyre North goes from Marree through Muloorina Station to the northern end of Lake Eyre South and follows the Goyder Channel to the southern shore of Lake Eyre North. (See map.)

The Muloorina lease was taken up by the late Elliot Price in 1936. His grave and memorial may be seen at the approach to the homestead. The property is now run by his family, and their cluster of houses and outbuildings form almost a village near the lagoon on The Frome. In 1963-64 the property was used as a base by the late Donald Campbell when he successfully broke the land speed record for a wheel driven vehicle on the dry bed of the lake. During this time, up to 200 people were housed or camped at the homestead.

Some birds of the area

The Frome Lagoon was excavated by Elliot Price and the water supplemented from a bore. This delightful oasis attracts large numbers of birds.

Numerous Black (Fork-tailed) Kites were seen roosting in the trees as well as circling overhead. These birds are a familiar sight in inland Australia; they feed on carrion and refuse, and large flocks congregate around homesteads, killing yards and rubbish dumps. Both the Australian Raven and the Little Crow were observed near Muloorina; the presence of the latter was confirmed by examination of a dead bird.

The water and associated growth provided a suitable environment for Reed Warblers, Welcome Swallows, Willie Wagtails and Magpie Larks which were all seen near the lagoon. A pair of Ground Cuckoo-shrikes were also seen among the scattered Acacias not far from the lagoon.

Beyond Muloorina the track crosses gibber plains and here the Gibber Bird and Australian Dotterel were seen. As a result of local rain there were extensive areas of shallow pools, and Black-tailed Native Hens were present whenever Cane Grass (*Eragrostis australasica*) or small shrubs provided cover. A Black-breasted Buzzard was seen circling overhead in this area.

Approaching Lake Eyre the gibber plain gives way to low sand-hills sparsely covered with small shrubs. Orange Chats were plentiful and easily observed perched on the tops of bushes. The White-winged Wren was also here, but was more elusive and only a few males in breeding plumage were seen.

Enormous flocks of tiny flies were encountered in the vicinity of the lake; they were of the size and appearance of mosquitoes and sounded like them but did not bite. Great clouds of them seen from a distance appeared like an approaching "willie-willie". Eric Bonython (1971) also observed them in 1950 and we found it necessary, as he did, to withdraw about 8 km from the water's edge before making camp.

It was not possible to walk to the water's edge of Lake Eyre South due to the large expanse of soft mud left by the receding water. However, good views were obtained of the birds crowding the margins. The most plentiful was the Avocet in flocks of several hundred, as well as large numbers of Pelicans, Black Cormorants, Seagulls and a few Black-winged Stilts.

The shore-line of both lakes was littered with dead fish, identified at Muloorina as Bony Perch. Apparently these breed in Coopers Creek and are carried down by flood waters to die in the saline lake water. Their presence in large numbers suggests that they may provide food for the Pelicans and Cormorants.

In Goyder Channel there were large flocks of Pink-eared Duck, Grey Teal and White-eyed Duck, as well as Pelicans and Hoary-headed Grebes. The road built across the channel to provide access to the lake for Donald Campbell's speed trials has been submerged by the flood waters. This road also enabled the Price family to make use of the western portion of their lease, but since the filling of the lakes and channel they have had to make a long detour round Lake Eyre South to reach this part of the property.

Lake Eyre North on 10th August 1975, although about two metres below the maximum level of May 1974, was still a magnificent stretch of seemingly endless water, with a sloping beach of clean white sand. It was a clear sunny day with a light breeze and rather hard to realise that these surroundings, so like the sea-side, were in fact some 700 km from the coast and below sea level.

Pelicans, Cormorants and Whiskered Terns were seen in this area but conditions were apparently not suitable for ducks or waders.

The bird list (Appendix 1) is of species seen between Muloorina homestead and the lake and is obviously not comprehensive.

Desert plants

Among the scattered shrubs close to the water's edge *Scaevola collaris* (Fan-flower) was blooming well, and little piles of fruits were found blown together into depressions in the sand. The innermost covering of the seed is extremely hard and well-adapted for survival in arid conditions.

Atriplex spongiosa (Pop Saltbush) was a conspicuous shrub at the margin of Lake Eyre South. The large, rounded, bright green bushes were up to 1 metre high and 1½ metres across. When young, the spherical fruits are like little balls of pale green foam plastic about 1 cm in diameter.

A small collection of plants found in flower close to the lake was made and is listed below (Appendix 2). It would appear that there had been a flush of flower some weeks earlier; some species were in fruit but not many annual or ephemeral plants were seen. No attempt was made to identify or collect species not in flower.

The making of lists was incidental to the main aim of the trip which was to experience and enjoy the rare spectacle of Lake Eyre under water.

Appendix 1

Birds observed on Muloorina Station and on and around Lake Eyre, 9-10 Aug. 1975. Common names according to 'A Field Guide to Australian Birds', Peter Slater.

Emu, Hoary-headed Grebe, Pelican, Black Cormorant, White-faced Heron, Black Swan, Grey Teal, Pink-eared Duck, White-eyed Duck, Black-shouldered Kite, Black Kite, Square-tailed Kite, Black-breasted Buzzard, Spotted Harrier, Brown Falcon, Nankeen Kestrel, Black-tailed Native Hen, Australian Dotterel, Black-winged Stilt, Red-necked Avocet, Silver Gull, Whiskered Tern, Crested Pigeon, Galah, Welcome Swallow, Pipit, Ground Cuckoo-shrike, Willie Wagtail, Reed Warbler, Brown Songlark, White-winged Wren, Orange Chat, Gibber Bird, Zebra Finch, Magpie-lark, Black-backed Magpie, Australian Raven, Little Crow.

Appendix 2

Plants seen in flower within half a kilometre of shore of Lake Eyre.

Eragrostis dielsii (Mulka Grass).
Muehlenbeckia coccoloboides.
Atriplex spongiosa (Pop Saltbush).
Salsola kali (Prickly Saltwort).
Swainsona stipularis.
Nitraria schoberi (Nitre Bush).
Lawrencia glomerata (Salt Lawrencia).
Frankenia sp. (Sea-heath).
Trichodesma zeylanicum (Cattle Bush).
Morgania glabra (Blue-top).
Scaevola collaris (Fan-flower).
Brachycome sp.

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Frankenia sp. (Sea-heath).

Natural History at the Coast

Kitty has one article in hand for our special coast issue in December; it deals with channels in shore platforms. And there are some promises, most of them unspecified but they include a short elementary item on Galeolaria, a more erudite one on organisms associated with Galeolaria, and another substantial article on tides.

We hope to receive material on geology, birds, land plants and seaweeds, mammals, insects and other invertebrates. There are so many things at the coast to interest naturalists.

Material for this coast issue should be with the editor by 30 September.

Observations of the Rainbow Bird *Mirops ornatus* in the Warby Ranges

September 1975-March 1976

BY I. C. MORRIS*

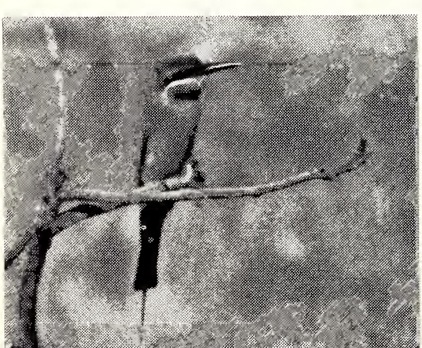
The area under observation was in a small clearing (about three acres) among dry eucalypt woodland in the Warby Ranges, south of Wangaratta. Nesting burrows of the Rainbow Birds were on sparsely vegetated slopes of granite gravel soil.

Arrival of birds

A few birds were first seen on 25 September, having migrated south from wintering in Northern Australia, New Guinea, Philippines, etc. Each day the numbers increased until approximately 50 birds could be seen at one time, usually in small flocks of 8-14 birds. They constantly called their characteristic "churr" as they circled around the tree tops or landed on high dead twigs.

Preparation of nests

About two weeks after arrival there were signs of some birds pairing off and they would land on the ground and start digging for brief periods but then appeared to abandon the attempt.



Male Rainbow Bird on observation twig.

Four to five weeks of excessively wet weather followed (10" rain in October) and birds could only be seen occasionally, keeping to the timber, and all digging ceased.

By the 10th November the weather was fine and warm and the ground was beginning to dry out. The birds then became very active in the clearing; flying in pairs, chasing off a third bird, engaging in courtship, feeding, eating gravel-particles on paths, and scratching preliminary shallow holes in the ground. I noticed at this stage that their colouring was most beautiful and much more vivid than in September. Although considerably reduced in numbers in the past six weeks, 15 pairs were seen commencing to dig their nesting tunnels or burrows in a small area near my cottage.

Digging appeared to be done mainly by the female (distinguished by shorter pin feathers on end of tail). She would dig with her strong thick beak and then scratch a shower of dirt out behind with her feet. The male would do a short stint of digging occasionally, but mainly he would sit on an "observation twig" nearby.

Observation twig

This observation twig, as I called it, was usually 2-4 metres from the entrance of the nesting burrow and seemed to be an important adjunct to the nest. It varied from a dead twig 30 cms high to an open twig on a tree five metres high.

*South Wangaratta Roadside.

It appeared to be used for the following:

1. For the male to keep watch while the female was digging or sitting.

2. For defending the pair's territory against other Rainbow Birds.

3. To alight on and look around before entering nest.

4. To alight on before taking food to the young in the nest.

5. As a base for catching food on the wing.

6. For communication. The birds had a series of calls given while perched on this twig, such as a warning call when a predator like a falcon was in the vicinity, a soft call "tookie tookie" before entering the nest, and a loud call "cleep cleep" when calling young birds, etc.

Sitting period

The sitting period commenced approximately 26th November. The female did most of the sitting, up to two hours at a time, but the male would enter the nest for 5-10 minutes on occasions. When the female was sitting, the male kept constant watch on the observation twig, even on the hottest days when he showed signs of distress with gaping beak. He left only briefly to catch food on the wing, such as moths, butterflies, small grasshoppers, dragonflies.

Due to the sloping nature of the tunnel, and the nesting chamber being approximately 30 cms deep, it was not possible to see the birds sitting or the number of eggs, even with the use of mirrors and torches.

As I did not take daily observation notes I cannot say accurately how long the incubation stage lasted but it was probably three weeks.

Feeding young

Feeding the young was first observed on 18th December, and it was shared by male and female. At first very small insects — flies and tiny moths were taken into the young, but after two weeks they were given larger insects such as dragonflies, grasshoppers, butterflies, beetles; only once I saw bees taken to the young although there was a beehive nearby. At one nest I observed multiple feeding (see below).

Young birds remained in the nest for approximately four weeks, and were fed with increasing frequency as they got older. For the last few days before emerging they came close to the entrance of the burrow; the adult birds would carry food to the entrance, but not enter. I was able to see young birds near the entrance with the aid of a mirror.

Leaving the nest

When the young birds left the nest, commencing 13th January, several adult birds would be seen excitedly and noisily flying round the entrance giving the "cleep cleep" call. Near sunset (2030 hours D.S.T.) five to six adult birds would take part in another noisy excited melee, as they helped to drive the young back into the nest for the night. This usually happened for three evenings, though the third time was rarely successful, and the young and adult birds finally would fly off into nearby tall timber and were not seen near the nest again.

I am not sure how many young birds were in each nest, as the times taken to emerge and re-enter nest were brief (1-3 minutes) and I was not often on the spot when it happened. However, I was able to count three young from Nest 1, three from Nest 3 and one from Nest 4. I could have missed some, of course, due to the excited circling and swooping of the adult birds.

The young birds appeared to be three-quarter size when they emerged and their colours were dull and lacked the black band on the neck. Their tails were short and broad and without the two long pin feathers at the end.

Once the young had left the nest all birds kept to the forest area and could be seen or heard occasionally. About a fortnight before they left the locality for their northern migration, birds were seen in small flocks (8-20) circling constantly around the nesting area. The last date the birds were seen by me was 14th March.

Mutual help

One of the most interesting parts of my observations was what I called "mutual help", such as:

1. At one nest I saw constant multiple feeding by 6-8 birds but, strangely enough, not at any other nest.

2. If a goanna approached the nest site, five to eight birds would be seen swooping and diving noisily to drive it away, always successfully.

3. Several adult birds (as mentioned previously) would gather around to assist in encouraging young birds to emerge from the nest and later to drive them back into the nest. I do not know whether these extra birds assisting the nesting pair were from nearby nests or whether they were unattached birds living in nearby trees.

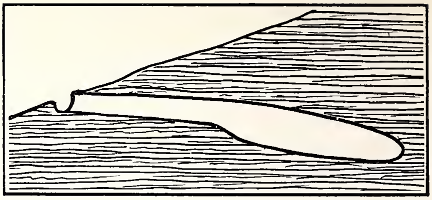
Nesting burrow

One nest was carefully excavated and measurements were taken: total length of burrow approximately 93 cm; deepest part approximately 30 cm from the surface.

Two sections of nesting burrow:

1. Tunnel: Length from entrance to beginning of nesting chamber approx 45 cm. Height approx 5 cm. Width approx 6.5 cm.

2. Nesting chamber: Length from where tunnel widens to back wall approx 38 cm. Height approx 8 cm. Width approx 20 cm.



Sketch of nesting burrow in gently sloping hillside of granite gravel soil.

The nesting chamber was large enough for two or three adult birds to enter at the same time while feeding the young, and to be able to turn around so that they emerge head first.

It seems that no nesting material was used, but the nesting chamber was found to be more than half-full of blackish droppings and debris consisting of wings, heads and shells of beetles, dragonflies, etc., and a few fine shards of white egg shell. Most of this debris was pushed to the rear part of the nesting chamber, was up to 5 cm deep and weighed a total of 1 kilogram. There were many small scavengers present including very fine white threadworms, maggots, pale grey flies and pale fawn-coloured centipede-like creatures.

Observations made during one season can give only a general picture, and this newcomer to the district will be checking that picture in following seasons.

A visit to Doughboy Island, Furneaux Group

BY J. S. WHINRAY †

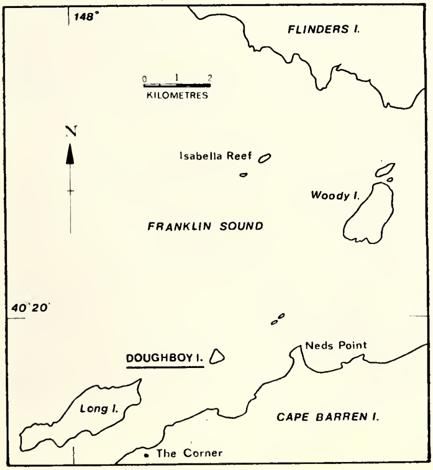
Flinders and Cape Barren Islands are the largest islands of the Furneaux Group in south-eastern Bass Strait. They are separated by Franklin Sound and Doughboy Island is in the western part of this Sound; see map.

Doughboy Island is well-named as it slopes to the sea on all sides from its central rise which is about 20 metres high. The island has not been surveyed but is about 8 hectares in area. It is a granite island and the coast is granite except at the eastern point where there are two small sand beaches and a consolidated dune.

A few sheep are grazed on the island which is leased from the Tasmanian Lands Department. My visit, which lasted an hour, was on 5 November 1969.

Eastern point

I landed at the tip of the eastern point. Hairy Spinifex *Spinifex hirsutus,* Jersey Cudweed *Gnaphalium luteo-album* and Coast Fescue *Festuca littoralis* grew on the coastal sand



here. Nearby were a few clumps of the introduced African Boxthorn **Lycium ferocissimum.* In sandy soil just in from the coast were Knobby Club-rush *Scirpus nodosus,* Bidgee-widgee *Acaena anserinifolia,* Kidney-weed *Dichondra repens* and Austral Carrot *Daucus glochidiatus.*

Most of the eastern slope of the island could be seen from this point. Blue Tussock-grass *Poa poiformis,* Pale Rush *Juncus pallidus* and Austral Bracken *Pteridium esculentum* were the dominant species on the slope. The Blue Tussock-grass was the most abundant species. No shrubs could be seen and it seemed that the vegetation was very simple. As I moved up the slope this impression soon proved false, as there were many herbs growing amongst the dominant species. The native grasses found were Long-hair Plume-grass *Dichelachne crinita* and a Wallaby-grass *Danthonia racemosa.* The introduced grasses were Giant Brome **Bromus diandrus,* Soft Brome **Bromus mollis,* Silvery Hair-grass **Aira caryophyllea,* Annual Cat's - tail **Koeleria phleoides,* Squirrel-tail Fescue **Vulpia bromoides,* Rat's-tail Fescue **Vulpia myuros* and Fox-tail Fescue **Vulpia megalura.* The other native herbs were the Common Onion-orchid *Microtis unifolia,* Yellow Wood-sorrel *Oxalis corniculata,* Leek Lily *Bulbine semibarbata* and Karkalla *Carpobrotus rossii.* The other introduced herbs were Suckling Clover **Trifolium dubium,* Sheep Sorrel **Rumex acetosella,* Four-leaf Allseed **Polycarpon tetraphyllum,* Cat's-ear

† Flinders Island, Tasmania, 7255.

Hypochoeris radicata, Centaury *Centaurium pulchellum* and Mouse-ear Chickweed *Cerastium fontanum* ssp. *triviale.*

There were some low granite outcrops on the slope and small herbs grew in the shallow soil at their margins. Sieber Crassula *Crassula sieberana,* Hairy Centrolepis *Centrolepis strigosa* and Toad Rush *Juncus bufonius* were found there.

Altogether twenty-five plant species were found on the slope. The photograph shows part of the slope.

North-eastern coast

This walk of about 150 metres brought me to the north-eastern coast about 25 metres from the eastern point. Here, on a small point, were a few tussocks of Prickly Spear-grass *Stipa teretifolia.* There were some Slender Thistles *Carduus tenuiflorus* near them and not far away was some Seaberry Saltbush *Rhagodia baccata* in a coastal granite crevice. This was the only native shrub noticed during my visit.

South-eastern coast

Next I walked to the south-eastern coast about 25 metres from the eastern point. Some herbs grew here in the sandy soil between the clumps of Blue Tussock-grass. The introduced species were Stiff Rye-grass *Lolium loliaceum,* Fern Grass *Catapodium rigidum,* Coast Barb-grass *Parapholis incurva,* Drooping-flower Clover *Trifolium cernuum* and Purple Cudweed *Gnaphalium purpureum.* The native species were Variable Plantain *Plantago varia,* Yellow Wood-sorrel *Oxalis corniculata,* Leek Lily *Bulbine semibarbata* and Sea Pearlwort *Sagina maritima.* Just to the south-west was some White Cudweed *Gnaphalium candidissimum.*

About 10 metres further to the south-west, the sandy shore gave way to a steep granite slope with ledges carrying shallow soil. Some of the herbs in this soil were Pink Purslane *Calandrinia calyptrata,* Sea Pearlwort *Sagina maritima,* Chickweed *Stellaria media,* Black-anther Flax-lily *Dianella revoluta* and a Pennywort *Hydrocotyle*

Doughboy Island: eastern slope and point. Blue Tussock-grass is in the foreground.
Photo: author

sp. The bright orange lichen *Teloschistes spinosus* (Hook. f. & Tayl.) J. Murray was collected from coastal granite below this spot.

Lichens at eastern point

Thence I returned to the eastern point and collected lichens from granite outcrops at and just out from the tip. The specimens included two collections of the orange and yellow *Xanthoria ectanea* (Ach.) Ras. ex R. Filson. All the lichens have been lodged at the National Herbarium of Victoria (MEL1013734 — 1013742). Only three of the nine collections could be determined.

Altogether forty-eight plant species were recorded for the island and a list is given below (Appendix 1). Other species are likely to occur as only about an eighth of the island was examined. The twenty-two introduced species make up forty-six percent of the island's flora. Seventeen plant specimens were obtained and lodged at the National Herbarium of Victoria, Melbourne.

All the Doughboy Island plants are widespread in the Furneaux Group where I have found them on many islands during the last eight years.

Birds

The only birds noticed were Cape Barren Geese *Cereopsis novaehollandiae*. A pair rose from the upper part of the eastern slope and flew towards Neds Point on Cape Barren Island. Another pair, that did not rise, was seen near the middle of the north-eastern coast.

Acknowledgements

Miss M. A. Todd determined the plant specimens lodged at the Herbarium and Mr. R. B. Filson determined three of the lichen specimens lodged at the Herbarium.

Appendix:
List of Doughboy Island Plants, 1969.

An asterisk marks an introduced species. M indicates a specimen lodged at the National Herbarium of Victoria.

FERN

Pteridium esculentum (Forst. f.) Nakai (Austral Bracken)

MONOCOTYLEDONS

Gramineae (Poaceae):

Spinifex hirsutus Labill. (Hairy Spinifex)
Festuca littoralis Labill. (Coast Fescue)
**Catapodium rigidum* (L.) C. E. Hubbard (Fern Grass)
M**Vulpia bromoides* (L.) S. F. Gray (Squirrel-tail Fescue)
M**Vulpia myuros* (L.) K. C. Gmel. (Rat's-tail Fescue)
M**Vulpia megalura* (Nutt.) Rydb. (Fox-tail Fescue)
**Bromus diandrus* Roth (Great Brome)
**Bromus mollis* L. (Soft Brome)
M**Koeleria phleoides* (Vill.) Pers. (Annual Cat's-tail)
M *Poa poiformis* (Labill.) Druce (Blue Tussock-grass)
M *Dichelachne crinita* (L. f.) Hook. f. (Long-hair Plume-grass)
Stipa teretifolia Steud. (Prickly Spear-grass)
**Aira caryophyllea* L. (Silvery Hair-grass)
M *Danthonia racemosa* R. Br. (Wallaby-grass)
M**Lolium loliaceum* (Bory & Chaub.) Hand.-Mazz. (Stiff Rye-grass)
M**Parapholis incurva* (L.) C. E. Hubbard (Coast Barb-grass)

Cyperaceae:

Scirpus nodosus Rottb. (Knobby Club-rush)

Juncaceae:

Juncus pallidus R. Br. (Pale Rush)
M *Juncus bufonius* L. (Toad Rush)

Centrolepidaceae:

M *Centrolepis strigosa* (R. Br.) Roem. & Schult. (Hairy Centrolepis)

Liliaceae:

Dianella revoluta R. Br. (Black-anther Flax-lily)
Bulbine semibarbata (R. Br.) Haw. (Leek Lily)

Orchidaceae:

M *Microtis unifolia* (Forst. f.) Reichenb. f. (Comon Onion-orchid)
f. (Common Onion-orchid)

DICOTYLEDONS

Polygonaceae:

**Rumex acetosella* sp. agg. (Sheep Sorrel)

Chenopodiaceae:

Rhagodia baccata (Labill.) Moq. (Sea-

berry Saltbush)
Aizoaceae:
Carpobrotus rossii (Haw.) Schwantes (Karkalla)
Portulacaceae:
M *Calandrinia calyptrata* Hook. f. (Pink Purslane)
Caryophyllaceae:
**Stellaria media* (L.) Cyrillo (Chickweed)
**Cerastium fontanum* Baumg. ssp. *triviale* (Link) Jalas (Mouse-ear Chickweed)
M *Sagina maritima* G. Don (Sea Pearlwort)
**Polycarpon tetraphyllum* (L.) L. (Four-leaf Allseed)
Crassulaceae:
Crassula sieberana (Schult. & Schult. f.) Druce (Sieber Crassula)
Rosaceae:
Acaena anserinifolia (Forst. & Forst. f.) Druce (Bidgee-widgee)
Papilionaceae (Fabaceae):
M**Trifolium cernuum* Brot. (Drooping-flower Clover)
M**Trifolium dubium* Sibth. (Suckling Clover)
Oxalidaceae:
Oxalis corniculata L. (Yellow Wood-sorrel)
Umbelliferae (Apiaceae):
Hydrocotyle sp. (Pennywort)
Daucus glochidiatus (Labill.) Fish. et al. (Austral Carrot)
Gentianaceae:
M**Centaurium pulchellum* (Swartz) Druce (Centaury)
Convolvulaceae:
Dichondra repens Forst. & Forst. f. (Kidney-weed)
Solanaceae:
**Lycium ferocissimum* Miers (African Box-thorn)
Plantaginaceae:
Plantago varia R. Br. (Variable Plantain)
Compositae (Asteraceae):
Gnaphalium luteo-album L. (Jersey Cudweed)
**Gnaphalium candidissimum* Lam. (White Cudweed)
**Gnaphalium purpureum* L. (Purple Cudweed)
**Carduus tenuiflorus* Curt. (Slender Thistle)
**Hypochoeris radicata* L. (Cat's-ear)

What do Swamphens feed on?

On Sunday morning 27 June, an Eastern Swamphen was on the small water-lily lake in the Botanic Gardens. It was standing on the lily leaves and seemed to be pecking at something. I managed to get quite near, and then the bird picked up a large fish in its bill and dragged it across the leaves. The fish was pale grey, almost as long as the bird and 10-15 cm across; a small piece was missing at the front end.

The bird placed one foot on the fish, and I watched it for several minutes: peck, peck, and look up; peck, peck, and look up. It walked away from the fish, turning over leaves with its foot and peering under them but did not seem to find anything edible. It looked around, saw a Moorhen poking the fish and returned at a rush. The Moorhen departed almost as rapidly.

When I returned three-quarters of an hour later, the Swamphen was in much the same place. And again it picked up the fish and carried it across the leaves — towards me. The fish was about two-thirds its previous size. The bird seemed to have difficulty in removing the flesh. One large foot grasped right round the fish at the narrow part towards the tail, and the bird had to tug to remove each bite so that the fish was pulled up and flopped back when the flesh came away.

Is a Swamphen capable of catching and killing a 40-45 cm fish? (With those strong feet and heavy bill, killing would seem to be less of a problem than catching.) If the bird did not kill the fish, what did? And, if given the chance, does the Swamphen feed on carrion or at least on the recently dead?

The books say that Eastern Swamphens feed on grass, aquatic plants and molluscs.

M. J. Lester, South Yarra.

The Distribution of Australian Plants

A request for information from Naturalists

BY A. C. BEAUGLEHOLE* AND R. F. PARSONS**

The available data on Victorian vascular plant distribution are based on National Herbarium of Victoria records as given in "The Distribution of Victorian Plants" by Churchill and de Corona and in the Handbook by J. H. Willis on the basis of 24 Major Grids. Much more work is needed before Victorian plant distribution is well documented even at this scale. For example, one of us (A.C.B.) has recently compiled 4,452 new Major Grid records. Victorian botanists often find plant species in a Grid Square not listed in the above sources, but such occurrences are not systematically recorded or drawn to the attention of others.

We are emphatic that it is worthwhile systematically recording such Major Grid additions, so that Churchill and de Corona's compilation can be updated, for the following reasons:

1. Although broad-scale, the Major Grid records provide a valuable starting point for much ecological and taxonomic research. New records help to indicate the occurrence of populations which would otherwise not be sampled or taken into account.

2. The Major Grid records are an essential first step in eventually producing an atlas of the Victorian flora.

3. They can be used in conservation for quantifying percentage representation of flora in reserves within any one Grid Square (see Churchill and de Corona).

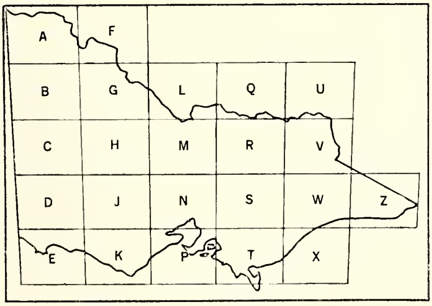
4. They are an essential first step in identifying and listing species endangered or threatened with extinction.

Accordingly, individual record cards have been designed with the aim of letting botanists easily document in standardized form new Major Grid records both from their past work and in the future. To serve the above purposes, new Major Grid records must include full data on locality, etc., all to be held on permanent file and freely available. Whenever possible, it is most important that they be supported by voucher specimens, which are important because:

1. Identification can be checked or the specimen re-named if necessary in future revisionary studies.

2. Existence of vouchers from every Major Grid Square helps ensure that variability within species is properly represented by the available specimens.

For convenience, it is preferable that these vouchers be held by the National Herbarium of Victoria, as permanent documentation of occurrence of a species in a Major Grid.



Major Grid used by botanists. Each rectangle is 1° latitude x 1.5° longitude.

*3 Beverley Street, Portland, 3305.
**Botany Department, La Trobe University, Bundoora, 3083.

We believe that such data on the distribution of Victorian plants are required as a matter of urgency. The information obtained will be critically important in determining rational land use policies in the future and in deciding just which Victorian plant species are at present threatened with extinction.

Anyone interested can obtain record cards for new Major Grid records by writing to Dr. R. F. Parsons, Botany Department, La Trobe University, Bundoora, Victoria 3083.

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Conservation of Genetic Resources of Indigenous Victorian Trees

The Forests Commission of Victoria is seeking information on the location of trees which could be of scientific interest due to variant characteristics of genetic origin. If you know of any Victorian trees or groups of trees that seem different from normal, they are the ones the Commission wants to hear about. A detailed form is available at FNCV meetings or from the Commission and should be returned before the end of 1976.

The Commission is undertaking research to determine whether any variant characteristic of a tree is due to genetic origin or merely to environmental factors. The significance of genetic variation lies in the opportunity to grow trees of improved characteristics that will be better than trees of uncontrolled seed origin.

Bibliography of works by Baron von Mueller

A bibliography of the works of Baron Ferdinand von Mueller (1825-1896) is being prepared by a team financed by the Commonwealth of Australia. We will be grateful for a list of any publications or other writings by him that may still exist in private hands. For further information please ring or write to the National Herbarium, Birdwood Avenue, South Yarra 3141; 'phone 63 7030.

D. M. Churchill, Director.

Young Little Grebes practise flying

Although there have been a number of comings and goings of Little Grebes to and from my dam in the last two years, I have never actually seen them arriving or departing. They are said to be feeble flyers and usually travel at night, so it was of interest to see the young grebes, when nearly full-grown, trying the strength of their wings.

As a preliminary, all four birds gathered in a group at one end of the dam; first one and then another flew the whole length of the dam, just skimming the surface. I observed this performance half a dozen times over a period of about a week, but I don't know the frequency in any one day. No doubt a good deal of practising went on unseen by me.

On the last occasion I observed it, one of the grebes lifted itself to the level of the top of the dam bank (3 or 4 feet up). I thought it was off, but it circled and landed on the water again.

Next day there were only three grebes on the dam.

N. T. Rossiter, South Wangaratta.

New Australian Plant for Victoria

Formerly known only from the Blue Mountains NSW, *Dampiera scottiana* was believed to be extinct

BY JEAN GALBRAITH

During the past few years we have heard of several interesting plant discoveries in Victoria's eastern highlands. One species, *Dampiera scottiana* F. Muell. collected by Mr. Evan Chesterfield, is of especial interest.

Dampiera scottiana was described by Baron von Mueller in volume 11 of "Fragmenta Phytographiae Australiae", published between 1878 and 1881, and is the only reference I can find (other than the listing in Kew Index). The description was based on the only known collection of the species by Dr. Woolls who sent it to Baron von Mueller from the Blue Mountains, N.S.W. Unfortunately I did not note the date on the Melbourne Herbarium specimen, but it must have been before 1880.

The species, although it resembles in many ways our familiar Blue Dampiera *Dampiera stricta*, is more erect and with a somewhat woody base, slightly different leaves, and smaller dark blue flowers. The really striking difference is the shining vesture of silver hairs on the flowers, very unlike the brown hairs characteristic of *D. stricta*, and unlike any other species I know except *D. fasciculata* of W.A., which differs conspicuously in other ways.

So far as I can discover, *D. scottiana* was not seen anywhere between 1880 and 1973, and it is not mentioned in the recently published "Flora of the Sydney Region", which covers the Blue Mountains plants.

When I asked the Director of Sydney Herbarium about this, I was referred to Mr. P. Smith of the Botany Department of the University of N.S.W.; he has made a special study of the group which includes *D. scottiana*. When Mr. Smith saw Evan Chesterfield's specimen, he confirmed the identification and said that he had believed *D. scottiana* to be extinct, although there are two somewhat similar N.S.W. species undescribed as yet.

It seems to me more surprising to re-discover a long lost species very far from its known habitat than to discover a new species. It certainly poses more questions.

The plants found by Mr. Chesterfield were fairly abundant in two or three small areas near McMillan's Lookout, elevation about 1,000 ft. It was on 18 June 1973. A visit in October of the same year found the plants still blooming. Perhaps June is the beginning of the flowering period for *D. scottiana* and October the end.

This discovery reminds me of the finding of *Hibbertia hermaniifolia* on Mt. Elizabeth near the Tambo River, during a Bairnsdale F.N.C. excursion some years ago. It was previously known only from Bent's Basin on the Nepean River, at the foot of the Blue Mountains.

The Origin of Generic Names of the Victorian Flora
Part 2 – Latin, Greek and Miscellaneous

(Continued from page 119 in the last issue)

BY JAMES A. BAINES

***Momordica.** Lat mordeo, bite, mordicus, biting; a genus of tropical cucurbits of twining habit, in which for 72 years **Ecballium elaterium*, Squirting Cucumber, was classified. The reason for the first syllable Mo- is obscure, but the leaves of *Momordica* are said to have the appearance of being bitten.

***Monerma.** Gk monos, single; erma, support; probably from the rigid flowering spike. **M. cylindrica*, Common Barb-grass (known in U.S.A. as Thin Tail), was listed in Ewart's 'Flora of Victoria' (1931) as *Lepturus cylindricus*.

Monoploca. Gk monos, single, alone; plokos, a lock of hair, curl, wreath. *Lepidium leptopetalum* was described by F. Mueller as a *Monoploca*, and at the same time (1855) he named Winged Pepper-cress *Lepidium monoplocoides*. All *Monoploca* species are now in *Lepidium*, family Cruciferae.

Monotoca. Gk monos, single; tokos, offspring, a birth; from the one-seeded fruit. Our three species of these epacridaceous shrubs are known as broom-heaths.

Morinda. Lat morus, mulberry; indicus, Indian; Indian Mulberry. *M. jasminoides*, Jasmine Morinda, is one of the sub-tropical plants reaching Victoria only in East Gippsland. N.E. Queensland has most of our six Australian species. *M. citrifolia*, Bankudo or Nino, is native to the Philippines, tropical Asia, Pacific Islands, but also is indigenous along the Queensland coast. The genus belongs to family Rubiaceae.

***Muraltia.** Named by N. J. von Necker after Johann von Muralt (1645-1733), a Swiss botanist. **M. heisteria* was introduced from South Africa. The genus belongs to family Polygalaceae. (Omitted from Part 1.)

***Myagrum.** Gk myagros, mouse-catcher (from myagra, mouse-trap), hence mouser (a kind of snake) and flycatcher (a plant, probably of family Cruciferae); applied to plants because of stickiness, not necessarily insectivorous. **M. perfoliatum*, Musk Weed, a troublesome plant in S.A., is so far confined to the Wimmera in Victoria.

Myoporum. Gk myo, to shut, close; poros, pore; alluding to the closed appearance of the leaf glands — transparent spots filled (and thus closed) with a pellucid substance. Victoria has seven species, all native, including *M. insulare*, Boobialla, *M. platycarpum*, Sugarwood, *M. montanum*, Water-bush, and *M. deserti*, Turkey-bush (so called because the wild turkey, or bustard, *Eupodotis australis*, is fond of the fruit. The genus gives its name to family Myoporaceae.

Myosotis. The classical Gk name for the European forget-me-not, from mys, genitive myos, mouse; ous, otos, ear; because of the resemblance of the leaves to the ears of a mouse. Victoria has three introduced species and two native ones, all known as different kinds of forget-me-not, a common name probably stemming from romantic notions of the 'language of flowers' (cf. German Vergissmeinnicht, with identical meaning). The Common Forget-me-not, *M. arvensis*, of our gardens has not been naturalized. Family Boraginaceae.

Myosurus. Gk mys, myos, mouse; oura, tail; alluding to the long slender spike. Our species, *M. minimus*, Mousetail, is regarded as native, but J. M. Black in his 'Flora of South Australia' mentioned it as 'introduced in America and possibly in Australia'. The genus is in family Ranunculaceae.

Myriocephalus. Gk myrios, very many, numberless (cf. myrias, 10,000, hence our English word myriad, from the genitive myriados); kephale, head; in reference to the numerous flower heads of these composites. Victoria has two of the ten species of this endemic Australian genus, *M. rhizocephalus*, Woolly-heads, and *M. stuartii*, Poached-eggs Daisy or Ham-and-eggs Daisy, picturesque common names given because of the vivid yellow centres surrounded by white florets. F. Mueller and Sonder gave the specific name in honour of explorer, John McDouall Stuart.

Myriophyllum. Gk myrios, very many; phyllon, leaf; in reference to the many divisions of the submerged leaves of these aquatic plants. All of our seven native species are known as different kinds of water-milfoil, and the single introduced species, **M. brasiliense*, is known as Parrot's Feather. The genus belongs to family Haloragaceae. (Milfoil means 1,000 leaves.)

Najas. Gk naias (plural naiades), a water nymph; Linnaeus used the late Latin j as more in keeping with the consonantal sound of i (y in English, but j in nearly all the continental languages of Europe, including his own Swedish). Nevertheless the generic name has often been rendered *Naias*. Our sole species, *N. tenuifolia*, Water Nymph or Australian Naiad, is one of five Australian species (of a world total of 50), and is very rare here, being found only a few times along the Murray and in the Wimmera. The family Najadaceae takes its name from the genus. The Naiades of ancient Greece were nymphs of fresh water, presiding over waters or springs which were believed to inspire those who drank of them (cf. Oceanides, of the wide oceans, Nereides, of the inner seas, the Mediterranean, and Potameides, of rivers).

***Narcissus.** Gk Narkissos, classical Gk name of the daffodil, in honour of the beautiful youth (known to us in the Latin spelling Narcissus) who was turned into the flower by the gods after falling in love with his own reflection (hence our word narcissism). **N. pseudo-narcissus*, Common Daffodil, and **N. jonquilla*, Jonquil, are very often seen as garden escapes, and in some places are quite persistent.

***Nassella.** Probably a diminutive of Lat nassa, a narrow-necked fish-basket, with suffix -ella added (cf. the protozoan genus *Nassellaria*). The species naturalized in Victoria, **N. trichotoma*, Nassella Tussock is native to the pampas of Argentina, and has become a noxious weed in N.Z. pastures. It first appeared in Victoria in 1954, but near Yass, N.S.W., in 1935, hence the name Yass River Tussock.

***Nasturtium.** Lat nasus tortus, twisted nose; from the pungent odour (that will 'turn up your nose'). **N. officinale*, Water-cress, was formerly *Rorippa nasturtium-aquaticum*, and is in family Cruciferae, which contain mustard oil, as does *Tropaeolum*, which is the 'nasturtium' of our gardens, but is one of 90 species from Mexico to South America, of family Tropaeolaceae.

*__Nepeta.__ Lat name used by Pliny for these plants (from nepa, a scorpion). **N. cataria*, Catmint or Catnip, has a specific epithet derived from Lat catta, a word used for both cats and weasels, the usual word for cat being felis (hence the adjective feline). Catmint was called in medieval Latin herba catti (postulating a masculine noun cattus — cf. *Rattus rattus*, the rat). *Cataria* was formerly capitalized, as it was a generic synonym of *Nepeta*; the latter name should be accented on the first syllable. Gareth Browning, in 'The Naming of Wild Flowers' has a most interesting paragraph on the extraordinary fascination this plant has for cats, mentioning 'the ridiculous creature's ecstatic behaviour in the presence of the herb'. He suggests that perhaps the bitter taste and strong flavour excites a sexual interest. He gives 'cat herb' names for the plant in French, Italian, German, Dutch and Spanish. Americans use the common name Catnip, which comes from Nep, a short form of Nepeta still heard in certain local English dialects. Family Labiatae.

Nephrodium. Gk nephrodes, kidney-like; alluding to the form of the indusium of these ferns. Two species of *Lastreopsis* in our flora were formerly classified in this genus, family Aspidiaceae.

Nertera. Gk nerteros, lowly; from the habit of growth of these creeping herbs. Our two species, both native, are *N. reptans*, Dwarf Nertera (the specific name means creeping), and *N. depressa*, Matted Nertera (an alpine bog-plant). The genus is in family Rubiaceae.

*__Neslia.__ Named by Desvaux after J. A. N. Denesle, a French botanist (many such surnames may be written either with the article attached or separated, like Latrobe, La Trobe; Labillardière, La Billardière; similarly with the preposition de, of, denoting place of origin, thus De Nesle, Des Vaux, etc.). **N. paniculata*, Ball Mustard, is in Victoria established only near St. Arnaud, but it is naturalized also in S.A. The genus is in family Cruciferae. (Omitted from Part 1, so included here.)

Neurachne. Gk neuron, nerve; achne, anything shaved off, froth, husk, glume; alluding to the many-nerved outer glumes. Our sole species is *N. alopecuroides*, Foxtail Mulga Grass, the specific epithet meaning 'like *Alopecurus*', the foxtail genus (Gk alopex, alopekos, fox; oura, tail).

*__Nicandra.__ Adanson named this monotypic solanaceous genus after Nikander of Colophon, a poet who wrote of plants and their medical uses, circa 100 B.C. (his name means in Gk victorious or conquering man). **N. physaloides* is known as Apple of Peru (it is endemic in that country), the specific epithet meaning 'like *Physalis*', a genus with three species naturalized in Victoria, also in family Solanaceae. (Omitted from Part 1.)

(To be continued)

Field Naturalists Club of Victoria

The Mammal Survey Group, FNCV

Editor's Note. Here is the second in our series on the F.N.C.V. Study Groups. All Club members are welcome at any of the Groups and, as meetings and other activities are more informal than the large Club affairs, people get to know each other more quickly. There is no extra subscription. Group events on page 167.

The major aim of the Mammal Survey Group is the study of the distributions of the species of mammals native to Victoria. The emphasis of the Group is therefore on field surveys throughout the State, and as correct identification of mammals is essential for this work, the distinctive characteristics of each species are learnt by all Group members. The Group aims to contribute both to the scientific knowledge of Victorian mammals and to awareness of these animals among the general public.

Camps

The most important activity of the Group is the regular survey camp. Each month, a weekend or long weekend is spent in a previously reconnoitred area of bush, and the mammals of the area are systematically surveyed. Small mammals are captured in portable box and wire cage live-traps, and are carefully identified. Such live-trapping is carried out under a permit from the Fisheries and Wildlife Department; every trapping party at a survey camp is therefore led by an experienced person who is licensed under this permit. Larger mammals, particularly the arboreal possums and gliders, are surveyed at night by spotlighting with hand-held lights.

Records of every camp are kept so that detailed distributional information on each species may be accumulated.

Most areas of Victoria are visited, but areas closer to Melbourne are naturally surveyed more often. Longer camps at Easter and Christmas are normally held in more distant areas.

Recent work by the Group has resulted in some significant discoveries. At the 1974 Christmas camp in the Casterton area of south-west Victoria, the insectivorous marsupial *Antechinus minimus* was trapped. This finding represents an inland range extension as the species had previously been known only from coastal localities. During a survey of the Langwarrin Military Reserve in 1975, the rare New Holland Mouse *Pseudomys novae hollandiae* was captured. These new discoveries, together with the routine camp records, help to fill the gaps in our knowledge of Victorian mammals.

Meetings

Meetings are held each month. At most of these a speaker addresses members on a particular aspect of the biology of mammals and their conservation. Speakers are often specialists from outside the Group. Apart from these talks, members report sightings and discuss past and future activities of the Group.

The meetings are held on the first Thursday of each month at the Arthur Rylah Institute, Brown Street, Heidelberg, from 8.00 pm until about 10.00 pm.

Contributions from Country Members

Recently we have published two very interesting articles written by people in the country. In this issue there is a report on Rainbow Birds; in last issue there was one on Little Grebes.

It is certain that other interesting nature observations are made by members in various parts of the country. The observations might be brief and could be prepared as short nature notes. Or they might be over an extended period and would make full length articles. Both kinds of items are wanted. People living in the country see more and have opportunities to see more than city members who can go to the country only once a week and probably not as often as that; they are at a disadvantage. So we look to our country members and other people in the country to supply a substantial part of our natural history material.

Preparing an article takes time and work. Writing is more difficult for some than for others, and many people declare they cannot write. Such a declaration could easily be due to modesty rather than to fact, but if you are one of the "can't write" school, it need not prevent you from giving us your observations. Simply send your notes. A member of our Editorial Committee will write them up and send them back to you for your approval or alteration.

Many worth while nature observations never get recorded in print because the observer lacked the energy and/or skill to write them. Everyone is the loser. If you lack energy, there is nothing we can do about it; if you merely lack skill or time but have the energy to jot down notes in a legible manner, we can have your observations prepared for other members to enjoy in a future Victorian Naturalist.

Life member passes on

Mrs. Effie Missen was made a life member about five years ago. Mrs. Missen was a Melbourne member until 1942, when she married and moved to the Colac area. But she took her natural history interests with her, and she and her family were among the founding members of the Colac F.N.C. in 1956. Mrs. Missen died in May. We extend sympathy to her relatives and to her son, Mr. Robert Missen, who is continuing the subscription to the "Victorian Naturalist" which he finds a valuable source of reference.

Reports of FNCV Meetings

General Meeting
Monday, 14 June

This was the Queen's Birthday holiday and attendance was only 50!

Speaker for the evening was Mr. Ian (Dick) Morrison. He showed slides of birds, lizards, caterpillars with their resulting butterflies or moths, spiders, orchids, and ended with the floral emblems of the six States and Northern Territory. On many of his subjects, Mr. Morrison gave fascinating comments from personal experience.

Exhibits. A large display of fungi from Enock's Point (10 miles from Jamieson) consisted mostly of gilled fungi — large and tiny, some "jelly" specimens, some brackets, and an intriguing ½ cm *Chlorosplenum* species; it was bright greenish-blue, and the piece of wetly dark wood on which it was growing appeared to be stained green, but the green was actually the fine mesh of the fungus mycelium.

Four microscopes revealed details of the anthers and stigmas of Fuchsia, Photinia, Cestrum and Daphne; it was interesting to compare their arrangements.

Fossil casts from Tertiary beds at Royal Park showed four different gastropod molluscs.

Slender, 3 cm caterpillars, dark green with a narrow red stripe along each side, had eaten everything except the veins of some gum leaves; were they Blue Gum Caterpillars?

Bird Study Group. Members interested in forming a bird group were asked to add their names to the list on the exhibit table. By the end of the evening, the list had several names.

General Meeting
Monday, 12 July 1976

This was the day of the Medibank strike and there was no meeting.

Boneseed Eradication at Studley Park
Sunday, 18 July 1976

This was a follow-up to the "pulling" exercise of May 1975. Workers went over the same area as last year and were very encouraged to find remarkably little Boneseed. It seems that the pest **can** be eradicated by pulling up the plants. Then the team attacked another area.

The organiser, Mr. Ian Cameron, and his fellow workers are to be congratulated on this project. Next year, the old areas will be checked and the range extended. More workers will be needed.

Boneseed (*Chrysanthemoides monilifera*) establishes itself very readily and threatens to crowd out the native vegetation. With the persistent efforts of members of this Club and other organisations, we can hope that the pest will eventually be eradicated from Studley Park.

Small Jobs

Mrs. Elma Gardner has volunteered to do our typing and duplicating. Miss Cicely Allen has volunteered as a library monitor at general meetings.

We thank Mrs. Gardner and Miss Allen for responding, but it would be desirable to have one or two additional library monitors. It is an easy job and would be even easier if two or three could form a roster.

(Continued from page 126)

GROUP MEETINGS

(All members are invited to attend any Group Meeting, no other payment.)
At the National Herbarium, The Domain, South Yarra, at 8.00 p.m.

First Wednesday in the Month—Geology Group.
1 September—"Earthquakes and Plate Tectonics". Dr. Chris. Gray, La Trobe University.
6 October—"Geology of Fiji". Mr. G. Love.

Third Wednesday in the Month—Microscopical Group.
18 August, 15 September, 20 October—Members' exhibits and discussion of subjects and methods. Details September Nature Show.

Second Thursday in the Month—Botany Group.
12 August—"Native Pea Flower Plants". Dr. R. G. MacDonald.
9 September—"The Grampians". Mrs. I. Dunn.
14 October—"Propagation of Native Plants". Mr. F. Jeffs.
Each meeting includes a quarter-hour address for beginners—various subjects.

At the Conference Room, The Museum, Melbourne, at 8.00 p.m.
First Monday in the Month—Marine Biology and Entomology Group.
6 September, 4 October, 1 November—Members' Exhibits.

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.
First Thursday in the Month—Mammal Survey Group.
5 August—"Wild Life of the Victorian Mallee". Mr. Clive Crouch.
2 September—"Cave Dwelling Bats". Mr. Ellery Hamilton-Smith.
7 October—"Biological Mapping". Mr. Arthur Brook.

GROUP EXCURSIONS

All Members are invited to attend Group Excursions.

Day Group—Third Thursday in the Month.

Thursday, 19 August—National Gallery of Victoria. Meet at Gallery Entrance, St. Kilda Road (1.15 p.m.). Guided tour starts at 1.30 p.m.

Thursday, 16 September—Melbourne University Grounds. Meet at Gratten Street Entrance at 11.30 a.m. Lunch will be provided for 20 members. Book with Mr. D. E. McInness (211-2427).

Thursday, 21 October—Maranoa Gardens. Meet at 11.30 a.m.

Geology Group

Sunday, 8 August—"A Beginner's Look at the Fossils and Geology of Beaumaris". Meet at Cheltenham Railway Station at 2.00 p.m.

Sunday, 12 September—"Geology of Euroa". Meet at Euroa Post Office, 10.45 a.m.

Botany Group—All members welcome.
Please note change of date for August Excursion—"Wattles".

Saturday, 14 August—"Wattles", Warrandyte, and Wonga Park. Leader: Mr. Ian Morrison.

Saturday, 11 September—"Cranbourne New Botanical Gardens". Leader: Mr. Ian Morrison.

Saturday, 25 September—"Survey of F.N.C.V. Land at Kinglake".

Week-end, 9-10 October—"The Grampians". (Leave Melbourne Friday evening.)

Saturday, 30 October—"Orchids—Mornington Peninsula". Leader: Mr. Ian Morrison.

GROUP CAMP NOTICES

The Mammal Survey Group will hold a camp at The Otways on 18-19 September.
(Details—Ray Gibson, 62-4007 business.)

Field Naturalists Club of Victoria

Established 1880

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 Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

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Geology: Mr. T. SAULT.

Mammal Survey: Mr. STEPHEN HARWOOD, 5 Prentice Street, Elsternwick, 3185. (53 1357)

Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

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.

Rates of Subscriptions for 1975

Metropolitan	$10.00
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FNCV DIARY OF COMING EVENTS

At The National Herbarium, The Domain, South Yarra.

GENERAL MEETINGS

Monday, 11 October (8.00 p.m.)—
Speaker—Dr M. Joshi.
Subject—"The Grand Canyon, U.S.A."

Monday, 8 November (8.00 p.m.)—
Speaker—Mr Brian Leonard.
Subject—"The Effect of Fire on Animals throughout the World."

Monday, 13 December (8.00 p.m.)—
Speaker—Dr Elizabeth K. Turner.
Subject—"In Darwin's footsteps to the Galapagos Islands."

New Members—October General Meeting:

Ordinary:

Mr. John G. Allan, 18 Charles Street, Cheltenham, 3192 *(Mammal and Field Survey).*
Mr. Andrew J. Barnes, 17/2A Robe Street, St. Kilda, 3182 *(Birds and Reptiles).*
Mr. Ralph Berg, 18 Walmer Street, Kew, 3101 *(Birds and General).*
Mr. Alister Briggs, 12/45 De Carle Street, Brunswick, 3056 *(Entomology and Geology).*
Miss C. Brumley, 32 Faversham Road, Canterbury, 3126 *(Mammal Survey).*
Mrs. S. G. Clark, 8/6 Balwyn Road, Canterbury, 3126.
Mr. Neil Duncan, 4 Holland Road, Ringwood East, 3135.
Mr. Rick Hancock, 2 Coombs Avenue, Huntingdale, 3166 *(Botany, Mammal Survey).*
Mrs. Ella Hurrell, University College, Parkville, 3052.
Miss J. A. Johnston, 1/155 Power Street, Hawthorn, 3122.
Mr. Bruce McGregor, 28 David Street, Brunswick, 3056.
Mr. Alf Salkin, 38 Pinewood Drive, Mt. Waverley, 3149 *(Botany).*
Mrs. T. Sherlock, 3 Kitmont Street, Murrumbeena, 3163 *(Botany).*
Mr. L. Smart, 22 Stewart Street, Windsor, 3181.
Mr. Symons, 81 Leicester Street, Fitzroy, 3065 *(Botany and Geology).*

Joint Members:

Mr. and Mrs. E. Parker, 1 Kiewa Street, Ashwood, 3147.

Country:

Mr. Ralph S. Coghill, P.O. Box 69, Wodonga, 3690.
Mr. Peter F. Dryden, 90 Kelp Street, Warrnambool 3280.
Mrs. Mary Gladstone, P.O. Box 329, Cobram, 3644 *(Trees, Plants, Birds, Geology).*
Dr. M. J. Hunter, P.O. Box 311, Albury, N.S.W., 2640.
Mr. F. Kingwell, 53 Service Street, Tatura, 3616.

FNCV EXCURSIONS

Sunday, 17 October—Kinglake. This will include an inspection of our Kinglake property and a visit to the Park. The coach will leave Batman Avenue at 9.30 a.m. Fare $4.00. Bring one meal and a snack.

Tuesday, 2 November. Cup Day Picnic—Wombat Forest. Leader, Mr J. Myers. The coach will leave Batman Avenue at 9.30 a.m. Fare $4.00, half price under sixteen. Bring a picnic lunch and a snack. Bookings should be made with the excursion secretary. Those going direct by private car should meet at approximately 11.15 a.m. at Firth Park picnic area which is reached by a good gravel road from Bullengarook about halfway between Gisborne and Bacchus Marsh. After lunch there will be a bushland walk to the site of an old sawmill. Juniors are specially invited to join in this excursion.

Sunday, 21 November—Angahook Forest Park. Leader, Miss J. Forster. The coach will leave Batman Avenue at 9.30 a.m. Fare $5.00. Bring two meals. Members travelling by car should meet at the Park about noon in the right-hand car park as you enter.

Saturday, 4 December—Lake Mountain. The December excursion will be held on Saturday, 4 December, in conjunction with the Native Plants Preservation Society. The coach will leave Batman Avenue at 9.00 a.m.. Fare $5.00 — bring two meals.

Saturday, 1 January - Sunday, 9 January—Tasmania. This excursion will be based on Burnie and led by members of the Burnie F.N. Club who have formed a committee to plan the programme consisting of day trips from Burnie, a day at Cradle Mountain is likely to be included. Accommodation has been booked at the Club Hotel for the party on a dinner, bed and breakfast basis. The party will travel to Burnie by air on Saturday morning and return on Sunday afternoon, 9 January, but members wishing to extend their stay may do so. The cost for accommodation and return air fare should be under $200.00. The transport on the day trips will be extra, but a figure cannot be given until the programme is arranged and there is some indication of the number going. Bookings should be made with the excursion secretary as soon as possible, accompanied by a deposit of $25.00 and the balance paid by the November General Meeting.

The Canterbury Botanical Society (N.Z.) Inc. will be on a camping tour of Tasmania while we are there and have suggested that a few members might like to join their party for the last few days of their trip; they will be going to Cradle Mountain on 9 January, then on to Launceston on the 11th and they leave for N.Z. on the 13th.

They are on a camping type trip with tents, sleeping bags, food and bus transport provided; the cost would depend on individual arrangements and the address of the Society can be obtained from the excursion secretary.

(Continued on page 211.)

The Victorian Naturalist

Volume 93, Number 5 6 October 1976

Cover illustration: The bat *Pipistrellus tasmaniensis* is now recorded alive in Victoria, see page 190. This photograph, about four times larger than life, was taken by Alan Hartup.

Solar Eclipse — 23 October 1976

BY DAVID F. MARSHALL*

On Saturday 23 October 1976 most of the densely populated areas of Victoria will experience a total eclipse of the sun by the moon. The total eclipse in Victoria will occur from 4.38 to 4.44pm; the partial phase will continue for about an hour before and after. All parts of Australia will have a partial eclipse. A total eclipse is a rare phenomenon, repeating itself only after hundreds of years for any particular place.

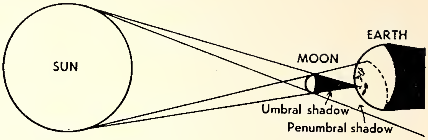
When an eclipse of the sun occurs, the moon passes between the sun and the earth so that the shadow formed by the moon crosses the earth's surface. Because the sun is larger than the moon, the intense black umbral shadow covers only a small area of the earth's surface, and this is swept across the earth's surface as the moon moves around its orbit. Surrounding the dark umbral shadow is an area where only part of the sun is obscured by the moon. This is called the region of partial eclipse.

The total eclipse will sweep across Victoria along a path shown in the map. Near the centre of the path, totality will last about three minutes; near the edges it will last only seconds. A detailed map has been prepared by the Lands Department and can be purchased for $2.00 from the Science Museum.

Danger

When an eclipse occurs a most eerie sensation is experienced and there is real danger; the danger is that you might look at the eclipse without the moon completely covering the sun.

If there is the least part of the sun



exposed, it will damage your eyes permanently if you look at it, even if you use smoked glass, welding goggles, or over-exposed photographic film. **Under no circumstances look directly towards the eclipse before or after it is total.** During the period that the eclipse is total, it is dark like night-time and only then is it safe to look directly at the eclipse.

To observe the early stages of the eclipse, an image must be projected on to a white screen, and this image can be looked at with perfect safety and the stages observed with reasonable accuracy. It is very likely that devices for projecting such an image will be explained in the daily press so no more will be said here, and information could be obtained from the Science Museum.

Things to look for

When the eclipse occurs, a number of phenomena can be seen with the naked eye which are invisible in the full glare of the sun. The faint upper atmosphere of the sun becomes visible. Streamers partly illuminated from the sun but mainly illuminated by ionized atoms and electrons are seen radiating around the sun in the corona. Sometimes prominences resembling large flames are seen, at times forming loops and arches. Flares which are brighter

*Planetarium Lecturer
Science Museum of Victoria

and smaller than prominences can also be observed. The sky around the eclipse will be so dark that planets and stars will be seen if the atmosphere is clear enough.

If a large white surface is placed facing towards the eclipse, often shadow bands are seen moving across it during the period just before and just after totality. Clouds in the sky show variation as the dark shadow passes. From a high position you can see the shadow of the edge of the moon sweeping across the countryside.

Many people will be interested in the behaviour of animals and insects. If humans experience an eerie sensation it is likely that animals will be even more sensitive to it, and the eclipse will be followed by a short "day" of about two hours as the sun sets at 6.45 pm. How creatures react to the second nightfall could provide some very interesting observations.

Anyone making observations will find the following items essential:

1. A notebook. On each page outline at least two circles the size of a 20 cent piece on which a vertical and horizontal diameter are drawn. Use them as foundations for sketches. 2. A torch. 3. A clock or watch with second hand.

Additional items are: tape recorder, weather vane, thermometer, spare sharpened pencils and rubbers, sheets of cardboard, white screen for shadow bands.

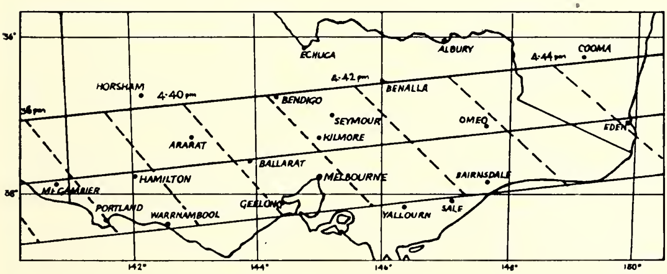
Remember, be ready to record anything; clouds can make observations uncertain and you may be the observer with the best chance to see something that was not anticipated. The eclipse will last less than three minutes so try to arrange that you are able to look all the time. Later you will realise the value of the sketches, jottings and noises you recorded.

Photography

Direct photography of the eclipse is only satisfactory if a telephoto lens is used. While any sun is visible the shortest exposure at minimum aperture must be used, but beware of damage to your camera from the intense heat generated on the shutter if direct sunlight is allowed to fall on it. When the eclipse is total, take photographs at as many different speeds and apertures as you can: short exposures show details close to the eclipse, long exposures show the streamers better; luck may enable you to photograph something your eye does not detect. Of course use a tripod and have a torch handy.

Do not look at the sun through the camera or its view-finder, even with a filter. It could result in permanent eye damage.

A booklet about the eclipse is available for $1.40 from The Astronomical Society, Box 1059 J, GPO, Melbourne. As well as astronomical data, it contains suggestions for natural history observers and useful hints for photographers.



Path of the moon's shadow across Victoria. It advances at about one mile (1.6 km) per second.

The Endemic Flora of Victoria

BY ROSS MACDONALD*

A list of the endemic vascular plants of Victoria can never be complete. Some species may have "border-hopped" to be found in other States, and so must be excluded from the list. On the other hand it is to be hoped that further searching will provide new endemic species in the future.

In this list, varieties and subspecies have been excluded. *Signifies hybrids and aberrant forms of other species.

At the present time there are 136 species endemic to Victoria.

FERN
Cyatheaceae:
Cyathea marcescens

MONOCOTYLEDONS
Gramineae:
Poa hothamensis
Deyeuxia sp., affin *D.angustifolia*
Cyperaceae:
Scirpus victoriensis (likely to be found in NSW and SA)
Carex paupera
Restionaceae:
Lepyrodia flexuosa
Centrolepidaceae:
Centrolepis cephaloformis
Liliaceae:
Astelia australiana
Orchidaeae:
Thelymitra murdochae
Calochilus richae
Diuris fastidiosa (presumed extinct)
Prasophyllum morganii
P.colemanae (presumed extinct)
P.subbisectum
P.parviflorum
P.appendiculatum
P.diversiflorum (presumed extinct)
*Paracaleana/sullivanii**
Caladenia pumila (presumed extinct)
*Pterostylis crypta**
*Pt. celans**

DICOTYLEDONS
Proteaceae:
Persoonia arborea
Grevillea repens
G.sp. (Elphinstone, Fryerstown, Enfield)
G.microstegia
G.sp., affin *G.microstegia* (Ben Major area)
G.willisii
G.dryophylla
G.steiglitziana
G.aquifolium
*G.williamsonii** (presumed extinct)
G.jephcottii
G.confertifolia
G.chrysophaea
G.dimorpha
Polygonaceae:
Muehlenbeckia horrida (likely to be in NSW)
Chenopodiaceae:
Atriplex papillata
Bassia ramsayae
Ranunculaceae:
Ranunculus eichleranus
Cruciferae:
Lepidium aschersonii
*L.dubium** (doubtfully distinct from preceding)
L.sp. (south coast)
L.desvauxii
Crassulaceae:
Crassula tripartita
Baueraceae:
Bauera sessiliflora
Tremandraceae:
Tetratheca subaphylla (almost certainly in SE of NSW)
T.stenocarpa
Mimosaceae:
Acacia phasmoides
A.ausfeldii
*A.X grayana**
A.glandulicarpa
A.williamsonii
A.howittii
A.phlebophylla
A.dallachiana
A.nano-dealbata
Papilionaceae:
Pultenaea tenella
P.maidenii
P.muelleri
P.prolifera
P.patellifolia
P.costata
P.williamsoniana
P.subalpina
P.mollis
P.weindorferi
P.d'altonii
Dillwynia oreodoxa
D.capitata
Platylobium alternifolium
Bossiaea rosmarinifolia
Swainsona plagiotropis
Rutaceae:
Boronia muelleri
B.latipinna
Phebalium sp. (Pine Mountain)
Ph.sp., affin *Ph.squameum*
Asterolasia asteriscophora
A.phebalioides
Rhamnaceae:
Trymalium d'altonii
T.ramosissimum
Spyridium cinereum
Dilleniaceae:
Hibbertia spathulata
H.humifusa
H.sp. (Macalister River watershed)
H.sp. (also from Macalister River watershed)

*Balcombe Court, Croydon.

Frankeniaceae:
Frankenia sp., affin *F.gracilis*
Thymelaeaceae:
Pimelea hewardiana
Myrtaceae:
Eucalyptus alpina
E.mitchelliana
E.kitsoniana
E.neglecta
E.crenulata
E.froggattii
Baeckea crenatifolia
Calytrix sullivanii
Thryptomene calycina
Haloragaceae:
Haloragis rubra
Callitrichaceae:
Callitriche cyclocarpa
Araliaceae:
Astrotricha parvifolia
A.asperifolia

Epacridaceae:
Wittsteinia vacciniacea
Choristemon humilis
Leucopogon riparius
L.neurophyllus
L.pilifer
L.glacialis
L.thymifolius
Monotoca rotundifolia
Acrotriche prostrata
Trochocarpa clarkei
Labiatae:
Westringia senifolia
W.cremnophila
W.crassifolia
Prostanthera melissifolia
P.sp. (Cultivation Creek, Grampians)
P.decussata
P.sp., affin *P.decussata*
P.sp., affin *P.rotundifolia* (Macalister R.)
P.sp., affin *P.howelliae* (Macalister R.)

Rubiaceae:
Coprosma nivalis
Lobeliaceae:
Hypsela tridens
Goodeniaceae:
Goodenia macmillanii
G.lineata
Stylidiaceae:
Stylidium soboliferum
Levenhookia sonderi
Compositae:
Brachycome petrophila
B.gracilis
B.riparia
Celmisia sericophylla
Olearia speciosa
O.frostii
O.rugosa
O.allenderae
Helichrysum rogersianum
Leptorhynchos gatesii (presumed extinct)
Gnephosis baracchiana

Acknowledgement

I wish to thank Dr. J. H. Willis for his meticulous correction and updating of the manuscript.

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Preparing material for 'The Victorian Naturalist'

When preparing material for publication, please have it typed with double line spacing and leave at least 3 cm (about $1\frac{1}{4}''$) clear margin at the left. Captions to figures should be typed on a separate page. Monochrome illustrations should be supplied, as it is costly and rarely satisfactory to reproduce from coloured material. If article is of a scientific nature, it is desirable to supply two copies of text matter.

To all FNCV members

The last few pages of each "Naturalist" are reserved for information about FNCV affairs and persons. Those pages are the chief means of communication of Council with all Club members. Whether or not you attend general meetings regularly, there will be much on those pages that will interest you and often some things you should know.

See page 209 in this issue.

Bush-peas of Victoria — genus *Pultenaea* No.1

Text by M. G. Corrick*

Pea flowers in various shades of yellow and brown are a prominent feature of Victoria's bushland. In all, fourteen genera comprising fifty-nine species are represented in the State. By far the largest genus is *Pultenaea*, the Bush-pea, of which forty-six species have been recorded.

They grow in a wide variety of habitats from sea level to the alps, in coastal dunes and semi-deserts of the north-west, in swamps and alpine moors. In fact any area rich in flowering shrubs is likely to contain one or more species of *Pultenaea*.

The genus *Pultenaea* is endemic in Australia, numbering about 120 species which are confined to the temperate regions. Many species occur on the Hawkesbury sandstones in New South Wales and in the Grampians in Victoria.

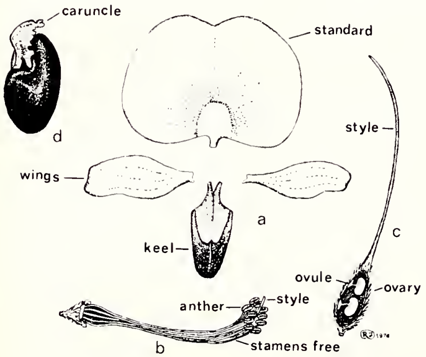

Fig. 1. A typical pea-flower; a, expanded petals showing the standard, wings and keel; b, staminal bundle; c, style and ovary disected to show the ovules; d, seed showing the caruncle.

Drawings by Rex Filson

Pultenaea was first described in 1793 by James E. Smith, a Scottish physician and botanist and founder of the Linnaean Society. He named the genus after a contemporary physician and botanist, James Pulteney. Dr Smith's description, with a coloured illustration by James Sowerby, was published in "A Specimen of the Botany of New Holland". The plants which Smith described were cultivated in England at Stockwell, from seed brought from New South Wales.

By 1799 there were twelve species in cultivation in Great Britain, but they have not proved easy to establish in cultivation in Australia.

Since the publication of Bentham's "Flora Australiensis", Vol. 2 in 1864 there have been two major publications on the genus *Pultenaea*. H. B. Williamson (1919-1928) dealt with over 100 Australian species. Mrs. Joy Thompson (1961) prepared a key and descriptions of all species known to occur in New South Wales.

Pultenaeas in Victoria vary in size from the low, mat-forming *P.pedunculata* to the tall *P.altissima*, which may reach a height of three metres, and all are classed as shrubs.

The flower

The *Pultenaea* flower is a typical pea-flower (Fig. 1a) and to distinguish the genus from others with similarly coloured flowers it is necessary to examine some of the less prominent features of the plant.

The stamens are always free from one another; if a flower is dissected

*7 Glenluss Street, Balwyn

they will fall out separately. The style is usually as long as or longer than the stamens and may be gently curved at the tip or occasionally hooked. The ovary contains two ovules, but often only one matures (Fig. 1c).

Stipules

Stipules are always present at the base of the leaves. They may be small and inconspicuous or deciduous; in the latter cases they may be seen on young growth, or the scars will be evident on the older wood. On the leaves immediately below the flower the stipules are often much enlarged and may be joined together. In some species a gradual transition can be seen from a leaf with a pair of stipules, to a single organ in which the vestigial leaf may appear as a minute central lobe between the united stipules. In the follow descriptions the term "enlarged stipules" will be used to describe these organs.

Bracts and Bracteoles

In many species the flowers are subtended by numerous conspicuous bracts. These probably have evolved from stipules but where they are noticeably different from them in shape or size the term "bract" will be used.

Bracteoles are always present; they may be immediately below the calyx or may arise on the calyx tube. They are one of the most important features distinguishing the genus, and their shape, texture and position are very important in separating species.

The fruit

The pod is ovate, usually swollen and often beaked; when ripe the valves curl back to release the seeds and reveal the pale inner surface. The caruncuculate seed (Fig. 1) is another important feature, but difficult to see because mature seeds are usually ejected as soon as the pod ripens. However, if the ovary of a mature flower or unripe fruit is carefully dissected the developing caruncle can often be seen. It is a small swelling, or outgrowth from the testa (seed coat) near the point of attachment to the funicle.

Features that identify the genus

Several of Victoria's yellow peaflowers combine some of the features described here, but it is only in *Pultenaea* that free stamens, stipules, bracteoles and carunculate seeds are combined. In fact there are few genera, apart from *Pultenaea*, that have both bracteoles on the calyx and stipulate leaves, so that the presence of these two features is a strong indication of a *Pultenaea*.

Most species are very variable, particularly in size and shape of leaves and degree of hairiness of the plant. The following descriptions are based on broad concepts; attention will be drawn to variations, but it is felt that in many cases a great deal of field study and collection is necessary before reliable classification can be made at sub-specific level. To avoid duplication of illustrations and to facilitate references, figures will be numbered consecutively throughout the series.

Records of the distribution of *Pultenaea* in Victoria are far from complete. The maps accompanying descriptions of species in this series are based mainly on existing collections and show the areas in which a species is likely to be found.

In some cases these vary slightly from distributions recorded by Churchill and de Corona (1972) and Willis (1972), but it was preferred to omit records which could not be checked. The author would be pleased to hear from anyone having additional information. Offers of help in locating some of the less widespread species would also be appreciated.

Pultenaea daphnoides

J. Wendlander in Botanische Beobachtungen, Hanover 1798.

Large-leaf Bush pea.

This species is one of the most widespread in southern and eastern Victoria. It is a tall showy shrub, usually 2 to 3 metres high, which favours sheltered and rather moist sites, often under tall timber. In drier areas such as the Brisbane Range, *P.daphnoides* will be found on south-facing slopes. It is not common in the Grampians and is absent from north-western areas. *P.daphnoides* also occurs in New South Wales, South Australia and Tasmania.

The flowers are in dense clusters at the tips of the branches. They are clear yellow, except for the dark brown keel. The standard is about 12 mm wide and 8 mm high (without the claw). The calyx is 8-10 mm long, with slender bracteoles 1 mm wide and 3 mm long inserted above the centre of the calyx tube, but not usually reaching the height of the calyx lobes (Fig. 2d).

Calyx and pedicel are densely covered with long, pale, silky hairs. The broad, brown, obtuse bracts are often split at the tips and have fine, silky appressed hairs at their base and along the mid-rib. Most bracts have fallen by the time the flowers are fully open.

The leaves are obovate or cuneate, glabrous and paler on the under side, with slightly recurved margins. The mid vein is produced into a slender mucronate point. The dark brown triangular stipules are about 2 mm long and their bases often remain on the stem after the leaves have fallen.

There is a good deal of variety in leaf size and shape (Fig. 2g) even on single plants. Most Victorian specimens have more obcordate leaves than the typical Port Jackson form. Willis mentions a narrow-leaved form from Mts Ida and Korong, and two distinct leaf forms are reported to occur on Wilson's Promontory but no collections from the latter area have been seen.

Acknowledgements:

I wish to thank the National Herbarium, Melbourne, for permission to study the collections and Dr Jim Ross, Senior Botanist, for advice and encouragement.

Fig. 3. The known distribution of *Pultenaea daphnoides*.

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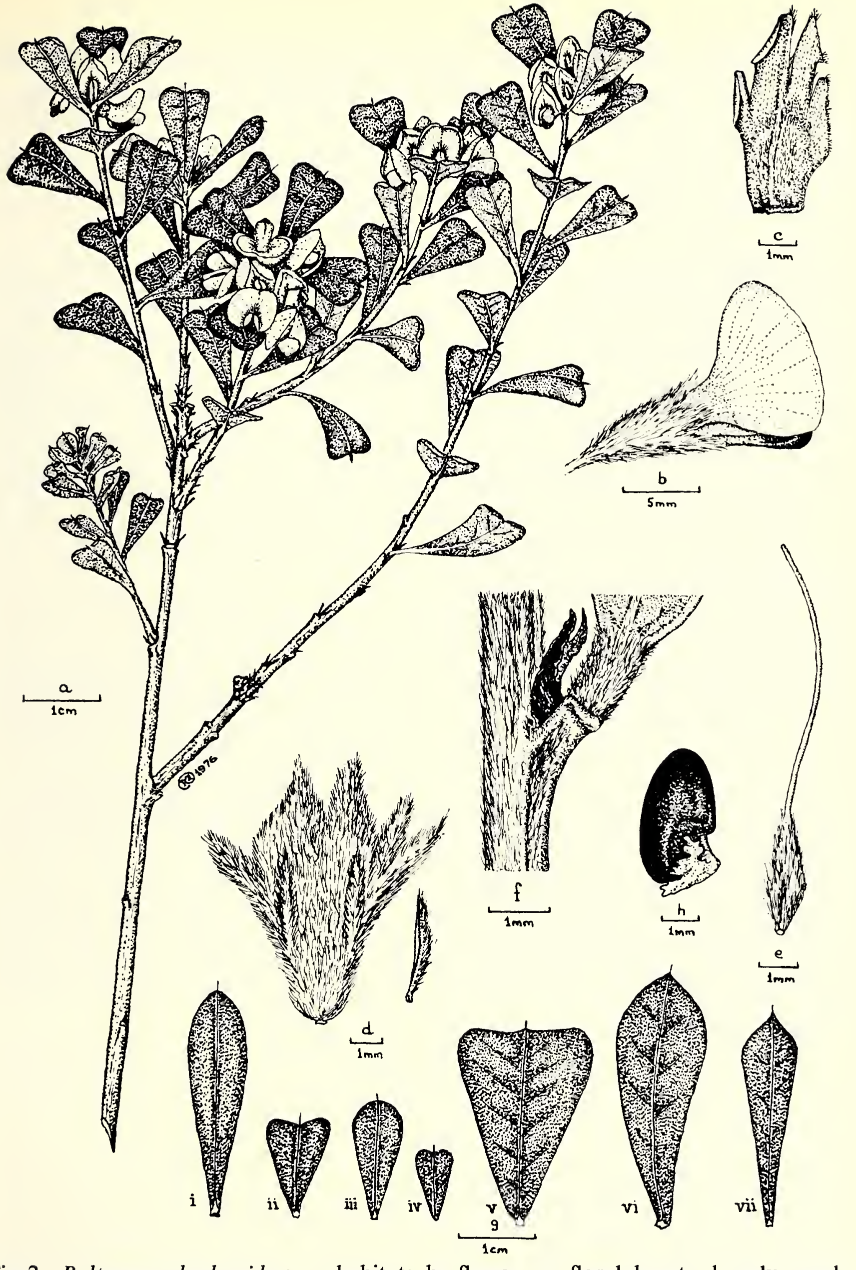

Fig. 2. *Pultenaea daphnoides*; a, habitat; b, flower; c, floral bract; d, calyx and a bracteole; e, style and ovary; f, base of leaf showing the stipules and hairy petiole; g, variation in leaf size and shape, i, from a typical Port Jackson specimen, ii and iii from Mount Kaye, north of Orbost, iv from Gippsland, v, Sampsons beach, Orbost, vi from the Bemm River area, vii from the Grampians.

DRAWINGS BY REX FILSON

Australian Plants still survive on Burwood - Alamein railway reserve in eastern suburbs of Melbourne

BY T. B. MUIR*

The metropolitan area is now largely covered by roads and houses, and the original vegetation has virtually disappeared. Recent articles by Bridgewater (1975), and Bridgewater and Wellington (1976) have discussed two remnants of this vegetation.

Another remnant is to be found in the railway reserve between Burwood and Alamein stations — an uncultivated place of the kind that small boys like to explore. One such schoolboy (Robert 1976) has written about his impressions of it. He found birds, sundews, ants, Running Postman — hours could be spent in contemplation of them. His interest led the author to compile a checklist of the native plants, the total being 42 for a distance of 1.8 km.

The trees, mostly *Eucalyptus camaldulensis*, are very attractive and are a dominant feature of the landscape in the vicinity of the railway line. They are fairly evenly scattered along the reserve, but the remainder of the native species are now found only in several isolated sections.

Various factors are contributing to their disappearance, the invasion of weeds being the most serious. In places lawn mowers have effectively eradicated the native species, replacing variety with a dull uniformity. Local residents have sometimes attempted to improve the reserve with exotic garden plants, whose garishness contrasts with the quiet subtle beauty of indigenous species. Others regard it as a rubbish dump, and the Victorian Railways occasionally plough or bulldoze some parts.

Nevertheless this reserve is potentially valuable. With wise management the smaller native plants should remain for some years yet, although it seems certain that they will eventually disappear. However the trees and shrubs, viz.: *Eucalyptus camaldulensis, E.viminalis, Acacia armata, A.mearnsii, A.melanoxylon, Bursaria spinosa*, and *Exocarpos cupressiformis*, should remain indefinitely.

To conserve the area

The following measures are necessary to preserve the area.

1. Rubbish, exotic garden plants and certain weeds such as *Chrysanthemoides monilifera* (Boneseed) should be removed.
2. Earthworks should be limited as far as possible, and banned from sections where the native species are best.
3. To allow regeneration, selected sections should be protected from burning, mowing, etc., until seedlings are big enough to survive without further attention.
4. If regeneration is slow in some places they should be replanted with seedlings propagated from existing plants in the reserve.

This reserve can be used in several ways. Areas of this kind offer us the means of teaching children about conservation in a very practical way, and without the need for travelling great distances. If they learn at an early age they will, like Robert, enjoy and pro-

*52 Liston Street, Burwood 3125.

tect these areas. The plants are a source of propagating material for people wishing to re-establish the indigenous flora. The larger areas can be incorporated into systems of bicycle and walking tracks, instead of being converted into freeways as is so often their fate at present.

The author would be pleased to hear from anyone knowing of other remnants of the original flora, no matter how small.

Checklist of Australian plants of the Burwood-Alamein railway reserve

MONOCOTYLEDONS
Agropyron scabrum, Common Wheat-grass
Anguillaria dioica, Early Nancy
Bulbine bulbosa, Bulbine Lily
Burchardia umbellata, Milkmaids
Caesia vittata, Blue Grass-lily
Danthonia caespitosa, Common Wallaby-grass
D.geniculata, Kneed Wallaby-grass
D.linkii, Wallaby-grass
D.setacea, Bristly Wallaby-grass
Dianella caerulea, Paroo Lily
Dichelachne crinita, Long-hair Plume-grass
D.sciurea, Short-hair Plume-grass
Dichopogon strictus, Chocolate Lily
Hypoxis glabella, Yellow Star
Juncus sp. (Section Genuini), Rush
Lomandra filiformis, Wattle Mat-rush
Luzula campestris sens.lat., Woodrush
Poa australis sp.agg., Tussock Grass
Stipa semibarbata, Fibrous Spear-grass
Themeda australis, Kangaroo Grass
Tricoryne elatior, Yellow Rush-lily
Thelymitra sp., Sun Orchid
DICOTYLEDONS
Acacia armata, Hedge Wattle
A.mearnsii, Black Wattle
A.melanoxylon, Blackwood
Acaena agnipila, Sheep's Burr
Bossiaea prostrate, Creeping Bossiaea
Bursaria spinosa, Sweet Bursaria
Cotula australis, Common Cotula
Drosera peltata, Pale Sundew
Eucalyptus camaldulensis, River Red Gum
E.viminalis, Manna Gum
Exocarpos cupressiformis, Cherry Ballart
Geranium retrorsum, Crane's-bill
Kennedia prostrata, Running Postman
Lepidium hyssopifolium, Common Pepper-cress
Leptorhynchos squamatus, Scaly Buttons
Pimelea curviflora, Curved Rice-flower
P.humilis, Common Rice-flower
Senecio quadridentatus, Cotton Fireweed
Wahlenbergia quadrifida, Sprawling Bluebell
W.tadgellii, Tadgell's Bluebell

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Thank you for help with block costs

The Fisheries and Wildlife Division of the Ministry for Conservation, Murdoch University of Western Australia, and the Zoology Department of the University of Melbourne, have all contributed generously to the cost of blocks in recent articles by their respective personnel. Illustrations add considerably to the cost of producing "The Naturalist" yet our journal would be much less attractive without them. The FNCV is very appreciative of the help given by those organisations.

Thank you.

The Origin of Generic Names of the Victorian Flora
Part 2 — Latin, Greek and Miscellaneous

(Continued from page 164 in the last issue.)

BY JAMES A. BAINES

Nitraria. Greco-Latin nitrum, saltpetre; because the plant was first found growing on saline plains in Siberia. Australia has only one of the seven species in the world, *N. schoberi*, Nitre Bush, which in Victoria is only in the N.W. and W. The genus belongs to family Zygophyllaceae.

*__Nonea.__ Name given by F. C. Medicus for reasons unknown; possibly from Lat nonus, nine; or non-ea, not there; or from a proper name such as Nona, -ea being used in New Latin to form generic names when the surname ended in a vowel. **N. lutea*, Yellow Alkanet, was formerly classified in *Alkanna* (through Spanish alcana from Arabic al-hinna, henna), of which alkanet is a diminutive. The genus is in family Boraginaceae. (Portuguese mathematician, Pedro Nunes, 1492-1577, was known also as Nonius, and Nonea could derive thence.)

Notelaea. Gk notos, the south; elaia, the olive, olive-tree; being southern plants in the olive family, Oleaceae. Our two species are known as Large Mock-olive and Privet Mock-olive, the latter name stemming from the specific epithet *ligustrina* (= like *Ligustrum*, privet).

Nothofagus. Gk nothos, false, spurious, bastard; hence Lat nothus, false; Lat fagus, beech; being in family Fagaceae, and therefore related to the beeches of Europe (*Fagus*). Our species is *N. cunninghamii*, named as a *Fagus* by Hooker after Allan Cunningham, and more appropriately known in Victoria as Myrtle Beech than in Tasmania, where the misleading name of Myrtle is almost universally used. Australia has three endemic species, but there are 35 in the genus, which extends to New Guinea, New Caledonia, N.Z. and South America.

Notholaena. Gk nothos, false; laina, cloak; because the curved margin of the leaf segments forms a spurious indusium. R. Brown founded the genus, which is now included in *Cheilanthes*, two of our cloak-ferns, *C. distans* and *C. lasiophylla*, having formerly been in *Notholaena*. Family Adiantaceae.

*__Nothoscordum.__ Gk nothos, spurious, false; skordon, garlic; a generic name established by Kunth in 1843 for Ventenat's *Allium fragrans* when he recognized it as not a true garlic (Lat allium, garlic). It is curious that Aiton's *A. inodorum* (1789) is conspecific, but the epithets mean exactly the opposite, i.e. fragrant, and 'without smell'. **N. inodorum* is the valid name for Wild Onion, also known as Fragrant False-garlic, a weed of uncertain origin, in family Amaryllidaceae.

Notothixos. Gk notos, the back; thixis, touching; because these mistletoes are parasitic on other mistletoes (in Victoria on *Dendrophthoe* and *Muellerina*). It recalls the verse:

'Great fleas have little fleas upon
their backs to bite 'em,
And little fleas have lesser fleas, and
so ad infinitum.'

N. subaureus, Golden Mistletoe, is in subfamily Viscoideae of Loranthaceae, raised by Barlow to family status as Viscaceae.

***Nuphar.** Gk nouphar, name of a medicinal plant, perhaps a water-lily (Jaeger); the Arabic name (Smith and Stearn); the Persian nufar or naufar, water-lily (Gilbert-Carter); from naufar, the Arabic name of the plant (A. T. Johnson and H. A. Smith). **Nuphar lutea*, European Yellow Water-lily or Brandy-bottle, is the water-weed that defies eradication from acres of the large lake in Melbourne's Royal Botanic Gardens. The latter common name was given because the flowers smell of alcohol (the new kiosk recently erected will *not* have a licence to sell alcoholic drinks, as was planned for the former structure that was to have obtruded near this lake). They are not lilies, being in the dicotyledonous family Nymphaeaceae.

Nymphoides. Resembling *Nymphaea* (Gk oides, with the form of); because these water-loving plants look rather like water-lilies. Our two native species, Wavy and Entire Marshworts respectively, were formerly in *Limnanthemum*, and belong to family Menyanthaceae.

***Oenothera.** Gk oinotheras, onotheras, the name in classical authors of *Nerium oleander*, Common Oleander native to Mediterranean countries, meaning ass-catcher (because of its poisonous qualities). Humphrey Gilbert-Carter, in his 'Glossary of the British Flora', refers to his 'Guide to Cambridge Botanic Gardens' (1922), where he gives, in the relevant scripts, the names, all meaning 'ass-poison' for the oleander in Arabic, Persian and Italian (the last-named being 'ammazzo l'asino'), and gives the Sanskrit name, meaning 'horse-killer', for Indian Oleander (*N. odorum*). The generic name *Onagra*, from which comes the family name Onagraceae to which *Oenothera* belongs, is a superseded synonym for this genus of the wholly American Evening Primroses, three species of which are successful introductions to Victoria (of a total of 80). *Onagra* means the onager, or wild ass; *Anogra*, its anagram, is another synonym for *Oenothera*. Johnson and H. A. Smith derive *Oenothera* from Gk oinos, wine, thera, pursuing or imbibing; claiming that the roots of an allied plant were regarded by the Romans as an incentive to drinking. A. W. Smith and Stearn give an alternative derivation from oinos, wine; thera, booty, but reject it in favour of ass-hunter or ass-beast (Gk ther, wild beast), and mention that the name originally had nothing to do with the yellow-flowered American plants to which the name was transferred.

Olax. Medieval Lat olax, odorous, ill-smelling; because the wood of some Asian species has an unpleasant odour. Victoria's sole species, *O. stricta*, is confined in this State to far East Gippsland, but another species is in S.A. and W.A. The genus is tropical, with 55 species, and gives its name to the family Olacaceae.

***Olea.** The classical Lat name of the Olive, **O. europaea*, which is found wild in some places, such as Studley Park, Kew. The genus gives its name to family Oleaceae. Olive trees are dominant in many Mediterranean landscapes.

Olearia. Often considered to be from Lat generic name, *Olea*, from the resemblance of the leaves of the N.S.W. species *O. dentata* named by Moench when he set up the genus in 1802, to those of the olive. However, it is almost certain that Moench named it in honour of Adam Ölschläger (1603-1671), whose name was latinized as Olearius, author of a flora of Halle (Germany). Professor J. F. Brechenmacher, in his 'Etymologisches Wörterbuch der Deutschen Familiennamen' (Etymological Dictionary of German Surnames), mentions, under the entry Olearius, that this name was adopted and written in this way by Johann Ölschläger (1546-1623), Superintendent of Halle, because his father (real name Coppermann) had been an oil-presser or oil-miller (Ölschläger) at Wesel. Oil came not from olives, but from linseed, poppies, rape and nuts, butter being used for cooking. So our genus is linked with oil through this derivation also; the name *Olea* was given to the olive by the Romans because of the oil content (oleo, to smell), though the word came to them from Greek elaia, the olive (from leios, smooth). Victoria has 37 species, all known as daisy-bushes, with different adjectives, one of them, *O. argophylla*, Musk Daisy-bush, being the fragrant species referred to in the early literature and still in popular parlance as musk (true musk is *Mimulus moschatus* in the plant world, and in the animal world the odoriferous secretion of the musk-deer, musk-rat, musk-ox, etc.). The family of course is Compositae. *Olearia* should be pronounced in five syllables, *not* four as though honouring a mythical Irishman O'Leary!

Omphacomeria. Gk omphakos, sour, unripe, bitter (omphakias, wine made from unripe grapes); meros, a part; because the obovate drupes are intensely acid, though edible. The genus has only a few characters separating it from the other sour-bush genus, *Choretrum*, in family Santalaceae. Our species, *O. acerba*, Leafless Sour-bush, has a specific name meaning tart (cf. acerbity).

Omphalolappula. A monotypic genus set up by Brand in 1931 because the nutlets are intermediate in character between those of *Omphalodes* and *Lappula*. *Omphalodes,* a genus from Eurasia and Mexico, was named because the nutlet hollowed out on one side resembles the human navel, and *Lappula* means little burr (Gk omphalos, navel; Lat lappa, burr). *O. concava*, Burr Stickseed, was named by F. Mueller first as a species of *Echinospermum*, then of *Lappula*. It is in family Boraginaceae.

*__Ononis.__ The classical Gk name of a plant in Dioscorides, probably a restharrow, but not our introduced species, **O. repens*, Restharrow, which Polunin states is not native to Greece; our other species, **O. spinosa*, Spiny Restharrow, however, is (he lists seven species for Europe). Family Papilionaceae. Restharrow means 'arrest-harrow', because its tough roots stop the harrow.

*__Onopordum.__ Latinized form of Gk onopordon, from onos, ass; porde, fart, breaking wind (cf. Lycoperdon). Linnaeus, 1753, used the form in -um, so Hill's *Onopordon* is invalid. One of our three species is **O. acanthium*, Scotch Thistle, for which Willis prefers the common name Heraldic Thistle, because it is used in heraldry and is thought to have been introduced to Scotland rather than being a genuine native. The genus is in family Compositae.

Opercularia. Lat operculum, a lid, cover; alluding to the lid of each partial fruiting head. It is an Australian endemic genus of family Rubiaceae, and Victoria's six species are all known as different kinds of stinkweed. (The name Stinkweed is used in U.S.A. for *Diplotaxis muralis* in Cruciferae.)

(To be continued)

Life History and Biology of a Snail

Part 2. Protection, Movement and Feeding

BY BRIAN J. SMITH*

Land snails are soft bodied animals protected from predators and the rigors of the hostile terrestrial environment by a hard external shell into which they can completely withdraw.

The shell

The shell is calcareous in nature, being made up of calcium/magnesium carbonate laid down by the leading or outer edge of the mantle. Thus it grows by adding on extra material to the aperture lip only and to form the shape, sculpture and colour pattern of the shell. The snail can repair small breaks or areas of damage in the body or outer whorl of the shell, but loses this ability the further away from the mantle edge the break occurs. Besides providing physical protection for the soft body of the snail, the shell gives protection from predators in providing camouflage by its colour pattern and sculpture.

The pattern and sculpture are species specific and under genetic control. Colour pattern in particular can have considerable variation in some species with local population variants showing interesting environmental modification. The classical work on this was carried out in Britain where populations of dark shells were shown to have a protective advantage in deep shadow hedge-row situations; while populations of light shells of the same species fared better in sand-dune habitats; the selecting factor being predation by birds in each case.

Figure 1. Scanning electron microscope picture of *Thryasona elenescens* from Geelong. (12x)

The most elaborate microsculpture on shells in south-eastern Australia is seen in the minute "endodontoid" snails (Fig. 1). This complex sculpture may have a function in relation to surface water in cracks in logs, but nothing is really known about this.

The body of the snail occupies the whole of the shell (see Fig. 2 in Part 1 of this series, Vic. Nat. 93(4): 130). The shell is coiled upon itself for added protection and is the best way to keep the weight of the body and its centre of gravity in the right place in relation to the foot on which locomotion occurs. This shell coiling is also under genetic control and occasionally odd growth abnormalities can occur.

Movement

Snails move by a progression of muscular waves of contraction along the sole of the foot. This is assisted by the secretion of a lubricating and protecting mucus from the pedal gland at

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the front of the foot creating the widely known slime trail. The wave movement of the foot combined with the protecting mucus enables the snail to traverse rough surfaces that might otherwise damage the animal.

Mucus is also secreted by the general body surface to conserve moisture and prevent dessication, and by the foot and mantle edge for lubrication in feeding.

Feeding

One of the unique structures, characteristic of the phylum Mollusca and possessed by five out of the six classes of living molluscs, is the possession of a radula. This is the basic feeding organ of all land snails and consists of a ribbon-like membrane in the buccal cavity of the snail on which are rows of hard radula teeth. This structure is carried on a moveable cartilage-like base and is moved over that base by a series of muscles to act like a rasp or file to break-down the food and carry it into the mouth (Fig. 2).

When feeding, the entire cartilage base, muscles and radula are projected through the mouth. The radula teeth are arranged in rows and are continuously being worn away at the front as indicated in the drawing, and new teeth are being formed at the back by the radula gland. As the front teeth become worn, they are replaced by the radula moving forward with new ones — rather like a conveyor belt. Throughout life the radula continues to grow.

Work on the common garden snail *Helix aspersa* has shown that the radula has about 180 rows of teeth with over 100 teeth per row and in the season of active growth and feeding the replacement rate of the radulae was over two rows of teeth per day.

As is to be expected the number, form, shape and arrangement of the radula teeth are different in different species of snail. This difference is influenced by two basic and sometimes conflicting factors.

Firstly the type and structure of the radula teeth is dependent on the type of food eaten by the snail. Teeth can function as scrapers, rasps, particle catchers, lances for soft animal food and many other variations. Also there is often variation along the row with some teeth acting in a primary role of fragmenting the food; while other teeth, usually the lateral and marginal ones, act as secondary particle gatherers and other roles in the feeding stroke.

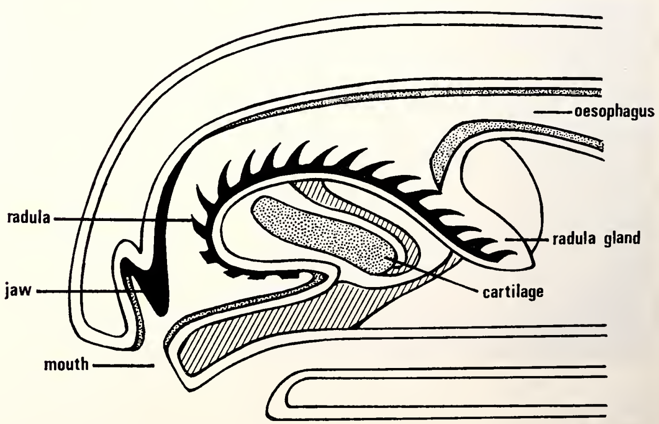

Figure 2. Diagram of head of a snail showing the position of the radula. Drawing by Phyllis Plant.

The other main influence on tooth type is the phylogeny of the species under study. Basic patterns of tooth arrangement give useful clues to super-family, family and generic placement and relationship and is used as an important character in taxonomic studies of land snails. Two examples of different tooth shape and form are given of Victorian land snails. The small rasping teeth of the herbivorous snail *Helicarion* sp. (Fig. 3) is contrasted to the long lance-shape teeth for holding prey of earthworms or slugs as in the carnivorous snail *Rhytida capillacea* (Fig. 4). Because of the different food and because these two species belong to totally different family and super-family groupings, the shape of the teeth are totally different.

Most snails also have a jaw which acts in conjunction with the radula in food gathering. Emptying into the buccal cavity are the pair of salivary glands which secrete mucus and probably some enzymes to commence digestion of the food. The food substances are then passed down the oesophagus into a large holding sack, the crop. This in turn leads to the stomach from where several blind-ending diverticulae lead into the digestive gland or liver. Digestion is both intra-cellular and extra-cellular by a complex battery of enzymes.

One of the most unusual features found in some herbivorous snails is the production of a cellulase, an enzyme which will directly affect the breakdown of cellulose. Land snails are one of the very few types of animals which produce this enzyme directly; even most herbivorous mammals such as cows and sheep have to rely on a cellulase produced for them by intestinal bacteria. Because of their cellulase, snail liver extracts were used in early commercial fibre manufacturing processes.

After digesting processes have taken place the food residues are passed into the rectum and voided as faeces.

Life duration

The life of a snail is often limited to a year. A snail hatches when one whorl of the shell has developed, the size depending on the species; a newly hatched *Helix aspersa* is about 4 mm. If conditions are favourable, the snail will continue steady growth, and will mate and lay eggs within a year. It will survive only to complete the laying of the last batch of eggs. But, if

Figure 3. Scanning electron microscope picture of the radula of a herbivorous snail *Helicarion* sp from Gray, Tasmania. (640x)

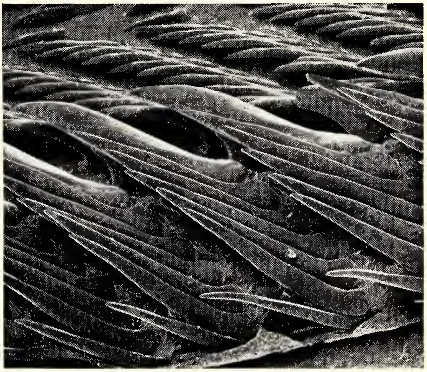

Figure 4. Scanning electron microscope picture of radula of a carnivorous snail *Rhytida capillacea* from the Hunter Valley, NSW. (54x)

there is a period or periods of aestivation, the snail might not mature for two or three seasons.

A slug is fundamentally a snail without an external shell; some have a vestige of a shell internally. Lacking a shell that can be sealed by epiphragms, the slug's aestivation is a matter of retreating to a damp dark spot and retracting head and tail so as to expose the least possible surface area.

Unwelcome as they are to gardeners, snails form a vital part of the ecology, being instrumental in the breakdown of both living and dead plant material, and in turn forming part of the food chains of other animals in the environment.

Wolf Spider and her Eggs

Some time ago some friends brought me a large female Wolf Spider *Lycosa ramosa* to photograph. After taking several pictures, I wondered how I could let it go without a predator getting it. As this spider lives in a hole in the ground, I drilled a five-eighth inch hole three or four inches deep in a well drained part of the lawn, placed the spider near the hole and put a box upside down over the spider and hole to allow the spider to find the hole itself.

Next morning I removed the box and found the spider had moved into the hole and had started to line the wall with silk.

Occasionally I would observe it just below the mouth of the hole. One day, to my surprise, the spider was on the surface outside the hole. A closer observation revealed it had spun a little mat of silk about three-quarters of an inch in diameter and was laying eggs on it. When it had laid about 50 or 60, it gathered the edges of the mat together (as one gathers a handkerchief full of plums), started to produce more silk and bound the bundle into a spherical eggsack which it carried into the hole.

Further observations showed that when the sun was shining, the spider would hold the eggsack in the sun at the mouth of the hole.

I had hoped to see the eggs hatch as this species of spider carries its young on the mother's back until they are old enough to fend for themselves. But sorry to say, before this happened I found the hole empty; apparently a predator — wasp or bird had found my spider.

IAN MORRISON.

"Pecking order" in Satin Bower Birds

Varying numbers of Satin Bower Birds frequent my garden and bird table from May to September.

Usually six to twelve can be seen at any one time, and it is interesting to see how the one mature blue male dominates the flock. He will not share the bird table and drives away up to half a dozen birds at once — though in time he becomes tired of perpetual challenges or is satisfied and flies off. The table is soon hidden by as many greedy snatching birds as can crowd on to it. That does not last long; one or other of two which will be blue quite soon drive off the rest and feast in solitude. Only when they have gone may the rabble eat in peace.

The almost mature male birds can be recognised by their pearly or pale grey beaks while the younger male birds and females have brown beaks.

The bower, in a sheltered part of the garden, was built four years ago by a pearly-beaked bird who is now the only blue one in the flock. He visits it comparatively rarely now and it is used more by younger birds.

JEAN GALBRAITH, TYERS

Victorian Non-Marine Molluscs, No. 16

BY BRIAN J. SMITH*

Many of the molluscs introduced into Australia are pest species, the most widely known being the Common Garden Snail *Helix aspersa*. However the most widespread and devastating in their effect on gardens, crops and pasture, are three small to medium slugs belonging to the family Limacidae. These are *Deroceras caruanae, Deroceras reticulatum* and *Lehmannia (Lehmannia) nyctelia.*

The genus *Deroceras* is typified by the body being spotted or without pattern but with no bands. The two species are both very common pasture and garden pests.

Deroceras reticulatum (Muller, 1774) Fig. 1. This is a medium-sized slug up to 50 mm in length, the body being typically a pale buff colour with dark brown to grey reticulations, sometimes so dense as to give a dark brown to grey appearance, sometimes with white calcareous-looking spots and reticulations. The body often appears swollen and flaccid, the animal slow-moving and not very active. When the animal is disturbed, a milky white secretion is exuded all over the body.

Deroceras caruanae (Pollonera, 1891) Fig. 2. This is a smaller and much slimmer slug reaching about 30-40 mm in length. It is typically light brown to grey in colour with an almost total lack of pattern. The body is cylindrical in shape with the head protruding a long way forward of the mantle. The slug is very active in behaviour, displaying extremely rapid crawling, the body producing a non-viscous colourless mucus. It is a cryptic animal, being hard to see because of its size, colouration and its habit of nesting in crevices and the root systems of plants.

The genus *Lehmannia* has bands and spots on the body, and internally the rectum bears a long caecum.

Lehmannia (Lehmannia) nyctelia (Bourguigrat, 1861) Fig. 3. This is a medium to large slug 50-60 mm in length characterized by longitudinal black bands on the body and mantle. Typically there are two lateral bands, but in some either one or two secondary bands occur towards the middle of the body. A median band can often be seen on the mantle. The body is usually pale buff to light brown, flaccid in nature, and the animal secretes a colourless mucus. The species is very common in cleared country and in suburban gardens, and lives under rocks or logs.

All three species described above are common species in all the southern States of Australia where man has extensively modified the environment.

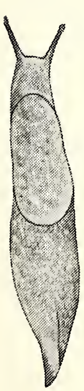

Fig. 1

Fig. 2

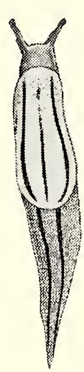

Fig. 3

* Curator of Invertebrates,
National Museum of Victoria

Live records for Victoria of the bat *Pipistrellus tasmaniensis* (Gould 1858)

BY HAROLD PARNABY*

The Tasmanian Pipistrelle *Pipistrellus tasmaniensis,* one of the largest Australian vespertilionids, has been recorded in Western Australia, Tasmania, New South Wales (Iredale and Troughton 1934) and Queensland (Kirkpatrick 1966).

There has been some confusion regarding the species status in Victoria, perhaps resulting from Wakefield's report of sub-fossil material of this species from the Buchan caves (Wakefield 1967). In a tabulation of the distribution of Australian cave bats, Hamilton-Smith (1964) indicates the live occurrence of the species in this State, but this is a typographical error (Hamilton-Smith, pers. comm.). Ride (1970) lists the species as occurring in southern Victoria; however Wakefield, in an amendment of Ride's Victorian distribution data, states that it has "not been recorded living in Victoria" (Wakefield 1971). The inclusion of the species in the Land Conservation Council's Report of the Melbourne Study Area (1973) appears to be baseless as none of the organisations credited with supplying the data for the mammal list have any records of the species. Its inclusion in an appended mammal list to the LCC's Report of the South Gippsland Study Area — District 1 (1972) is an error (Andrew Thornley, pers. comm.).

Thus the Tasmanian Pipistrelle has only recently been recorded live in Victoria (Brunner *et al* 1976). This note gives some further details of that occurrence made available to the author by Mr. Alex Gilmore of the Fisheries and Wildlife Division, together with reports of captures at two other locations.

Daylesford, 1974-76

A survey of the bat fauna within a 20 km radius of Daylesford (lat. 37° 21′ S, long. 144° 09′ E) was undertaken over a two-year period from early February 1974 to late February 1976 and resulted in 54 pipistrelle captures (36 ♀ and 18 ♂ which were not individually marked). Five of these speciments are preserved and registered in the National Museum of Victoria as C.11488 ♂, C.11489 ♀, C.16009 ♀, C.16011 ♂ and C.16151 ♀.

I began the survey by experimenting with a method of capturing bats that involved stretching strands of fishing line across a dam several cm above the water surface, or over concrete water tanks 4.25 by 4.25 metres which protruded about a metre above the ground. The lines used were monofilament nylon fishing line ranging in diameter from 0.1 to 0.2 mm (as stated by the manufacturers), and with breaking strain from about 0.8 to 1.5 kg.

On 9 February 1974, two separate parallel lines 3 to 4 cm above the water and perhaps a metre apart were stretched across a tank on the south side of Currays Hill, 6.4 km east of Daylesford. Of the many bats which collided with these lines during the 2½ hours following dusk, 10 crashed into the water and were captured: 6 female *Eptesicus pumilus,* 2 female *Chalinolobus morio,* and 2 *Pipistrellus tasmaniensis* (C.11488 and C.11489) which were sent to Mr J.McKean (CSIRO Division of Wildlife Research) who confirmed the identification. This was the second

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night during which I had tried the method. The first time was at the same tank on 2 February, and using one line a male *Eptesicus* was captured.

On subsequent occasions, using mist nets in addition to the line method, the pipistrelle accounted for about 25% of the total of 219 captures, while *Eptesicus* accounted for 43%, and the remaining 5 species combined, 32%. Despite the possible selectiveness in these techniques, I consider the pipistrelle to be one of the commoner species in the area.

Pipistrelles were captured at 4 tanks and 10 dams in all three forest types defined by the LCC Report (1973). Habitat preference could not be determined due to the great disparity in efficiency of the techniques when used on tanks compared with dams which were less successful; the tanks were in forest type III, the dams in the other two forest types.

The LCC vegetation classification is a modification of Specht's vegetation system (LCC, 1973: 63) and open forest I, II, and III are rough equivalents of Specht's low open forest, open forest and tall open forest respectively.

Vegetation and precipitation in the Daylesford region are described and mapped by the LCC (1973):

Open forest III. Forest 28 to 40 metres in height, of Messmate *Eucalyptus obliqua* and Narrow-leaved peppermint often in association with Candlebark *E.rubida* and Manna Gum *E.viminalis,* typically with a shrubby understory and Forest Wire-grass *Tetarrhena juncea.* It occurs along the divide which is commonly of 600 to 800 metres elevation and around 1,000 mm rainfall.

Open forest II. Forest 15 to 28 metres in height and of similar species composition to open forest III but with an understory of low open shrubs and tussock grass. Its main occurrence is on sites intermediate in elevation and rainfall, and in addition is interspersed with type III over much of the divide, and also occurs on the better sites to the north of Daylesford.

Open forest I. Forest less than 15 metres in height of Red Stringybark *E.macrorrhyncha,* Messmate, Long-leaved Box, Red Box *E.polyanthemos,* Grey Box *E.microcarpa* and Yellow Box *E.melliodora,* with a sparse ground cover of tussock grass often with low open shrubs. Open forest I is found in the lowlands to the north of the area between Daylesford and Guildford where sites are much poorer, of 300 to 420 metres elevation and annual rainfall around 600 to 700 mm.

Ectoparasites were collected but await identification.

Dartmouth Dam, 1975

A specimen was obtained on 21 April 1975 during a fauna survey of the Dartmouth Dam inundation area (lat. 36° 34′ S, long. 147° 36′ E) conducted by the Fisheries and Wildlife Division (Thomas and Gilmore 1976 in press). It was shot at dusk by Alex Gilmore in a clearing adjacent to the Dart River one kilometre upstream from its junction with the Mitta Mitta River, and is preserved in spirit as C.14845 in the National Museum of Victoria. This specimen is a female with undeveloped teats and and forearm measurement of 50 mm.

Vegetation along the river consists of Northern Swamp Gum *Eucalyptus camphora* and thickets of *Leptospermum phylicoides* and *L. brevipes* with low open forest (Specht, 1970) of Narrow-leaved Peppermint *E. radiata* on the adjoining river flats, and Broad-leaved Peppermint *E. dives* and Long-leaved Box *E. goniocalyx* on the surrounding hills.

The elevation of the site is approximately 305 metres and average annual rainfall about 1,200 mm.

Dargo, 1976

An adult male pipistrelle was captured on 2 January 1976 on the Dargo High Plains by Boyde Wykes of Zoology Department, Monash University and is lodged with the National Museum as C.16131. It was caught in one of several mist nets erected around a dam on the Dargo High Plains Road, 33 km north from Dargo (lat. 37° 28′ S, long. 147° 15′ E). Other species netted at the same site on this and the previous night were released and identified by Boyde Wykes as *Nyctophilus geoffroyi, N.timoriensis, Eptesicus pumilus* and *Chalinolobus morio*. The dam appeared to be the only water source in the area.

No site details are available.

Forearm length and identifying characteristics

Descriptions of the pipistrelle in the literature are mostly incomplete. Dobson (1878) gave probably the most thorough diagnosis (under *Vesperugo krefftii*), and Troughton (in Le Souef and Burrell 1926) was also useful. Tate (1942) was primarily concerned with cranial and dental features. Lord and Scott (1924) give the forearm length as 45 mm, apparently based on Dobson. However, Dobson gives only one forearm measurement of 1.9 inches (48 mm) for a mainland specimen. Four female specimens from Tasmania in the Queen Victoria Museum, gave forearms of 48 mm and 50 mm (measured fresh prior to skinning), and 47 mm and 48.5 mm for bats that had been in spirit for about 3 months (R. H. Green, pers. comm.).

At Daylesford bats were not individually marked on release but the forearm lengths of 29 female captures ranged from 49-53.5 mm with mean 51 mm, and 15 male captures had a range of 49-53 mm and again a mean of 51 mm.

When attempting to identify a pipistrelle one should consider a large vespertilionid with the snout naked anterior to the eyes, and slender ears that project well above the fur. The ears have a characteristic notch on the outer margin near the tip (see cover photograph). While the drawing in Ride (1970: 172) exhibits the naked snout and long projecting ears, the ear notch is unfortunately not visible due to the angle from which it has been drawn.

There are three south-eastern Australian Vespertilionidae of comparable size to the pipistrelle. The Bent-wing Bat *Miniopterus schreibersii* and Goulds Bat *Chalinolobus gouldii* are readily distinguished by their ears which are about as broad as long, and do not project far above the fur. The Bent-wing is also distinguished by the characteristic wing fold of the third digit. According to Troughton (1967) the species with which the pipistrelle is most likely to be confused is the Broad-nosed Bat *Nycticeius rueppellii.* I have not seen live specimens of the latter but its external characteristics are apparently

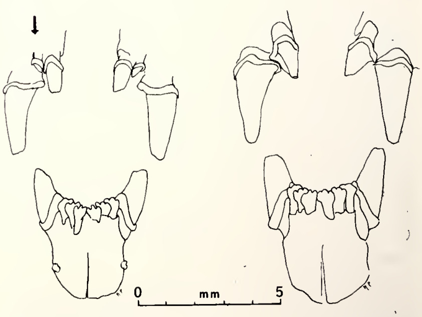

Diagram showing minute upper second incisor in *Pipistrellus* (left), which is absent in *Nycticeius* (right).

similar to *P.tasmaniensis*. The distinguishing feature generally cited in the literature is the absence of the minute second upper incisor tooth in *Nycticeius* (see diagram).

Acknowledgements

I am grateful for assistance given by R. M. Warneke of the Fisheries and Wildlife Division, and E. Hamilton-Smith, for reading the manuscript and their resulting suggestions, and to J. M. Dixon of the National Museum for checking the draft and allowing access to the collections. Drawing equipment was loaned by Lee Ahere. Boyde Wykes of Monash University and Sandy Gilmore of the Fisheries and Wildlife Division kindly supplied information concerning their locality records. The fine photograph was taken by Alan Hartup of Newstead.

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bold Expeditions Nu. 47. Reviews of the

Winner of 1976 Natural History Medallion

The Natural History Medallion for 1976 has been awarded to Winifred M. Curtis, M.Sc., Ph.D.(Lond.), F.L.S. Dr. Curtis was first nominated for the award in 1972 by the Society for Growing Australian Plants (Tasmanian Region), and the nomination was supported in subsequent years by the North East Tasmania Field Naturalists' Club and the Latrobe Valley Field Naturalists' Club. This is the thirty-sixth year of the award and the first time it has gone to a Tasmanian.

Dr. Curtis was for many years lecturer in Botany at the University of Tasmania and is a leading authority on that State's flora. Her publications include "A Student's Flora of Tasmania", and the text which accompanies Margaret Stones' paintings in "The Endemic Flora of Tasmania" of which five volumes have been published.

Palaeo-ecology of Pebbles

Beach pebbles and stream pebbles can be distinguished and the presence of one or the other can help determine the origin of sediments

BY K. N. BELL

On the basis of a study of water-washed pebbles in Malaya, Lenk-Chevitch (1959) suggested that beach-washed and stream-washed pebbles had easily distinguishable characteristics. This is a note to describe the results of a similar study on some Victorian pebbles.

If such pebbles can be easily distinguished then it would be possible to use that fact in the study of pebble beds in geological strata to show their origin.

Pebble Characteristics

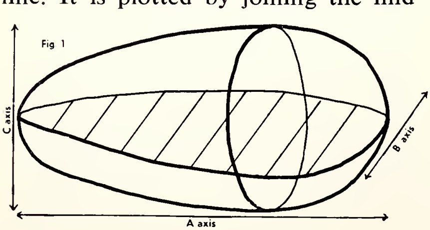
(i) PROFILE: A pebble has three axes A, B, C, the longest, medium and shortest axes respectively (Fig. 1). These axes may or may not be mutually perpendicular, and are not concurrent. It is possible therefore to have three profiles or cross-sections of the pebble — AB profile which is perpendicular to the C-axis, and BC and AC profiles.

Only the AB profile has been studied here.

(ii) GEOMETRICAL LINES:

(a) Apical line—the longest straight line which can be drawn on the cross-section, i.e. the A axis in the AB profile.

(b) Bisectrix — usually a curved line. It is plotted by joining the mid-points of the width chords of the profile considered. These chords are at right angles to the apical line. Lenk-Chevitch found that for beach pebbles the bisectrix lies on one side of the apical line, whereas for stream pebbles the bisectrix cuts the apical line at least once.



(iii) FRACTIONAL DEPARTURE — Schleiger (1969) added to the theory of pebbles by defining the fractional departure, D′, between the apical line and the bisectrix as $D' = \frac{T}{B}$ where T is the maximum distance between the apical line and the bisectrix and B is the maximum width of the pebble in the profile being considered. If D′ is less than 0.05, the pebble is regarded as *symmetrical*, S type. If D′ is greater than 0.05, the pebble is *asymmetrical*, As type if the bisectrix does not cut the apical line (Fig. 2), or *disymmetrical*, Ds type if the bisectrix cuts the apical line at least once (Fig. 3).

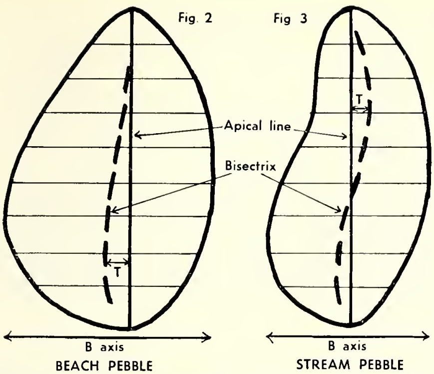
Thus the As type corresponds with the beach pebble and the Ds type with the stream pebble.

Method

Pebbles were collected for study from Indented Heads, Port Phillip Bay (marine pebbles); Morrison's, Moorabool River (stream pebbles) and from Steiglitz.

About 100 non-cracked and unsplintered pebbles were selected, in size about 3-10 cm longest diameter. These were photographed on graph-paper to

*22 Mallaluka Avenue, Ocean Grove.



give the AB profile. On the photographs each apical line and bisectrix were drawn and the fractional departure then calculated for each pebble.

Results

The table shows the results found for pebbles from Indented Heads and the Moorabool River.

It was found that As type pebbles were dominant in the marine sample and the Ds type in the river sample. In neither case were the S type pebbles very common. This is the same result as Lenk-Chevitch found.

As it is possible to check upon the origin of pebble shape it becomes feasible to use this fact in palaeo-ecological studies of sediments where fossil organisms may not be present. With this in mind pebbles were collected and measured from a gravel pit at Steiglitz. As shown in the table, the percentage of each pebble type present at Steiglitz bears a closer resemblance to those of the river-worn than to the ocean-worn pebbles. So we can conclude that the gravels about Steiglitz are river deposits.

TABLE

Locality	*As*	*Ds*	*S*
Indented Heads	44%	29%	27%
Moorabool River	38%	44%	19%
Steiglitz	37%	53%	10%

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Increase of the Cape Barren Goose

When seeking back issues of "The Victorian Naturalist" which contain information on Big Green Island, a reader supplied up-to-date news about some of its bird life. (In spite of the prefix "Big", the island has an area of less than two square miles; it is about two miles west of Flinders Island in the Furneaux Group.)

Since purchasing the property four years ago, Mr. John Nield reports that Cape Barren Geese are increasing in numbers and are in no danger of extinction. In previous years, rarely were more than 30 geese seen on the island. Now, Mr. Nield estimates that there are up to 400 at any one time, although there might be as few as 50 — according to the green feed available. Sometimes, with the quantity of droppings, parts of the property look like a fowlyard. Of course they affect the sheep carrying capacity, and many farmers regard the Cape Barren Goose as a pest and approaching plague proportions.

Mr. Nield also reported on the predation of Mutton Birds by Pacific Gulls. The gulls frequently raid the Mutton Bird nest sites, especially in the early mornings. They take anything they can reach — eggs and young birds.

Life History of a Gall Fly on Eucalypts

BY G. A. CURRIE

Editor's Note. Intrigued by Ken Strong's account of Gall Flies in our April issue, a reader brought attention to the following article. It is a short extract from "Galls on Eucalyptus Trees" published in the "Proceedings of the Linnean Society of New South Wales", Vol. LXII, Parts 3-4, 1937, and is reprinted here by permission of that Society. The complete article is available in our F.N.C.V. library.

There are many species of *Fergusonina* flies which attack *Eucalyptus* trees, and all are associated in the galls with nematodes. The fly which causes the galls on *E. macrorrhyncha* was studied most intensively, so the life history of that fly is presented here.

Nematodes accompany fly eggs laid in young flower buds

Adult flies emerge from the galls in summer, and the females, after mating, proceed to lay eggs in the young flower-buds which are appearing at that time. With each egg, any number of larval nematodes from one to fifty is passed into the cavity between the operculum and the floor of the inside of the bud. Many eggs may be laid in the same bud by a single fly or by several flies, and as many as 74 eggs and 227 nematode larvae have been found in a single bud.

Embryonic development within the egg of the fly proceeds during the next six weeks (eggs which were laid on 15th December hatched on 1st February). During that period the larval nematodes feed vigorously on the primordia of the stamens and cause a rapid proliferation of cells which form irregular masses inside the galled bud.

On hatching, the fly larvae make their way between two contiguous masses of cells and tear out small crypts in which to lie. The larval nematodes join them in their several crypts and develop rapidly to the adult stage. The nematodes of that generation are all parthenogenetic females which lay eggs in the gall cavity alongside the fly larva, with which they lie in contact.

The fly larva passes through three instars, all in the crypt inside the galled bud, obtaining its food from the plant cells surrounding it. During the first and second instars it feeds on the gelatinous cell-sap, some of which oozes from the cells after they have been punctured by the stylets of the nematodes. The third instar larva tears down the walls of the cavity in which it lies and feeds on the ruptured cells.

Female nematodes in fly pupae

The nematodes breed parthenogenetically in the cavity during the larval life of the fly without harming it in any way; males appear in numbers in the autumn and winter, and when the female fly larva is about to pupate, two fertilized female nematodes enter its body cavity, probably through the skin. There, during the pupal period of the fly, the female nematodes change from the free-living form to a much enlarged parasitic form which has no stylet or gut, the whole of its internal space being filled by a much enlarged ovary. Male flies are never parasitized in this way by the nematodes, female flies invariably so.

By the time the adult female fly

emerges, the parasitic nematodes are discharging large numbers of segmenting eggs inside its body cavity. On hatching, larval nematodes make their way to the ovary of the fly, penetrate into the oviduct, and there await the passage of an egg down the chitinous ovipositor, whence they accompany it into the young flower-bud to start the cycle anew.

This life history can be taken in its broad outlines as typical for the whole series of flies. The time of year when adults emerge and the point of the tree attacked vary, but young growing tissue is always selected by the flies for oviposition, and the nematode larvae which are always deposited with the eggs of the fly are active before the eggs hatch.

Blackburn Lake Classified by the National Trust

As well as Blackburn Lake the Classification includes Jeffery Street and some other streets further west that are known as the "Bellbird Streets". In addition, two nearby small areas have been Recorded.

Classification means ". . . those parts of the physical environment, both natural and man-made, which in the Trust's view are essential to the heritage of Australia and which must be preserved." *Recorded* areas are those ". . . which contribute to the heritage of Australia and whose preservation is encouraged."

In its citation, the Trust describes the area as an oasis in suburbia. The lake and its environs remain largely in their natural condition, providing a haven for more than 165 bird species. The area is renowned for its Bell Miners, for a breeding colony of Regent Honey-eaters, as a resting place for certain migratory birds (Rufous Fantail, Satin Fly-catcher, etc.) and for large numbers of waterfowl, many breeding. The second Victorian recording of the Koel was in the Lake Reserve in 1976.

The streets extending outwards from the lake are an integral part of the ecology of the lake area, being corridors of movement for birds. These private streets have resisted the pressures of normal street-making requirements and retain a quiet, almost rural character unique in Melbourne. They demonstrate an excellent integration between the natural and man-made environments. The natural vegetation, bird life and informal roads and gardens combine to provide a rare example of *rus in urbe*.

The streets vary greatly in quality. Jeffery and Linum Streets are the most consistent and unified, but in spite of faults the area has an overall "sense of place".

The lake area also varies in quality. At its worst there are large areas where sheet erosion has resulted from intensive use around barbecues. At its best there are tranquil winding tracks passing through dense indigenous forest. Regeneration is being successfully undertaken by sensitive management operated by local residents.

The two Recorded areas do not have high aesthetic value. However, they both have potential for sensitive development compatible with the general character of the Classified areas.

Interested readers should apply to the National Trust for further information of this newly Classified area.

Recent Fossil Discoveries in Victoria

Five late Cenzoic fossil marsupial sites in Victoria: a progress report

BY THOMAS H. V. RICH*

Introduction

The history of Australia's unique mammals and birds begins with a few feathers and fleas found at Koonwarra in deposits of early Cretaceous age, about 120 m.y.B.P. (m.y.B.P. = million years Before Present) (Waldman, 1971). It is thought that the fleas could only have lived as ectoparasites of mammals; hence mammals are thought to have been present by this time.

From then until about the beginning of the Miocene, approximately 20 m.y.B.P., the only record of these groups are penguins and cetacean remains from a few areas, plus some rare enigmatic traces of what could be land birds. Until the beginning of the Miocene, therefore, the fossil record is virtually mute about even the most general aspects of the evolution of terrestrial mammals and birds in Australia. However, in at least a preliminary fashion based on the fossil record, it is now possible to chronicle the evolutionary events after 20 m.y.B.P. that affected the higher terrestrial vertebrates of Australia.

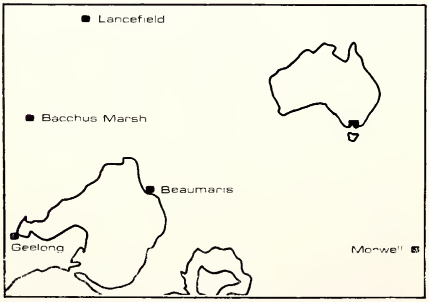

Fig. 1. Five fossil marsupial sites in Victoria that are currently being studied.

That this comparatively detailed history of land mammals and birds can be constructed only for the last one-sixth or less of the time these groups have been in Australia, means that much remains to be done by vertebrate palaeontologists to shed light on the evolutionary events that occurred there.

By 20 m.y.B.P. all the major groups of marsupials and birds had differentiated. Therefore, what the fossil evidence can now shed light on are the phyletic relationships within some of the groups best represented in the fossil record. Questions of a broader nature concerning relationships receive little useful information from fossil evidence simply because the events of interest took place long before the record begins.

Other major questions that a detailed understanding of this earlier history could throw light upon (were it available) are the places of origin and time of entry into or migration from Australia of the various birds and mammals — questions that intrigued biogeographers before the time of Wallace. Recent reviews of these questions show that controversy still exists (Lillegraven, 1974; P. Rich, 1975; Tedford 1974).

To answer these questions properly will require the discovery of many new fossil sites: both older sites than the 20 m.y.B.P. barrier beyond which our

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National Museum of Victoria

understanding at present is merely that the groups existed, and younger sites in order to be able to refine the general outline that now exists. In addition, previously known sites must be re-examined to increase knowledge of their fossil forms, and to refine the age estimate for the localities so that the order of events is more accurately known.

What follows is a summary of current activities of the Department of Palaeontology, National Museum of Victoria, directed at furthering understanding of this history. Several other organisations are involved in these projects to various degrees. Much of what is written in the paragraphs below is of a preliminary nature and subject to revision and refinement with further work. None of these projects are finished or ready for definitive treatment yet. The unanswered questions are discussed as well as the relatively firm conclusions, for in the former lie the most fertile ground for future research.

Batesford

In October 1975, Mr Greg Sack of Hawthorn, Victoria, when on a visit to the Batesford Quarry of Australia Portland Cement Ltd, near Geelong, discovered the left and right mandibles of a *Zygomaturus* sp, a member of the family Diprotodontidae, National Museum of Victoria P42530. Both mandibles had M_{2-4} preserved, unfortunately in an extremely advanced state of wear preventing a more precise identification. Measurements indicate that this individual is as large as the largest available specimens of the Pleistocene *Zygomaturus trilobus* and the Pliocene *Zygomaturus keani*, the largest of the recognized species in the genus.

Where did the enclosing matrix come from?

During the course of quarrying activity, the block of matrix in which the specimen occurred was moved at least 100 metres to the place it was found on the quarry floor by Mr Sack. That

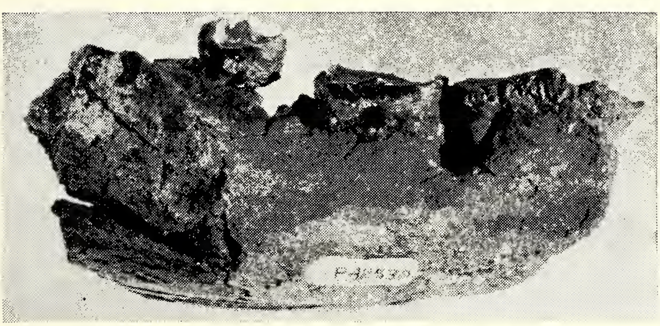

Fig. 2. Lateral view of right mandible of *Zygomaturus* sp. from the Batesford Quarry of Australian Portland Cement Ltd near Geelong, Victoria. Approx. 23 cm long. NMV P42530.

Fig. 3. Crown or occlusal view of same specimen as in figure 2.

it survived the action of the earth-moving equipment at all was an incredible bit of good luck. Unfortunately, this displacement means that the original location of the specimen can never be established with certainty.

However, circumstantial evidence strongly suggests that it came from a fissure in the Batesford Limestone. Several such fissures have been uncovered over the years in the process of excavating the Batesford Limestone for cement. Blocks from that unit are found in the fissures, together with large contorted slabs from the overlying Fyansford Formation, and a third lithology seen nowhere else in the quarry but the fissures.

This third lithology is a black, silty clay distinguished from similar lithology in the Fyansford Formation by a strong sulphur odour and the absence of finely comminuted marine fossils. Although the Fyansford Clay is characterized in its lower part as having sulphur present, no sample has been found that is as strongly odoriferous as this black silty clay. In this unique lithology occur the only bone fragments thus far found *in situ* in the fissures, and a similar matrix was adhering to the *Zygomaturus* mandibles when they were discovered. Both the isolated bone fragments from the fissures and the jaws have a strong odour of sulphur. The only other fossil bones found in the quarry are in the Batesford Limestone and they are much lighter in colour and completely lack the sulphur smell.

What is the age of the deposit?

Directly above the Fyansford Formation over much of the Batesford Quarry is a basalt flow of the Newer Volcanics. Samples taken from the same flow about two kilometres to the south have been dated by Aziz-Ur-Rahman and McDougall (1972) at about 2 m.y.B.P., late Pliocene. Because blocks of this basalt are not present in the fissure deposits, the fissures must have been filled by the time of outpouring of the basalts, late Pliocene. Conceivably, the fissures could have been filled any time after the deposition of the Fyansford Formation which was completed by the Bairnsdalian, late Miocene (Abele et al, 1976). However, because the fissures were apparently open to the air rather than the sea, it is likely that they were not active until after the Cheltenhamian (about 7 m.y.B.P.) to Kalimnan, the age of the Moorabool Viaduct Sand (Abele et al, 1976) during or after which the sea finally withdrew from the area.

Current efforts at this site are directed towards finding additional specimens that can be identified. Subsequent to the discovery of the mandibles, only scraps have been recovered. This site has the potential for yielding a reasonably well-dated collection that could be a major reference point if the maximum age can be more precisely determined and turns out to be close to the minimum of 2 m.y.B.P. As present, there is no assemblage of terrestrial vertebrate fossils with a firmly fixed age in the vicinity of 2 m.y.B.P. in Victoria and few in Australia.

Bacchus Marsh

This site is located about nine kilometres south-west of the town of Bacchus Marsh on an unnamed tributary of Parwan Creek. It was discovered by Miss Kerry Hein in a kaolin pit owned by her family.

From this locality have come about fifteen skulls, twelve jaws, and numerous skeletal elements of small individuals referrable to the genus *Diprotodon*. Only a few other sites have as many well-preserved specimens of this genus. The small size of the individuals is not simply because

Fig. 4. Right lateral view of skull of *Diprotodon* sp. from Bacchus Marsh, Victoria. Approx. 66.5 cm long. NMV P31299.

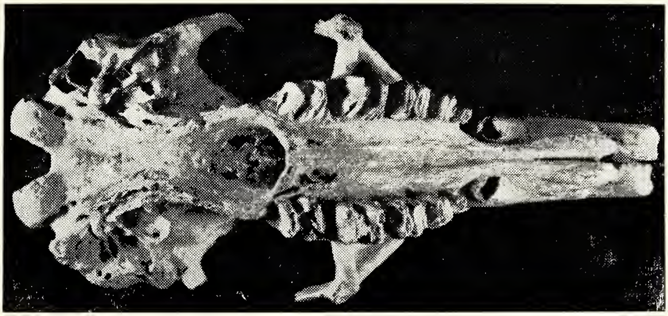

Fig. 5. Palatal view of same specimen as in figure 4.

the sample consists of juvenile animals only, for obvious adults with all teeth fully erupted and in a worn condition are present. Whether the size of the individuals warrants their being separated as a distinct species from other specimens of *Diprotodon* must await detailed study. From this material it will be possible to extract information about the anatomy of *Diprotodon* that has never been described, such as the structure of the auditory region. Such information should prove useful in furthering our understanding of the relationships of this genus to other diprotodontids as well as other marsupials.

The deposit from which the specimens came appears to be a channel or series of channels which have cut into an older kaolin deposit. These channels, besides containing material reworked from the kaolin deposits, have coarse quartz sands and blocks of basalt that were derived from a flow that caps the present surface through which the Parwan Creek is cut. A maximum date on the locality is provided by a sample of basalt collected about eight kilometres from the fossil site and presumably formed by the same volcanic episode that generated the blocks found in the channel deposit. This sample has been radiometrically dated at 4.03 ± 0.04 m.y.B.P. (Aziz-Ur-Rahman and McDougall, 1972).

Subsequent to the deposition of the fossiliferous sediments, the valley where the specimens occur has been eroded another fifty metres deeper. The time required for this erosional episode or episodes has not yet been established, but dating it offers the only possibility at present to establish a minimum age for the fossils. The erosional episodes may have occurred during or immediately after periods of uplift along the Rowsley Fault which triggered downcutting by the Parwan Creek and its tributaries on the upthrown block west of the fault.

Lancefield

The swamp deposit

At Lancefield there is an extremely rich deposit of fossil bones located in a swamp near the town park. Much effort has been expended during the past three summers by numerous persons connected with Monash University, the Victorian Mines Department, Sydney University, University of Melbourne, the Institute of Aboriginal Studies and the National Museum of Victoria; they are attempting not only to excavate the fossil bones, but to understand the environment they accumulated in and the mechanism or mechanisms that brought about such a great concentration of specimens.

Most of the area excavated thus far appears to have been a swamp when the fossils were parts of living animals — not unlike the present swamp. All the animals that occur in the inferred swamp deposit were the size of a living emu and grey kangaroo or larger. About 90 per cent of all the specimens belong to *Macropus titan*. Other elements in the fauna are *Diprotodon* sp, the kangaroos *Sthenurus* sp, *Protemnodon anak, Protemnodon* sp, and the ground birds cf. *Genyornis* and *Dromaius* sp. About forty square metres of the swamp deposit have been excavated, yielding approximately eight individuals per square metre.

Swamp site and channel site compared

During the 1976 field season, a two square metre test trench was excavated that encountered a second type of deposit, a former channel of a stream that had become filled with sediment. Unlike the swamp deposit from which the bulk of the specimens came, material here tended to be more complete. Despite the fact that literally hundreds of maxillae fragments of *Macropus titan* had been recovered in the swamp deposit, there was not one palate intact of the species in this channel, much less a complete skull. In the channel deposit, along with the maxillae fragments, a palate and a nearly complete skull of another individual were found.

In the swamp deposit, long bones tended to be nearly horizontal or dip at relatively low angles; bones with a vertical orientation were extremely rare. By contrast, the channel deposit yielded about a dozen long bones of emus that were vertical. In the swamp deposit, remains of small animals were conspicuous by their absence, although a concerted effort was made to find some. From the channel deposit, only about a half-dozen teeth of small animals were recovered, but they added considerably to the number of taxa represented at Lancefield: *Thylacinus* cf. *cynocephalus, Vombatus* sp, cf. *Wallabia*, and rodentia.

In 1977, it is planned to return for a fortnight to this site and excavate another two or three square metres of the channel deposit. The objectives will be to recover more of the smaller animals in order to gain a more complete picture of the fauna there and to see if additional, well-preserved skulls and skeletal elements can be recovered. The excavation in 1976 chanced to encounter the edge of a stream channel. It is planned to locate the 1977 excavation at a point likely to be close to the central axis of the former channel.

Artefact with the animal fossils

Originally, a single season of excavation was planned at Lancefield, the summer of 1974. In the course of work that year, a stone tool was found in association with the fossil bones. In an attempt to decide whether further evidence of the association between the animal remains and humans could be found, work continued during the following two summers. To date, no unequivocal evidence has been discovered to establish this association at Lancefield, and the site therefore remains a tantalizing puzzle. If the artefact was associated with the bones owing to the action of humans living at the same time as the animals, why are there no other indications of human activity at the site? If the artefact was emplaced long after the animals were buried, how did it become intercalated among the bones?

Interest in this question of the possible association between the animal remains and humans has resulted in a much more thorough investigation of this site than would otherwise have taken place. The geology has been studied in detail by several workers and attempts have been made to radiometrically date the bone.

Beaumaris

Fossils of land animals

The fossil land mammals from Beaumaris are the oldest in the State. True, at Koonwarra there is evidence that land mammals were present much earlier (the fleas) but it is at Beaumaris that the unquestioned record of their presence begins — with bones of the actual animals. Unfortunately, fossils of this kind from this site are quite rare; less than half a dozen have been found.

Meagre though this sample is, the site is extremely important because along with the land mammal fossils, marine invertebrates occur in the same rock unit; the Black Rock Member of the Sandringham Sands. The assemblage of marine invertebrates from this unit forms the basis of recognition of the Cheltenhamian Stage. Because similar marine invertebrates occur elsewhere in the world, it has been possible to establish that the Cheltenhamian corresponds to the late Miocene (about 7 m.y.B.P.) in terms of the world-wide geological time scale.

It is unusual for an assemblage of land mammal fossils to be so accurately dated in Australia because generally the geological conditions of the fossil sites are unfavourable. Therefore, these few specimens form an important reference point for dating collections of land mammal fossils from other places using only the land mammals themselves.

Two kinds of land mammals are represented at Beaumaris and both are diprotodontids. *Zygomaturus gilli* is the oldest and smallest species of the genus. It is known only from Beaumaris. The second diprotodontid cannot be definitely identified at the generic level although it probably is allied with *Kolopsis*, a genus known from the Northern Territory and New Guinea. Previously, it has been suggested by Woodburne (1969) that all the diprotodontid material known from Beaumaris belong to *Z. gilli*. However, comparison of an undoubted lower M_4 of *Z. gilli* found in 1972 by

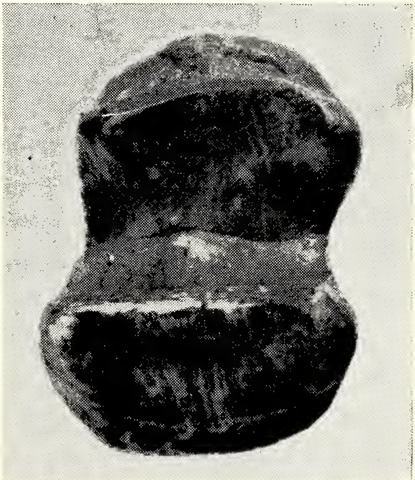

Fig. 6. Crown or occlusal view of right M_4 (lower fourth molar) of *Zygomaturus gilli* from Beaumaris, Victoria. Original specimen property of Mr Brian Crichton. 30.5 mm long.

Mr Brian Crichton with the homologous tooth in the jaw previously thought by Woodburne to represent the lower dentition of this species, indicates that the latter belonged to a quite different animal. Unfortunately, this jaw was badly battered in the intertidal zone before being discovered and can only tentatively be referred to *Kolopsis*.

Fossils of marine birds and animals

Specimens of marine birds are surprisingly common at Beaumaris, particularly penguins. An albatross has also been described. Although marine mammals are common at Beaumaris, they have received scant attention in the scientific literature beyond simple lists of taxa. Most of the material consists of water-worn fragments but two sections of articulated vertebrae are known; one is from a seal and the other a small cetacean.

Morwell

The site of this fossil occurrence is a firehole roughly 250 metres in diameter at the top of the Morwell 1A seam in the State Electricity Commission of Victoria Opencut Mine at Morwell.

Formation of the firehole began when the coal seam was exposed to air and caught fire. Burning of the coal formed a depression which subsequently filled with water to create a lake. The lake in turn was gradually filled with clay and silt up to the level of the top of the surrounding coal seam. While these lake sediments were accumulating, several skeletons of two species of kangaroo, *Macropus titan* and *Protemnodon anak* were buried in them. Afterwards, the Haunted Hill Gravel was deposited on top of both the coal seam and the sediments filling the firehole.

Bones were first reported in May 1975 by mining personnel, and since then the remains of about forty individual kangaroos have been found, together with a single skeleton of a bird, the Plain Wanderer *Pedionomus*, and the skeletons of a few small fish. Many of the skeletons were complete and often in articulated condition before being uncovered by the mining machinery.

The skeletons were scattered over an area within the firehole about 100 x 200 metres. About half of them were found in a group near the southern margin of the firehole, but others occurred singly or in groups of two or three at random in the south-eastern two-thirds of the firehole. The absence of skeletons from the north-western third of the firehole has not been satisfactorily explained as yet.

Not all the specimens died at one time. They occur over a vertical distance of 8.9 metres near the bottom of the firehole. Some of the difference in elevation between pairs of specimens may be owing to slumping and irregularities in the bottom of the lake at the time of deposition of the skeletons. However, examples were observed where specimens close to one another were separated vertically by sediments in which individual beds were uncontorted and could be traced continuously from above one specimen to below another.

Whatever the mechanism that caused this accumulation of bones at Morwell, it was highly selective. With the exception of the one small bird skeleton, all the terrestrial vertebrates in this large collection can be assigned to only two species of kangaroos. Presumably, there were many other mammals of approximately the same size living at the time these skeletons were buried. Where these two kangaroos are found elsewhere, other such forms occur alongside them. Yet, there is not the slightest indication at Morwell of any of these other mammals.

Dating by fossil pollen

Preliminary palynological or fossil pollen analysis of sediment collected from around the skeletons suggests a late Miocene age, 8 to 10 m.y.B.P. If this determination is correct, it would mean seriously revising the present picture of macropod evolution, for *Macropus titan* has previously been known only from late Pliocene[1] or younger deposits and *Protemnodon anak* from Pleistocene deposits exclusively (Bartholomai, 1973).

Partridge (pers. comm., 1975) placed the pollen samples collected from around the skeletons in the late Miocene *Triporopollenites bellus* zone of Stover and Partridge (1973). The Morwell coal seams are placed in the immediately previous zone of Stover and Partridge (1973), the early Oligocene to early Miocene *Proteacidites tuberculatus* Zone. Therefore, the great age of the firehole cannot be readily explained away by contamination from the immediately surrounding coal seam. The coal seams at nearby Yallourn have been assigned to the *T. bellus* Zone so there may have been a source of contaminants nearby during post-*T. bellus* time. However, if pollen was being reworked into the firehole deposit during that period, one would expect palynormorphs that are exclusively post-*T. bellus* Zone in range to be present, but none have been seen in the samples analyzed by Partridge thus far (pers. comm., 1975).

Even if the palynological evidence is ignored, the Haunted Hill Gravels give some control to an age assignment for the underlying firehole. Jenkin (1968) reviewed the age of this unit and concluded, "However, it can be stated with reasonable certainty that the Haunted Hill Gravels were deposited in the period between the Kalimnan and the Upper Pleistocene, and the bulk of the formation in the Upper Pliocene and perhaps Lower Pleistocene times."

A Final Comment

Not one of these sites was found by a palaeontologist deliberately setting about to locate fossils. Rather, people with other interests who had an overwhelming desire to understand what they had found were responsible for the discoveries. Driven by their curiosity, these people took the trouble to bring the material to the attention of professional palaeontologists. These five sites are not unique in this regard, the same could be said for most of the terrestrial vertebrate sites in Victoria.

Persons of a similar outlook have been responsible for many valuable later discoveries at these same sites that also added to the knowledge of the history of terrestrial vertebrates in this part of Australia. Much of the credit, therefore, for the understanding of this history that has been and will be wrung from the fossil record must be given to these people.

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[1] A partial skeleton identified as *Macropus faunus* by De Vis (1899) was collected in a deep lead beneath a basalt at the Great Buninyong Estate Mine. Hart (1899) discussed the geological setting of the specimen and Whitelaw (1899) gave a cross-section of the Great Buninyong Estate Mine in which the original location of the bones is noted.

The specimen, National Museum of Victoria P24133, on re-examination has been assigned to *Macropus titan*, a course suggested by Bartholomai's action (Bartholomai, 1975) synonomising *M. faunus* De Vis, 1895, with *M. titan* Owen, 1838.

Aziz-Ur-Rahman and McDougall (1972) analyzed three basalt samples collected in the vicinity of Ballarat and obtained dates greater than 2 m.y.B.P. They suggested that, ". . . many of the basalts in the Ballarat area are Late Pliocene in age." A sample taken from the basalt directly above the fossil site would be more satisfactory but until this is done, the inference for a minimum age of late Pliocene for this specimen must be based on radiometric dates determined for samples collected no closer than thirteen kilometres which are inferred to have been generated by the same episode of volcanism.

Acknowledgement

Few of the ideas and pieces of information in this article are exclusively my own. Rather than attempt to reconstruct the plexus of innumerable conversations with and written communications from many different persons that led to them, I here take the liberty of thanking them all and earnestly beg the pardon of any inadvertently overlooked: Drs P. Gunn, G. and J. Hope, D. Horton, P. Ladd, E. Lundelius, P. Rich, G. Sanson, A. and J. Warren, R. Wright; Messrs W. Blake, B. Crichton, T. Darragh, T. Flannery, R.Gaulton, E.Gill, R.Glenie, C.Mallett, R. Macdonald, C. Macrae, P. Macumber, R. McCutcheon, J. Parker, A. Partridge, R.Thorne, G.Sack, A.Shugg, K. Simpson, I. Stewart, C. Tassell and R. Walkley. Finally, none of these people would probably agree *in toto* with what is written here and therefore bear no responsibility for its contents.

I wish to thank Ms Susan Gibson, Lynette Anderson and Patricia Batchelor for respectively drawing Figure 1, typing the manuscript, and editing, and Mr Frank Coffa for the photographs in figures 2-6.

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Notice to Authors concerning first proofs

If authors wish to see galley proofs, please enclose a stamped addressed envelope with your material and proofs will be sent to you as a matter of routine. But time is critical, and the editor should receive checked and OK'd proofs by return mail or such material could be delayed to a later issue.

Book Reviews

"How to Know Western Australian Wildflowers — Part IV"

by B. J. Grieve and W. E. Blackall
24 x 17 cm, 402 pp. University of Western Australia Press, 1975.
Recommended retail price: $21.00.

More than ten years have elapsed since Part III of this "How to Know" series was published (see review in *Muelleria 1:* 239-240, July 1967), and 22 years since Part I appeared in 1954. It is now most gratifying to see the work completed, by treatments of the families Solanaceae to Compositae (in Engler & Prantl's sequence); Goodeniaceae was already presented in Part II. High praise is due to Professor Brian Grieve and the University of Western Australia Press for a splendidly produced and most useful book.

In many ways the present volume is superior to its predecessors, having much more detailed drawings (including whole plants of the smaller herbs) and a gallery of sixteen attractive colour plates, each of which carries from five to eight pictures of different species. It is an excellent complement to A. H. and A. W. Reed's recently published "Flowers and Plants of Western Australia" (1973). The very strong blue cover is embossed with floral motifs; the useful introductory key to all plant families in Western Australia is repeated, as is the illustrated glossary to botanical terms preceding the index.

This fine textbook will be indispensable to any student wishing to identify the multitudinous flowers of the West — even though its retail price is several times higher than the $5 for Part III.

J. H. Willis.

"Flowers and Plants of New South Wales and Southern Queensland"

by E. R. Rotherham, Barbara G. Briggs, D. F. Blaxell and R. C. Carolin
28.5 x 22 cm, 192 pp, incl. 35 pp of text (with index) and 556 colour plates.
A. H. and A. W. Reed, 1975. Recommended retail price: $18.95.

This very commendable book is the third in Reed's series on Australian Flora in Colour, which began in 1968 with "Flowers and Plants of Victoria".

Except for that vast tropical third, the Commonwealth's wildflowers are now fairly well covered pictorially. Both format and lay-out follow closely those of the Victorian and Western Australian predecessors, but only vernacular names of wide usage are provided — none have been coined. Plates are arranged under eleven broad eco-geographical sections, e.g. Heath, Mallee, Alpine and Subalpine Communities, etc. Green endpaper maps show the 17 major geographic divisions under which Queensland and New South Wales vegetation is discussed.

The 556 colour photographs are noteworthy for their beauty, clarity and easy recognition, with quality of reproduction up to the high standard set in the two companion volumes. If there be any questionable feature, it is the re-appearance of 88 species that were already portrayed in "Flowers and Plants of Victoria"; indeed, Plate 2 (*Avicennia marina*, Grey Mangrove) is the selfsame picture as Plate 191 in the Victorian book. While some overlapping is perhaps unavoidable, it would have been advantageous to see most of these repetitive items replaced by plants not hitherto illustrated.

Except for species ranging widely over Australia, the distribution is set out State by State; but in 26 instances (e.g. *Atriplex vesicaria, Bossiaea heterophylla, Pomaderris lanigera* and *Scaevola aemula*) Victoria has been omitted from captions to species well documented for this State. The statement that *Acacia longifolia* var. *sophorae* is "Native to the coast north and south of Sydney, but has been extensively planted elsewhere" would seem to imply that this tree is endemic in New South Wales, but it is certainly indigenous and widespread throughout the sandy littoral of Victoria and Tasmania. *Banksia integrifolia*, given for "Bass Strait Islands", has not been observed anywhere in the Strait this century, and the old record for King Island (1876) may be dubious.

Fortunately, very few errors seem to have crept into the text. One notices under Plate 349 "Chiloglothis" instead of *Chiloglottis*, while the long-familiar name *Cassia eremophila* (Plate 478) is now generally abandoned in favour of the prior *C. nemophila.* Plate 203 depicts the orchid *Lyperanthus suaveolens*, not "Orthoceras strictum" as stated in both text and index; Plate 462 looks much more like *Kochia erioclada* than any form of *K. pyramidata*, and, anyway, the latter is hardly a "small shrub" but the tallest of its genus in Australia (sometimes to 2 m high).

Here then is a welcome botanical book covering the most densely populated part of the Commonwealth which, coincidentally, has the richest and most varied flora of any Australian State; it is bound to prove popular and useful to the professional plantsman, as well as to wildflower lovers and all cultivators of our native plants.

J. H. WILLIS.

New Publication available from FNCV Sales Officer

"The Mosses of Southern Australia" by George A. M. Scott and Ilma G. Stone; 496 pages; more than 100 species illustrated by Celia Rosser, others described. Published by Academic Press at $29.50; 20% discount to members; add postage.

Other publications, including the two reviewed above by Dr Willis, are available from FNCV Sales Officer; discount to members; add postage. Write for a list of titles — include stamped addressed envelope for reply.
Mr D. E. McInnes, 129 Waverley Road, East Malvern, 3145, or phone 211 2427.

Natural History Medallion Trust Fund

We will be pleased to receive donations from organisations that feel this Fund is worthy of their support.

The following donations have been received and we thank the donors:

Amount invested as at 30 June 1976	$319
Miss M. McLaren	50
Total	$369

GARNET JOHNSON, ASSISTANT SECRETARY

Errata

In the headline to the article by I. C. Morris on page 152 of the August issue (Vic. Nat. 93: 4) the specific name should read *Merops ornatus.*

In the article on Lake Eyre (*Vic Nat* 93: 4, 148) 6.35 metres below sea level refers to the surrounding area, not to the bed of the lake.

Field Naturalists Club of Victoria

The Geology Group, FNCV

The Geology Group was founded in 1946 when there was a world-wide upsurge of interest in the earth sciences. During its 30 years the Group has aimed to increase that interest and to help provide information on the various aspects of geology. The science has many branches — petrology, mineralogy, palaeontology, geomorphology, etc., but most members feel that a general interest touching on all aspects provides great satisfaction. However, they are always eager to learn from the specialists among them and from visitors.

Meetings and Excursions

The Group has a meeting each month and an excursion each month. At the meetings there is an address by a guest speaker or by a Group member. Exhibits are a feature of the meetings and create much fruitful discussion.

The monthly excursions are to quarries, volcanic eruption points, fossil sites, or to other areas of geological significance. Transport is by private car but there are usually some spare seats for those who do not drive. On one occasion, the Group surveyed and mapped the aboriginal chipping sites in the "greenstone" at Mt. William near Lancefield. This was done under the supervision of two licensed surveyors in the Group.

Collecting, recording, conservation

Many members become keen collectors of minerals, fossils or various rock types, but the Group has a long-standing principle: when specimens are found that are not common to the particular area or cannot be readily identified, they are sent to the National Museum for identification and recording. Without this understanding, members could unwittingly conceal information that is vital to our geological history. This precaution is particularly necessary when unexpected fossils are discovered.

The Group is concerned about the preservation of geological features and has often brought the attention of local councils and planning bodies to such matters.

The Geological Group meets on the first Wednesday of each month at the National Herbarium; excursions are on the second Sunday. All FNCV members are welcome and no previous knowledge of geology is necessary: Group members will gladly help newcomers.

Field Survey Group in recess

Since its beginning in 1972, most members of the Field Survey Group have been involved in taxonomic and distribution studies on aspects of Victoria's invertebrate fauna. These projects have been very rewarding for the people concerned and it is hoped that eventually they will make an important contribution to scientific knowledge in the fields studied.

An on-going project is the publishing of introductory articles in "The Naturalist" on the invertebrate groups that members have specialised in. The first of these should appear early next year.

Unfortunately, a fall-off in attendances at meetings and camps made it impossible for formal Group activities to be continued successfully. At the July meeting, members agreed to suspend meetings and camps until there are enough interested people to make the Group viable again. With new members, the group could readily return to vigorous activity. No sphere of natural history study is excluded from our aims.

Robin Sandell

Work meeting of Editorial Committee

On Tuesday, 19 October there will be a work meeting of the Editorial Committee at the Editor's home at 7.30 p.m. sharp. Each member will edit one, two or three articles, and mark them for the printer together with their relevant illustrations. This will be followed by a paging day, probably on Tuesday 9 or 16 November.

Members not on the Committee who wish to attend these editorial work meettings should phone the Editor. Two or three extra persons could be fitted in.

Reports of FNCV Meetings

General Meeting
Monday 9 August

Speaker for the evening was Dr. Peter Attiwill on "Plants and the atmosphere". Dr. Attiwill began by describing Joseph Priestley's experiment of 1772 demonstrating the ability of green plants to "restore air" as Priestley expressed it; as later discovered, this is because they put oxygen into the atmosphere. Thousands of millions of years ago the earth's atmosphere had very little free oxygen, and it was probably due to the photosynthetic activity of microscopic green plants that produced enough oxygen for other forms of life to develop in any quantity.

Later, Dr. Attiwill talked about the carbon dioxide that green plants had "locked up" millions of years ago and how this carbon dioxide is now being released in steeply rising amounts by the burning of fossil fuels; and he spoke of modern man's production of more dust: one activity tends to warm up the earth's atmosphere, the other to cool it. Although there is enough oxygen in the atmosphere for millions of years, Dr. Attiwill feels that the increase of carbon dioxide is very disturbing.

Exhibits. Cross sections of Sea Urchin spines under six microscopes showed the colour and diversity of these objects and were a most informative follow-up to the article in the August "Naturalist".

A specimen of Turkey Bush *Myoporum deserti* had attractive, pendant white flowers about 1 cm across. An intriguing woody fruit from the Bunya Mountains of Queensland carried the question "what is it?". It was a multiple fruit about 5 cm across; each single fruit had opened out into three sections, very thick and woody, and each section contained a ½ cm black seed neatly fitting in its own woody hollow.

New Secretary needed. Dr. Alan Parkin has resigned as he is off to Norway for further study. The President asked for a volunteer to replace him and stressed that the job is not heavy as our Assistant-Secretary, Mr. Garnet Johnson, handles all correspondence.

Other Officers. The appointment of Mr. Reuben Kent as a Council member was announced. We need another Council member and a Vice-President. Council consists of 13 persons. All members cannot always attend and the Council Meeting is likely to lack the necessary quorum of seven if we have not our full quota of Council members. Any FNCV member who can spare a little extra time (another meeting each month and some attentive thought) should consider offering his/her services as a Council member or as an officer, even if it can be only for a six-month period.

"The Naturalist." The Editor asked members to show more interest in the journal they finance — a journal that has a recognised standing and world-wide distribution. This interest could take the form of contributing articles and nature notes, by criticising the contents and appearance of the journal — both favourably and unfavourably, by consciously reading more of the journal than they usually do, by expressing appreciation to authors when articles are particularly enjoyed. If members have difficulty in preparing material for publication, simply apply to one of the Editorial Committee and he will help you.

Black Rock Junior FNC seeks leaders for excursions. Persons willing to give a half day or full day service should contact Mark Bailey, 31 Potter Street, Black Rock, phone 598 1137.

General Meeting
Monday 13 September

The speaker was Mr S. J. Cowling of the Fisheries and Wildlife Division of the Ministry for Conservation. The Division is the oldest of the conservation agencies and operated successively under various departments as ideas changed. These days, the basic objectives of the Division are to ensure perpetuation of animal species by conserving wildlife populations and their habitat.

Exhibits included rock specimens from Euroa — rhyodacite, aplite and, under a microscope, black tourmaline crystals. Also under a microscope were some garnet crystals from the Violet Town volcanics.

There was a bag of sand from Cooper Nook, N.S.W., and separate bags showed the minerals that are mined from that sand — monazite, rutile and zircon.

A crystal of chiastolite showed the characteristic X pattern down the centre formed by carbon impurities; "chi" is Greek for the letter X, hence the name.

(Continued from page 170.)

GROUP MEETINGS

(All members are invited to attend any Group Meeting, no other payment.)

At the National Herbarium, The Domain, South Yarra, at 8.00 p.m.

First Wednesday in the Month—Geology Group.
3 November—"Earthquakes and Plate Tectonics."
Dr Chris Gray, La Trobe University.
1 December—"Members' Night, slides and exhibits."

Third Wednesday in the Month—Microscopical Group.
20 October, 17 November—Members' Exhibits and Discussion.

Second Thursday in the Month—Botany Group.
14 October—"Propagation of Native Plants." Mr F. Jeffs.
11 November—"Aquatic Plants—Paddling after Puzzles." Miss Helen Aston.
9 December—"Members' Night."
Each meeting includes a quarter-hour address for beginners, various subjects.

At the Conference Room, The Museum, Melbourne, at 8.00 p.m.

First Monday in the Month—Marine Biology and Entomology Group.
1 November, 6 December—Members' Exhibits.

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.

First Thursday in the Month—Mammal Survey Group.
4 November—"Film Night."
2 December—"Members' Discussion Night."

GROUP EXCURSIONS

All Members are invited to attend Group Excursions.

Day Group—Third Thursday in the Month.

Thursday, 21 October—Maranoa Gardens. Meet at Entrance 11.30 a.m. Mont Albert tram in Collins Street, No. 42, alight at Kireep Road.

Thursday, 18 November—Tour of Tintern School grounds (Ringwood). Leader, Miss M. Doery. Meet at Ringwood East Station at 11.15 a.m. Train leaves Flinders Street at 10.25 a.m., arrives Ringwood East 11.07 a.m.

Geology Group

Sunday, 10 October—"The Island, Werribee Gorge." Mr J. Myers. Meet at Bacchus Marsh, 10.30 a.m.

Saturday-Sunday, 13-14 November—Meet at Yea Post Office, 11.00 a.m., Saturday. Arrangements for a week-end stay to be decided at next meeting.

Botany Group—All members welcome.

Week-end, 9-10 October—The Grampians (leave Melbourne Friday evening).

Saturday, 30 October—Orchids—Mornington Peninsula. Leader, Mr Ian Morrison.

Saturday, 13 November (afternoon)—Aquatic Plants. Leader, Miss Helen Aston.

Saturday, 27 November—Grange Heathland.

Saturday, 11 December—Mr. Donna Buang. Leader, Mr Ian Morrison.

GROUP CAMP NOTICES

The Mammal Survey will hold a camp at The Switzerland Ranges, 20-21 November.
(Details—Stephen Harwood, 53 1357.)
Christmas Camp to be arranged, details later.

Field Naturalists Club of Victoria

Established 1880

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

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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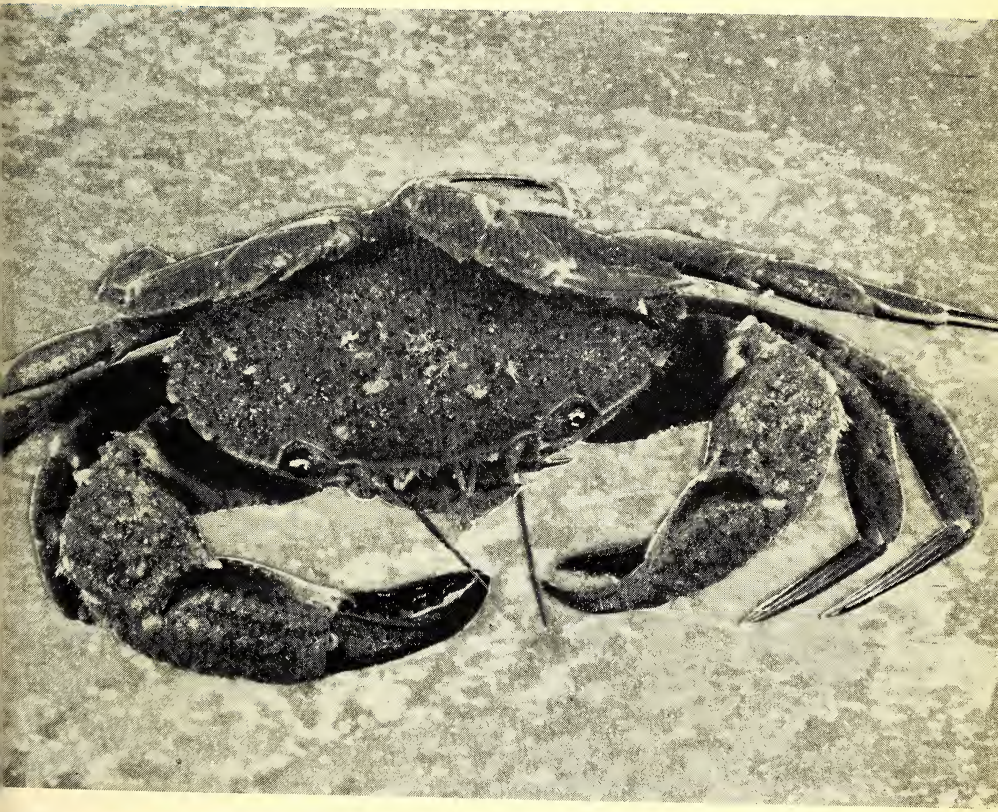

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FNCV DIARY OF COMING EVENTS

At the National Herbarium, The Domain, South Yarra.

GENERAL MEETINGS

Monday, 13 December (8.00 p.m.)—
Speaker—Dr Elizabeth K. Turner.
Subject—"In Darwin's Footsteps to the Galapagos Islands."

Monday, 10 January (8.00 p.m.)—
Subject—"Members' Night"—Short talks with slides on various subjects.
Convener: Mr Ian Cameron (86 7035).

Monday, 14 February (8.00 p.m.)—
Speakers—Miss Mary Doery and Mr Ian Morrison.
Subject—FNCV Bus Trip to N.S.W., August-September, 1976.

New Members—December General Meeting:

Ordinary:
Mrs Joan Anderson, 18 Grosvenor Street, Mid Brighton 3186 (*Botany, Marine, Entomology*).
Mr C. Henshaw, 4 Pelling Road, Murrumbeena 3163 (*Botany*).
Miss Juliana M. Koth, 21 Smart Street, Hawthorn 3122 (*Mammal Survey, Botany*).
Mr Michael J. McBain, 17/1 Fulton Street, East St Kilda 3182 (*Botany, Geology*).
Mrs Gabi Rosos, 1/11 Irving Avenue, Windsor 3181 (*Geology, Ecology*).
Mr Michael Schramme, 4/9 Robe Street, St Kilda 3182.
Mr Fabio Zudich, 5 Mary Avenue, West Heidelberg 3083 (*Mammal and Field Survey*).

Joint:
Mr. Peter Burchill and Mrs Rita Burchill, 10 Gleeson Drive, Bundoora 3083.
Mr Robert D. Thompson and Mrs F. R. Thompson, 23 Byron Street, Box Hill South 3128.

Country:
Mr A. E. Logan, "Wodara", Carobost, Wagga Wagga, N.S.W. 2650 (*Orchids*).
Ms Christine Riley, 1201 Acton Road, Cambridge, Tas. 7170.
Mr Jeffrey A. Wauchope, Ormiston Gorge, C/- P.O. Box 1046, Alice Springs, N.T. 5750.

FNCV EXCURSIONS

Saturday, 1.1.1977-Sunday, 9.1.1977—Burnie, Tasmania. Led by the Burnie F.N. Club. The plane (T.A.A.) will leave at 9.00 a.m. and the connecting coach from 50 Franklin Street at 8.10 a.m. The accommodation is at the Club Hotel, Mount Street, Burnie, on a dinner, bed and breakfast basis. The cost of the trip should have been paid by the time this issue of the Naturalist is received and it is hoped the $200.00 will now cover transport in Tasmania. We will be going on day trips on Sunday and Monday and it might be advisable to include something for picnic lunches on these days as they will be holidays. On the return flight the plane will leave for Melbourne at 3.00 p.m.

Sunday, 16th January—French Island. Leader Mr T. Sault. The Stony Point express leaves Flinders Street at 9.27 a.m. and connects with the Cowes ferry which stops at Tankerton on request. Bring two meals.

Sunday, 20 February—A Marine Biology Excursion led by Dr Brian Smith. Details will appear in the next Naturalist.

(Continued on page 259)

The Victorian Naturalist

Volume 93, Number 6 8 December 1976

Cover illustration: Rough Rock Crab *Nectocarcinus tuberculosus,* see page 237. Photograph by B.Pump.

Channels in Shore Platforms — a world of their own

BY EDMUND D. GILL*

Australia possesses some of the most energetic coasts in the world. The Southern Ocean is the dynamo that provides this power, which arrives chiefly in the form of swell.

Because most Australian tides are of small range, and the marine attack is concentrated in that range, many excellent shore platforms exist on the rocky coasts, especially in the southern part of the continent. As the cutting of the platforms is a function of ocean energy, they occur on headlands and on exposed coasts. However, platforms are not continuous. They are characteristically divided by channels. These constitute an ecologic unit of their own — a world in itself.

1. Channels as Boulder-makers

Most boulders are made in rivers. On the Otway coast of Victoria, for example, more boulders are found in the vicinity of river mouths than anywhere else. However, the channels also are factories for the making of boulders and pebbles. Angular pieces of rock from cliff falls are swept by waves into channels, as also are rocks quarried from platform edges or plucked from platform surfaces. Angular rocks are also levered from channel walls by the uprush of surf and the subsequent backwash.

Even on platforms that are very resistant to marine attack, a great deal of abrasion occurs in the channels. The angler can feel through his line the movement of boulders on the channel floor, and the sinker can become buried and irretrievable if left unattended.

2. Channels as Ecologic units

The oxygen-rich surf zone has a large biota both in species and in numbers. But the channel has a different range of life forms from both the platform edge and the platform surface.

Let us again take the Otway coast as an example. The large kelp *Durvillea potatorum* common in Victoria and Tasmania, is characteristic of open coast sites. It ranges along the platform edge, but does not inhabit the channels. In an open sea situation, the tops of the kelp holdfasts mark mean low water level. Similarly, the ascidian (sea-squirt) *Pyura* forms a band in the vicinity of low sea level on the open coast, but does not continue up the channels.

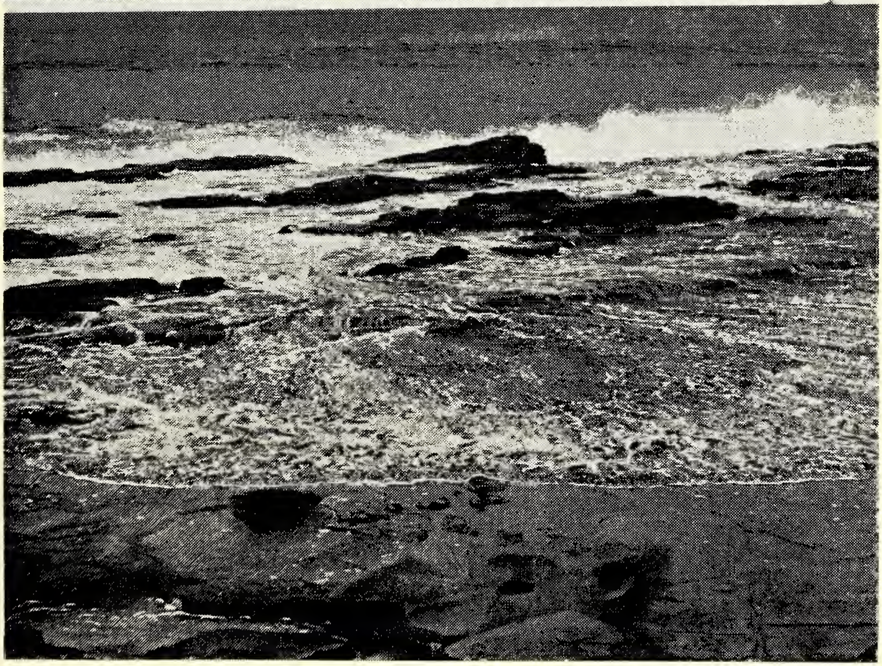
On the other hand, *Galeolaria* the marine worm with a calcareous exoskeleton, builds its white tubes on rock surfaces in the surf zone, but not where the sea makes a frontal attack. *Galeolaria* can thus be found in various sheltered spots along the edge of the platform, but more extensively in the channels. Where best developed, it forms a white band on the channel wall, and the top of the band marks mean sea level.

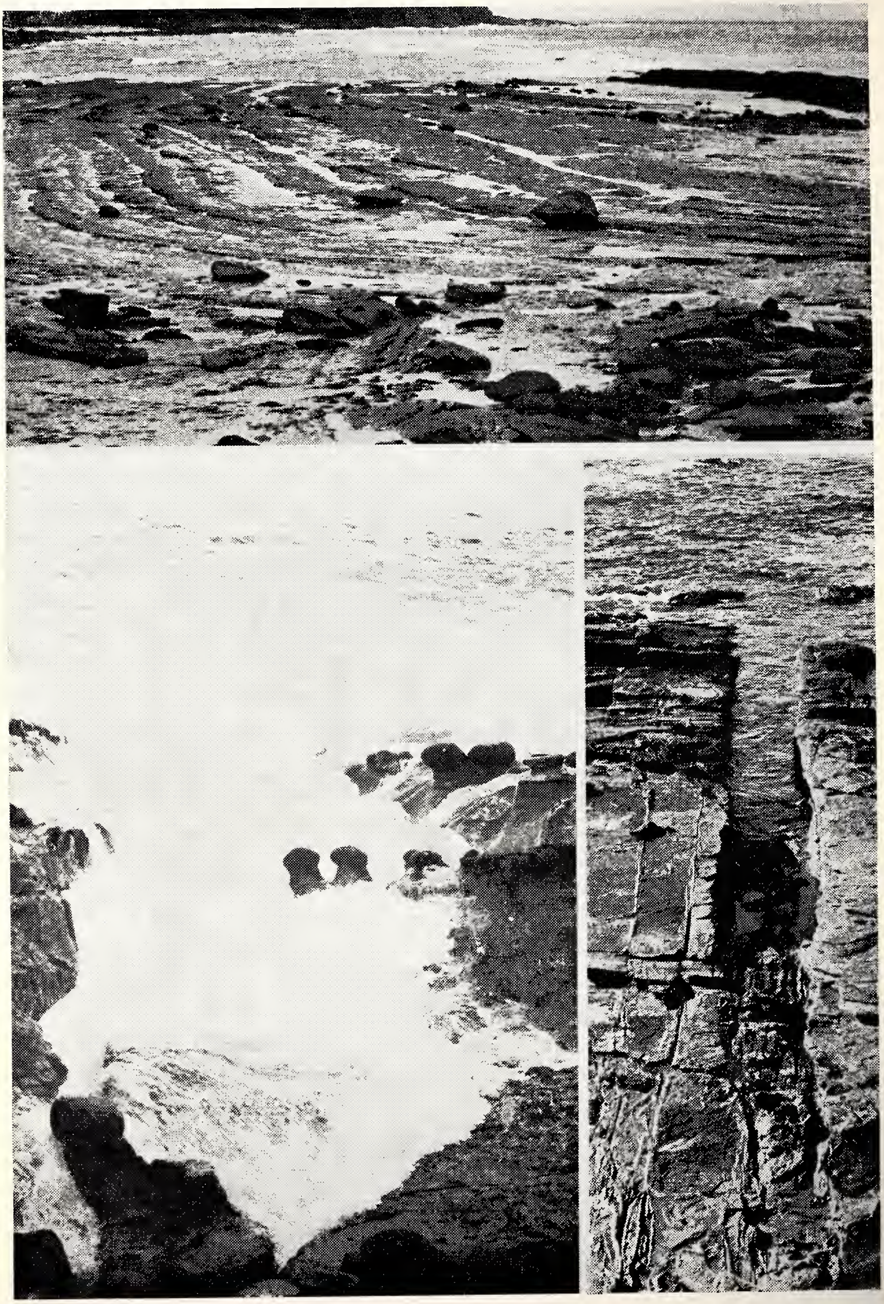
*1/47 Wattle Valley Road, Canterbury.

Plate 1

Upper. Near horizontal supratidal shore platform in Lower Cretaceous arkose about 1 km SW of Point Sturt, Otway coast, Victoria, Australia. Note two channels beyond the platform; they originated by the sea eroding along major joint planes.

Lower. Surf spreading across the above platform, As it is horizontal there is no backwash. The water runs from the back of the platform into channels, and so returns to the sea.





Photographs by author.

Channels have a range of seaweeds, calcareous algae, molluscs and other forms of life that populate the rock surfaces except for those of the mobile boulders and pebbles. At the head of the channel there are often boulders too big to be moved, and on these various life forms make their homes.

3. Channels as Refugia

On the Otway coast parrot fish are the normal inhabitants of channels and platform edges. Young sweep may be found in the channels from time to time, and probably occupy them as refugia from marauding larger fish. However, occasionally the channels carry fish that are far from their normal habitat. Mr Ian Hunt, a fisherman at Lorne, told me that he has seen a channel full of barracouta driven in by attacking dolphins. One evening at dusk I caught two "sea cod" in a channel but know of no other occurrence in this habitat. Most people did not know what they were.

4. The Channel as a Water System

On an open beach, the energies of the restless sea are dissipated by the waves breaking to surf, then running up the beach, and returning as backwash that battles the next incoming surf line. The beach is essentially a ramp, where gravity works against the water running up it, and pulls the backwash back into the sea.

Plate 2

Upper. Lower Cretaceous siltstone platform with low seaward dip (ramp) graded to low water level, NE of the platform shown in Plate 1. The boundary between the siltstone and the arkose is a fault, and the photo shows the siltstone beds curved against the fault line.

Lower left. Gulch at Artillery Rocks, Otway coast, filled with heavy surf, May, 1975. Note the calcitic concretions on arkose pedestals.

Lower right. The beginning of a channel. The sea is quarrying along major joint planes in the arkose platform on the SE side of Reedy Creek, NE of Lorne, Otway Coast.

The softer rocks form similar ramps, and some beaches are veneers of sand over such ramps. However, the harder rocks have not yet had time (since the sea returned to its present level from the Last Glacial low) to evolve ramps, and so platforms stand at all manner of levels. At Lorne, between the supratidal platform at Stony Creek and the mouth of the Erskine River, a gradation of levels occurs until the beach takes over at the river mouth.

Whereas on a beach or a ramp-platform the sea runs up the incline, then down again, the sea breaks over a supratidal horizontal shore platform, and spreads across it, often in a series of fans. As the platform is horizontal, there is no backwash. Then where can the water go? It runs off the back of the platform into channels, which are the conduits for conducting the water back to the sea. Supratidal platforms look flat, but their profile near the cliff is slightly arched so as to lead the water to the channel. Occasionally gutters are excavated by the sea at the back of the platform to assist this process.

In addition to conducting away the waters from horizontal and irregular platforms, the channels have their own system of advancing and retreating waves and surf. So the waters of the channel are the most turbulent, and as a result the most oxygenated, of all the coastal ecologies.

5. Channels as Marine Structures

The architecture of channels is the work of the sea. They are usually built at right angles to the waves, the direction of energy input. However, if there is a band of weaker rock oblique to the platform edge, this material will be preferentially eroded, resulting in a channel at an angle to the platform edge. All channels are a function of weaker rocks being more rapidly eroded by the waves. The weakness may be in the lithology, or due to internal structures such as bedding planes, joints or faults.

Some channels are in early stages of development, while others are mature. Some are narrow and deep, while others are wide and shallow. When deeper than wide they can be called *gulches*. Because the channel floor is usually covered with rocks that abrade it, erosion extends down below low water level.

The head of a channel may be at a cliff, or in a cave cut in a cliff. More commonly the head of a channel corresponds to a gully or other negative feature on land. The subaerial forces have worked down the same zone of rock weakness that the sea exploited to carve the channel.

Museum of Coastal Geomorphology

Point Sturt on the SW side of Wye River on the Otway coast of Victoria is noticed by travellers along the Ocean Road because of the radio telephone installation on it. About 1 km SW of the Point there is a small headland of Lower Cretaceous massive arkose that has resisted the attack of the sea. On the seaward edge is an excellent supratidal horizontal platform, with a dip slope at the edge of about 10°. On the NE side of the headland, the arkose suddenly cuts out, and the shore is inset. This is because a fault brings in the 100% more erodable siltstone, which forms a low ramp with a beach at the back.

A channel has developed along the fault plane, and another nearby to the SW where the arkose has been weakened by a series of large joint planes. The latter channel passes up into an abandoned channel where coastal tea-tree and other shrubs grow up through the rocks. At the top of the channel is a platform (parking space) cut during the Last Interglacial when the sea was 7.5 m higher. Other channels exist further SW again, and they also are due to large joint planes.

Beyond the Otways are the cliffs of earthy limestone at Port Campbell, and of aeolianite from Lake Gillear to Warrnambool. The latter contrast in both rate and mode of channel erosion, showing that channels can form in different ways at different rates in different rocks!

Another coast issue in February

There has been a great response from writers with coastal material, and there will now be two coast issues — this one and February 1977.

It was not easy to decide which articles should appear in December and which should be withheld until February. However, the Editorial Committee agreed that we should carry out our usual aim of providing material on a variety of interests in each issue, but with particular emphasis on marine biology in this one. In February, there will be more articles on coastal geology, plants, mammals and birds.

Articles for this issue were received well on time; we thank all writers and apologise to those who may have made a particular effort to meet the deadline but whose work is being withheld until February. Although this issue contains four pages more than usual, it could not accommodate all the material.

One environment for an issue seems to be a good idea and the Editorial Committee is considering another special issue for next December. If readers have any suggestions regarding subject matter, please send them to the editor.

Some Birds of the Victorian Coast

BY JACK WHEELER*

Bass Strait is a natural corridor or fly-way for many species of sea birds which frequent both the Indian Ocean and the Pacific Ocean.

On the other hand, the Strait is a barrier to certain land-locked species, fourteen of which are endemic to Tasmania and its islands. There are also many mainland species that have never attempted the crossing to Tasmania, one being the Kookaburra which has been introduced. Even two of our most common mainland species, the Willie Wagtail and the Peewee, are only stragglers to the south. However, many species do move between Tasmania and Australia, including many of our migrants.

Sea birds that breed in burrows

Sea birds, no doubt, have bred for centuries on the Bass Strait islands and other islands off our coasts. None is better known than the Short-tailed Shearwater which returns every September with clockwork precision from its remarkable migration to the Arctic region. Some of the islands are riddled with countless thousands of nesting burrows. The birds are best observed at dusk during the breeding season throughout summer at Phillip Island, Muttonbird Island (near Port Campbell) and Griffith Island at Port Fairy. After a day at sea, each arrives at dusk to feed its mate incubating the single egg, or the hungry chick alone in the nesting burrow. During daylight hours, it is an amazing sight to watch huge flocks of these birds feeding off shore.

After the Short-tailed Shearwater has migrated northwards, its smaller cousin the Fluttering Shearwater provides a similar interest during the winter months, the birds having crossed the Tasman from New Zealand, often in flocks of countless thousands.

Another of our coastal birds is of course the Little Penguin, often referred to as the Fairy Penguin; it also breeds in burrows. Thousands of tourists at Phillip Island are entertained by these birds when they arrive in the evening to feed their young. One pair of Penguins continually takes up residence in an old cannon resting on the sand at lonely Fort Island, immediately south of Sorrento.

The White-faced Storm Petrel, often referred to by sailors as "Mother Carey Chickens", is another species that nests in burrows. The two Victorian rookeries are within Port Phillip Bay; one is at Mud Island and the second, an overflow rookery, is to the east on Fort Island where it occupies almost every available space. Each year, observers make special trips to Mud Island to watch these dainty birds arrive — usually around 9 p.m. after a day of feeding miles out in the ocean. Well before dawn they are off again for another day at sea.

Other sea birds

Off shore, the Australian Gannet is frequently seen. It is not quite so handsome on the wing as the Albatross, but is untiring in its search for shoals of small fish. It gives a remarkable display of near-vertical diving,

*72 James Street, Belmont, 3216

and often remains under water for several seconds.

Gannets breed on Lawrence Rocks near Portland, and on Black Pyramid Rock near King Island. Ten years ago, a tiny overflow of Lawrence Rocks birds established a breeding rookery on a pile light in Port Phillip Bay known as the Wedge. The writer visits there every season to band the chicks, over seventy of which have now been reared.

There are two raw sewage outfalls on the Victorian coast, one at Black Rock near Barwon Heads and the other at Point Danger, Warrnambool. Each winter, near these points there are excellent opportunities for observing both species of Giant Petrel which visit there to feed, having bred in sub-antarctic rookeries. The Southern Giant Petrel sometimes exhibits a white phase bird, although it has some brown to black mottling on the feathers.

There is little doubt that the number of Silver Gulls is increasing along our coastline, although most of the breeding occurs at inland rookeries. Often seen with them are the larger Pacific Gulls. Together with the latter, keen observers may identify the Dominican Gull of New Zealand. It is slightly smaller, and when in flight reveals a pure white tail. These birds have recently been seen at Lakes Entrance and Airey's Inlet.

Wading birds

Wading birds are almost a study on their own and without that fine booklet published by the Bird Observers Club "Field Guide to Waders", the average observer finds it most difficult to positively identify particular birds.

Waders may be seen in a number of areas — Altona Salt Works, Little River and Werribee Sewerage Farm, Avalon, Moolap Salt Pans, Swan Island, Queenscliff and particularly Mud Island. At any of these localities species which may be seen include Dotterels, Godwits, Greenshanks, Knots, Plovers (Golden and Grey), Sandpipers, Stints and Turnstones. Some of these species winter here and do not fly north to breed. Even the large Eastern Curlew has remained. During winter, the lovely Double-banded Dotterel from New Zealand may be seen occasionally.

Along any beach, particularly in remote areas, the Red Oystercatcher may be observed, but there is concern that so few Sooty Oystercatchers and Double-banded Dotterels are seen.

The several estuaries in this State also provide excellent areas for waders. The Pelican, White Egret and White-faced Heron frequent these areas, and on occasions the White-necked Heron.

Other birds of the coastland

A walk near the beach might result in sighting the watchful Kestrels or the Black-shouldered Kite hovering high or, if in east Gippsland, the majestic White-bellied Sea Eagle.

Where bushland is close to the sea as at Lorne and Mallacoota, many species of bush birds can be seen — from dainty Grey Fantails to robust Crimson Rosellas.

Australian Gannets with young at nesting site on Lawrence Rocks, Portland. Photograph by author.

Two favourite haunts of the writer are along the coast west of Port Campbell and at Point Addis. The former is where stunted shrubs and tussocks give cover to one of our most delicate species of bird — the Southern Emu Wren. It has been observed here within a stone's throw of the ocean, but has disappeared from many other localities.

At Point Addis, the elusive Rufous Bristle Bird may be stalked amidst the stunted melaleuca scrub at the base of tall cliffs, and its distinctive note can be heard answered by its mate. Superb Blue Wrens and tiny White-browed Scrub Wrens share the habitat with the Bristle Bird.

One could fill many pages covering this subject, but let the foregoing whet the reader's appetite for more exploration, whether it be at Portland or Mallacoota, or during a quiet stroll at Sorrento.

Book Review

"The Care of sick, injured and orphaned Native Birds and Animals"
By Jack Wheeler. 10cm x 18cm, 20 pp. Published by Geelong Field Naturalists Club.

High speed vehicles, overhead cables, oil pollution of waterways and systemic poisons have all contributed to the increase in present day hazards to our birds and animals. Often, when such hazards are the cause of an injury to either, it is probable that neither veterinary service nor Fauna Authority is nearby to give advice.

It is at such a time, that some knowledge of what should be done may prove invaluable in treating the injury and providing aftercare; and with the publishing of this small book, that knowledge is readily available.

Within its pages, details of the initial treatment, housing and feeding of both birds and animals are given; and special sections dealing with orphans, oiled sea birds and window-crash birds, together with many other species are included.

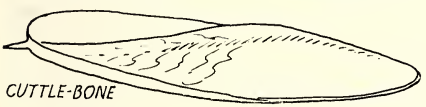
The booklet has been produced for free distribution and already has been sent to every school library in Victoria; it is now going to public libraries and to conservation groups. Individual orders should include postage: one copy 20c, 2-3 30c, 4-6 60c. Obtain them from Mr J. R. Wheeler, 72 James Street, Belmont, 3216.

G. M. Ward

Cuttle-bone

Cuttle-bone is often washed up on our beaches, but few people know where it comes from. Many are surprised to find that this "bone" is actually the shell of a mollusc for it does not look at all like a sea shell. The cuttlefish, the animal that produces the cuttle-bone, is a highly modified mollusc and is more closely related to the squid and octopus than to other molluscs.

Although cuttle-bone is equivalent to the shell of ordinary molluscs, it is inside the body of the animal, along the back. The cuttle-bone contains a great number of gas chambers, and the buoyancy of the animal can be adjusted by altering the amount of gas in the chambers. It also serves as a sort of skeleton to support muscles, so the term "bone" is not so very wrong after all!



Like squids, the cuttlefish has ten long arms at the front. It is a predatory animal, the well-developed eyes being used for sighting the prey, the arms for catching it, and it can change colour rapidly to camouflage with its surroundings.

Rosalind St Clair, East Malvern

Animals that make Shells

BY E. A. BISHOP, MARINE BIOLOGY GROUP, FNCV

On the beaches of Port Phillip Bay, on the long coastline of Gippsland, below the cliffs of the west Victorian coasts, we find shells. They are the protective coverings of a most interesting group of animals.

These animals have been given the name "molluscs" from the Latin *mollis*, meaning soft; they have soft bodies and are not supported by any internal framework such as a skeleton. There are about fifteen thousand species of molluscs in Australian waters with about three thousand recorded from Victoria.

Some characteristic features of molluscs

The shell of a mollusc is produced by special cells in the mantle. This is a sheet-like extension of the body that lies closely against the inside of the shell. Gills project into the space between the mantle and the main body of the animal. Sometimes, the mantle has remarkable colours. With the tropical Giant Clam, it is the mantle that tourists look at with admiration rather than the shell.

A noticeable characteristic of molluscs is the muscular thickening of the undersurface of the body to form what is called the "foot". In the gastropods (snails and limpets) the foot is a means of creeping locomotion, and the limpets also use it as an organ of attachment. The foot of a bivalve is wedge-shaped and serves as a burrowing tool.

A structure unique to molluscs is the radula. This is like a flexible file that is extended from the mouth and used for rasping food. (See Dr Smith's account of snail feeding in the last issue: *Vic Nat* **93, 5,** 186-7.) Bivalves are filter feeders and do not have a radula.

Eggs and young

Eggs may be laid singly or in vast numbers contained in formations characteristic of the particular species — straps or ribbons of various kinds, strings, rafts, capsules, or blobs of jelly. These egg-masses are often washed up on beaches.

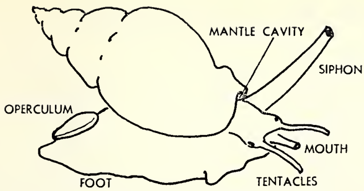
One of the sand snails *Ectosinum zonale* has a peculiar egg-mass. Hold one up to the light and you will see that it consists of thousands of microscopic eggs lying between and surrounded by sand grains that are glued together in a compact layer, the whole mass looking like a collar. It can be five or six centimetres across.

The eggs hatch into tiny larvae, quite unlike their parents and capable of swimming. These larvae (veligers) float about with the tides as plankton, together with other larvae and minute animals and plants.

The Anemone Cone *Floraconus anemone*, which is found in Victorian waters, is known to have direct development. Numbers of small, flask-shaped egg-capsules are attached to a rock; the juveniles break through an "escape hatch" and crawl off as miniature snails, each equipped with a tiny fragile shell already recognisable as that of a cone.

Various ways of living

A few molluscs continue a planktonic existence all their lives. The Violet Snail and Ram's-horn Shell are floating creatures carried by the ocean currents.



A carnivorous gastropod. The mouth part of carnivores is extended forward as a snout or proboscis. Many carnivores have a siphon, and there is usually a groove or channel where the siphon emerges at the shell opening.

The Violet Snail *Ianthina* is known as the "floating shell of the high seas". The shell can be up to four centimetres across and is very thin and fragile. It is strange that a gastropod mollusc complete with shell should be a floating creature, but it is achieved by a remarkable secretion from the foot that produces a float of foam-like mass. To the underside of this float, a series of egg-capsules are fastened in the breeding season. *Ianthina* feeds on other planktonic animals.

In contrast to *Ianthina*, the Ram's-horn Shell *Spirula spirula* is a creature of the depths, floating along on the deep currents of the ocean. Specimens have been taken in plankton nets at depths of 200 to 2000 metres.

Most molluscs live in coastal waters or in the intertidal zone and many feed on seaweeds, the leafy kinds or the smaller or encrusting ones. The radula is a splendid rasping tool as the gardener sadly knows with land snails. Generally they feed at night.

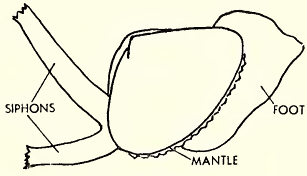
Limpets settle themselves in one place on a rock but move away to graze, each always returning to its own indented spot. With the suction and muscular action of the foot they can make themselves capable of withstanding rough seas; it is almost impossible to move them once they are aware of danger.

Some molluscs are carnivorous and even feed on other molluscs. They are capable of drilling a hole in the shell of their victim and sucking out the animal. A few carnivores, such as whelks, are able to get under the operculum, the hard trap-door that closes the opening of many gastropods.

Bivalves are found on open beaches, on mud flats and estuaries, often burrowing under the sand where they can go to a depth of 30 centimetres. They have no radula and feed by a filter system. Most bivalves have two projecting tubes or siphons; water enters through the inhalent siphon, passes across the gills and goes out through the exhalent siphon. During its passage across the gills, both oxygen and food particles are drawn from the water; the oxygen passes directly into the blood stream in the gills, and the food particles are directed to the mouth.

One bivalve, Hairy Ark *Barbatia pistachia*, is amongst the few invertebrate animals that have red blood. It is not like the red blood of backboned animals in regard to its corpuscles, but contains a red pigment related to haemoglobin, and so is unlike that of blue-blooded lobsters or crabs.

The waters of tropical areas are very rich in molluscs, many of which have brightly coloured shells. But the animals within the superb tropical shells are built on the same pattern as the animals in the less brilliant shells of temperate areas. The colour of a mollusc's protective covering — the shell — is partly determined by environmental factors.



A typical bivalve. A bivalve has no head or eyes, although some species have light-sensitive spots at the mantle edge.

Two new Molluscs recorded for Victoria

BY ALAN E. MONGER*

While collecting in shell sand at Honeysuckle Point, Shoreham, during May 1973, I picked up a limpet-like shell quite unlike any I had seen before. Although empty of animal it was in perfect condition and at first glance looked like *Zeacrypta* with its tiny shelf covering part of the aperture. However, it possessed a slit and fine latticed sculpture which showed the family to be *Fissurellidae*. A look at Cotton's "South Australian Mollusca" gave the genus as *Zeidora* A. Adams 1860 (synonyms *Crepiemarginula* Seguenzin 1880, *Legrandia* Beddome 1883 and *Zidora* Fischer 1885).

Only two species of this genus have been described from South-east Australia; *Z.lodderae* (Tate & May, 1900) *Z.tasmanica* (Beddome 1883). A synonym of the latter is *Z.legrandi* (Tate 1894). The Shoreham specimen was identified as *Z.tasmanica.*

At the time of Tate's writing his note on the genus (Tate 1894) there were only six species known in the world, two of which were fossil. More are now known, but they are few and far between and apparently inhabit deep water, although May recorded a specimen of "*Z.legrandi*" from the littoral zone at Leven, North Tasmania.

Beddome's description of *Legrandia tasmanica* was quite unsatisfactory and there was no figure to help matters. Tate described his *Z.legrandi* in detail although without a figure and while noting that his species was twice the size of Beddome's, stated that there was a distinct possibility that they were one and the same species. This was later confirmed by Tate and May (1900).

The description of *Z.tasmanica* is as follows: Shell cap-shaped, very flat, delicate, elliptical in outline with a deep anterior fissure and a narrow furrow extending from the fissure to the apex. Apex minute, hooked, almost reaching the posterior margin. Colour, pale brown. Sculpture of obliquely radial and concentric threadlets producing an elegant cancellation. The aperture margin is finely serrated. On the inside which is smooth and glossy, is a narrow crescent-shaped shelf at the posterior end. Dimensions: 9.5 mm x 6.0 x 2.0 height.

Zeidora lodderae (Tate & May) was originally incorrectly described and figured as *Z.tasmanica* by Hedley, but Tate and May later recognised it as a separate species. It is much smaller than *Z.tasmanica* but otherwise very similar in appearance. The one striking difference is that the apex of

*Honorary Associate in Invertebrates, National Museum of Victoria.

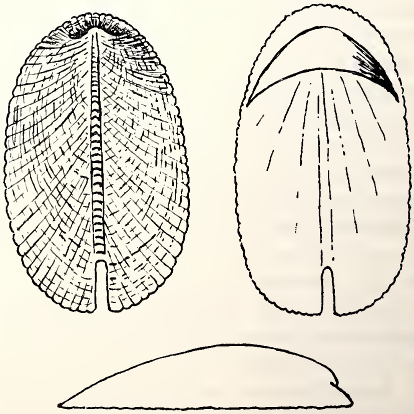


Figure 1. *Zeidora tasmanica.*

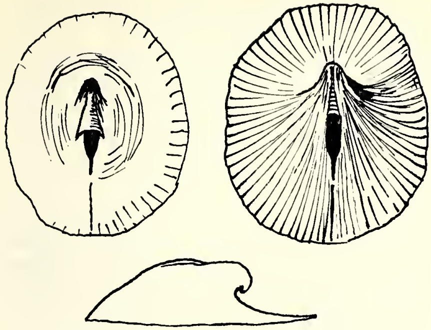


Figure 2. *Rimulanax corolla.*

Z.lodderae overhangs the posterior edge of the shell.

During the HMAS "Kimbla" expedition of November 1973, a second specimen of *Z.tasmanica* was dredged in eastern Bass Strait. It was about the same size as the Shoreham specimen and somewhat bleached.

The fact that *Z.tasmanica* is found in South Australia and Tasmania makes it not surprising that it has at last turned up in Victoria and can be added to the list of Victorian Marine Mollusca.

Dredging from the "Kimbla" produced a number of specimens of *Rimulanax corolla* (Verco 1908) also from the family Fissurellidae. The easternmost record was in 274 m depth, off Cape Howe, and the southernmost was in 421 m depth off Flinders Island.

The description of *R.corolla* is: Shell thin, roundly ovate, depressed conic; colour white; apex spiral, recurved backwards; a perforation occupies the middle third of the anterior dorsal slope; between the perforation and the apex, its previous site is closed by sunken plates; between it and the margin is a distinct rib fissured superficially throughout; the whole shell covered by as many as 90 radial ribs which crenulate the edge; between the ribs concentric lamellae form tiny scales which however are barely visible on the tops of the ribs; internally a small shelf or septum convex towards the interior, hides the upper part of the perforation; dimensions up to 18 mm x 15.5 mm x 5 mm height.

This beautiful little shell was only known previously from deep water off South Australia. It is unfortunate that no live specimens were taken off the "Kimbla" expedition, but the shells that were obtained were in such good condition for such a fragile species that it can be safely assumed that they were living in the immediate vicinity of dredging operations and that therefore their known range has been extended to far eastern Victoria.

At the moment, the Shoreham specimen of *Z.tasmanica* and one specimen of *R.corolla* are in my collection. The remainder of the specimens from the "Kimbla" collections are housed in the National Museum of Victoria.

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Galeolaria – the white, Coral-like Growth seen on rocks at low tide

BY D. E. McINNES, MARINE BIOLOGY GROUP, FNCV

Everyone scrambling along a rocky shore sees a layer of white coral-like material on rocks exposed at low tide. This growth can also be seen on the piles of a pier and particularly well along the fence of sea-water baths as in Fig. 1. The white layer extends in a level band that is just covered at high tide and well clear of the water at low tide.

Most people see it and think of it as "just some corally stuff". But what is it? A close look as in Fig. 2 shows it is composed of a multitude of intertwined **limy tubes (4).** (The words and numbers in bold type are key clues in determining what the growth is; they will be referred to again.) Look at the tubes with your hand lens (every good naturalist carries a hand lens); each tube is seen to be blocked with an ornamental disc just below the edge of the tube. But what are these closed tubes? Let us find out by taking some home and making a closer examination.

Figure 1. Along the wall of sea-water baths.

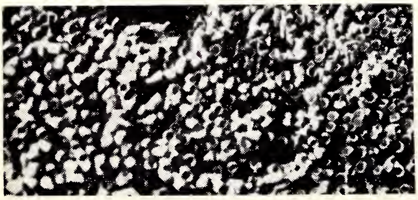

Figure 2. Closer view of the tubes.

A closer look at the tubes

Gently prise off about two square inches of the "corally stuff". Also collect some clear sea water in a bottle or clean thermos flask. Take home the sample and the salt water.

When home, place the sample of tubes in a porridge bowl — have a desk lamp near to give plenty of light on the object. Now for the closer examination. The ideal way is to use a low power stereo-microscope which gives a wonderful three-dimensional view, but our 8x hand lens will give enough magnification and with it we can see quite a lot of detail.

First, let us look carefully at the little disc just inside the tube. This disc is similar to the operculum of a periwinkle, where it serves as a door that closes and protects the animal within from danger and drying. Look carefully with the hand lens at this operculum (for that is what it is called) and notice how ornamented it is, in contrast to the operculum of a periwinkle. The operculum has **3 to 5 basal plates with movable calcareous spines (5)** arising from the base of the plates; there are **9 of those spines (6)** and the outer ones are toothed like a curved saw. Fig. 3 is a drawing of the operculum with the spines spread out to show the detail of the saw-like outer ones. The ornamentation on the operculum is important in identifying the various genera.

Underwater action from the tubes

Now for the real action. Cover the sample with salt water, and with the lens in focus we will watch. Soon the opercula in the tubes start to move up, then to one side, and cautiously there emerges what looks like the fronds of two tiny tree-ferns growing from each tube. If we give the dish a tap, all the fronds disappear back into the tubes. After a short time, the fronds gradually push their way out again and spread out like a net.

If we watch one set of fronds very carefully, we will see tiny particles in the water being swept in a current down the fronds towards their centre. This is how the creature obtains its food. Along the arms forming the fronds are little finger-like projections on each side and these are covered with minute hairs (cilia). The cilia can be seen only with a high-power microscope; they beat in unison and it is their combined action that causes the current. But even with a hand lens, the little fingers can be seen bending down to help push a choice particle towards the mouth or, if an unsuitable bit arrives, the fingers help to reject it and push it aside. The whole system of fronds, finger projections and cilia forms an elaborate net to guide food to the mouth of the animal.

The action of these creatures spreading their nets to catch food never fails to arouse interest. If it is possible to see them with a low-power stereo-microscope, the three dimensional view makes things even more interesting.

With the fronds extended, we no longer see the operculum for it has disappeared behind them, but we still do not know what kind of animal we are looking at.

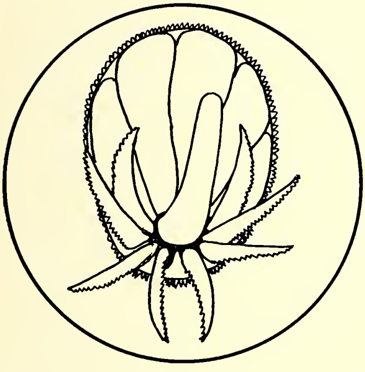

Figure 3, above. Basal plates and moveable spines on the operculum of *Galeolaria caespitosa.* (Drawing by K.McInnes.)

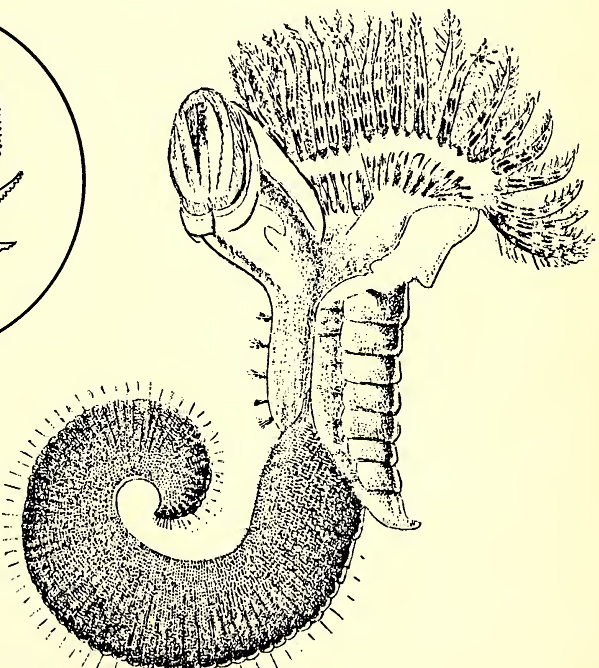

Figure 4, at right. Worm removed from limy tube. *Galeolaria caespitosa.* (From Linnean Soc. 1884.)

The animal out of its tube

The next step is to select one tube and gently break it apart without damaging the inhabitant. Sometimes, merely breaking the whole sample in half will do the trick and will release a tube dweller.

We place the freed animal in a small saucer or petrie dish and, with light from a desk lamp, we can have a good look with the stereo-microscope or hand lens. What we now see is shown in Fig. 4. (For a good drawing it was necessary to go to the Proceedings of the Linnean Society 1884.) What we now see is a **worm (1)** of some sort, about 15-25 mm in total length. An initial examination shows that it is composed of **many segments (2).**

The operculum is at the end of a short pillar called the peduncle growing out from the dorsal side of the worm. The frond arms or tentacles, numbering thirty-six, are formed at the front of a saddle-shaped part that has a series of circular ridges. If we look carefully at the edges of the saddle we can see groups of fine hairs that project and withdraw. The hairs are called setae, and there are **many setae (3)** on the saddle (or thorax) and also on the remainder of the worm which is seen to be composed of **many segments (2).** This lower part is the abdomen.

The front of the saddle (thorax) is curled over into a collar, and this is the part that secretes a ring of new lime around the edge of the tube to gradually lengthen and enlarge the tube.

Another interesting feature that can be discerned is that particles are being carried in a water current in a depression along the ventral side of the abdomen to the thorax, where the current passes round to the dorsal side. Again, this current is caused by minute cilia. When the worm is in the tube, the current carries the excreta along the depression in the abdomen around to the back of the worm where it is expelled well clear of the food net.

This is what it is

After this examination, it is possible to find out just what we are looking at. During the examination, key clues and numbers were printed in bold type. Let us take the clues in the order of their numbers.

Number 1 states that the creature is a **worm;** number 2 states that it has **many segments** which places it in the Phylum **Annelida** (segmented worms). Number 3 says it has **many setae** which places it in the Class **Polychaeta** (many setae). Number 4, the worm lives in **limy tubes** so that means that it is a member of the Family **Serpulidae** (limy tubes); number 5 with an operculum of **basal plates and movable spines** fits it into the Genus **Galeolaria;** and number 6, having **nine spines** attached to one side of the plate it becomes the species **caespitosa.**

So much for the anatomy of *Galeolaria caespitosa.* Another aspect is that the *Galeolaria* inhabits a particular part of the intertidal zone. It forms a band 18 to 40 centimetres wide, the top of the band reaching just under the lowest high tide level. In Port Phillip Bay the lower level of *Galeolaria* is about half tide mark when the tide is at its lowest spring level; there is much variation in different situations, but this holds as a general rule.

Also in Port Phillip Bay the *Galeolaria* band is at a higher level next to the mussels; the latter seem to grow from below low tide level to the half way tidal mark. In places where there is wave action the *Galeolaria* and mussels tend to mix together, but in sheltered areas the dividing line is quite sharp and obvious.

Polycheate worms, of which *Galeolaria* is one genus, have an amazing variety of forms. They range from a large centipede type over one metre long and used as bait by fishermen, to a form that lives in a mud tube and throws out a net of single threads to trap food particles; in some tropical forms the threads can be a metre in length.

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Some Saltmarsh Plants

Saltmarshes are always places of interest. The plants in them are often common in their specialised habitat but not found elsewhere, and some that have both interest and beauty are so inconspicuous amongst taller growth that we do not see them. I realise this anew on every visit to the saltmarsh between Loch Sport and Golden Beach.

With one exception, not yet confirmed, plants in that marsh are species one would expect in such a place, yet I have not seen all of them growing together elsewhere. Beside the common Beaded Glasswort *Salicornia quinqueflora*, they include the coarser Thick-head or Black's Glasswort *S.blackiana*. The fleshy leaves of these plants, together with those of Trailing Hemichroa *Hemichroa pentandra,* make a background of soft green, smokey red and dull yellow or occasionally scarlet. Against this background, the loose mats of Southern Sea-heath *Frankenia pauciflora* are conspicuous because of their fine heathy foliage dotted with delicate white or pink flowers, a centimetre across and so thin they are almost translucent.

Amongst these a diligent searcher may find two of Victoria's three species of Wilsonia: Silky Wilsonia *Wilsonia humulis* forming mats of small, cloudy grey and pink leaves overlapping in clusters like tiny fans, and the much looser sprawling Narrow-leaf Wilsonia *W.backhousei* with fleshy green linear leaves 2-3 cm long. Both species have tiny flowers.

It is interesting to note that our third Wilsonia *W.rotundifolia* which has round but not overlapping green leaves, grows beside a lagoon at Meerlieu, a little north of Golden Beach. In Victoria, Wilsonia is nearly always coastal, but in Western Australia it grows frequently on inland saltpans.

JEAN GALBRAITH, TYERS

Examining the Radulae of Molluscs

As stated on page 257, a member of the FNCV Marine Biology Group is carrying out a project on radulae. The radula is "a sort of flexible file that is extended from the mouth and used for rasping food" (page 224). It is unique to gastropods.

The National Museum of Victoria supplies our worker with preserved specimens that it wishes to have examined. They are placed in 10% sodium hydroxide overnight. The horny radula is resistant to the solution and is easily picked out from the resulting mush; it looks like a thread of brown cotton, 1 cm to 20 cm long according to the species and size of the specimen. If fresh specimens are available a quicker process can be used.

The radula is an important factor in separating species. Superficially, one animal might look very like another, but the radula of each could be entirely different and is a great aid to identification.

The radula thread is placed under the microscope for critical examination. In our next issue the process of making radula slides will be described.

Cryptic Molluscs inhabiting *Galeolaria* in Victoria

BY ROBERT BURN* AND K. N. BELL*

The tubicolous polychaete *Galeolaria caespitosa* (Lamarck, 1818) "occurs as a band at the top of the lower eulittoral on open coasts which afford some shelter. In localities of extreme exposure it is found where rock stacks or boulders protect it from the full force of the sea. In Port Phillip Bay it is found as a fringe on boulders, favouring the exposed side" (Black, in King, Black and Ducker 1971). Rarely in Victoria does it attain the thick encrustations reported from NSW (Dakin, Bennett and Pope 1952) or eastern Tasmania (Guiler, 1959), and then only at well protected areas such as the northward facing rocky outcrops at Portarlington in Port Phillip Bay.

Where *Galeolaria* growths are thick enough, and not just a veneer on the rocks, the spaces between the tubes are populated by an extensive cryptic fauna (Bennett and Pope, 1953).

Prompted by the discovery of a small ectoparasitic pyramidellid mollusc *Pseudoskenella depressa* (Ponder 1973) living on intertidal encrustations of *Galeolaria* in south-eastern Australia (Ponder 1973), samples of *Galeolaria* from Port Phillip Bay and the open coastline were investigated for the cryptic molluscan fauna. Detailed lists of the living molluscs present were compiled for each locality; the results are shown in Table 1. The presence of other animals were noted, but no attempt was made to assess how common the species were, molluscan or otherwise.

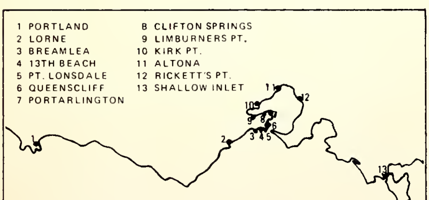

Fig. 1. Map showing the localities of the *Galeolaria* collections made for this study.

Locality notes

Selection of localities was governed largely by the fact that both authors reside in the Geelong area. All samples were collected by the authors, except that from Ricketts Point which was made by Dr Brian Smith.

Seven localities within Port Phillip Bay were sampled. Three localities, the explosives jetty at Altona, Kirk Point, and Limeburners Point (Corio Bay) are not listed in Table 1 because no molluscs occurred. Of the other four localities, Steeles Rocks at Portarlington has large thick encrustations on a northward facing shore; here too it was noted that the *Galeolaria* formed larger, thicker tubes less closely packed together and the animals were larger and softer coloured than the open ocean samples. At Clifton Springs, the sample was taken from old timber piles well above the sand and shingle substrate. The Queenscliff sample from about 100 metres south of the pilot jetty, and that from Ricketts Point, were both from semi-

*Honorary Associates,
National Museum of Victoria.

Table 1 Species	East of Port Phillip Bay 'Winchesters' Shallow Inlet	Port Phillip Bay Ricketts Point	Clifton Springs	Steeles Rocks Portarlington	Queenscliff	West of Port Phillip Bay Point Lonsdale	13th Beach	Bancoora Reef	Point Grey, Lorne	Point Anderson, Portland	
Meturoplax retrojects	X	X		X	X	X		X	X		7
Poneroplax albida		X		X						X	3
Ischnochiton variegatus		X									1
Montfortula rugosa				X		X		X	X	X	5
Austrocochlea constricta	X										1
Bembicium nanun juv.	X							X			2
Notoacmea alta						X		X		X	3
Notoacmea sp.					X	X		X		X	4
Patelloida alticostata						X					1
Trochid sp. juv.		X	X			X		X			4
Rissoid sp. 1		X			X			X		X	4
Rissoid sp. 2		X						X			2
Orbitestella sp.	X										1
Omalogyra (Helisalia) sp. 1			X	X							2
Omalogyra (Helisalia) sp. 2								X			1
Lepsiella vinosa		X			X	X		X		X	5
Fusinid sp. juv.	X										1
Pseudoskenella depressa	X	X			X	X	X	X	X	X	8
Odostomia indistincta		X		X							2
Runcinid sp. nov.		X									1
Leuconopsis pellucidus	X				X	X		X		X	5
Onchidella patelloides	X				X	X		X	X	X	6
Siphonaria dimenensis										X	1
Kerguelenella stowae						X		X		X	3
Mytilus edulus planulatus	X	X		X	X	X	X	X		X	8
Brachydontes rostratus					X	X					2
Electroma georgiana				X							1
Kellia australis	X			X	X	X		X	X	X	7
	10	11	2	8	10	14	2	16	5	13	

Table 1. Mollusc species present at each locality.

protected areas, in the former subject to much sand movement and very close to the main interchange of oceanic waters into Port Phillip Bay.

The single sample from east of Port Phillip Bay came from timber piles in the channel of Shallow Inlet, on the north-eastern side near the area known locally as "Winchesters". This is a very protected shallow water locality.

The Point Lonsdale sample came from a very narrow band of *Galeolaria* on the NE (protected) side of the base of a rock stack on the platform below the lighthouse. At Bancoora Reef, Breamlea, and Point Anderson, Portland, the samples came from thin encrustations on the protected damper (usually lower) parts of boulders well back from the edge of the reef.

An isolated flat rock table at mid-tide in a beach of large-grained highly mobile sand provided a small sample from 13th Beach, Barwon Heads. A southfacing high rock overhanging a narrow channel on the high energy coast at Point Grey, Lorne, carried a thin encrustation.

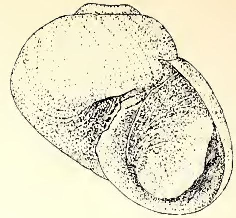

Fig. 2. *Pseudoskenella depressa.* Height of shell 1.05 mm (Drawing from Ponder 1973).

The molluscan species

The majority of the molluscan species inhabiting *Galeolaria* are sufficiently large to be identified from standard reference books such as "Marine Molluscs of Victoria" (Macpherson and Gabriel 1962). The remaining species are small to minute, needing careful examination and reference to specialized literature. Some species enjoying the protection of the *Galeolaria* were present only as juveniles, never as adults. *Bembicium nanum* and *Patelloida alticostata* were readily identifiable despite their small size. The Trochid sp and Fusinid sp were quite unrecognizable except for a tentative family placement.

Other species were fully adult but small, only about 1 mm in major diameter. *Orbitestella* sp has a brown shell with radial ribs on one side. *Omalogyra (Helisalia)* spp 1 and 2 also have brown shells, the first with a darker band and rounded whorls, the second with slightly higher spire. Laseron (1954) described similar species from NSW. The latter species are widespread in Victorian waters, being found in great numbers on the green algae *Caulerpa* and *Bryopsis* in rock pools and subtidally.

Rissoid spp 1 and 2 are very common; the first being pale brown and up to 3 mm long, the second black and up to 2 mm long. Laseron (1950) described four species of *Notosetia* from *Galeolaria* within Sydney Harbour, all of which are very close to the present species. Seven species of the genus are recorded from Victoria (Macpherson and Gabriel 1962) but nothing is known of their habitats.

Small specimens of a dark brown highly conical limpet appear to be *Notoacmea alta*, usually associated with mussel beds. The small greenish yellow *Notoacmea* sp with a distinctive brown cross might be *N.granulosa.* This latter species is close to *N.mufria* described from *Galeolaria* in the Sydney area (Hedley, 1915).

Pseudoskenella depressa is a pearly turbinate species about 1.5 mm across and 1 mm high. It is separated from all other Australian pyramidellids by its short spire. The presence of this species at eight localities, often in large numbers, indicates that it is both widespread and common despite its small size. The other pyramidellid, *Odostomia indistincta* Brazier (1894) has a conical spire and a small tooth in the aperture. It was abundant in the Ricketts Point sample, and Laseron (1951) found it abundantly in *Galeolaria* in North Harbour, Sydney. It is a new record for Victoria.

The small air-breathing ellobiid *Leuconopsis pellucidus,* that was previously considered a rare species restricted to damp litter in swampy areas at the back of beaches, was found to be very common in five of the 10 samples. Its preference seems to be for more open coastal situations.

The other air-breathing species *Onchidella patelloides, Siphonaria diemenensis* and *Kerguelenella stowae* show the same preference, none of them occurring in samples from within Port Phillip Bay. On the other

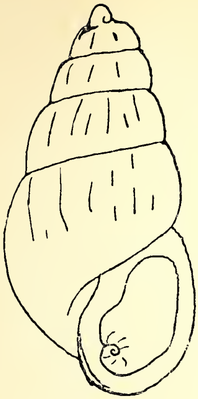

Fig. 3.
Odostomia indistincta.
Height of shell 2.5 mm.
This is a new record for Victoria. (Drawing from Laseron 1951.)

hand, *S.diemenensis* is very common at rocky localities in the Bay and on the open coast, so perhaps its occurrence on *Galeolaria* at Portland was by chance rather than purpose.

The only opisthobranch found represents a new species of the suborder Runcinacea, distinguished from its Australian relatives (Burn, 1963) by the presence of a distinctively shaped external shell. The present specimens, both adult and juvenile between 1 and 3 mm long, indicate that this species lives in the *Galeolaria.* A similar species is known from the West Indies.

Of the chitons, *Meturoplax retrojecta* has been long associated with *Galeolaria caespitosa.* It was not present in the Portland sample, where instead small *Poneroplax albida* were found. *P.albida* was present at Portarlington and Ricketts Point in Port Phillip Bay but not elsewhere on the open coast. Small *Ischnochiton variegatus* specimens occurred in the Ricketts Point sample. This is a common species in very sheltered conditions within Port Phillip Bay.

The bivalve *Electroma georgiana* appears to be a chance occurrence on *Galeolaria.* It is very common attached to brown algae and *Zostera* at Portarlington.

Other animals present

At Lorne, a peculiar shrimp-like crustacean with translucent cylindrical abdominal section was found inside empty *Galeolaria* tubes.

At Portarlington a small orange peanut worm (Sipunculoidea) is very common, together with the barnacle *Ibla quadrivalvis*, various polychaete worms and nemertines. Two species of foraminifera were present. *Ibla quadrivalvis* was also found in the Shallow Inlet and Point Lonsdale samples, and at least two species of polychaetes were present in both. In addition, the Shallow Inlet sample contained one species of shelled barnacle, at least two species of ostracod and one of isopod.

Foraminifera were present in the Clifton Springs, Ricketts Point and Point Lonsdale samples. Small crabs were noted in the samples from Shallow Inlet and Portarlington. An ostracod and the small brown anemone *Actinia tenebrosa* occurred in the Ricketts Point sample.

Discussion

There have been very few studies of the cryptic and associated faunas of *Galeolaria*, and these refer only to the larger and more conspicuous species present. Bennett and Pope (1953) listed five molluscs as characteristic of the *Galeolaria* association along the Victorian coastline, and noted the presence of a number of other animals. Kershaw (1958) gave a list of six molluscs associated with *Galeolaria* in relation to the general Tasmanian coastline. Guiler (1959) examined a more restricted area in south-eastern Tasmania, and listed six species from the *Galeolaria* association. Their results appear in Table 2. Of the nine species recorded from Tasmania, seven occur in Victorian samples.

As a result of this study, it appears that *Meturoplax retrojecta, Pseudo-*

Table 2

Species	Victoria coast (Bennett & Pope, 1953)	Tasmanian coast (Kershaw, 1958)	Tasmanian coast (Guiler, 1959)
Meturoplax retrojecta	X		
Sypharochiton maugeansis		X	X
Montfortula rugosa	X	X	
Notoacmea alta	X		
Patelloida alticostata		X	
Lepsiella vinosa		X	X
L. reticulata			X
Onchidella patelloides	X	X	
Mytilus edulus planulatus			X
Brachydontes rostratus			X
Kellia australis	X	X	X

Table 2. Previous records of molluscs among *Galeolaria* in Victoria and Tasmania.

skenella depressa, *Mytilus edulus planulatus* and *Kellia australis* are characteristic of the cryptic fauna of *Galeolaria* on the central and western coasts of Victoria. Of these, *M.e.planulatus* and *K.australis* occur in the Tasmanian lists, with *Sypharochiton maugeansis* replacing *M.retrojecta* as the characteristic chiton. *P.depressa* is recorded from deeper water in Tasmania (Ponder 1973), and more recently has been collected alive from *Galeolaria* at localities on the Tasmanian north coast (W. F. Ponder pers. comm.).

Furthermore, the Victorian samples examined indicate that (i) the cryptic fauna becomes depauperate within Port Phillip Bay in a north and west direction, and (ii) the air-breathing species are restricted to the open coastline where perhaps the oxygen content of the water is higher and the sediment deposition is lower.

Lastly, the authors agree wholeheartedly with the statement by Endean, Kenny and Stephenson (1956) regarding *Galeolaria:* "Investigation of the ecology of the associates of such species is a task of sufficient complexity to warrant separate study."

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The Intertidal Crabs of Victoria

An introduction, check list and key to adults

BY GEOFF WESCOTT*

Introduction

After several early works on the shore crabs of Victoria (Fulton and Grant 1901, 1906a, 1906b; Ward 1929) very few studies were published until the compilation of species lists for Port Phillip Bay (Griffin and Yaldwyn 1971) and Westernport Bay (Marine Study Group of Victoria 1971). This paper brings together the results of these papers and provides a key to the identification of Victorian shore crabs (brachyurans). A check list and some information on the general ecology of these crabs are also included.

The true crabs, or Brachyura (*brachys*: short; *oura*: tail) are one major group (or section) of the Reptantia (walking) decapod (ten-legged) Crustacea. The other decapod groups are the crayfish and lobsters (Macrura) and the half crabs and hermit crabs (Anomura). Brachyurans can be recognised by the presence of five pairs of limbs, a fused head and thorax covered by a carapace, and a distinctive but reduced, recurved abdomen.

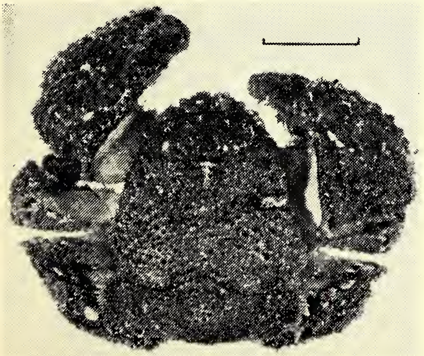

Figure 1. The anomuran *Lomis hirta* or hairy stone crab (scale line 1 cm).

Some anomurans such as *Lomis hirta* the hairy stone crab (Figure 1) can be mistaken for true crabs, but a limb count and check of the abdominal region will show that only four pairs of walking legs are visible, instead of five as in the true crabs. Only the true crabs (brachyurans) will be considered in this paper.

Crabs always have a calcified carapace and a pair of stalked eyes which can be retracted into hollow orbits at the front of the carapace. Near the eyes are two pairs of short sensory antennae. The mouth is complex and bordered by six pairs of appendages, the outer three (the maxillipeds) being modified thoracic appendages. The shape and structure of the maxillipeds are influenced by the habitat and ecology of the crab. The first pair of legs is modified as chelipeds (pincers or nippers) and they are usually larger in the male. The sexes are also separable by the shape of the abdominal flap on the underside of the crab. In the male the flap is narrow, while in the female it is broad (semi-circular in shape) and covers most of the underside of the thorax. The female carries the eggs between this broad flap and the thorax on the modified abdominal appendages (pleopods). In the male only two pairs of abdominal appendages remain and these are used in reproduction.

The eggs of crabs hatch into a larval form known as a zoea. These larvae are free-floating (planktonic) and may moult several times, going through a

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Figure 2. Eight common Victorian crabs (scale line 1 cm). Left to right and upper to lower: *Mictyris platycheles, Macrophthalmus latifrons, Litocheira bispinosa, Carcinus maenas, Nectocarcinus tuberculosus, N. integrifrons, Philyra laevis, Ozius truncatus.*

Figure 3. The spider crab *Halicarcinus ovatus*

number of different stages, before they are deposited on shores as juvenile crabs.

Crabs, like all other crustaceans, grow by a series of moults during which the carapace, legs, mouth appendages and gills are cast off. This process is controlled by hormones released from the central nervous system.

Shore crabs breathe by means of gills which must remain moist for respiration to occur. The gills are found in the branchial chambers at the sides of the carapace, and are arranged in two series attached to the thoracic appendages and to the walls of the branchial (gill) chamber. Further general information on life history, morphology and terminology, can be found in works by Rathbun (1918), Hale (1927), McNeill (1962) and Griffin (1970). More detailed information can be obtained from Waterman (1961) and Newell (1970).

There are four major groups of crabs (Griffin 1970):

(1) Oxystomata (pebble and box crabs) in which the mouth frame (the shape formed by the outer maxillipeds) is triangular (the frame is rectangular in other crabs);

(2) Dromiacea (sponge crabs) in which the last pair of legs is folded over the back;

(3) Oxyrhyncha (spider or masking crabs) which have round or oval carapaces; and

(4) Brachyrhyncha which have square or rectangular carapaces. Most species of crabs in the key are members of the last two groups — which include the families Portunidae (swimming crabs), Xanthidae (reef crabs), Ocypodidae (ghost and fiddler crabs), and Grapsidae (shore crabs).

An Artificial Key to the Intertidal Crabs of Victoria

This key to the identification of Victorian crabs has a number of limitations. Firstly, it is artificial. This means that the more obvious characters used to choose between alternatives are not necessarily those regarded by taxonomists as important in distinguishing groups. A check list (with common names) is presented in Table 1. Species nomenclature follows Hale (1927) and Griffin and Yaldwyn (1971).

Secondly, the word "intertidal" includes any crab, dead or alive, which may be collected within the intertidal zone on Victorian shores. Therefore, the inclusion of a species in this key does not necessarily mean it inhabits the intertidal zone.

Finally, this key is constructed from the records of the National Museum of Victoria, the species list given in Griffin and Yaldwyn (1971), the list provided by Marine Study Group of Victoria (1971), and collections made by the author (Wescott 1974, 1976). Four species in the check list (Table 1) have not been included in the key due to unavailability of study material. Hence, the key is only a preliminary version and is not complete. Additional species found in Victoria should be brought to the attention of the National Museum of Victoria.

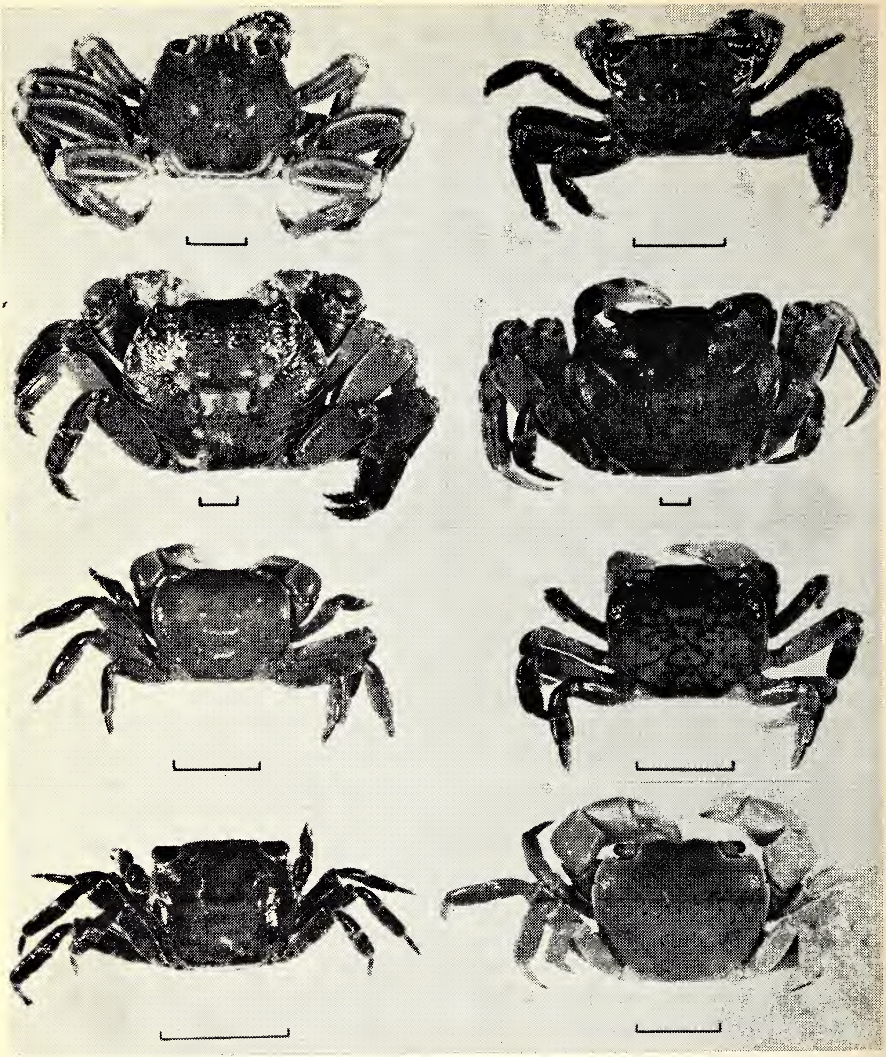

Figure 4. Eight species of the Family Grapsidae (scale line 1 cm). Left to right and upper to lower: *Plagusia chabrus, Sesarma erythrodactyla, Leptograpsus variegatus, Leptograpsodes octodentatus, Cyclograpsus audouini, C. granulosus, Brachynotus spinosus, Paragrapsus quadridentatus.*

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TABLE 1
A Check List of Victorian Brachyurans
(53 species)

Tribe: Dromiacea:
Family DROMIIDAE:
Petalomera lateralis Ridged sponge-crab.
P.wilsoni Hairy sponge-crab.
Dromidiopsis excavata Shaggy sponge-crab.
**Cryptodromia octodentata* Bristled sponge-crab.

Tribe: Oxystomata:
Family LEUCOSIIDAE:
Phylxia dentifrons Square nut-crab.
Ebalia intermedia Smooth nut-crab.
Philyra laevis Smooth pebble-crab.
P.undecimspinosa Large pebble-crab.
Merocryptus lambriformis Rough nut-crab.

Tribe: Brachygnatha
Sub-tribe: Oxyrhyncha:
Family HYMENOSOMATIDAE:
Halicarcinus ovatus Three-pronged sea-spider.
H.rostratus Beaked sea-spider.
H.australis Blunt-nosed sea-spider.
Elamena unguiformis Triangle crab.
Family MAJIDAE:
Paratymolus latipes Velvet crab.
Naxia deflexifrons
N. aurita Smooth seaweed-crab.
N.tumida Little seaweed-crab.
N.spinosa Spiny seaweed-crab.
Eruma hispidum Shaggy seaweed-crab.
**Notomithrax minor.*
**Leptomithrax gaimardi* Great spider-crab.
Gonatorhynchus tumidus Sea-toad.

Sub-tribe: Brachyrhynca:
Family PORTUNIDAE:
Carcinus maenas.
Nectocarcinus integrifrons Rock-crab.
N.tuberculosus Rough rock-crab.
Ovalipes australiensis Sand crab.
Family XANTHIDAE:
Actaea peroni Thorn-legged crab.
Pilumnus acer Long-spined hairy-crab.
P.etheridgei.
P.monolifer Beaded hairy-crab.
P.tomentosus Common hairy-crab.
P.fissifrons Tasselled-crab.
Heteropilumnus fimbriatus Bearded crab.
Pilumnopeus serratifrons Smooth-handed crab.
Ozius truncatus Reef crab.
Family GONEPLACIDAE:
Litocheira bispinosa Two-spined crab.
Family PINNOTHERIDAE:
Pinnotheres pisum Swollen pea-crab.
Family GRAPSIDAE:
Sesarma erythrodactyla.
Leptograpsus variegatus Common shore-crab.
Leptograpsodes octodentatus Burrowing shore-crab.
Planes minutus Columbus crab.
Cyclograpsus audouini Smooth shore-crab.
C.granulosus Purple-mottled shore-crab.
Paragrapsus quadridentatus Notched shore-crab.
P.gaimardi Mottled shore-crab.
P.laevis.
Helice leachi.
Helograpsus haswellianus Mud crab.
Plagusia chabrus Cleft-fronted shore-crab.
Brachynotus spinosus Little shore-crab.
Family MICTYRIDAE:
Mictryris platycheles Soldier crab.
**M.longicarpus.*
Family OCTYPODIDAE:
Macrophthalmus latifrons Sentinel crab.

*These species are not included in the key but have been recorded by Griffin and Yaldwyn (1971) and Powell (1974).

KEY TO VICTORIAN BRACHYURANS

1. Commensal in bivalve molluscs; body round; eyes small; poorly calcified carapace .. .. *Pinnotheres pisum* (Figure 174, Hale 1927; as *P.subglobosa.*)

Free-living; body may be rounded but not poorly calcified (unless during moulting) **2**

2. Body semi-spherical and bright blue in colour; always walks forwards and in large groups; found only on sandy shores (see Fig.2) .. .. *Mictyris platycheles* (Powell 1974, has studied the ecology of this species.)

Body partly flattened dorso-ventrally (top to bottom); usually walks sideways **3**

3. Eyes on very long stalks which at rest lie parallel to front of carapace (Fig.2 and Fig.5-A) .. .. .. *Macrophthalmus latifrons*

Eyes not on pronounced stalks **4**

4. One distinct and very pointed notch on side of carapace (Fig.2 and Fig.5-B) .. .. *Litocheira bispinosa*

If notch present, not as in Fig.5-B **5**

5. Distal (outermost) segment of last walking leg flattened noticeably relative to other legs — an adaptation to swimming (Family Portunidae) **6**

Distal segment of last walking leg not flattened, and therefore not noticeably different from other legs **9**

6. Two large conspicuous spots to rear and sides of carapace; distal segment of last leg oval .... *Ovalipes australiensis* (Figure 148, Hale 1927; as *O.bipustulatus.*)

No spots present on carapace, last leg flattened but narrow, not oval **7**

7. Carapace shaped as in Fig.2 and Fig.5-C; pronounced notches on sides and front of carapace; carapace green in life .... *Carcinus maenas*

Carapace generally quadrilateral, not as in Fig.5-C; frontal area may be lobed, but definitely not corrugated; brown-orange in life **8**

8. Tubercles (small, sharply defined elevations of various shapes) present on anterior of carapace giving a rough appearance; frontal region lobed as in Fig.2 and Fig.5-D(i); found on muddy shores .... *Nectocarcinus tuberculosus*

Tubercles absent, frontal region of carapace smooth and entire, or possibly with a very small notch (Fig.2 and Fig.5-D(ii)); found on rocky shores .... *Nectocarcinus integrifrons*

9. Mouth frame (shaded region, Fig.5-E) triangular and sharply pointed in front (Fig.5-E(i)); body generally pebble-shaped (Family Leucosiidae) **10**

Mouth frame quadrilateral (Fig.5-E(ii)) **14**

10. Dorsal surface of carapace lacking large protruberances although may be uneven; some protruberances may be present on sides of carapace **11**

Dorsal surface of carapace uneven, with large protruberances, two conical forward-directed prominences in mid-area of carapace, and one large protruberance in mid-rear area *Merocryptus lambriformis* (Figure 202, Hale 1927.)

11. Dorsal surface of carapace smooth and shiny; margins of carapace may possess small projections or bumps **12**

Dorsal surface of carapace reasonably smooth but always beaded or nodulate; never shiny (Genus *Philyra*) **13**

12. A pronounced "snout" with distinctive "eyeball-shaped" structures behind snout (Fig.5-F) .... *Phylxia dentifrons*

No pronounced "snout" or "eyeball-shaped" structures; chelipeds (pincers) of males may be much larger than body .... *Ebalia (Phlyxia) intermedia* (Figure 199, Hale 1927; as *P.intermedia.*)

13. Posterior margin of carapace rounded and without teeth (Fig.2) .... *Philyra laevis*

Posterior margin of carapace with teeth .... *Philyra undecimspinosa* (Figure 196, Hale 1927; as *P.murrayensis.*)

14. Last walking leg bearing pincers (Fig.5-G) permanently carried over back (used to hold camouflaging seaweed in place) (Family Dromiidae) **15**

Last walking leg without pincers and not permanently carried over back; if seaweed present on dorsal surface of carapace then permanently attached to the crab and not held on by legs **17**

15. Transverse fringe of long hairs on front of dorsal surface of carapace .... *Dromidiopsis excavata* (Figure 106, Hale 1927.)

Not as above **16**

16. Front of carapace with three teeth, the two outer ones being pointed (Fig.5-H(i)) .... *Petalomera lateralis* (Figure 108, Hale 1927.)

Front of carapace with three teeth, the two outer ones being rounded (Fig.5-H(ii)) .... *Petalomera wilsoni* (Figure 111, Hale 1927.)

17. Carapace triangular or subcircular (Fig.5-I(i)) **18**

Carapace square or quadrilateral (Fig. 5-I(ii)) **28**

18. Dorsal surface of carapace flat and often with rostrum protruding over eyes and mouth (Family Hymenosomatidae) ... **19**

Not as above (Family Majidae) **22**

19. Carapace shaped like an equilateral triangle .... *Elamena (Trigonoplax) unguiformis*

Carapace roughly circular in shape ... **20**

20. Rostrum three-toothed (Fig.3 and Fig. 5-J); margin of carapace angular .... *Halicarcinus ovatus*

Rostrum simple (not three-toothed); margin of carapace a smooth arc **21**

21. Rostrum long, narrow and acute (Fig.5-K) .... *Halicarcinus rostratus* (Figure 114, Hale 1927.)

Rostrum blunt and as long as wide .... *Halicarcinus australis* (Figure 115, Hale 1927.)

22. **Note:** In the following species it may become necessary to remove weed from the crab before considering a couplet.
Carapace as in Fig.5-L .... *Paratymolus latipes* (Figure 119, Hale 1927.)

Carapace not as above **23**

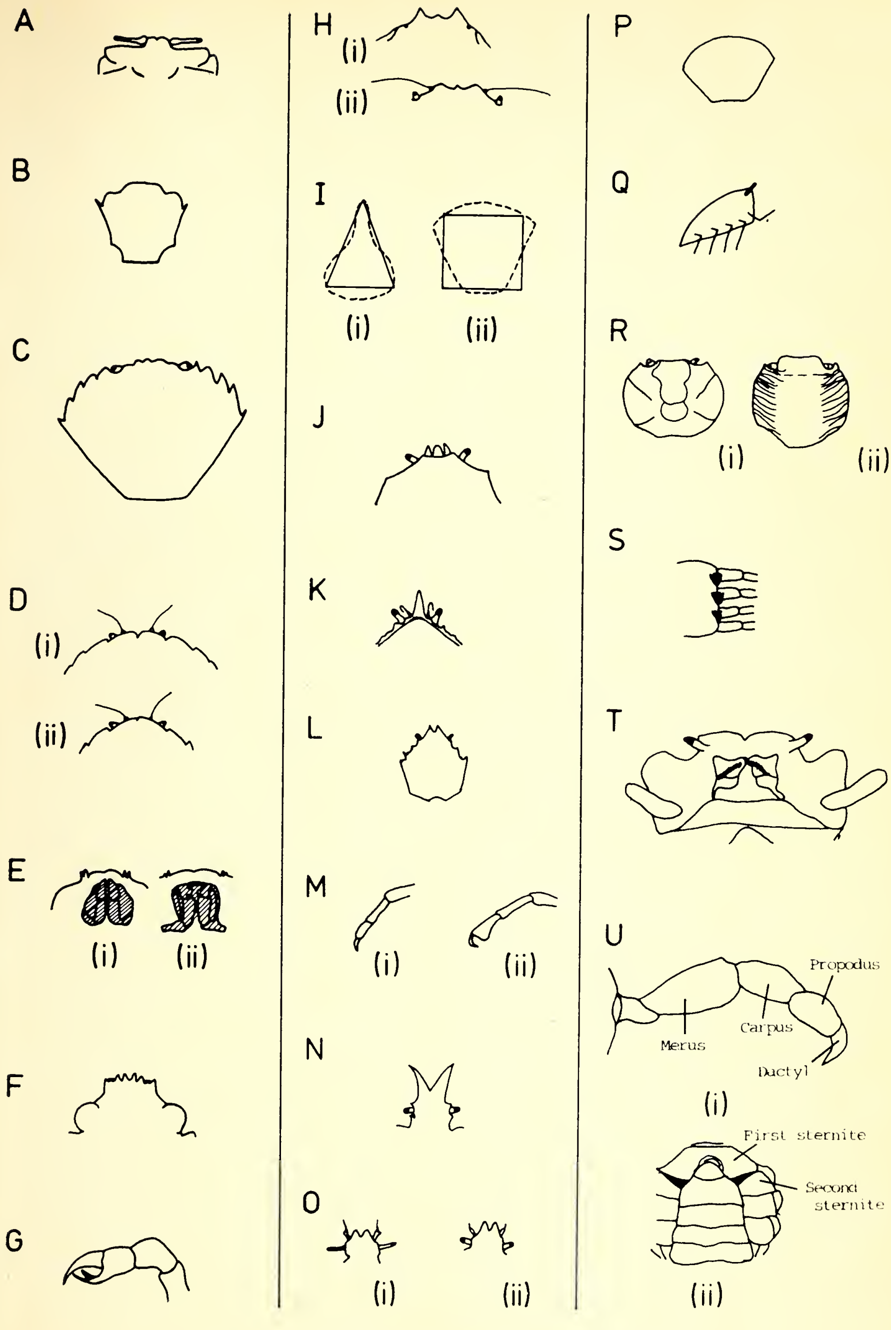

Figure 5. Diagnostic characters A-U, referred to in key.

23. Carapace with lateral spines (Genus Naxia) **24**

Carapace without lateral spines **27**

24. Second-last segment of leg (propodus) very wide and truncated at distal end. (Compare normal shape in Fig.5-M(i) with truncated propodus in Fig.5-M(ii)) **25**

Propodus only slightly widened, but definitely not truncated at distal end **26**

25. Spines and tubercles (defined in Couplet 8) on carapace relatively sharp and long; no spines on the anterior part of the lateral margin of basal antennal segment .. .. *Naxia spinosa* (Figure 125, Hale 1927.)

Spines and tubercles on carapace short and blunt relative to spines on anterior part of lateral margin of basal antennal segment .. .. *Naxia tumida* (Figure 126, Hale 1927.)

(These two species are very difficult to tell apart and Hale 1927, p.127, should be consulted.)

26. Small spines on carapace above eyes (Fig.5-N) .. .. *Naxia aurita* (Figure 127, Hale 1927.)

Not as above .. .. *Naxia deflexifrons*

27. Eye stalks narrow; anterior external angle of basal joint of second antenna greatly produced and visible from above (Fig.5-O(i)) .. .. *Eruma hispidium* (Figure 130, Hale 1927.)

Eye stalks thick, anterior external angle of basal joint of second antenna not visible from above (Fig.5-O(ii)) .. .. *Gonatorhynchus timidus* (Figure 129, Hale 1927.)

28. Carapace shaped as in Fig.5-P, with front significantly broader than rear (Family Xanthidae) **29**

Carapace squarish, with front broad but rarely wider than rear (Family Grapsidae) **37**

(The ecology of a number of species of grapsid crabs has been studied by Griffin 1971; zonation in Victoria has been discussed by Synnot and Wescott 1976.)

29. Carapace smooth and free of any covering; distinctive black chelipeds (Fig.2) .. .. *Ozius truncatus*

Not as above **30**

30. Carapace and chelipeds covered with lobes and granulations .. .. .. *Actaea peroni*

Not as above **31**

31. Carapace naked, or with only a few hairs .. .. *Pilumnopeus serratifrons* (Figure 162, Hale 1927; as *Heteropanope serratifrons.*)

Carapace covered with many long or short hairs **32**

32. Front and antero-lateral margins (between front and side) of carapace covered by a very dense and long fringe of hairs; hair covering remainder of carapace; four rounded lobes on antero-lateral margins .. .. *Heteropilumnus fimbriatus* (Figure 170, Hale 1927.)

Carapace without long fringe of hairs, and if possessing lobes then not rounded and not four in number (Genus *Pilumnus*) **33**

(Although nine species of *Pilumnus* occur in S.E. Australia (Griffin and Yaldwyn 1971), this key will separate only four species found in the Port Phillip Bay Survey of 1957-63, and one species found by the Marine Study Group of Victoria 1971 in Westernport Bay.)

33. Carapace covered with very short hairs, or pubescent **34**

Carapace covered in long hairs **35**

34. One to three tubercles (defined in Couplet 8) on middle or rear antero-lateral lobes of carapace .. .. *Pilumnus monilifer* (Figure 163, Hale 1927.)

Not as above .. .. *Pilumnus fissifrons* (Figure 164, Hale 1927.)

35. Long hairs forming a sparse but obvious fringe just behind front of carapace .. .. *Pilumnus acer* (Figure 166, Hale 1927.)

Not as above **36**

36. One to three spines near antero-lateral border of carapace, but no spines or tubercles (defined in Couplet 8) on the second-last and third-last segments of walking legs .. .. .. *Pilumnus tomentosus* (Figure 167, Hale 1927.)

No spines on carapace, but many spines on second-last and third-last segments of walking legs .. .. *Pilumnus etheridgi*

37. Front of carapace with several deep clefts (Fig.4) .. .. *Plagusia chabrus*

Front of carapace may contain teeth, but not with deep clefts **38**

38. Body highly vaulted (Fig.5-Q); one very small notch on side of carapace; very narrow legs; found on muddy shores .. .. *Helograpsus haswellianus* (Figure 177, Hale 1927; as *Helice haswellianus.)*

Body not vaulted; may possess notches on side of carapace **39**

39. Dorsal surface of carapace ridged in a grille-like effect (Fig.5-R(i) or (ii)) **40**

Dorsal surface of carapace smooth and relatively flat **43**

40. Body square, ridges confined to outer edges of carapace; greenish-black or iridescent green (Fig.4) .. .. *Sesarma erythrodactyla* (Gunn 1972, reports the first Victorian occurrence of this species.)

Body ellipsoid or oval, but never square; ridges cover most of dorsal surface **41**

41. Ridges very weak; found on drift weed .. .. *Planes minutus* (Figure 182; Hale 1927.)

Ridging on carapace obvious; underside of crab often blue or purple in life; found on rocky reefs and headlands; moves very quickly when disturbed **42**

42. Ridges on carapace clearly delineated and in a regular parallel pattern; under-surface usually blue (Fig.4) .. .. *Leptograpsus variegatus*

Ridges not parallel or in a regular pattern; under-surface usually purple (Fig.4) .. .. *Leptograpsodes octodentatus*

43. Margin of carapace entire, although may be microscopically beaded **44**

Margin of carapace conspicuously notched **45**

44. Tufts of hair present between bases of walking legs (Fig.5-S); carapace never purple-mottled (Fig.4) .. .. *Cyclograpsus audouini*

No tufts of hair between bases of walking legs; often possessing a purple-mottled carapace (Fig.4) *Cyclograpsus granulosus* (Wescott 1974, 1976, has examined these species in detail.)

45. Oblique hairy ridge on external surface of outer segment of feeding apparatus (third maxilliped) (Fig.5-T) **46**

Not as above (Fig. 4) .. .. *Brachynotus spinosus*

46. Body thick, front abrupt (no over-hanging shelf); lateral margins sub-parallel towards rear of carapace, and usually with more than two distinct notches; slate-grey to olivaceous in life .. .. *Helice leachi*

Body not thick; front of crab over-hanging, shelf-like; one or two notches on lateral margins **47**

47. One notch on side of carapace near front (Fig.4) .. .. *Paragrapsus quadridentatus* (Wescott 1974, has examined this species in detail.)

Two notches on side of carapace **48**

48. The next separation is very difficult to make, especially for females. See Campbell and Griffin (1966) and Griffin (1969) for more information.

First walking leg with felt on anterior surface of carpus, propodus, and dactyl (Fig.5-U(i)); suture between first and second sternites not marked by prominent ridge (Fig.5-U(ii)) .. .. *Paragrapsus laevis*

First walking leg of male with felt only on edges of propodus and dactyl (possibly naked in female); first and second sternites of male separated by a distinct ridge (Fig.5-U(ii)) .. .. *Paragrapsus gaimardi*

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Eucalypts along the Victorian Coast

Notes on the Victorian ocean coastline with reference to aspect and distribution of Eucalypts

BY PAT CAROLAN*

The following observations refer generally to a narrow zone bordering the ocean coast, most tree species named growing within about 200 metres of high water level. This does not extend to areas which could be described as coastal in a broader sense, and much more information could be obtained with more detailed study of botany and soils.

Climate

The Victorian coast extends about 800 km east-west but only about 130 km north-south so there is little difference in average temperature. There is also a very low range in extreme temperatures. Examples are:

	Average Max. hottest month	Average Min. coldest month
Gabo Island	21.2°C	8.5°C
Wilson's Promontory	20.7	8.0
Cape Otway	21.2	8.5
Cape Nelson	20.8	7.8
Compared with:		
Melbourne	25.9	6.2
Bendigo	29.2	3.5

Average annual rainfall varies from 1049 mm at Wilson's Promontory to 610 mm at Queenscliff (and possibly lower along the 90 Mile Beach). In the west there is a pronounced rain deficiency in summer and even at Wilson's Promontory the average winter rain is about three times the average summer — hence the summer fire danger. At Gabo Island rainfall is still slightly heavier in the winter months. This is in contrast to the nearby NSW coast and inland where rainfall is fairly uniform through the year.

The high rainfall areas of the Otways and Wilson's Promontory are backed by high land and naturally support better quality forest, while the less likelihood of summer drought and winter frost in East Gippsland aid the penetration of sub-tropical east-coast type vegetation. However, the climate figures appear to have little relation to the variation in plant species in adjoining areas. More detailed micro-climate information, including wind data, is necessary.

Influence of Aspect

There is a marked difference in vegetation on adjoining east and west facing coasts, far more than would be expected from the minor climatic differences. Eucalypts rarely attain tree size on any coast facing west or south-west.

In southern Victoria southerly winds are dominant in summer and northerly in winter, but westerly winds are frequent in all seasons and, combined with hot afternoon sun in summer, have a strong dehydrating influence. Salt spray also inhibits plant growth on exposed west coasts (Parsons & Gill, 1968).

But there are some puzzling factors about the higher quality vegetation on east faces. There should be a slightly higher rainfall on western slopes. Easterly winds may be strong and persistent in South Gippsland in summer (e.g. in the dry February of 1976) and

*1/92 Were Street, Brighton.

there is no reason why an easterly should not transport salt in spray. Wind pruning and dead leaf tips are common on exposed east faces. Great damage has been caused on the NSW coast by storms (e.g. in 1974) yet forest vegetation in many places extends to the beach.

Effects of Calcareous formations

There is another important factor which affects vegetation on much of the Victorian ocean coast as far east as Wilson's Promontory. This is the presence of calcareous sands and consolidated dune limestone (often referred to as aeolianite or calcarenite), of Pleistocene or Recent age, derived from the sands. These formations nearly always occur on west facings or exposed points which are partly exposed to the southwest, e.g. Point Roadknight at Anglesea, Point Lonsdale and the Nepean Peninsula. The only minor exception known is where the calcarenite covering the Cretaceous mudstone at Cape Otway extends eastwards to the mouth of the Parker River. Calcareous sands are dominant on the south and west coasts of Australia and quartzose sands on the east (Bird, 1968).

Surface streams are absent from the permeable calcarenite, in contrast to the numerous small creeks and springs with sources close to the coast which are common in other areas, e.g. Otways, Waratah Bay. Calcarenite is not related to the underlying geological formations which may be Tertiary, Mesozoic or Palaeozoic sediments, basalt or granite.

Even when fairly deep soils have developed on the calcarenite and there is good vegetation cover, including trees such as casuarina, leptospermum and banksia, there are no eucalypts, e.g. Nepean Peninsula. This is not the case in South and Western Australia where apparently more lime-tolerant species survive despite low rainfall, e.g. west of Port Lincoln, and near Portland. Eucalypts do grow on older limestone formations.

Distribution of Eucalypt Species

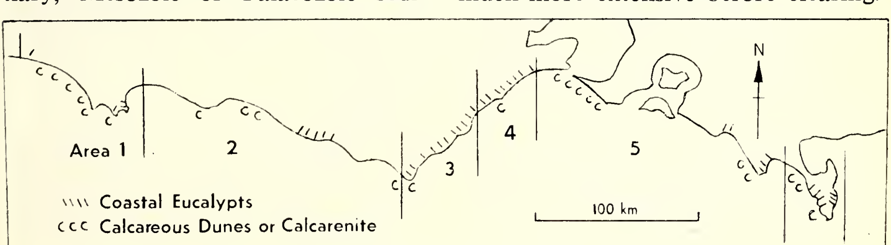
These notes refer to areas where species have been identified. Unfortunately there are many gaps. The East Gippsland coast is left for someone better informed to describe as Fell (1972) has done for the Gippsland Lakes district.

The areas are numbered 1 to 6 as shown on map.

1. Portland Area (Sand dunes, calcarenite, basalt. Rainfall about 700 mm per annum).

Eucalyptus leucoxylon ssp. macrocarpa (Yellow Gum). At Nelson behind sand dunes near mouth of Glenelg River.

E.diversifolia (Coast Gum). At Cape Nelson. Grows as dwarf mallee in dense coastal scrub to within about 100 m of coast but about 30 m above sea level, and as small gum-barked tree in slightly more sheltered positions, on calcarenite with very thin soil cover. Extends over large areas and probably much more extensive before clearing.



E.baxteri (Brown Stringybark). Mixed with *E.diversifolia* within 1 km of coast, still on calcarenite but with more soil cover. Bud opercula are extremely warty suggesting affinity with *E.alpina* (Grampians Gum). *E.nitida* (Shining Peppermint) also occurs in this area but distance to coast is not known.

E.goniocalyx (Bundy) (gum-barked). On cliff top overlooking Portland Bay, on basaltic soil.

E.viminalis (Manna Gum) on Dutton Way between Portland and Narrawong. This is further inland but on coastal plain with basalt outcropping.

2. Port Campbell Area (Horizontal Tertiary Limestone forming undulating plain above vertical cliffs. Rainfall about 700 mm).

E.nitida and *E.obliqua* (Messmate Stringybark). Stunted trees in grey sand over limestone.

E.ovata (Swamp Gum) and *E.obliqua*. Slightly further inland. Better forest in sheltered valley round Port Campbell.

E.ovata and *E.obliqua*. At Loch Ard Gorge.

3. Cape Otway-Lorne (Mainly Cretaceous Arkose, steep slopes, good soil when weathered. Rainfall over 1000 mm).

E.kitsoniana (Bog Gum) near Blanket Bay.

E.obliqua. A few survivors in cleared landscape at Apollo Bay.

E.viminalis (gum barked) with *E.obliqua* near Separation Creek.

E.ovata, E.aromaphloia (Scentbark), *E.obliqua*. West of Jamieson River and common in many areas to Lorne.

E.globulus (Southern Blue Gum) (and/or *E.st.johnii*). At Mt. Defiance Lookout and extending for about 20 km along coast including very exposed sites.

E. sideroxylon (Red Ironbark). Big Hill area, east of Lorne. This is an unusual habitat as they grow as tall trees in a high rainfall, east-facing sheltered site and on the Cretaceous formation in association with *E.globulus*.

4. Aireys Inlet-Torquay (Tertiary — sandy soils, partly gravel and ironstone capping. Rainfall about 600-900 mm).

E. sideroxylon with *E.ovata* on cliff tops from Aireys Inlet to Urquhart's Bluff.

Dwarf *E.sideroxylon, goniocalyx, baxteri, obliqua* on cliff tops east of Anglesea. The distribution of *E.baxteri* is interesting. It may occur in intermediate localities but has not been noticed between the Portland and Anglesea districts. In latter area it appears to hybridise with associated *E.obliqua*. *E.obliqua* is most ubiquitous of all species and so common that it is impossible to name all localities.

E.sideroxylon forms almost pure low dry forest right to beach on east side of Point Addis and continues intermittently to Torquay.

E.leucoxylon (not seen since Nelson) reappears near Jan Juc.

5. Point Nepean-Waratah Bay (Rainfall about 600-1000 mm).

Eucalypts are rare or absent on calcarenite, basalt and Cretaceous sediments which mainly face southwest.

E.viminalis. On sheltered sandy-alluvial foreshore at Inverloch.

E.obliqua, ovata, radiata. In east facing sheltered pocket round Walkerville. (Also wet gully vegetation with prosanthera and tree ferns extending to beach.)

6. Wilson's Promontory (Granite — bare rock, gravel, sandy and peaty swamp soils. Rainfall over 1000 mm).

This is such an interesting area that it needs fuller description. The following is a brief record of eucalypts near coast.

E.obliqua, baxteri (re-appearing after long gap), *radiata, kitsoniana, globulus* (rare but very close to sea), *cypellocarpa* (Mountain Grey Gum) (only noticed at sheltered south end of Sealers Cove). The notable feature is that eucalypts grow on granite facing west.

In many areas man has destroyed or altered the natural environment by clearing, burning and bulldozing. The present craze to turn every road into a high speed highway is a threat to roadside vegetation which is often the only remnant of the original ecology. The position is further complicated by planting Australian species not native to an area, e.g. *E.camaldulensis* (River Red Gum) at Apollo Bay and *E.viminalis* at Tidal River. It is therefore hoped that naturalists will record their own observations and do much more to arouse interest in preserving the natural habitat, especially among local residents.

In conclusion, two facts of plant ecology are stated:

1. When plants occur in areas isolated by hundreds of kilometres from the same species, this is evidence of a suitable habitat **now.** This simple fact sometimes seems to be forgotten in speculation about climatic change.

2. Plants may extend from a major area of typical habitat into nearby areas which may not be their normal habitat, if there is room, i.e. if competition from other plants does not keep them out.

These statements may appear somewhat contradictory but it is the apparent contradictions and unknown factors which make ecology such an interesting subject.

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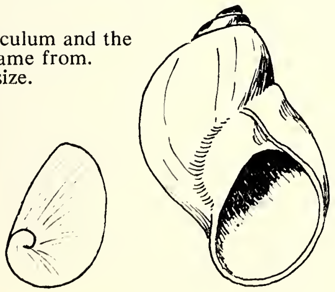
Operculum of a Sand Snail

In May 1976 among the shells on the beach at Edithvale, we found several seemingly new shells which, over many years, we had not noticed before.

They were frail, ear-shaped, transparent, honey-coloured and slightly pliable, 20-25 millimetres long and 15-16 mm at the widest part. Each looked like a miniature false ear shell, concave on one surface and convex on the other, the concavity being 1-2 mm up from a flat surface. Faint radial striations diverged from a once-coiled whorl near the wider end of the straight side towards the curved outer side.



The operculum and the snail it came from. Natural size.

Dr Brian Smith recognised this as the operculum of the Conical Sand Snail *Polinices conicus* that produces the jelly blubber "sausage" containing hundreds of eggs seen as tiny white spots in the jelly. These sausages are common on the beach.

It is strange that there is no mention of this operculum in "Marine Molluscs of Victoria" by MacPherson and Gabriel, where the shell of the sand snail is pictured and described.

L. M. White, Canterbury

Bush-peas of Victoria – genus *Pultenaea* No.2

BY M. G. CORRICK*

The distribution of several Victorian Pultenaeas extends to coastal areas, but present records show that two are exclusively coastal.

Habitats close to the sea are extremely varied and often very harsh; many distinctive plant communities have evolved in response to these conditions and, because of the adaptations necessary to cope with the differing environments, the dividing line between communities is often very sharp. Small changes, such as the presence of a sheltering dune or a trickle of water soaking down a cliff may completely alter the vegetation around it. The two coastal Pultenaeas will never be found growing together in the same plant community.

Pultenaea canaliculata

F.Mueller in Trans.Roy.Vic.Inst.119 (1855)

This species is usually found on sand dunes within sight of the ocean and is thus adapted to one of the most rigorous of the environments near the sea. In this situation it must endure salt-laden winds and loose, sandy soil which dries very rapidly.

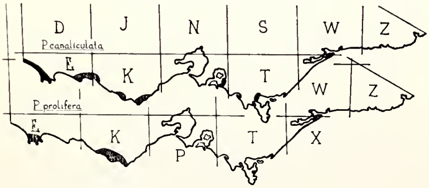
It is recorded from along the shore between Portsea and Cape Schank, from Corner Inlet and from a few areas in the extreme south west of the State. It also occurs in South Australia. Ferdinand von Mueller first described the species from plants collected by Charles Stuart at Encounter Bay in 1847.

It is a stiff spreading shrub 1 to 2 metres high, often forming dense mounds 3-4 metres across. Except for the petals and stamens it is covered with soft, silky, often golden hairs which may give the whole plant a brown, velvety appearance.

The leaves are 8-12 mm long, oblanceolate terete, channelled above; usually curved upwards and very hairy. The prominent stipules are 3-4 mm long, hairy, slender, somewhat recurved from the stem and have a prominent mid vein.

The calyx is hairy, the lobes taper to slender tips and the three lower ones are longer than the tube. The linear, concave bracteoles are attached at the base of the calyx tube; they are brown and hairy with a dark keel, and reach to about half-way up the calyx lobes.

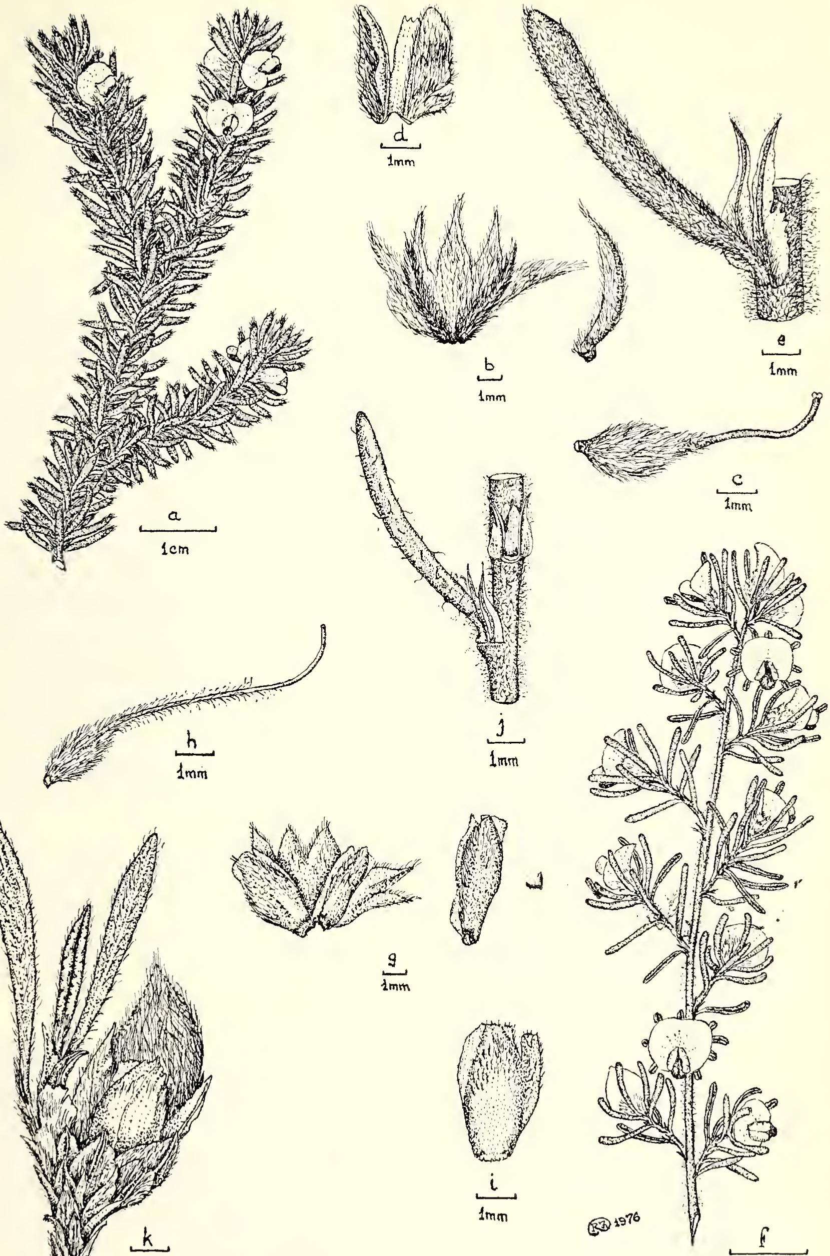
The flowers are axilliary and densely clustered at the tips of the branches among leaves with enlarged stipules. The ovary and base of the style are



Known distribution of
Pultenaea canaliculata and *P.prolifera.*

*7 Glenluss Street, Balwyn

Fig.3. a-e, *Pultenaea canaliculata* drawn from MEL 503760; a, habit; b, calyx and a bracteole (slightly larger); c, style and ovary; d, floral bract; e, leaf and stipule. f-j *Pultenaea prolifera* drawn from MEL 503761; f, habit; g, calyx and bracteole (slightly larger); h, style and ovary; i, floral bract; j, leaf and stipule. k, pod of *Pultenaea prolifera* drawn from MEL 35267.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covered with hairs. The pod does not extend far beyond the calyx lobes.

Pultenaea canaliculata is apparently not very common and there is very little variation among the few Victorian collections examined.

The other *Pultenaea* restricted to coastal areas is *P.prolifera*. This species is endemic in Victoria. It is almost co-extensive with *P.canaliculata*, but prefers situations a little further from the sea where the soil is still sandy but the environment less harsh.

SPECIMENS EXAMINED included: South Australia — Encounter Bay, *Stuart*, 1847 (MEL 503717, SYN-TYPE); Victoria — Wilson's Promontory, *J. W. Audas and P. R. H. St. John*, 21.x.1910 (MEL 503769); Portland, Nelson Bay, *A. C. Beauglehole 39999*, 1958 (MEL 503760); Apollo Bay, *P. R. H. St. John*, 28.xii.1909 (MEL 503770); Corner Inlet, *Wilhelmi*, (MEL 503771).

Pultenaea prolifera

H. B. Williamson in Proc.Roy.Soc.Vic.35:102 (1922)

This species was described from plants collected in the Otway Forest by Master Willie Lucas in 1921.* It also occurs in Wilson's Promontory, Port Campbell and Mt. Richmond National Parks and several other areas west of Portland.

P.prolifera is an erect shrub about 1 to 1½ metres high, with long, slender, nodding branches. The alternate, linear, almost terete leaves, 4-10 mm long are hispid with short hairs on the underside. The upper surface, if visible, is glabrous. The stipules are 2-3 mm long, brown and papery with a darker mid-rib.

The flowers are solitary or in twos at the tips of very short branchlets. The large number of branchlets along each main stem make the shrub very showy at flowering time. The ovary is covered with silky hairs which extend halfway along the style.

The calyx is hairy and the lobes are rather short and broad. The bracteoles, attached at the base of the calyx tube, are broad, brown and have no conspicuous mid-rib; they are slightly hairy and have ciliate margins. The bracts are large, brown and papery, with a hairy mid-rib and ciliate margins; some may have a central lobe.

Pultenaea prolifera is recorded by Churchill & de Corona from Grid H in central Victoria, but this is apparently an error due to confusion between the location of Lower Bridgewater, near Portland, and Bridgewater, near Bendigo.

SPECIMENS EXAMINED included: Victoria — Carlisle River, *W. Lucas*, x.1921 (MEL 503758, SYN-TYPE); near Kentbruck, *M. G. Corrick* 197, 10.ix.1967 (MEL 503761); Lower Bridgewater, nr Portland, *K. J. Kittson*, 18.ix.1946 (MEL 503772); Mt. Richmond National Park, *M. E. Phillips*, 26.x.1963 (CBG 004817: MEL 503772); Wilson's Promontory, *H. B. Williamson*, x.1909 (MEL 503759).

*The type collection, now in the National Herbarium, Melbourne, was exhibited at the December 1922 meeting of the Field Naturalists' Club of Victoria. (See *Victorian Naturalist* **39:** 112 (1923)).

Preparing material for 'The Victorian Naturalist'

When preparing material for publication, please have it typed with double line spacing and leave at least 3 cm (about 1¼″) clear margin at the left. Captions to figures should be typed on a separate page. Monochrome illustrations should be supplied, as it is costly and rarely satisfactory to reproduce from coloured material. If article is of a scientific nature, it is desirable to supply two copies of text matter.

Habitat of the Swamp Antechinus in Victoria

Distribution and Habitat requirements of the mainland Swamp Antechinus *Antechinus minimus maritimus* (Finlayson) (Marsupialia: Dasyuridae)

BY J. W. WAINER* AND R. J. GIBSON†

Introduction

The Swamp Antechinus, *Antechinus minimus* (Figure 1) is a terrestrial, nocturnal and insectivorous dasyurid marsupial with a life cycle typical of Australian *Antechinus,* i.e. it is monoestrous, and there is synchronous winter breeding and post-mating mortality of males (Wainer 1976). *A.minimus minimus* occurs on Tasmania and islands in Bass Strait while *A.m.maritimus* is distributed on the Australian mainland. It can readily be distinguished from other species of *Antechinus* by its long fore claws, short ears and tail, small eyes, and especially by the grizzled appearance and rough texture of the long pelage, which is leaden grey on the dorsum gradually becoming rufous on the flanks and lighter on the undersurface.

Distribution

Wakefield and Warneke (1963) listed only four mainland localities for *A.m.maritimus*, two in South Australia (Robe and Port MacDonnell), and two in Victoria (Bridgewater Lakes and Portland). Wakefield and Warneke (1967) recorded three additional Victorian specimens (from Anglesea, Wilson's Promontory and Glennie Island) thus greatly increasing the known range. Since then there have been numerous records from central Victorian coastal localities, especially the Otways. In addition there are two records from the Casterton district of SW Victoria, approximately 60 km from the coast (Figure 2).

The present status of *A.m.maritimus* in South Australia is uncertain. Finlayson's (1958) description of *Phascogale swainsoni maritima* (=*Antechinus minimus maritimus*) was based on 11 specimens; only the holotype (from Port MacDonnell, SA) was lodged in the South Australian Museum. Three of the other ten specimens are from Heathmere, north of Portland, Victoria, but Wakefield and Warneke (1963) established from Finlayson's photographs that the Heathmere specimens are *A.swainsonii.* The remaining seven specimens are apparently from coastal SE South Australia and SW Victoria (Robe and Portland are the only localities given). However, it is clear from Finlayson's biometric data that some of these specimens are also *A.swainsonii* (Wakefield and Warneke 1963); thus, the only certain record of *A.m.maritimus* in South Australia is the holotype from Port MacDonnell.

Figure 1: Mainland swamp antechinus, *A.minimus maritimus.* Photo: G.Lewis.

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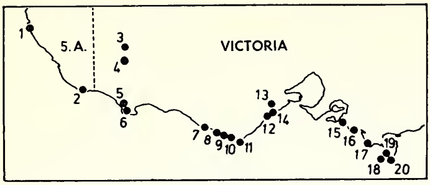

Figure 2: Locality records of *A.minimus maritimus:*
1.Robe; 2.Port MacDonnell; 3.14 km WNW of Casterton; 4.21 km SW of Casterton; 5.Bridgewater Lakes; 6.Bats Ridge Wildlife Reserve; 7.Port Campbell; 8. Mouth of Gellibrand River; 9.Moonlight Head; 10. Rotten Point; 11.Mouth of Parker River; 12. Urquhart Bluff; 13.13 km from Anglesea; 14. Hutt Gully; 15.Mouth of Powlett River; 16.2 km E of Hamilton Creek, Venus Bay; 17.Cape Liptrap; 18.Great Glennie Island; 19.Tidal River Camp turn-off; 20.2 km along walking track to Waterloo Bay from Lighthouse track.

Habitat

The mainland Swamp Antechinus is restricted to dense, closed heath up to 2 m high, and dense coastal tussock grassland and sedgeland. It never occurs in forest and there appears to be only one record from woodland (14 km SW of Casterton) in an area with an understorey of grass tussocks and heath (see below). Most specimens are taken near river outlets, where these plant associations predominate (e.g. Parker, Gellibrand, Anglesea and Powlett Rivers), but some are from heath not associated with rivers, at both coastal (e.g. Cape Liptrap, Glennie Island) and inland localities (e.g. Casterton district).

The following are brief descriptions of the vegetation at five localities in Victoria where *A.m.maritimus* has been collected:

A. Cape Liptrap

Moderate to very dense vegetation in wet areas, but occasionally more exposed and relatively open lower heath. Usually occurs in areas not recently burnt; i.e. where there is an open ground vegetation but a very dense upper zone. Conspicuous plants include *Leptospermum juniperinum, L.myrsinoides, L.laevigatum, Casuarina paludosa, C.pusilla, Melaleuca squarrosa, Epacris* spp, and *Calorophus lateriflorus* (P. Cheal, pers. comm.).

B. Parker River Inlet

(a) Closed coastal heath of *Leptospermum juniperinum, Leucopogon parviflorus* and *Banksia marginata,* with an understorey of saw-sedges *Gahnia seiberiana* and *Lepidosperma gladiatum*, and grasses *Imperata cylindrica* and *Poa* sp.

(b) Tussock grassland of large *Poa* tussocks with occasional bracken *Pteridium esculentum* and weeds (e.g. *Cirsium vulgare*).

Figure 3. Tussock grassland and closed heath on Glennie Island.

C. Glennie Island (Figure 3)

(a) Closed coastal heath of *Leptospermum laevigatum, Banksia marginata, Correa alba, Olearia phlogopappa* and *Myoporum insulare* up to 2 m high.

(b) Tussock grassland of *Poa poiformis* often interspersed with small shrubs, especially *Helipterum albicans*, and many low succulent herbs, including *Tetragonia implexicoma, Rhagodia hastata* and *Disphyma australe.*

D. 14 km WNW of Casterton (Fig.4)

Swampy closed heath to 1 m high, surrounded by areas of *Eucalyptus baxteri* open forest. Predominant heathland plants include *Leptospermum juniperinum, L.myrsinoides, Banksia marginata*, some *B.ornata, Epacris impressa, Dillwynia sericea, Calytrix tetragona, Xanthorrhoea australis, Melaleuca squarrosa* and rushes and sedges.

E. 21 km SW of Casterton

Swamp Gum *Eucalyptus ovata* woodland, with a grassy understorey, dense in places and to a height of 0.5 m. *Xanthorrhoea minor*, sedges *Ghania* sp and rushes *Juncus* sp are abundant with occasional patches of *Leptospermum juniperinum* and *Acacia verticillata.*

Conclusion

A.m.maritimus appears to be rare and restricted in distribution, occurring in lower SE South Australia, SW, and coastal Victoria at least as far east as Wilson's Promontory. It is found in treeless vegetation of the closed heath, tussock grassland and sedgeland structural formations. It thus resembles the nominate sub-species whose preferred habitat is the treeless "wet sedgelands and associated drainage areas . . . and with few exceptions all specimens collected have been taken in or near to areas of *Mesomelaena sphaerocephala* (Button Grass)" (Green, 1972).

The species is probably more widespread than is presently realised, particularly in coastal Gippsland and inland SW Victoria. However, the distribution is patchy and is suggestive of fragmentation of a wider range, presumably as a result of climatic change.

Acknowledgements

Information on habitat preference at Cape Liptrap was kindly provided by Mr P. Cheal and at Casterton by the MSG-FNCV. Locality records were generously made available by the Fisheries and Wildlife Department of Victoria, and Joan Dixon, Curator of Vertebrates, National Museum, Victoria.

Many thanks are due to Angus Martin, Steve Morton and Robert Warneke for their helpful suggestions on the manuscript.

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Figure 4. Damp heath 14km WNW of Casterton.

The Origin of Generic Names of the Victorian Flora
Part 2 — Latin, Greek and Miscellaneous

(Continued from page 184 in the last issue)

BY JAMES A. BAINES

Ophioglossum. Gk ophis, a snake; glossa, tongue; alluding to the shape of the fruiting spike. Our species, *O. coriaceum*, Austral Adder's-tongue, is very closely allied to the European *A. lusitanicum*. The genus belongs to the fern family Ophioglossaceae, to which it gives its name. Old English 'a nadder' (cf. German Natter) became 'an adder', with loss of initial n by absorption with the n of indefinite article, as happened also with 'orange'.

Oplismenus. Gk hoplismenos, armed (from hoplon, armour; hoplismos, weapon); the spikelets of these grasses have awns, as though armed with spears. Our species, *O. aemulus*, Australian Basket-grass or Creeping Beard-grass, is a tropical grass that reaches Victoria only in far East Gippsland.

***Opuntia.** From the Gk name for a different plant that grew around the ancient town of Opos in Greece (latinized as Opuntus), the name meaning place of figs. A number of species of these cacti are found in Victoria, but only two are truly naturalized, known as Common and Drooping Prickly Pear respectively. Family Cactaceae, of about 2,000 species, is wholly American, with the exception of the genus *Rhipsalis*, perhaps an introduction to the Old World. The prickly pear, a terrible pest in Queensland until defeated by *Cactoblastis*, has no greater affinity to orchard pears than the so-called Woody Pear.

Oreobolus. Gk oros (genitive oreos), mountain; bolos, a lump; because these plants are cushion-forming perennials of mountain bogs, native from Borneo through the intervening regions to the Andes. Victoria's two species are Alpine Tuft-rush and Fan Tuft-rush, of family Cyperaceae.

Oreomyrrhis. Gk oros, oreos, mountain; myrrhis, the Gk name for a plant often identified as *Myrrhis odorata*, known in England as Sweet Cicely or Myrrh, as well as the true myrrh, the fragrant gum resin of *Commiphora myrrha*, a small East African and Arabian tree. Our five species are known as different kinds of caraway, the true caraway being another umbelliferous species, *Carum carvi*.

Orites. Gk oreites, a mountaineer (from oros, mountain); referring to the habitat of many species, including Victoria's *O. lancifolia*, Alpine Orites. This proteaceous genus would be endemic in Australia (eight species), except for species in South America, i.e. one of the genera lending support to the theory of continental drift because of disjunct distribution.

***Ornithopus.** Gk ornis, ornithos, bird; pous, foot; the fruits resembling birds' claws. Victoria has two introduced species, Sand Bird's-foot and Serradella, both native to the Mediterranean region; family Papilionaceae. Serradella is an Italian word (the little serrated one), but the French (pied-d'oiseau) and German (Vogelfuss) names both mean bird's-foot.

Orobanche. Greco-Latin name for the dodder, and probably also applied to the broom-rape (from Gk orobos, vetch or other leguminous plant; ankhe, strangle); one species being a pest on bean crops in the Mediterranean region. Our introduced species is **O. minor*, Lesser Broomrape, but *O. australiana*, indigenous to S.A. and W.A., has been doubtfully collected at Swan Hill. The genus gives its name to family Orobanchaceae.

***Orthocarpus.** Gk orthos, straight; karpos, fruit; from the small upright pods. Our two introduced species are Purple and Small Owl-clover. The genus belongs to family Scrophulariaceae.

Orthoceras. Gk orthos, straight; keras, horn; from the resemblance of the filiform erect lateral sepals to a pair of horns. *O. strictum*, Horned Orchid, is called Bird's-mouth Orchid in N.S.W., doubtless from the likeness of the labellum and column to the open beak of a baby bird awaiting food. The specific epithet also means straight or erect (in Latin). The generic name should be accented on the second syllable, and pronounced with soft c.

(To be continued)

Field Naturalists Club of Victoria

The Marine Biology and Entomology Group combines these two subjects because there are not enough attending members to form two separate groups. However, most members have a general interest in both subjects though usually with a particular keenness for one.

At meetings there is often a guest speaker who addresses the group on some aspect of marine biology or entomology. Sometimes, members give short talks, frequently illustrated with colour slides and followed by discussion, questions and answers. Exhibits are always brought to meetings, explained and discussed, and microscopes are often used.

Marine biology

There are several specialist marine talks during the year; they have recently included one on marine collecting in the Darwin area, and on deep-water dredging in Bass Strait. Several members have exhibited shells, echinoderms, tube-worms and microscopic marine life, the exhibits being spoken about in the meetings and a lively discussion ensuing.

Some members have a special interest in various aspects of microscopy concerned with marine biology. One member is carrying out a project of radula slide projection of the limpet collection of the National Museum; a second is working on the identification of sea urchins from spine sections and on the photo-micrography of marine medusae. Observational studies are carried out on marine worms and littoral micro-organisms by a third member, and several are keen shell collectors.

Entomology

Entomology is covered in a general way by the Group, but some members are involved in special fields. One member is making a complete revision of all known species of a genus of beetles; another is carrying out a programme of tagging butterflies; some have been studying and mounting flies and wasps hatched out from galls, and one member has a particular interest in the food plants of insects.

Meetings of the Marine Biology and Entomology Group are held on the first Monday of each month at the Conference Room of the National Museum; enter through the gates from Latrobe Street where cars can be driven into the courtyard and parked free. Meetings commence at 8.00 p.m. We welcome members of all ages who are interested in either of these subjects.

Reports of FNCV Meetings

General Meeting
Monday, 11 October

Dr M.Joshi gave us a fascinating address on "The Grand Canyon, USA". The Canyon is not only a great tourist attraction; to the geologist it is something of a goldmine — but not literally, for the removal of rocks or fossils is absolutely prohibited. The Canyon is more than 5000 feet deep (almost a mile) and rocks ranging from 2500 million years ago are exposed on its walls. All members at the meeting were given a diagram showing a vertical section of the Canyon; we started at the bottom and moved up the Canyon with Dr Joshi, looking at the rocks as they became progressively less ancient. Then slides showed the fantastic depth and formations of the Canyon.

Dr Joshi was thanked by Dr Barry Cooper, himself a geologist who has been to the Grand Canyon. Barry Cooper was over from Adelaide during South Australia's long week-end. Four years ago he was Vice-President of this Club (probably our youngest ever V-P) and we hope that, some day, he will be back in Melbourne for good and again with the FNCV.

Our representative with NRCLV. Mr. Alf Fairhall has resigned as our representative with the Natural Resources Conservation League. He has served for several years in that capacity, and this Club is very grateful for his work. A replacement is required. There are two meetings of representatives each year, usually for the whole day and sometimes at a country centre.

Exhibits included only four items. Some basalt showed nodules that were presumed to be derived during weathering from iron in other minerals of the basalt. Another piece of rock carried the question "Amorphous calcite?" Both these specimens came from "The Island", Werribee Gorge.

A sprig of 3 mm flowers of Tamarisk were under a 9x microscope which revealed the white trifid stigma above the fat red ovary. Some small red flowers (Centranthus?) under a microscope had only two stamens apiece, and only one of the stamens carried an anther.

Mr Jim Baines has retired to Torquay, will no longer be a regular attendant at FNCV meetings and will join the Geelong FNC. Jim Baines has served this Club in a variety of ways.

At one time he was book sales officer, for several years he was secretary to the Natural History Medallion Committee, and he has compiled the index to recent 'Naturalists'. In addition, he has made the Author Index of the entire 'Naturalist' over the 1100 issues since the first one in 1884. This was a huge undertaking, and he has continued to add to it after each issue. Jim is also a contributor to the journal, and botanists regularly follow his "Origin of Generic Names of Victorian Flora". Geelong's gain is our loss.

General Meeting
Monday, 8 November

Mr. Brian Leonard spoke of the effects of fire on some Victorian animals. Mr Leonard had trapped animals in three areas before and after control burning by the Forestry Commission. As well as decrease in numbers, his findings revealed that there was little breeding for at least one season after a fire. More research is needed, but he estimated that it would take 4 to 5 years for an animal to build up its population to the former level.

When on the same field project, Mr Leonard made an examination of organisms in leaf litter before and after fire. The creatures were mostly mites, springtails and larvae of various kinds. After fire there was 50% reduction of species and 70% fewer individuals, but the population had built up again within a year.

Exhibits. Fruits of the NSW Turpentine Tree *Syncarpia glomulifera* showed an easy-to-recognise characteristic of the genus: several woody capsules firmly united to form a 2-3 cm ball, each capsule opening by 3 or 4 valves at the top. A loose head of deep pink flowers rather like Grevillea was a Proteacea species from South America — *Embothrium coccineum;* the Queensland Waratah used to be in that genus. A 50-70 cm stem of *Dianella tasmanica*, covered with masses of its hanging blue flowers, was from a garden-grown plant of 26 years.

A fat black caterpillar, 8-10 cm long was taken from a vertical hole in a lawn; it was thought to be the larva of a beetle, and an entomologist took it away to await results.

(Continued from page 214)

GROUP EXCURSIONS

(All members are invited to attend any Group Meeting; no extra payment.)
At the National Herbarium, The Domain, South Yarra, at 8.00 p.m.

First Wednesday in the Month—Geology Group.
No meeting in January.
2 February—"Members' Night—Holiday Reminiscences."

Third Wednesday in the Month—Microscopical Group.
No meeting in December.
19 January—Members' Exhibits and Discussion.

Second Thursday in the Month—Botany Group.
9 December—"Members' Night."
No meeting in January.
10 February—"Members' Night."
Each meeting includes a quarter-hour address for beginners.

At the Conference Room, The Museum, Melbourne, at 8.00 p.m.
First Monday in the Month—Marine Biology and Entomology Group.
No meeting in January.
7 February—"Members' Exhibits."

At the Arthur Rylah Institute, Brown Street, Heidelberg, at 8.00 p.m.
First Thursday in the Month—Mammal Survey Group.
No meeting in January.
3 February—Subject, details at Camp.

GROUP EXCURSIONS

All Members are invited to attend Group Excursions.

Day Group—Third Thursday in the Month.
No Excursions in December or January.

Thursday, 17 February—Visit "Rossneath" Garden. Meet at Kew Gardens 11.30 a.m. Mont Albert Tram No. 42 in Collins Street, alight at Kew Town Hall.

Botany Group—All Members welcome.

Saturday, 11 December—Mt Donna Buang. Leader Mr Ian Morrison.

Saturday, 26 February—Coastal Vegetation. Leader Mrs B. Morrison.

GROUP CAMP NOTICES

The Mammal Survey Group will hold a Christmas Camp at Club Terrace.
From Boxing Day, 26th December, for eight days (or longer).
(Details—Stephen Harwood, 53 1357.)
29-31 January—Holiday Week-end Camp at Gelliondale.

Field Naturalists Club of Victoria

Established 1880

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 Honorable Sir HENRY WINNEKE, K.C.M.G., O.B.E., Q.C.

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Microscopical: Mr. M. H. MEYER, 36 Milroy St., East Brighton. (96 3268.)

MEMBERSHIP

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

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