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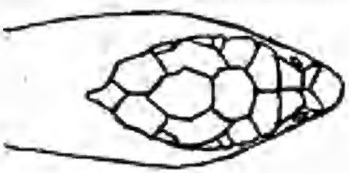

ADDENDUM

Vol. 89: No .7, p. 186.

A space to the right of the text under Frasers Legless Lizard should contain this illustration.

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Assistant Editor: G. Douglas

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Front Cover:

This appealing photograph of the Fat-tailed Pouched Mouse was taken by Hans Beste.

Notes on West Sister Island, Furneaux Group Tasmania

by J. S. Whinray†

The Furneaux Group is part of the broken arc of islands stretching across eastern Bass Strait from Wilson's Promontory, Victoria, to Cape Portland in north-eastern Tasmania. Flinders Island is the central and largest island of the Furneaux Group. West Sister Island, about 1,500 acres in area, lies about two miles north-west of North Point, Flinders Island (see Figure 1).

West Sister Island is three miles long from East Point to the west end. Its width varies from about 300 yards at narrow East Point to a mile and a half near the west end (see Figure 2). The island is made up of two granite hills, East Hill (636 feet) and West Hill (526 feet), separated by a narrow strip of low land. This low land, which forms the central part of the island, has sand ridges and a sand beach at its north and south ends. These are the sand ridges and beaches of North Bay and South or Home Bay. East Point has a sand beach on its north and south sides. The sand ridges between the East Point beaches carry an open-scrub** of native coastal species. These include Coast Teatree (*Leptospermum laevigatum*), Coast Wattle (*Acacia sophorae*), Boobialla (*Myoporum insulare*), Coast Beardheath (*Leucopogon parviflorus*), White Correa (*Correa alba*) and Thyme Riceflower (*Pimelea serpyllifolia*). The South Bay sand ridges carry a similar open-scrub, but about one quarter of it has been replaced by African Boxthorn (**Lycium ferocissimum*). Only parts of the first sand ridges behind North Bay carry open-scrub like that at East Point. The other parts of the first ridges, and the inner ridge, have been fired so often that they carry mainly Austral Bracken (*Pteridium esculentum*). Altogether the sand ridge open-scrub of the island covers about 120 acres. Farming activity has established pasture, of mainly introduced species, on the central strip of low land and on the adjoining slopes of East and West Hills (see Plate 1). Although this central pasture covers about 300 acres, only three native grasses were found in it. Wallaby Grass (*Danthonia racemosa*) was widespread, but the other two species were localized in occurrence. Spear Grass (*Stipa compacta*) was found only in the pasture just behind the sand ridges of North and South Bays. Tussock Poa (*Poa australis* sp. agg.) was noticed only as a few widely scattered tussocks in one small area. The introduced herbs found in the pasture included Barley Grass (**Hordeum leporinum*), Soft Brome (**Bromus mollis*), Giant Brome (**Bromus diandrus*), Yellow Suckling (**Trifolium dubium*) and Common Burrmedick (**Medicago polymorpha*). The pasture varies greatly, and weeds, which include White Horehound (**Marrubium vulgare*) and Smallflower Mallow (**Malva parviflora*), are common in parts of it. Most of the introduced

**Terms used for vegetation types are those set out in Chapter Five of *The Australian Environment*, Fourth Edition, 1970, edited by G. W. Leeper.

An * preceding a botanical species indicates an introduced plant.

†Flinders Island, Tasmania, 7255.

grasses are annuals, and these form a closed-grassland in much of the pasture area during Winter, Spring and early Summer. By Midsummer the only live grasses in the central pasture area are the three native species mentioned above and a small patch of Kikuyu Grass (**Pennisetum clandestinum*).

A list of the herbs found in the central pasture area of the island between 1965 and 1969 is given as Appendix One. Of the fifty-six species in this list, only eleven are native ones.

The major vegetation area of the island could be called — for the purpose of these notes — a tussock grassland complex. This complex, which covers about 900 acres, is very variable and its vegetation types range from open-tussock grassland to closed-tussock grassland. The two dominant tussock-forming species of the complex are Prickly Speargrass (*Stipa teretifolia*) and Tussock Poa (*Poa australis* sp. agg.). The Prickly Speargrass is exclusively coastal in occurrence while the Tussock Poa is the dominant species of the tussock grassland complex areas of East and West Hills (see Plates 2, 3). The two dominant grasses do not seem to be grazed by the leaseholder's sheep, except perhaps when young green leaves sprout after fires. Many of the herbs of the central pasture area occur in much of the tussock grassland complex areas. They grow amongst the tussocks and are grazed by the sheep and other animals.

Periodic burning is the only form of pasture control practised in the tussock grassland areas (R. E. Blyth, pers. comm.). About 200 acres of the complex on West Hill were burned during the last firing which was in the late Summer of 1967. I walked through the burned area during February, 1968. It appears that the extent of the complex depends on the frequency of the periodic burning. It was more extensive when the 1951

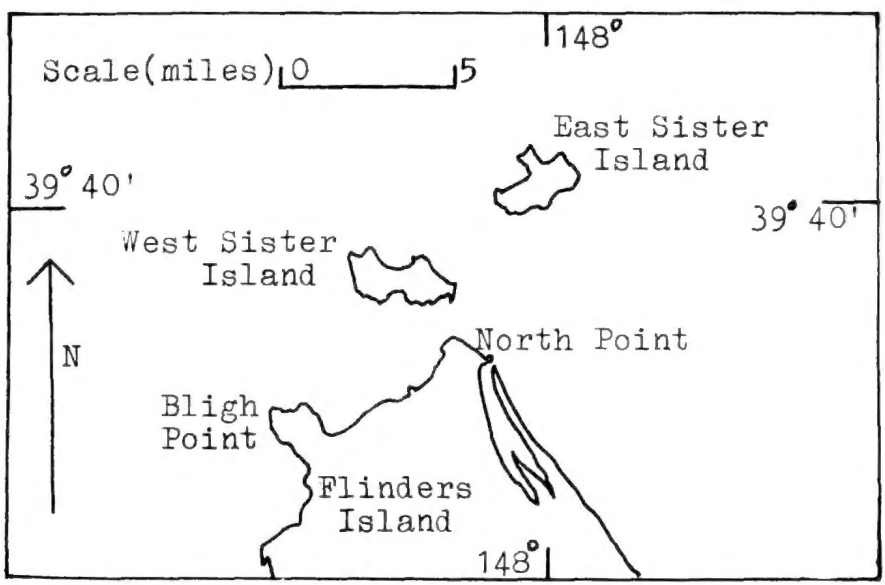


Figure 1

aerial photograph* was taken, but regrowth of trees and shrubs since then has decreased its area.

There is one large patch of shrubby Coast Sheoke (*Casuarina stricta*) open-forest on the island, and there are some scattered small patches of shrubby Coast Sheoke low open-forest also. Most of these are in places protected, in one way or another, from the full effects of the periodic burning. As well, one patch of tall shrubland, in which only one or two Coast Sheoke were found, is still known to the leaseholder's sons as "The Sheoak Scrub" (R. E. Blyth, pers. comm.). During my visits I walked to all the Coast Sheoke and scrub patches of East and West Hills. All of them showed the effects of periodic burning and most were partly, or wholly, immature. This can be seen, for example, in the patch of Paperbark Teatree (*Melaleuca ericifolia*) in the middle part of West Gully, East Hill. It ranges from three feet in height (open-heath) to twenty feet (open-scrub). I consider that the present Coast Sheoke patches on the island are remnants of a more extensive cover and that periodic burning, to improve the island for grazing, has been the main cause of its reduction. I suggest that the former main vegetation of the island could have been shrubby Coast Sheoke open-forest and low open-forest. The present Coast Sheoke and scrub patches of East and West Hills cover about 120 acres. Some of the trees and shrubs recorded by the writer on East Hill were Manuka (*Leptospermum scoparium*), Sweet Bursaria (*Bursaria spinosa*), Tree Broomheath (*Mono-*

*Aerial photograph, Flinders Run 11, No. 34423, Department of Lands, Hobart.

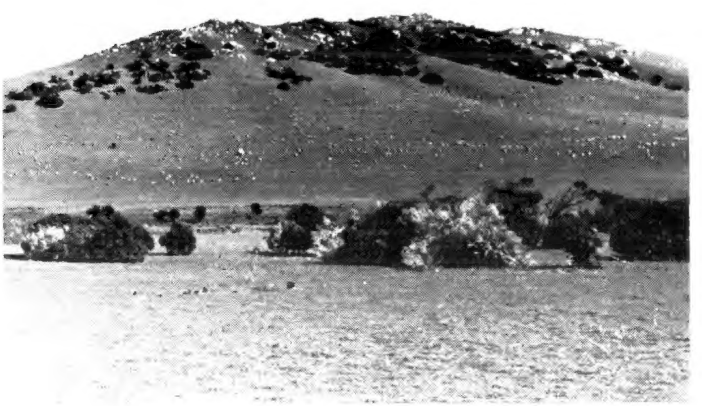


Plate 1

Photo: Author.

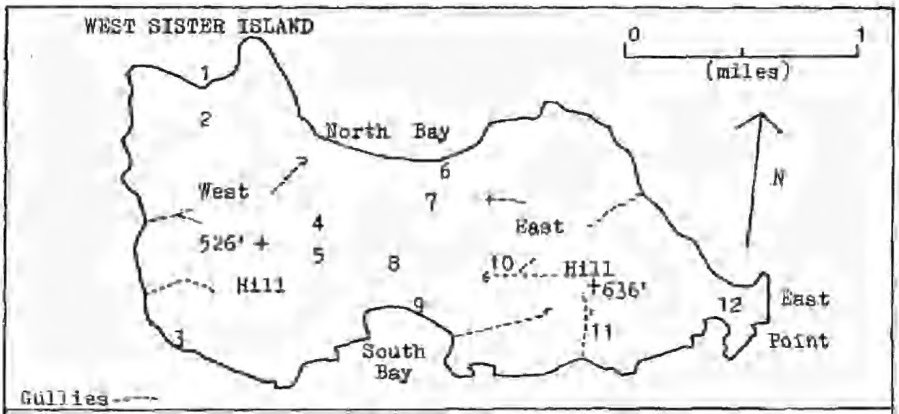
The north side of the eastern ridge of West Hill seen from behind North Bay, August, 1969. The tall shrubland below the crest of the ridge is still called "The Sheoak Scrub" although there are now only one or two Coast Sheokes in it. Much of it is now African Boxthorn. This introduced shrub is also replacing the native shrubland in the foreground. The central pasture extends up the ridge to the top of "The Sheoak Scrub".

toca elliptica), Variable Sallow Wattle (*Acacia mucronata* var. *dependens*), Shrubby Spurge (*Phyllanthus gunnii*) and the heath *Cyathodes juniperina* var. *oxycedrus*.

PLANTS

Some plants that occur in Tasmania only on Bass Strait islands are known from West Sister. Dr. J. Milligan collected the creeper *Sicyos angulata* there in the 1840's (J. H. Willis, pers. comm.). The writer collected it at two places near the western end of North Bay in February, 1968, but did not see it elsewhere on the island. North-eastern Flinders Island is its only other known Tasmanian locality (Curtis, 1963). M. H. Christie and the writer found the small daisy Indian Cudweed (*Gnaphalium indicum*) near the south-west point in February, 1968 (see Figure 2). The specimen, lodged at Melbourne, is apparently the first collected in Tasmania, as Indian Cudweed is not mentioned in the appropriate volume of Dr. Curtis's *The Student's Flora of Tasmania*. During the same visit we found a plant of Prickly Saltwort (*Salsola kali*) on a small beach near the north-west end of the island (see Figure 2). Specimens were sent to Melbourne and Hobart. Prickly Saltwort was found on Hogan's Island by members of the McCoy Society, University of Melbourne, only a week before our discovery of it on West Sister (J. H. Hope, pers. comm.). I think that the Hogan's Island record is the first for Tasmania, as Prickly Saltwort also is not mentioned in *The Student's Flora of Tasmania*.

During my six visits to West Sister between 1965 and 1969, just over 200 plant species have been recorded. Many specimens were sent to the National Herbarium of Victoria and to the Herbarium of the University of Tasmania. Some of the plants found were very restricted in occurrence. Streaked Arrowgrass (*Triglochin striata*) was found only in one coastal soak at the eastern end of



1-Prickly Saltwort beach. 2-Plate Two taken from here. 3- Indian Cudweed locality. 4-"The Sheoak Scrub." 5-Plate three taken from here. 6-North Bay sand ridges. 7-Plate One taken from here. 8-The Homestead(Plate Four). 9-South Bay sand ridges. 10-West Gully of East Hill. 11-Nettle Gully. 12-East Point sand ridges.

Figure 2

South Bay beach. This soak and the many others around the coast carried species not found elsewhere on the island. Some species confined to these soaks were Shiny Bogrush (*Schoenus nitens*), Swamp Weed (*Selliera radicans*), Small Spikerush (*Eleocharis pusilla*) and (*Lilaeopsis polyantha*). The Small Spikerush had not been recorded previously from any Bass Strait island. Common Duckweed (*Lemna minor*) and Water Cress (**Nasturtium officinale*) were found in a number of soaks and also in some of the small streams.

Apart from Austral Bracken (*Pteridium esculentum*) all the ferns found were also restricted in occurrence. Necklace Fern (*Asplenium flabellifolium*) was found in a number of rock crevices on East and West Hills. Tender Brake (*Pteris tremula*) was found only amongst the boulders at the base of the outcrop above the western end of North Bay. The Mother Shieldfern (*Polystichum proliferum*) was found only in the damp bed of the Nettle Gully stream. Ruddy Groundfern (*Hypolepis rugosula*) was growing with it.

Orchids were very hard to find. There were a few Mosquito Orchids (*Acianthus reniformis*) and Broad-leaved Caladenias (*Caladenia latifolia*) on the South Bay sand ridges, but no orchids at all were found on the North Bay sand ridges. Only Broadleaved Caladenias were found on the East Point sand ridges. A few leaves of a Sunorchid (*Thelymitra* sp.) and of an Onion Orchid (*Microtis* sp.) were found in shallow soil at the edge of a granite outcrop in the upper part of West Gully, East Hill. Nearby, in a small crevice under short Paperbark Teatree, were a few plants of what appeared to be the Tiny Star (*Hypoxis pusilla*). I took three of them and when they flowered in a pot on Flinders Island they proved to be Tiny Stars. This species was not seen elsewhere on the island.

A few Blue Gums (*Eucalyptus bicostata*) were the only eucalypts found on the island. They form a small group of gnarled old trees at the inner edge of the South Bay sand ridges.

The species mentioned above, and others of restricted occurrence, make up nearly a quarter of all the plant species found on the island.

Lichens

Collections taken in 1965 and '66 have been lodged at the National Herbarium of Victoria. The most unusual species which was collected in December, 1966, from two localities on West Hill, is a small grey lichen called *Anaptychia japonica* (Sato) Kurokawa. Mr. R. B. Filson, who determined it, told me that before this discovery it was thought to be endemic to Japan. At the same time I found another unusual species. Mr. Filson considers that it is probably *Teloschistes flavicans*. Before this discovery, he had recorded the species in Australia only from Queensland and northern New South Wales (Filson, 1968).

The other West Sister lichens determined so far by Mr. Filson are:—*Teloschistes spinosus* (Hook. f. & Tayl.) J. Murray; *Teloschistes chrysopthalmus* (L.) Th. Fr.; *Cladia aggregata* (Sw.) Nyl.; *Xanthoria ectanea* (Ach.) Räs. ex R. Filson; *Diploicia canescens* (Dicks.) Mass.; *Physcia orbicularis* (Neck.) Poetsch; and *Anaptychia pseudospeciosa* var. *tremulans* (Müll. Arg.) Kurokawa.

Reptiles

Seven species of reptiles were collected on West Sister, and specimens of them were lodged at the National Museum of Victoria.

The Black Tiger Snake (*Natechis*

ater Krefft) was the only large snake seen or collected on the island. One was caught at 11 p.m. eastern standard time in February, 1968. It was hunting in African Boxthorn open-scrub just east of the homestead when I saw it. Some of the many Black Tigers seen in the extensive Short-tailed Shearwater rookeries were obtained.

The smaller White-lipped Snake (*Denisonia coronoides* Gunther) seemed much less common than the Tiger Snakes. One specimen was obtained which was hunting at 9.30 p.m. eastern standard time in February, 1968. It was in African Boxthorn open-scrub just east of the homestead. Only two others were seen: both during daytime. One was in closed-tussock grassland near the south-west point and the other was in native open-scrub on a South Bay sand ridge.

Only six live Bluetongue Lizards (*Tiliqua nigrolutea* Quoy & Gaimard) were seen. All were in the central and western parts of the island. One, collected in August, 1969, had a tick in one ear. It was removed, and determined by Dr. D. H. Kemp (pers. comm.) as *Aponoma hydrosauri* (Denny). The tick specimen was lodged at the National Museum.

White's Skink (*Egernia whitei* Lacepede) was the commonest reptile in the central pasture area. For example, nearly fifty were seen during one warm afternoon in August, 1969. In the pasture area White's Skinks were found under old posts, planks and corrugated iron. African Boxthorn was also used as shelter and many specimens were obtained.

In the central pasture area both the Metallic Skink (*Leiolopisma metallicum* O'Shaughnessy) and the Three-lined Skink (*Leiolopisma trilineatum* Gray) used the same shelter as White's Skinks. They were, though, much less common and few specimens were either seen or obtained.

Bougainville's Skink (*Lerista bougainvilli* Gray) was the rarest species on the island. In December, 1966, one specimen was found buried in loose soil under an old log on the upper part of the eastern ridge of West Hill. Later searches in this and other areas yielded neither sightings nor specimens.

Marsupials and Other Animals

Small bats are seen often in the homestead when the leaseholder's sons pay their periodic visits to the island (E. T. Blyth, pers. comm.). A specimen of the Lesser Long-eared Bat (*Nyctophilus geoffroyi*) which was obtained in the homestead on 5 February, 1968, was lodged at the Queen Victoria Museum, Launceston (QVM 1968/1/28-spirit specimen). The writer found it under peeling wallpaper in one of the rooms.

The White-footed Sminthopsis (*Sminthopsis leucopus*) is well known to the leaseholder's sons who call it the Shrew Mouse (E. T. Blyth, pers. comm.). When in the company of M. H. Christie, a dead specimen was found on the homestead bathroom floor in February, 1968; and was lodged at the National Museum of Victoria (NMV C 9566-skull and skeleton). It had not been dead long for when we found it there were still one or two maggots in it.

The Red-bellied Pademelon (*Thylogale billardieri*) is common on the island. This population is one of the six surviving island populations in the Furneaux Group (Whinray, 1971b). Fishermen use West Sister pademelons for bait — one crayfish boat was taking between fifteen and twenty a week in February, 1968 — and they are

shot for the dogs, and occasionally for the table, by the leaseholder's sons. As well they are hunted by the parties of quail shooters which visit the island each year. During the severe drought of late Summer and Autumn of 1967 the sheep had to be hand fed with hay and grain fetched from Flinders Island. The people employed to feed the sheep noticed weak pademelons feeding on African Boxthorn clumps even in daylight (I. Chamberlain, pers. comm.). Some pademelons probably died during the drought, because fewer pademelons were seen in February, 1968, than in December, 1966. As well, over thirty pademelon skeletons were found in February, 1968. These were almost all in the central pasture area and were especially common around African Boxthorn clumps and open-scrub. The African Boxthorn would have provided the main green feed in the pasture area during the drought. The writer collected a number of these dead pademelons in February, 1968, and donated the heads of those which could be sexed — due to sufficient skin and tissue remaining on the skeletons — to the Monash University Zoology Department. They were later lodged at the National Museum of Victoria (MEL C 7998, 8012-8014, 8016, 8018, 8019, 8021-8024, 8026, 8027, 8062-8066, 8072).

The Short-nosed Bandicoot (*Isoodon obesulus*) occurs over much of West Sister but is common only in the central pasture area. Bandicoots feeding at night were watched in this area on many occasions during the 1966, '68 and '69 visits. During the latter visit, one was watched while feeding at the western end of South Bay beach. It dug only where sea weed wrack was buried in the sand.

Judging by the number of bandicoots seen, and the number of food pits noticed, it seems that the population is not numerous. A personal estimate is given at about eighty animals.

Plate 2

Photo: Author.

South Bay seen from the eastern ridge of West Hill, February, 1968. The sand ridge open-scrub can be seen directly behind the beach. The West Gully of East Hill is in the top left-hand corner. Tussock Poa *Poa australis* sp. agg. tussock grassland can be seen in the foreground.

Two bandicoot nests were seen in December, 1966. One was in grassy Coast Sheoke open-forest in the lower part of West Gully, East Hill. The other was under an African Boxthorn bush beside a narrow track through the African Boxthorn open-scrub just east of the homestead. Two others were seen in February, 1968. M. H. Christie found one of them amongst a dense stand of Winged Slender Thistle (**Carduus tenuiflorus*) on the lower part of the eastern ridge of West Hill. It was made of thistle leaves and moss. The other nest was in the homestead enclosure. It was in closed-grassland beside African Boxthorn open-scrub.

A bandicoot shot by a fisherman in late January, 1968, was obtained and lodged at the National Museum of Victoria (MEL C 7892 — skin, skull and skeleton). Another specimen, which seemed to have been killed by a dog some months before, was found at the same time. It was lodged at the Queen Victoria Museum, Launceston (QVM 1971/1/7 — part skull, part skeleton).

During the month spent on the island the writer never saw bandicoots in the open during daytime. Occasionally though they were seen at dusk beside African Boxthorn clumps and open-scrub. In the central pasture area they seemed to use the African Boxthorn as shelter during the daytime and they ran to it when disturbed at night.

Mr. A. E. Blyth, whose father and uncle took over the lease of the island in 1884, indicated that there was never anything said in the family to suggest that the bandicoot was introduced to the island (A. E. Blyth, pers. comm.). As the only bandicoot bones in Mr. D. G. F. Smith's extensive collections from coastal blowouts on Flinders Island were from Short-nosed Bandicoots (D. G. F. Smith, pers. comm.), the bandicoot caught on Flinders Island in 1832 (Backhouse, 1843; Backhouse & Tylor, 1862) was probably the same species. So the West Sister population could be a relict one.

The European Hare (*Lepus europaeus*) is remembered by Mr. A. E.

Plate 3

Photo: Author.

The homestead, built 1896, behind South Bay. Pademelons and bandicoots were seen feeding in the pasture around the homestead. The African Boxthorn open-scrub just behind the homestead was a narrow hedge originally.

Blyth as being on the island at least sixty years ago, and he thinks that his father introduced them to the island (A. E. Blyth, pers. comm.). Many hares were seen on West Sister in December, 1966. Each evening there were always between ten and twenty in the pasture between the homestead enclosure and the South Bay sand ridges. Apparently the 1967 drought was hard on the population, for only three or four were seen during the many walks of the 1968 visit. They seemed no more common by August, 1969.

The Eastern Water-Rat (*Hydromys chrysogaster*) has been recorded for the island in late 1929 or early 1930, and in about 1960 (Whinray, 1971b).

It is interesting to note that nearby East Sister Island had only the Red-bellied Pademelon (*Thylogale billardieri*), until two smaller marsupials were introduced by the late Mr. George Blyth (A. E. Blyth, pers. comm.). East Sister, about 1,000 acres in area, lies about three miles north-east of West Sister (see Figure 1). Pademelons were noticed when the writer visited East Sister in December, 1966. Mr. A. E. Blyth (pers. comm.) said that both the Brushtail Possum (*Trichosurus vulpecula*) introduced from Flinders Island in the 1920's, and the White-footed Sminthopsis (*Sminthopsis leucopus*) introduced from West Sister Island in the 1920's or 1930's, were present still on East Sister when he paid his last visit there in 1966.

Birds

Notes on some of the species seen are followed by a list of species. This list is not complete because of inability to identify the species of a number of the birds seen. Quail, Ravens, Whistlers and Thornbills were some of these.

Little Penguin (*Eudyptula minor*).

Only one was seen. It was in an isolated burrow near the north-west point in February, 1968.

Short-tailed Shearwater (*Puffinus tenuirostris*).

There are a number of rookeries on West Hill and they cover about 100 acres.

Sooty Oystercatcher (*Haematopus unicolor*).

Although West Sister is so close to Flinders Island, only this species is present. In Kent's Group (Jones, 1970; Whinray, 1971a) and on Cat Island, Furneaux Group (Cashion, 1958), this seems to be the only resident Oystercatcher. It is, apparently, better suited than the Pied Oystercatcher to islands with mainly rocky coasts and no surrounding mudflats.

White-breasted Sea-Eagle (*Haliaeetus leucogaster*).

One, or sometimes two, birds were seen over the island on most days during the month spent there. No nest was noticed on the island.

Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*).

Three were seen flying at about 300 feet above the lower western slopes of East Hill on 15 August, 1969. This was the first fine day after a week of cold squally south-westerly gales. They were noticed only because of hearing their distinctive calls while packing my gear in the kitchen at 2 p.m. Using field glasses, the writer watched them until they were out of sight. Up to this time they were heading for the north coast of Flinders Island about a mile west of North Point. They were not noticed on the island during the week before the sighting. During this time, practically all the scrub areas of the island had been traversed.

Dusky Robin (*Amaurodryas vittata*).

This Tasmanian endemic was seen often in the central pasture area of the island.

Scrub Wrens.

Using Sharland's descriptions in his *Tasmanian Birds*, I. concluded that both the White-browed Scrub Wren (*Sericornis frontalis*) and Brown Scrub Wren (*Sericornis humilis*) were present. However, Green (1969) claims the species present as the Brown Scrub Wren.

Crescent Honeyeater (*Phylidonyris pyrrhoptera*).

This species of honeyeater was the only one seen and heard on the island. The area of suitable habitat, which includes the African Boxthorn areas, is about 250 acres. In Kent's Group, only the Crescent Honeyeater seems to occur on Erith Island (Jones, 1970; Whinray, 1971a) and Dover Island (Whinray, 1971a). The areas of suitable habitat on these islands are about 300 and 900 acres respectively. On Deal Island, which has about 2,400 acres of suitable habitat, both the Crescent and White-naped Honeyeaters occur (Whinray, 1971a). It is possible that the Crescent is the species best suited to life on Bass Strait islands which have sufficient habitat for only one honeyeater species. The details given above show that it can live on islands with quite small areas of suitable habitat.

Beautiful Firetail (*Zonaeginthus bellus*).

One bird was seen by M. H. Christie in February, 1968, at the lower part of West Gully, East Hill (M. H. Christie, pers. comm.). This was the only sighting of the species.

List of Birds of West Sister Island (1966-1969).

This list, of twenty-six species, is set out after Leach's *An Australian Bird Book*, 1968. An asterisk indicates an introduced species and (T) indicates a Tasmanian endemic species.

Eudyptula minor
Little Penguin.
Puffinus tenuirostris
Short-tailed Shearwater.
Larus novae-hollandiae
Silver Gull.
Larus pacificus
Pacific Gull.
Haematopus unicolor
Sooty Oystercatcher.
Lobibyx novae-hollandiae
Spurwinged Plover.
Charadrius cucullatus
Hooded Dotterel.
Cereopsis novae-hollandiae
Cape Barren Goose.
Haliaeetus leucogaster
White-breasted Sea Eagle.
Falco berigora
Brown Hawk.
Ninox novae-seelandiae
Boobook Owl.
Calyptorhynchus funereus
Yellow-tailed Black Cockatoo.
Cacomantis pyrrhophanus
Fantailed Cuckoo.
Hirundo neoxena
Welcome Swallow.
(T) *Amaurodryas vittata*
Dusky Robin.
Rhipidura fuliginosa
Grey Fantail.
Sericornis humilis
Brown Scrub Wren.
* *Turdus merula*
Blackbird.
Epthianura albifrons
White-fronted Chat.
Zosterops lateralis
Grey-breasted Silver-eye.
Phylidonyris pyrrhoptera
Crescent Honeyeater.
* *Alauda arvensis*
Skylark.
* *Carduelis carduelis*
Goldfinch.
* *Passer domesticus*
House Sparrow.
Zonaeginthus bellus
Beautiful Firetail.
* *Sturnus vulgaris*
Starling.

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Appendix 1

List of herbs of the central pasture area, West Sister Island, 1965-1969.

Species with M before their scientific names were determined at the National Herbarium, Melbourne. Other determinations are by the author. An asterisk indicates an introduced species.

Poaceae

Pennisetum clandestinum
Kikuyu Grass.

* *Catapodium rigidum*
Fern Grass.

* *Vulpia megalura*
Foxtail Fescue.

M * *Vulpia bromoides*
Squirreltail Fescue.

M * *Vulpia myuros*
Ratstail Fescue.

* *Bromus mollis*
Soft Brome.

* *Bromus diandrus*
Giant Brome.

* *Koeleria phleoides*
Annual Catstail.

Poa australis sp. agg.
Tussock Poa.

* *Poa annua*
Annual Meadowgrass.

M *Stipa compacta*
Spear Grass.

M * *Aira caryophyllea*
Silvery Hairgrass.

M *Danthonia racemosa*
Wallaby Grass.

* *Avena fatua*
Wild Oat.

* *Avena sativa*
Oat

M * *Lolium perenne*
Perennial Ryegrass.

M * *Hordeum leporinum*
Barley Grass.

Urticaceae

* *Urtica urens*
Garden Nettle.

Polygonaceae
Rumex brownii
Swamp Dock.
* *Rumex acetosella*
Sheep Sorrel.
M * *Rumex pulcher*
Fiddle Dock.

Chenopodiaceae
M * *Chenopodium pumilio*
Clammy Goosefoot.
* *Chenopodium murale*
Nettleleaved Goosefoot.
M * *Chenopodium album*
White Goosefoot.

Caryophyllaceae
* *Stellaria media*
Common Chickweed.
M * *Sagina apetala*
Annual Pearlwort.
M * *Cerastium fontanum*
Sticky Mouse-ear Chickweed.
* *Polycarpon tetraphyllum*
Fourleaved Allseed.
M * *Silene nocturna*
Catchfly.

Fumariaceae
M * *Fumaria muralis*
Fumitory.

Cruciferae
* *Coronopus didymus*
Lesser Swinescress.
* *Capsella bursa-pastoris*
Shepherds Purse.

Crassulaceae
Crassula sieberiana
Annual Stonecrop.
Crassula macrantha
Stonecrop.

Rosaceae
Acaena anserinifolia
Bidgee Widgee.

Fabaceae
M * *Trifolium dubium*
Yellow Suckling.
M * *Trifolium cernuum*
Droopingflower Clover.
* *Trifolium glomeratum*
Clustered Clover.
M * *Trifolium tomentosum*
Woolly Clover.
M * *Medicago arabica*
Spotted Medick.
M * *Medicago polymorpha*
Common Burrmedick.
M * *Melilotus indica*
King Island Melilot.

Geraniaceae
* *Geranium molle*
Soft Geranium.
* *Erodium cicutarium*
Common Heronsbill.
* *Erodium moschatum*
Musk Heronsbill.

Oxalidaceae
Oxalis corniculata
Creeping Woodsorrel.

Malvaceae
M * *Malva parviflora*
Smallflower Mallow.

Labiatae
* *Marrubium vulgare*
White Horehound.

Rubiaceae
M * *Sherardia arvensis*
Field Madder.

Asteraceae
* *Gnaphalium candidissimum*
Silver Cudweed.
Cotula australis
Common Cotula.
M *Cymbonotus preissianus*
Annual Bearsear.
* *Carduus tenuiflorus*
Winged Slender Thistle.
M * *Leontodon nudicaulis* ssp.
taraxacoides Hawkbit.
* *Hypochaeris radicata.*
Cats Ear.
M * *Hypochaeris glabra*
Smooth Cats Ear.

The Ambulatory Medusa or Walking Bud of *Clavatella Prolifera*

By H. Bishop

Whilst carrying out an inspection of material in a small marine aquarium during September, 1969, a number of star-shaped specks were observed on the sides of the aquarium.

These were assumed to be small brittle stars, but on inspecting them with a hand lens, they were found to be entirely different. To make a more detailed inspection, a few of these creatures were removed from the aquarium and placed under the microscope, where they were clearly visible, and presenting a fascinating sight.

Plate 1. 6-arm Medusa.
Photo: Author

These creatures had a central body with six radiating arms (Pl. 1). Each arm was branched in the shape of a "Y". One branch of each arm terminated in a suction pad and the other branch terminated in a disc covered with stinging cells. The suction pads provide a means of locomotion and are used for walking about on, whilst the section terminating in stinging cells, wave around as though searching for food, at times meeting overhead. Small crustaceans coming into contact with these stinging cells, were instantly paralysed.

There were six ocelli (simple light receptors), one at the junction where each arm joined the body. These ocellus appear as red spots.

A small trunk-like protrusion was observed on rare occasions, sweeping around under the body.

Not being able to identify these creatures, one was taken into the microscopy group meeting, where it was identified by D. McInnes as the medusa stage of the hydroid, *Clavatella prolifera.*

It appears that these medusa are rarely found, possibly owing to the lack of observation. Mr. McInnes has sighted these before, but the only other known sighting which has been reported in Victoria was in 1949. It was the subject of an article by M. E. Freame. *Victorian Naturalist* **65**. headed "The Crawling Jelly Fish" Bud of *Clavatella prolifera.* This article refers to a previous discovery in Port Jackson, N.S.W. in 1893.

The number of medusa in the aquarium increased rapidly, as many as six were counted in a square inch (Pl. 2).

It was at this time that a request was received for a number of specimens to be forwarded to the Emperor of Japan, who is a world-renowned marine biologist. Six good specimens with buds were removed from the aquarium, and placed in a small container with some of the water. This was passed to Mrs. J. Watson of the Underwater Observatory Group, who arranged for their despatch through the Japanese Consul. Word was received at a later date that the medusa arrived safely, and in good condition.

The medusa in the aquarium were kept under observation for the next ten months. A considerable number were always visible. As each medusa developed buds would appear between the radiating arms; as many as six buds have been observed on the one medusa. These buds are young medusa, and when they reach a certain stage they detach themselves from the parent, and continue an existence of their own. These young medusa develop buds and so the numbers rapidly increase.

It has not been possible to establish what happens to the adult medusa, after the buds break away. "Does it die" or start developing buds again? As they have the power to walk about, it was not practicable to observe one medusa through its life cycle.

With the view to making a permanent record of these medusa a microscope slide was prepared, but it was not a success. The only other alternative was to have a photographic record, and this led to the purchase of a camera suitable for photomicrography.

After considerable experimenting, and a lot of failures, a number of good colour transparencies were obtained, and from these, black and white negatives and prints were made.

Having successfully maintained the medusa for a considerable time in a small aquarium, I was most anxious to see if the hydroid itself would develop.

After numerous inspections of material from the aquarium, two hydroids were found. These are much smaller than the medusa and it was most rewarding to find these. To my knowledge there is no record of these being observed before in Victoria.

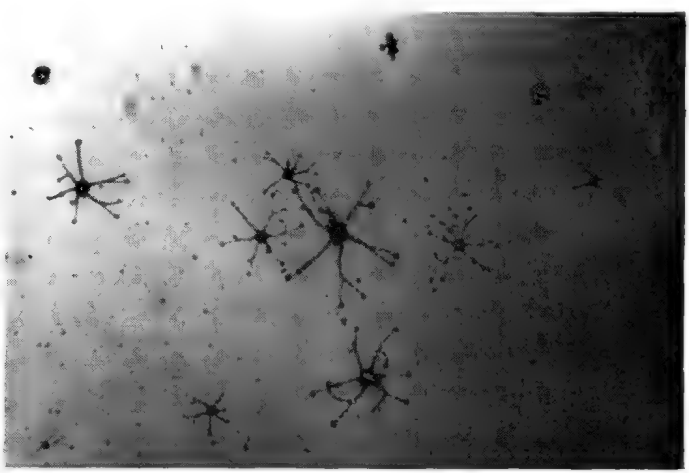


Plate 2

As many as 6 medusa per square inch were counted.

(See text.)

Photo: Author

The hydroid *Clavatella prolifera* has a slender stem-like body, with four arms radiating out from the top. Each arm terminated in a disc of stinging cells identical to the medusa.

A number of photographs were immediately taken of the hydroids, in case these were the only specimens in the aquarium. However, quite a few more were observed during the next months.

Whilst searching for hydroids numerous planula were observed moving about on the algae. These are small spheres covered with cilia, and under high power magnification an extremely fine flagella was observed sweeping around when the planula moved. Although I had not observed the development of these planula, it seems quite evident that the complete life cycle had been attained, as the medusa, the planula, and the hydroid were all observed in one container at the same time.

During the summer months the medusa developed in large numbers, but in the winter months their numbers were reduced. Specimens were always visible during the ten months that the aquarium was operating. After ten months of continuous operation the aquarium became overgrown with algae, and it was necessary to clean it out.

The material gathered to commence this aquarium was collected from Rickets Point, Melbourne, and the medusa were found on the coraline, and algae *Enteromorpha intestinalis* in the clear pools at low tide. Various visits to the same area have resulted in additional findings of the medusa. During a holiday at Wye River in January 1971 two specimens were found on material from the ocean rock pools, which indicates that they are widespread.

The medusa are hardy animals, and can withstand a variety of water temperatures, as was proved during January and February 1970 when water temperature in the aquarium reached 82° Fahrenheit on numerous occasions without causing any reduction to their numbers.

They appear to prefer light in preference to darkness, as they always gathered on the sides of the aquarium facing the daylight.

The number of arms on the medusa varied, and specimens have been observed with five (Pl. 3) six, and seven arms.

Both the medusa and the hydroid have been kept in a small petri dish for up to 12 days whilst under observation. The water was changed daily and aerated twice daily.

The establishment of and maintaining a small marine aquarium, did not present any problems, or require special attention. The aquarium re-

Plate 3. 5-arm Medusa.
Photo: Author

ferred to in this article was placed in a position where it received full daylight (no direct sunlight) and was kept constantly aerated by a vibrating type air pump. The conditions were evidently favourable, as apart from the medusa, small crustaceans and microscopical forms of life were always in abundance.

The following publications refer in detail to *Clavatella prolifera* with its ambulatory medusa.

"British Hydroid Zoophytes", Vols. 1 and 2 by T. Hincks, B.A., dated 1868 and "A Monograph of the Gymnoblastic or Tubularian Hydroids", by G. J. Allman, M.D., dated 1871. This publication is available from the Public Reference Library.

Hincks refers to the first sighting of *Clavatella prolifera* at Torquay, England.

Allman mentions finding specimens on the west coast of Scotland, but does not mention the date of sighting.

The information gained from the excellent recordings in these publications, of the life cycles of *Clavatella prolifera* and its ambulatory medusa, has answered my query on the link between the medusa and the planula stage.

As mentioned earlier in this article, I had the medusa, the planula, and the hydroid in a container at the one time, but I was unable to find out how the planula developed. Both Hincks and Allman refer to this sexual stage, and Hincks' observation is briefly as follows.

Ova are produced in the extreme posterior portion of the body of the medusa, between the ectoderm and the endoderm. The two membranes are separated more widely as the embryos multiply, and increase in size, and the body becomes extended. At last the outer wall is ruptured and the contained young are liberated, swimming away in the form of ciliated planula. This stage has been observed to take place in the Autumn.

The planula settles down on a suitable surface, eventually developing into the hydroid, which rises from a creeping filiform.

Hincks also refers to the development of the ambulatory medusa from the hydroid. These develop in clusters on the lower portion of the body, finally being liberated and walking away on their stilt-like legs, to start a new life cycle.

The development of the buds from the medusa, by gemmation, takes place in the Spring.

The various stages in the life cycle of *Clavatella prolifera* are illustrated in the accompanying diagram (Fig. 1), as follows:—

1. Hydroid with young medusa.
2. Ambulatory medusa.
3. Bud on medusa.
4. Young medusa developed from bud (asexual reproduction).
5. Planula, which develops into the hydroid (sexual reproduction).

Figure 1.

Concerning Birds that Store Food

By A. H. Chisholm

How much is known in Australia of the practice followed in various countries by certain birds, especially corvids, of (a) smashing molluscs and the like by dropping them from aloft on to hard surfaces, and (b) the practice of the same, or other birds of burying, or otherwise concealing surplus food?

I have discussed the first of these questions (which relates to secondary tool-using) in the *Victorian Naturalist* for July 1971. As to the matter of food-storing there is an interesting item in an unpublished letter, held by Mr. J. S. P. Ramsey of Sydney, written in May 1894 to Dr. E. P. Ramsey by A. M. N. Rose of Buckley's Crossing, Snowy River, N.S.W. It concerns what is described as a year-old crow (*Corvus coronoides*), with a cut wing, that had the freedom of a garden.

"When this bird has had sufficient meat or bread", the writer says, "he often conceals some in his pouch. I do not mean you to understand that he is a marsupial, but that he has a receptacle below or behind his lower mandible. Then off he hops, and on finding a suitable place he digs a hole with his beak and empties his hoard into it, and covers it up. He then returns for more, and each time he selects a different spot for his store, often hiding under a bush or at the base of a shrub, and covering it with leaves."

It is added that on one occasion the bird filled his "pouch" with sunflower seeds, and emptied them in a corner of the garden without covering them. On another occasion, when walking away with a piece of bread he found another piece, whereupon he transferred the first to his "pouch", picked up the second piece, and took both to a bush, where he covered them with leaves.

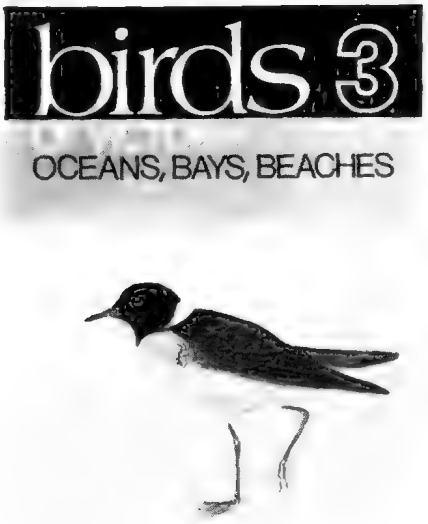
A second record is dated 77 years later. It is presented by Ian Gall, a nature writer and illustrator, in the Brisbane Courier-Mail of July 10, 1971. Under the heading, "Old Crow with a very fast brain", Mr. Gall remarks that this species — sometimes termed "Kelly" — has been said to have a more agile mentality than many human beings. He then relates that an individual of the kind has been making a habit of visiting a Brisbane suburban garden (where a bird-bath is installed), and there "doing a squirrel act for the day of need" by obtaining items of food, and burying them.

This avian Autolycus has, for example, been seen to wrench a pecan nut from a tree and bury it, with husk complete, behind a rocky border in the garden. Then, "so that no freshly turned soil would be visible to fossickers", and perhaps also to give itself the benefit of "a spot marked X", it carefully laid fine poinciana twigs on top of the disturbed earth.

"Is it instinct for this bird to hide things from his prying brethren?" Ian Gall asks. "Will he return when the husk has fallen clear from the nut, or will it be forgotten, just as butcher-birds sometimes forget where they have hidden pieces of bread in tree-forks, or under bark?"

Actually, although much has been written regarding the multitude of food-gathering habits of birds, there are few records in any country touching the frequency with which food-storers retrieve their hoards. The one Australian species that has no trouble on this point is the Crested Bellbird (*Oreoica*), which collects caterpillars, cripples them, and stores them beside eggs, or small young in its nest

book review



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Mammal Survey Group Bi-Annual Report

July 1969-June 1971

The committee of the Mammal Survey Group regrets that the Annual Report for 1969/1971 was not submitted for publication. This present report covers the two-year period to June 1971. It is intended that subsequent reports will be on an annual basis.

Throughout this period the group has experienced steady progress, both in active membership, and consequent field effort. Membership has risen to 39, of whom an average of 12 have attended organised group camps. Nineteen such camps have been mounted in 10 regions of the State. (Details of surveys are given in accompanying Tables I and II.)

Regional sample surveys have been completed in the Brisbane Ranges (three surveys), Upper Lerderderg Valley (six surveys), Cardinia Creek Reservoir site (two surveys), and the Otway Ranges (seven surveys).

Three more papers have been published in the *Victorian Naturalist*; being numbers IV, V, and VI of the Mammal Survey Group's contributions.* They were — "Mammals of the Riddell District" (1); "First Record of New Holland Mouse in Victoria" (2); and "The Mammals of the Brisbane Ranges" (3). Several more papers are in preparation.

The discovery of New Holland Mouse (*Pseudomys Novaehollandiae*) at Tyabb was a highlight of the group's field activity, and has prompted a fuller investigation of uncleared bush around Westernport.

This region, including the Mornington Peninsula, has been receiving much attention from the group in an effort to ascertain the status of its mammal fauna before industrial, and residential pressures irreversibly alter the present habitats. Surveys are also current in the Kinglake, and Central Highlands regions.

The Conservation Council of Victoria, whilst engaged in collecting data for environmental surveys of the Melbourne metropolitan area, and the Westernport district, approached the Mammal Survey Group for relevant information on the mammals, and their habitats in these areas. Such information as was available in the group's records was freely given.

A film featuring the activities of the group was produced by the A.B.C., and screened in the secondary school's science programme this year.

Monthly meetings have been attended by an average of 20 members, and eight visitors.

As in the past financial assistance has been received from the M. A. Ingram Trust for the purchase of equipment, and other expenses. The group also wishes to acknowledge the assistance of the Fisheries and Wildlife Department of Victoria, in whose Rylah Research Institute its monthly meetings are held.

* 1. Vict. Nat. **87**, 192, 1970.
2. Vict. Nat. **87**, 280, 1970.
3. Vict. Nat. **88**, 62, 1971.

Summary of Survey Results

1969-70

TABLE I

Locality	Number of Surveys	Trap-nights	Spot-light hours	Specimens* identified	Number of † native species recorded
Lerderderg Valley	3	318	56·4	140	10
Otway Ranges	3	552	69·5	197	16
Central Highlands	3	522	54·6	234	14
Westernport	2	221	37·3	209	7
Carlinia Creek	2	173	25·5	43	5
Kinglake Ranges	1	92	12·2	25	6
Brisbane Ranges	1	69	12·5	9	2
Metropolitan	1	46	1	6	2
Totals	15	1993	268	863	25

TABLE II

Locality	Number of Surveys	Trap-nights	Spot-light hours	Specimens* identified	Number of † native species recorded
Westernport	8	1461	48·0	396	12
Grampians	1	727	21·3	220	14
Central Highlands	2	298	15·7	250	15
Kinglake Ranges	2	200	32·1	43	9
Murrindindi	1	77	14·3	17	8
Totals	14	2763	131·4	926	23

*Including daylight sighting.

†From all sources of evidence.

Readers' Nature Notes and Queries

Fork-Ferns and Lyrebirds at Waratah Bay

This note comes from Mrs. Ellen Lyndon of Leongatha.

For the past few seasons we have been anxiously watching two tiny colonies of the Small Fork-fern (*Tmesipteris parva*) in a bog just outside of the camping area at Walkerville North. The drought summer of 1967-68 dried out many of the natural ferneries along the shore and killed off most of the Coral-fern jungles that made them unattractive to campers and trampers.

It is very cheering to find *T. parva* still well established on the headwater branches of Second Creek and again on those of Bluff Creek. The long Fork-fern (*T. billardieri*) is also present on Bluff Creek, in some instances on separate tree-ferns and in others, in company with *T. parva*. One colony of *T. billardieri*, in a particularly dark and shaded site, has produced fronds up to 30 inches in length.

A survey of Lyrebird activity in that region has shown that the birds are still present, but only just. An old nest containing a rotten egg has been found on McPherson's Creek. Then a new nest with fresh egg above Second Creek in the timbered area. There are no mounds to be seen and few signs of scratching. No singing at all. Foxes are all too plentiful.

Miss Jean Galbraith of Tyers in Gippsland, writes:

Mistletoes are always interesting. I was puzzled by one in Chiltern Forest, which was parasitic on Drooping Mistletoe (*Amyema pendula*). It had the foliage of *A. miraculosa* (Fleshy Mistletoe) but had such minute buds that I thought it might be a *Notothixos* as members of that genus have pin's-head buds and tiny flowers. This was supported by its habit—parasitic on another mistletoe—a habit common in *Notothixos*, though not invariable except in Golden Mistletoe (*N. subaureus*) which I have seen on more than one host—on one occasion on its sister species *N. cornifolius*. However, I knew it was no *Notothixos* of temperate Australia so showed it to Mr. Willis who recognised it as *Amyema miraculosa* with very immature buds. Naturally any mistletoe, even a large-flowered species, has small buds at first, and this one is not large-flowered, a normal bloom would be ½ in. long. Apparently it is not unusual for Fleshy Mistletoe to parasitise another species. A more developed specimen, from another plant, also on *A. pendula*, was later sent to me. In this the pairs of tiny "buds" (which I thought ruled out *A. miraculosa*) had burst open, showing each was a cluster of three, enclosed in bracts.

Field Naturalist Club of Victoria

General Meeting 13 December

As announced in the November issue the December general meeting was devoted to discussion of suggestions for improving and modernising the club. The large number present almost filled the hall and included most regular attenders, plus many who seldom come to general meetings.

Club President Mr. Tom Sault opened proceedings by saying many members seem to feel the club is not fulfilling its objectives. With club leaders getting older it is also being wondered where are our future leaders. The concern of members about these matters led to the setting up of a club improvement committee, which drew up the questionnaire sent to members in the September issue of the Victorian Naturalist. Out of some 800 members only 76 filled in the questionnaire and returned it. He then outlined the format the meeting would take —opening with a summary of the survey, followed by a number of prepared speakers giving short statements, then general discussion of the topic before the prepared speakers presented motions on ideas for club improvement.

Miss Gwen Piper presented a statistical analysis of the questionnaire answers received, and Mr. Sault read brief summaries of the comments, and suggestions sent in with them. These will be published later.

The Club's Assistant Secretary, Mr. Barry Cooper, was the first set speaker. He felt the club was failing in two areas. The first of these was the lack of worthwhile field activity, particularly by way of ecological surveys. The second is that we are not attracting young people. In connection with the first of these he mentioned the work done by club expeditions into remote areas during its early years. He considered a new group was needed to run camping expeditions, and that this would attract young people. He also wanted to see a section set up to initiate ecological surveys.

The second speaker was Dr. John Hampton, who felt it wise to be discussing this topic as some members considered the club's future seemed in doubt. He questioned how much has been achieved in relation to the stated aims of the club. To get anything done these days one has to put factual reports to the authorities, he said, and queried —how much F.N.C.V. has contributed to this: the extent to which it has encouraged the study of natural history; whether in fact the club is giving leadership in its field; and whether the journal has become bigger, or better, or sells more copies? He then said that to many of us it seems not a question of how to improve the club, but how to keep it alive, and asked is the club achieving what it set out to do? Since he doubted that it was he said he would move that a sub-committee be set up to propose needed changes.

Mr. David Munro prefaced his remarks by admitting he has attended only six general meetings in six years. He has however been involved in field naturalist activities, as a member of the Mammal Survey Group.

Though pleased to see the questionnaire he was disappointed at the superficiality of its questions—he felt they could have probed deeper, and discovered more. As preliminary questions they had some merit since their results were disturbing enough to hold this meeting on them. In regard to the club's stated objective of stimulating interest in natural history he said this can be interpreted in many ways, and asked when, in what direction, to what degree, and in what manner do we stimulate? One can stimulate one's own interest in natural history, and while becoming knowledgeable in a particular field discover some new facts of value. Such discoveries be submitted were usually accidental rather than planned, and therefore rarely as useful as systematically collected information. He described such people as "casual amateurs" with a self-centred approach, and their contribution to the fund of knowledge on natural history as negligible; and contended that the bulk of present F.N.C.V. membership fit this description. He asked whether F.N.C.V. is unravelling any mysteries of nature, are the amateur members of today more active than in the past, and if so why is the serious content of the Victorian Naturalist diminishing? We do need more active naturalists he said. No doubt the idea of a field study group involving young people is that their enthusiasm will revitalise the club. The need however is not so much to find young people, many of whom are turned away by the present state of the club, as it is to find experienced, reliable, mature people to guide and organise study group, and field activities. After listing the qualities he felt such people needed he asked whether F.N.C.V. had such members, and if not whether it was willing to recruit them, which he proposed be done.

On the *Victorian Naturalist* Mr. Munro said even a casual analysis of its content over any 12 issues shows it is inconsistent in type of article and quality of writing. Its articles he considered fell into two clear categories — the first being serious papers, while the second includes club reports and nature rambles. These two are so different, he said, that he doubted if anyone could get equal satisfaction from both, and proposed they be separated, the latter group being published in a newsletter so as to leave the *Victorian Naturalist* exclusively for the serious papers.

Proposals from the next two speakers were of simpler nature. Miss M. Allender asked whether members thought attendance at meetings might improve if the venue was changed. Saying the Botany Group was considering this, as some people did not like going to the area of the Herbarium at night. Mr. Fairhall suggested having a leisured and retired group who could meet during the day, because many older members did not like going out at night.

The secretary, Mr. R. H. Riordan, summed up saying the ideas put forward are generally not asking for changes in club policy, but rather for its re-dedication to get it going again. Former secretary, Mr. David Lee, said F.N.C.V.

was set up by Act of Parliament and is a gift horse for anyone who wants to study any aspect of natural history — what speakers were really asking was how far we had drifted from its original aims. All you have to do is use them — do so.

A number of members spoke on various points raised by the main speakers. Several said the general meetings had at first bored them, but they had gradually become deeply absorbed in club activity. It was however up to individuals to make the effort to become involved. Meetings, it was pointed ont, helped members in getting to know one another. Ideas were put up by two groups, said one — the young and the old. The young it was suggested were selfish in wanting to get out, only from older members could they gain "pearls of knowledge" on natural history that cannot be found in scientific literature. A young member said on behalf of junior naturalists that many tend to drop out as they get older because nothing was offered them by F.N.C.V. What they want is leadership, to go on camps and do research.

The main speakers were then called to move their motions. The first was Mr. Cooper, who moved — "That the F.N.C.V. establish a section to initiate and co-ordinate studies of the environment and natural history, and a committee be formed to establish this section." The motion was carried.

Dr. Hampton then moved — "That the club set up a committee as a matter of urgency to examine all reasonable proposals for improving the club performance and the furtherance of its aims, and to recommend any necessary change in structure, constitution, organization or policies forthwith".

The President pointed out that a club improvement committee already existed, whereupon Dr. Hampton, with the agreement of his seconder, amended the opening words of his motion to — "That the club improvement committee be instructed as a matter of urgency" — followed by the words after urgency in the original motion. With this amendment by the mover the motion was carried.

Mr. Munro moved — "That the field survey group investigate immediately means of locating or recruiting organizers for study groups". The motion was carried.

He next moved a lengthy motion pertaining to the content of the *Victorian Naturalist*, which sought to limit by definition the type of material that might appear in it. This drew considerable debate, which gradually became heated, and when the secretary sought to have the motion treated as a serious matter that should be placed on notice for presentation at the Annual General Meeting pandemonium broke out over this procedure. After some time Mr. Munro agreed to postpone its presentation, and put the motion on notice for the Annual General Meeting. This was agreed to by the meeting, following which order was gradually restored, though there was still some heated argument before the next motion could be put.

Formal notice of Mr. Munro's motion will be given in the February issue, when its text will appear in full.

Mr. Lee then moved, as an addendum motion to that passed in November about joining the Westernport Coalition — "That the use of the name F.N.C.V. by the Westernport Coalition on matters of policy and in public statements be made only with adequate consultation, and with approval of the executive of F.N.C.V.". This was carried.

F.N.C.V. CAMP

Australia Day Weekend.

It is proposed to hold a survey camp over the Australia Day weekend (Jan. 29-31), either at Mt. Torbreck, or at Mt. Sugarloaf near Buxton. For further details ring Roger Riordan (92 8579).

the victorian naturalist

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

GENERAL MEETINGS

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

1. Minutes. 2. Announcements.

3. Subject for evening:—"Victorian Orchids"— Mr. J. Hyett.

4. New Members.

Ordinary:

Mr. Michael Coulthard, 47 Westbrook St., East Kew, 3102. General
Miss Nerina Du Preez, 16 Thompson St., Glen Waverley, 3150. Plants & Mammals
Mr. Noel Disken, 24 Mayston St., Hawthorn East, 3123. Mammals
Mr. Gregory J. Hocking, 6 Elonara Court, Glen Waverley, 3150. Botany
Mr. Carl A. Hunter, 180 Mont Albert Rd., Canterbury, 3126. Botany
Mr. Damian K. Kelly, 107 St. Elmo Rd., Ivanhoe, 3079.
Mr. Peter Lawson, 49 Packham Crescent, Glen Waverley, 3150.
Miss Cecily Piper, Flat 8, 1419 High St., Glen Iris, 3146.
Mrs. Julie A. Rayner, 122 Normandy Rd., East Kew, 3102.
Mr. John C. Reid, Lot 10, Mackintosh Rd., Glen Waverley, 3150. Orchids & Birds
Mr. Keith F. Westhead, 27 Northcote Rd., Armadale, 3143.
Mr. Colin E. Smith, Flat 1, 122 Regent Ave., Springvale, 3171. General

Joint:

Mr. & Mrs. W. J. Bennett, 2 Hunter St., East Kew, 3102.

Country:

Gavin B. Haycraft, 45 Ursa St., North Balwyn. Fauna & Botany
Miss Rosalind St. Clair, 4 Westgarth St., East Malvern, 3145. Pond Life
Miss Rae Trathen, 7 Estella St., Glen Iris, 3146.

Junior:

Miss Olive Codling, P.O. Box 117, Wodonga, 3690.
Mr. A. E. Spillane, 117 Rutland Ave., Mount Eliza, 3930.
Mr. D. Wickham, 16 Drysdale St., Sunbury, 3429. Mammal Survey, Marine Biology
Mr. J. D. Sherwood, c/o Dept of Crown Lands & Survey, 2 Treasury Pl., Melb., 3002
Mr. Robert J. Gully, 25 McLaughlin Ave., Sandringham, 3191.
Mr. Austen G. Redfern, 8-10 Kitchen St., Mansfield, 3722. Birds & Wildflowers

5. Correspondence. 6. General Business.

F.N.C.V. EXCURSIONS

Sunday, 13 February — Marine Biology excursion led by Dr. Brian Smith, probably to the Kilcunda area. This excursion is a week earlier than usual because of the tide. Members travelling by private cars may join party at Dandenong near comfort station at approximately 10.30 a.m. Bring two meals. The coach will leave Batman Avenue at 9.30 a.m. Fare $2.

Easter — 30 March to 3 April — King Island. The plane will leave Melbourne at 6.30 p.m. on Thursday, 30 March, returning at 4.50 p.m. on Monday, 3 April. Motel accommodation has been booked on a room only basis at $5 to $6 per person per day; meals will be extra and there may be some cost for transport on the island. Please book as soon as possible so definite numbers can be given to the motel, bookings to be made with the excursion secretary and $35 forwarded by 1st March to cover plane fare and motel deposit, all cheques being made out to Excursion Trust.

GROUP MEETINGS

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

Thursday, 10 February — Botany Group. Mr. A. Fairhall will speak on "Propagation of Australian Plants".

Friday, 11 February — Montmorency and District Junior F.N.C. meeting in Scout Hall at Petrie Park at 8 p.m.

Wednesday, 16 February — Microscopical Group.

Friday, 25 February — Junior meeting at 8 p.m. at Hawthorn Town Hall at 8 p.m.

Wednesday, 1 March — Geology Group.

Monday, 6 March — Entomology and Marine Biology Group meeting in small room next to Theatrette at National Museum at 8 p.m.

Thursday, 9 March — Botany Group.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 2 9 February, 1972

CONTENTS

Front Cover:

This photograph of Banded Stilts feeding in the shallows was taken by Hans Beste.

Feeding of the Yellow-tailed Black Cockatoo on Cossid Moth Larvae inhabiting *Acacia* species

by K. N. G. SIMPSON*

Summary

Some field observations are provided concerning activity of the Yellow-tailed Black Cockatoo *Calyptorhyncus funereus* Shaw, in searching for and extracting large wood-boring cossid moth larvae from wattle trees.

Three species of *Acacia* variably infested by larvae of *Xyleutes durvillei* (H-Sch) (Cossidae, Lepidoptera) were studied at Tidbinbilla, Australian Capital Territory.

The evidence indicates that a distinct routine for extraction of these larvae or pupae from tree-trunks and exposed lateral roots is followed. A discussion on possible methods of location of larvae in trees by the cockatoo is included.

Some local ecological factors limiting *C. funereus* attack, and tree destruction resulting from cossid and cockatoo damage, are discussed.

Introduction

On 25 August, 1963, four Yellow-tailed Black Cockatoos *Calyptorhyncus funereus* Shaw, were disturbed from a small stand of *Acacia dealbata* Link, marginal to a cleared valley at Tidbinbilla, Australian Capital Territory. Examination of the trees indicated that many had been torn open by the cockatoos in a search for large moth larvae tunnelling in the wood.

On 2 September, 1963, a single male Yellow-tailed Black Cockatoo was seen investigating *A. dealbata* saplings in the same stand of trees. The bird was observed through binoculars for almost three minutes, after which it became alarmed and departed.

These observations, together with subsequent study of the trees concerned, give an indication of methods employed by the Yellow-tailed Black Cockatoo in locating and extracting large wood-boring moth larvae from small acacias, and in particular, an indication of damage caused by both bird and larvae, and some consequent effects to three different species of *Acacia*.

The observations recorded here are an incidental result of frequent and regular inspections of the area between August, 1962, and October, 1964. The author was then assisting in a mammal ecology study conducted by the Division of Wildlife Research, C.S.I.R.O.

Previous Records

It has long been known that *C. funereus* causes considerable damage to various species of trees whilst extracting insect larvae, but there have been no detailed descriptions of such damage, and little attempt to study the method by which the cockatoos actually locate or extract wood-boring larvae. The few previous accounts of such damage are principally in the form of brief nature notes or passing comments in annotated bird lists.

Bennett (1834) recorded destruction of small trees in the Yass District of New South Wales by Black

* 21 Kingswood Drive, Dingley 3172, Victoria.

Cockatoos. Mellor (1906) in Tasmania, and Hyem (1936) at Barrington, N.S.W., give observations of Black Cockatoos searching for larvae on trunks of newly ring-barked stringy bark trees (*Eucalyptus* spp.). Fletcher (1908) noted *C. funereus* in Tasmania searching for large moth larvae in cut and stacked logs of "Black wattle" (presumably *Acacia mollissima* Wild)

There are also several published accounts of the boughs of trees being eaten completely through by *C. funereus*, e.g. Barnard (1924), Paterson (1928), Gray (in Crosbie-Morrison, 1949).

More recently Tindale (1953) discusses damage caused by moth larvae and subsequently by *C. funereus* in experimental plots of eucalyptus saplings grown by researchers of the Commonwealth Forestry Bureau at Taranna, Tasmania. The moth was described later as *Oenetus paradiseus* Tindale (Hepialidae, Lepidoptera). Structural damage caused to saplings by the cockatoos resulted in losses of trees in strong winds. Tindale draws attention to the evident culling effect among natural stands of eucalyptus saplings resulting from interaction of cockatoo and moth. In the same paper, Tindale records some information from Mr. I. F. B. Common (Division of Entomology, C.S.I.R.O., Canberra, A.C.T.) concerning damage caused by *C. funereus* in gouging larval hepialids from Snow Gum, *E. niphophila* Maiden et Blakely, at 5,500 feet on Mt. Gingera, in the Brindabella Range, A.C.T. (the larvae proved to be a subspecies of the same moth, *O. p. montanus* Tindale) A brief note has been published concerning possible damage by *C. funereus* to the Grass-tree *Xanthorrhoea australis* R.Br., in an adjacent area of the Tidbinbilla District (Simpson, 1964).

Environment

The main study area is dissected by tributary water-courses of the Tidbinbilla River, and comprises six approximately parallel, low, and relatively mature easterly-trending granite ridges at the foot of Mt. Tidbinbilla (lat. 35°27'S., long. 148°54'E.). The area is approximately a square mile in extent, and is now part of the Tidbinbilla Native Fauna Reserve. Elevation above sea level is 2,500 feet approximately.

This area of the Tidbinbilla Range is covered with extensive and relatively dense wet sclerophyll forest. Much of the eucalypt forest up to one mile from the cleared valley margin comprises relatively thick secondary growth following heavy slashing over many years to obtain leaves for a local eucalyptus-oil still. The still ceased operating when the area was declared a Reserve.

Fairly dense clumps of *A. dealbata*, and of *A. falciformis* DC., occur throughout the region, but more particularly in marginal areas and on the rocky summits of small hills. The groups of saplings and trees may be quite separate, or the two species may adjoin each other, although such boundaries seem to remain sharply defined. *A. melanoxylon* R.Br., is also widespread but grows principally as single trees along or near to the water-courses.

A thick growth of introduced plants also grows along or near to many portions of the water-courses. These are mainly Blackberry *Rubus vulgaris* Weihe et Nees (*R. fruticosus* agg.), Raspberry *R. idaeus* L., and the Briar Rose *Rosa rubiginosa* L.

Observed Feeding Behaviour

The male Yellow-tailed Black Cockatoo observed on 2 September, 1963, investigating saplings of *A. dealbata*, did so by walking on the

ground between the trunks and giving each sapling in turn one or more bites at or just above ground level. The bird paused for approximately two or three seconds only at each tree before moving to the next. It was seen later that one or more bites (henceforth called "test bites") had been given to each trunk and to any exposed lateral roots. The cockatoo examined four or five trees in succession, turning its head to a horizontal plane for the bites to the vertical trunks ("lateral" bites).

Following a test bite indistinguishable from those preceding it, the cockatoo gave several strong lateral bites to a trunk, removing a large piece of bark and some underlying wood each time. The sap-wood was then stripped off, the bird's head being now held close to vertical in attitude (i.e. the head in its normal position in line with the body axis) and a downward levering motion adopted to tip out large splinters. Three or four bites were sufficient to breach the larval tunnel, and it was rapidly enlarged by a combination of lateral bites and downward leverings.

A whitish larva was seen to be extracted from the lowest portion of the hole thus made. The cockatoo used an upward pull to stretch the larva, followed by a relaxing of pressure, a sideways shaking of the head, and a further upward stretch. This process was repeated once to extract the larva. When free, the larva was transferred to the right foot and then eaten. The larva was estimated to be some three inches in length. Two more saplings were test bitten before the bird suddenly flew off, calling loudly.

Identification of Larvae

On 6 September, 1963, Mr. M. S. Upton (Division of Entomology, C.S.I.R.O., Canberra) accompanied the author in an examination of the trees in the area and a number of larvae were collected. The large moth larvae sought by the Yellow-tailed Black Cockatoos were subsequently identified as *Xyleutes durvillei* (H-Sch) (Cossidae, Lepidoptera). The largest individual obtained was some five inches long and approximately an inch in diameter. Larvae of *X. durvillei* were subsequently obtained from each of the three species of acacia examined.

Other Insect Larvae

A plump, one-inch long larva of the Botany Bay Diamond Weevil *Chrysolophus spectabilus* Fab. (Chrysolophidae, Coleoptera) was also found in a lateral root of an *A. dealbata* sapling. A cockatoo had exposed the tunnel but had either failed to secure the larva or had rejected it.

Larvae of an unidentified cerambycid beetle species in some dead or dying *A. dealbata* in the study area, were believed to represent an incidental food item only. They were generally situated near to older, empty tunnels of the larger cossid larvae. Some of the cerambycid tunnels had been opened by *C. funereus*, but it could not be determined whether larvae had been secured.

Larval Habits of *X. durvillei* (H-Sch)

A brief resume of the larval habits of *Xyleutes durvillei* is appropriate to this paper.

The larvae are believed to live in the trees for three years or more before pupating (Littler, 1904, on *Zeuzera eucalypti* (H-Sch) = *X. durvillei* (H-Sch)).

The larvae excavate tunnels up to an inch in diameter in three different species of acacias in the study area. A few tunnels are found in branches, but most are situated either in the lower trunk and extending into the lateral

roots, or in the roots themselves. This is particularly so where these roots project above the ground. In the region of the lower trunk, the larvae occupy the centre of saplings up to about three inches in diameter. The tunnels are not particularly extensive.

At some point in the lower portion of the tunnel, a larger excavation permits the larva to turn around. This region may become a point of major structural weakness in small acacia saplings, more particularly if it is situated at the junction of the lateral roots and base of the trunk. Prior to pupation, the exit hole is enlarged and plugged with silk, and pupation takes place in a head-downward position at the uppermost portion of the tunnel. When emergence is due, the pupa works its way down the tube by the action of the tergal spines.

Extraction of Larvae by *C. funereus*

It is convenient to deal with the extraction technique before considering the problem of location of larvae by *C. funereus*.

Examination of more than two hundred extraction points on acacia trees in the area indicates that the procedure described is almost unvarying.

Small saplings offer little resistance to *C. funereus*, but larger trees may require a considerable amount of work before a larva can be obtained.

For larger trees, often with from half to one and a half inches of wood tissue between cavity and external surface, a very definite routine is practised for the actual extraction of large wood-boring larvae. The best development of the method is seen on trunks and large limbs, or on projecting lateral roots having a diameter generally greater than about two inches (see Plate 1).

The observations indicate that once the position of a larva or tunnel has been ascertained, lateral bites are made directly over the uppermost portion of the tunnel and again several inches or more below this point.

The bark is then stripped off to form a roughly rectangular working area. Following this, the sapwood is removed by tearing splinters out and nipping each of them off at top and bottom until the uppermost portion of the tunnel can be penetrated. Occasionally, further work by the bird may then cease (see below). Normally, however, the cavity is enlarged progressively downard, until the opening is large enough for the larva or pupa to be extracted.

The observations indicate that the upper limit of each cossid tunnel is determined and penetrated with great precision — to approximately an inch in every instance examined.

Initial penetrations ("inspection holes") had been made by *C. funereus* in a number of larval burrows in small sapling bases or roots, but work had ceased immediately the interior was breached. An examination of such cavities revealed that they were either empty, the imago having emerged during a previous season, or that the pupal chamber was occupied by an empty pupal case. In such instances, the pupa had been parasitized and destroyed *in situ*. On a few occasions, fresh cockatoo inspection holes were found in completely dead branches still attached to living trees. Larval cossids, and the subsequent cerambycid larvae that often frequent dead or dying trees, had long gone from these branches, which appeared to be several years old.

Location of Cossid Larvae by *C. funereus*

The location of cossid and other wood-boring insect larvae in trees by

C. funereus may be through application of a combination of several factors.

Larvae may be located by visual evidence on the external surface of trees at times. Trickles of chewed wood were frequently seen on the acacias with heavy infestations of cos-acacies with heavy infestations of cossids, and exudations of sap were sometimes observed also. Such evidence is dependant on the insect species concerned and the nature of the damage it causes. However, where test bites are given to all apparently similar trees in a clump (e.g. of sapling acacias), it would indicate that visual determinations of larval burrow positions are probably not being made.

It is conceivable, therefore, that the test bite may fulfil any or all of three separate functions simultaneously:—

a. By the purely mechanical effect of pressure and resistance it may indicate the presence of a structural weakness in a tree (e.g. a larval

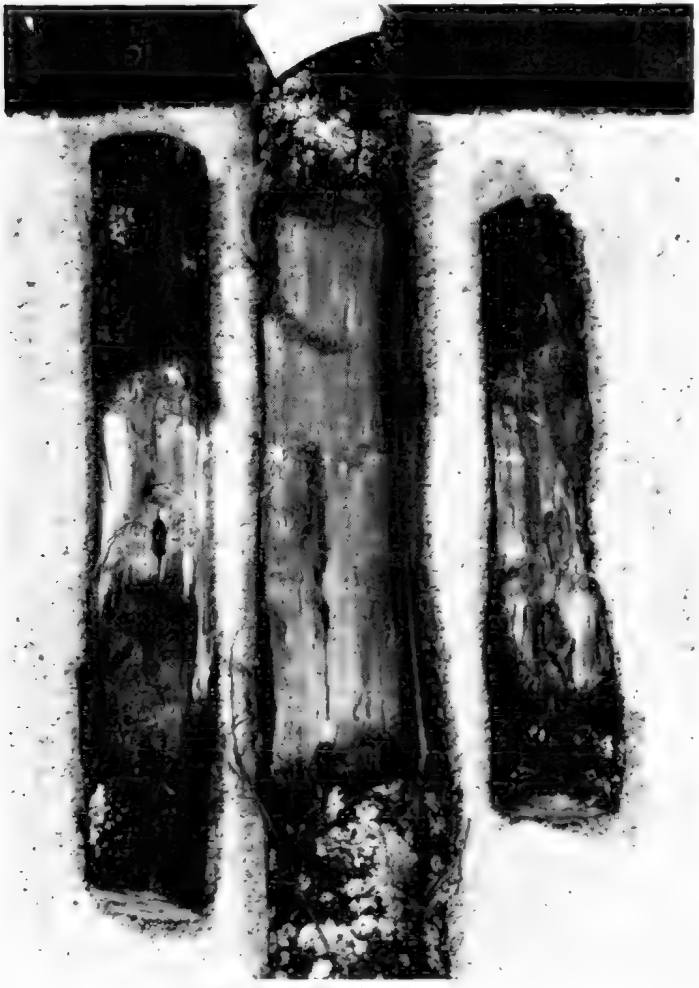

Photo by Graeme Chapman.

Plate 1. Trunks of *Acacia dealbata* trees from which Cossid moth larvae were extracted by Yellow-tailed Black Cockatoos. Tidbinbilla, A.C.T.

burrow). This may particularly apply in the case of test bites to small saplings.

b. The vibration of the bite itself may stimulate the larva or pupa to a response (e.g. movement) detectable by the bird. Crosbie-Morrison (1949), believed that cockatoos listened to the gnawings of larvae within the trees. Any rustling or scratching of contact between the burrow walls and the sclerotized surface of a moving larva or pupa possibly is also audible to the bird. However this explanation does not account for the observed ability of the bird to locate empty tunnels.

c. During contact with the tree (and perhaps as a result of b) the bill and (or) tongue may act as a sensory organ to detect movements of the insect. Vibrations received via the feet and legs may also contribute. It is known that in many birds, vibrational stimuli may be received exclusively by means of extremely sensitive vibration receptors (Herbst's Lamellar Corpuscles), which are often concentrated in the legs or about the oral cavity. In the *Picidae* (Woodpeckers), groups of these cells are prominent in the tongue, which is used for probing insect tunnels. It is also known that reception of vibrational stimuli is independent of hearing in birds (A. Portmann (in Marshall, 1960)).

Some Local Ecological Factors

In the relatively small study area at Tidbinbilla, several variable ecological factors were observed and are outlined below:

(1) *Degree of infestation of acacias by cossid larvae* — As previously noted, the same species of cossid, viz. *X. durvillei*, was discovered in each of the three species of *Acacia* examined. There was, however, a considerable variation in the degree of infestation within the area studied.

Of two adjacent small patches of *A. dealbata*, one group was heavily infested, and showed abundant evidence of both recent (1963) and prior damage by cockatoos. In the other patch of trees thirty yards away, all the trees showed recent test bites, but no sign of any further damage at any time. At the northern edge of the study area, a patch of *A. dealbata* was infested, but only a few trees in a contiguous clump of *A. falciformis* contained larvae. Elsewhere, two large *A. melanoxylon* trees, situated forty yards from a heavily infested clump of *A. falciformis*, showed no sign of attack by either cossids or cockatoos. Three of four adjacent *A. melanoxylon* growing beside a streamcourse had sustained damage caused by cockatoos over a period of several years (degree of weathering of exposed wood was used as a basis to determine recent damage from that of prior years). The fourth tree was apparently identical in size and situation, but showed no sign of cossid infestation or of cockatoo attack.

(2) *Growth of blackberry, etc.* — It was seen that the access of cockatoos to trunks and lower limbs of many *A. melanoxylon* trees (and occasionally of *A. dealbata*), was frequently restricted by a dense growth of blackberry, raspberry and briar-rose. Although some of these acacias were infested by cossid larvae and showed evidence of previous cockatoo attack, only branches of such trees above the level of secondary growth had been investigated or damaged recently by cockatoos.

(3) *Nature of soil* — *C. funereus* investigating or endeavouring to obtain cossid larvae from lateral roots of acacias growing in the loose, silty or

sandy soils near water-courses, at times excavated holes up to four inches deep around such roots. They often succeeded in extracting larvae from roots leading below the soil surface.

Where soils were generally more stony, e.g. on the tops of hills, cockatoos made very little attempt to dig down alongside a root, and only occasional minor soil disturbances were noted. This applied more particularly to *A. falciformis* clumps.

(4) *Cossid parasites and empty tunnels* — The fact that *C. funereus* occasionally wasted time and effort in opening tunnels where the cossid larvae or pupae have been destroyed by obligate parasites, or from which pupae have emerged during earlier years, has been previously noted.

Types and Results of Damage to Acacias

The characteristic types of damage commonly caused by *C. funereus* to trunks, trunk-bases and lateral roots of *Acacia* trees and saplings at Tidbinbilla are shown in photographs accompanying this paper.

Several successive causes were seen to contribute to ultimate collapse and destruction of *Acacia* saplings and trees in the study area and its surrounds. They can be roughly categorised as follows:—

(1) *Primary structural failure* — There is a considerable initial loss of *A. dealbata* saplings due to insecure root-hold and (or) overweight of the foliage of the crown. These factors contribute to tree losses under adverse weather conditions. The losses reach a peak when the small saplings and trees come into (literally) heavy flower between August and September annually. Occasionally, boughs of quite large *A. melanoxylon* were also seen to have collapsed after rain or wind owing to the weight of the foliage. *A. falciformis* seemed to be the least affected by these causes.

(2) *Cossid and cockatoo damage* — The large size of cossid tunnels in the centres of small *A. dealbata* saplings is clearly shown in Plate 2. Collapsed saplings were often seen showing no trace of cockatoo damage, but simply broken off at the level of a recent larval tunnel.

The addition of severe wounds made by cockatoos to small saplings already weakened by large cossid tunnels, generally brought about their collapse within a few weeks or months.

Similar observations were made concerning *A. falciformis* saplings, except that the strength of the tree generally appears to be greater, and these may remain standing for a considerable period after sustaining damage. The same type of damage to trunks of large *A. melanoxylon* trees does not appear to seriously impair their growth. Collapse of some individual branches resulted from structural damage imposed by cockatoos.

(3) *Fungus infection and cerambycid infestation* — *A. dealbata* and *A. falciformis* generally showed infection by fungus some time after sustaining damage by cockatoos. In a few cases the infection appeared to spread throughout the tree. In most instances however, it was localised to the immediate area of damage although its weakening effect was usually sufficient to bring about the ultimate collapse of the tree. Individual large branches of *A. melanoxylon* were also lost owing to fungal decay of tissue surrounding local damage. The fungi concerned were not identified.

A few trees of *A. dealbata* became heavily infested with an unidentified species of wood-boring cerambycid beetle larvae, following cossid and cockatoo damage.

Plate 2. *Acacia dealbata* saplings from which Cossid moth larvae were extracted by Yellow-tailed Black Cockatoos. The larvae have occupied the base of the trunk, just above or into the lateral root. Tidbinbilla, A.C.T.

Photo by Graeme Chapman.

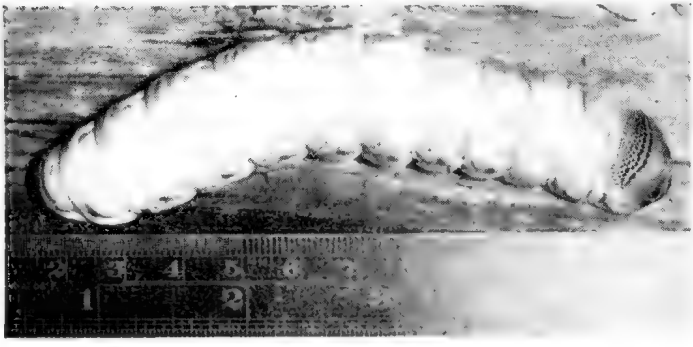

Plate 3. A larva of *Xyleutes durvillei* (Cossidae, Lepidoptera) from sapling of *Acacia dealbata*, Tidbinbilla, A.C.T., 1964.

Photo by Mr. M. S. Upton.

Acknowledgements

Reference to this work has been made by Forshaw (1969).

I am grateful to Mr. M. S. Upton, Division of Entomology, C.S.I.R.O., for assistance in the field and for insect identification, and to Mr. Max Gray, Division of Plant Industry, C.S.I.R.O., for plant identification.

From the Division of Wildlife Research, C.S.I.R.O., Dr. M. E. Griffiths generously provided time for me to complete field work associated with this study, Mr. Roy Coles assisted in the field, Mr. John H. Calaby read and criticised an early draft of this paper, and Mr. Graeme Chapman photographed specimens for me.

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NATURE SHOW

Unless some member is willing to take over the organizing and setting-up of exhibits, the F.N.C.V. will be able to take no part in the 1972 Nature Show.

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Due to S.E.C. restrictions it is regretted that this issue of Victorian Naturalist will be late in arrival.

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Ecology of some *Eucalyptus* Woodlands near Halls Gap, Victoria

by

R. F. Parsons,* N. H. Scarlett,**
N. J. Rosengren†

Introduction

In August, 1970, an area of Crown Land about 5 miles E.N.E. of Halls Gap and 0.6 miles south of the rubbish tip on the Halls Gap-Stawell Road (Fig. 1), was studied to determine the angiosperm species present and their relationship to varying soil and elevation. The area is found on the Grampians Plains at elevations of around 200 feet and is covered by relatively undisturbed eucalypt woodlands. Mean annual rainfall is 28 inches (78 cm.) and other regional data are given by Sibley (1967).

Methods

A continuous series of 20 foot radius quadrats were laid out along a number of line transects. The soil profile was described (by augering) and species cover and relative elevation (by dumpy levelling) were determined in each of about 250 quadrats, all within an area about 670 x 80 yards.

Results

Elevation only varied by a maximum of 5 feet over the entire area. All soils examined had A_1 horizons of siliceous sand with organic matter and A_2 of siliceous sand over subsoils of badly structured sandy clay loam to sandy clay. At higher elevations some iron and organic staining was found at depth in the sand, usually as a very narrow band just above the clayey horizons. Total depth of sandy horizons varied from one to five feet. The clayey horizons continue for more than 6 feet.

Increasing surface elevation was not caused just by increasing depths of sand over relatively level clayey horizons as in a general way, the clay surface rose and fell with corresponding changes in surface elevation (Figures 2d, 3 and 4). This may be evidence that the soils are not made up of transported sand deposited over clay, but are the result of soil genesis *in situ*, as is probably the case for similar soils in adjacent areas (Blackburn, Bond and Clarke, 1967).

However, the clay surface is more uneven than the ground surface and does not always follow surface contours. The most obvious deviation is the presence of two deep depressions in the clay surface beneath a sand ridge in the south-east of the area (Figures 2a, 2b and 3).

Plant species distribution was generally correlated with surface elevation, while little correlation with sand depth was obvious (Figures 2, 3 and 4).

Lowest elevations generally carried the tallest communities — *Eucalyptus camaldulensis* and *E. aromaphloia*, or a combination of both — over a scattered, predominantly herbaceous understorey. Scattered *E. melliodora* occurred in this community, but is not shown in Figure 2c. With increasing elevation, the understorey changed to a dense layer mainly of low sclerophyllous shrubs. This was dominated by *E. aromaphloia* and, usually at the

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highest elevations, a pure tree layer of *E. vitrea* (this name is applied to the same kinds of population as it was used for by Black (1952) and Sibley (1967) in the absence of detailed work on the southern Australian peppermints). In Figure 2c, *Hypolaena fastigiata* has been used as an approximate indicator of sclerophyllous understoreys. This is misleading only in the western corner, where it is absent from understoreys dominated by *Brachyloma daphnoides*.

This small area was surprisingly rich floristically, containing 158 angiosperm species (Appendix 1). Gymnosperms and ferns were absent.

Discussion

Distribution of some species appeared to be extremely sensitive to changes in elevation — a slope rising only 17 ins. showed successively *E. camaldulensis - E. aromaphloia, E. aromaphloia, E. aromaphloia-E. vitrea* and finally *E. vitrea*. Only sometimes are such changes accompanied by increasing depths of sand topsoil. Elevation itself seems, at least in many cases, to override sand depth in importance. In this area, the most obvious way elevation could be acting on plant distribution is by augmenting water supplies at low elevations through gravitational drainage, much of which may move downslope over the surface of the clayey horizons (Whipkey, 1965). This may also carry nutrients downslope, so that the role of nutrients cannot be excluded. In addition, casual observation suggests the possibility that low-lying topsoils may have a slightly higher percentage of fine-textured particles, perhaps leading to slightly higher fertility. It is also possible that low sites are more prone to topsoil waterlogging from a water table perched on the clayey horizons. If so, this may exclude some species intolerant of waterlogging from low-lying sites.

Elevation limits for the various species vary with the location of the transects. For example, *E. vitrea* is found on the highest parts of section C-D (Figure 3) but does not occur in section E-F (Figure 4) which reaches much higher elevations. This is probably because section E-F runs parallel to a greater extent of higher ground from which it may receive gravitational drainage.

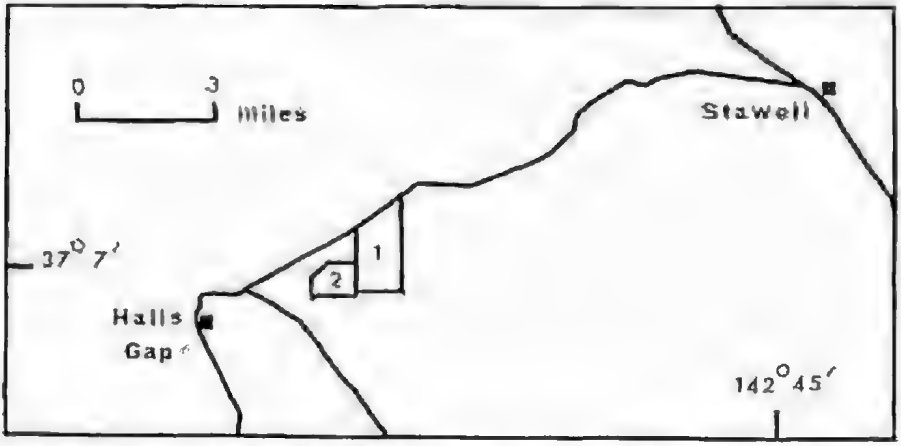


Fig. 1. Location of the study area. 1 = study area — Crown Allotments 66 and 69, Parish Bellellen. 2 = adjacent Forests Commission reserve.

The main exception to the above generalizations about elevation and plant distribution is the occurrence of *E. vitrea* sclerophyll shrub woodland at low elevations in the extreme south-east of the area (Figure 2c). This site may differ from the *E. camaldulensis-E. aromaphloia* sites in the smaller extent of surrounding higher ground from which it may receive gravitational drainage. Obviously in such an area, elevation itself must be considered in relation to adjacent topography.

Overall then, the trees can be ranked *E. camaldulensis*, *E. aromaphloia* and *E. vitrea* in order of decreasing site wetness. In the understorey, herbs predominate in the wetter sites and sclerophyllous shrubs in the drier ones. As stated before, the wetter sites may be slightly more fertile than the drier ones.

Conservation

A large area of the Grampians Ranges themselves is a Forests Commission reserve, and hopefully, much of this will not be cleared. On the surrounding Grampians Plains, however, nearly all the vegetation has already been cleared or drastically disturbed. A similar situation is found throughout the wetter parts of Victoria, where relatively level terrain is cleared and native fauna and flora and virgin soils survive only on unusable hilly country.

Very little is known of the ecology of the Grampians Plains and the destruction of the last remnants of native vegetation would make future study impossible. Because the Grampians Plains have quite different vegetation from the Ranges, it is necessary to reserve as many of the surviving remnants of the Plains vegetation as possible, to ensure adequate preservation of the unique vegetation of the whole Grampians area.

The work described here was carried out within Crown Allotments 66 and 69, Parish Bellellen, County Borung. This area has formerly been grazed under licence, and applications have recently been made to have at least part of it alienated.

We strongly believe that none of this area should be alienated, both from the arguments given above and for the following additional reasons:—

1. In or near the study area, the plants *Lepidobolus drapetocoleus* and *Phyllota pleurandroides* reach the absolute easternmost limit of their distribution; both are common in drier areas like the Little Desert to the west. The presence of these two species in the *Eucalyptus vitrea* sclerophyll shrub woodland make this woodland a completely unique assemblage of plants, as *E. vitrea* is absent from the Little Desert and similar areas. In these respects at least, *E. vitrea* woodland in the study area is transitional between the drier sclerophyll shrub woodlands in the Little Desert (lacking *E. vitrea*) and the wetter *E. vitrea* sclerophyll shrub woodlands to the south.

2. Crown Allotments 66 and 69 carry an extensive area of *Eucalyptus melliodora - E. camaldulensis* woodland as well as the vegetation described here. Thus there is a considerable range of vegetation types within a small area and so an ideal opportunity to investigate the relationships between the types.

3. The abundance of plants important to the honey industry like *E. melliodora*, *E. camaldulensis* and *Banksia marginata* suggest that the area would serve a valuable economic function if left uncleared.

4. The two allotments together make up an area of 1,122 acres, and this is large enough to make a

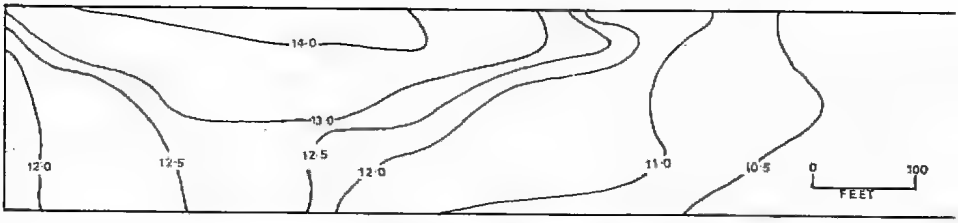


Fig. 2a. Surface relief. A = 10 feet (arbitrary datum).

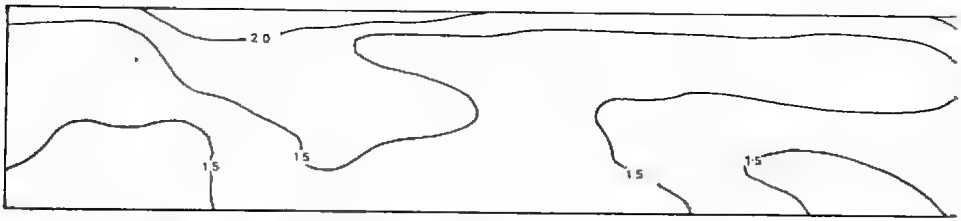


Fig. 2b. Depth of sandy horizons.

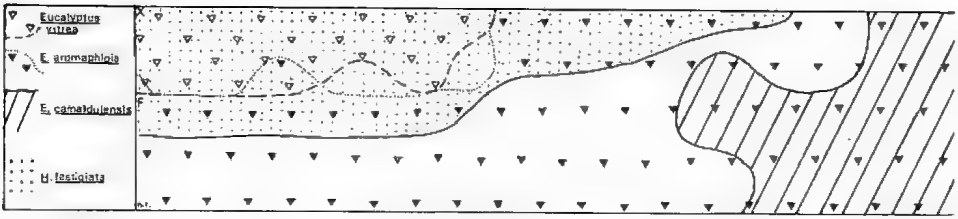


Fig. 2c. Vegetation.

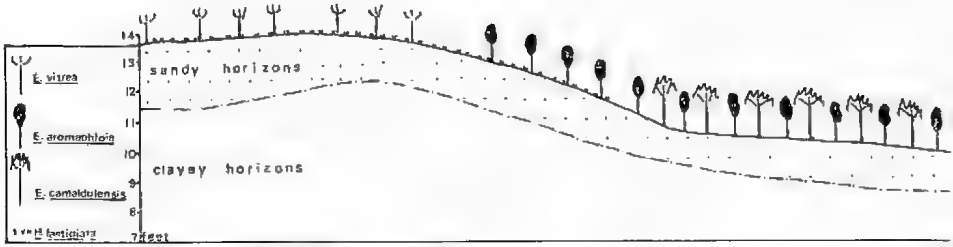
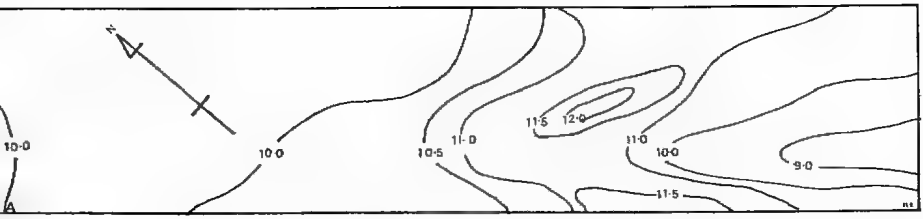


Fig. 2d. Section X-Y (location shown on Fig. 2c).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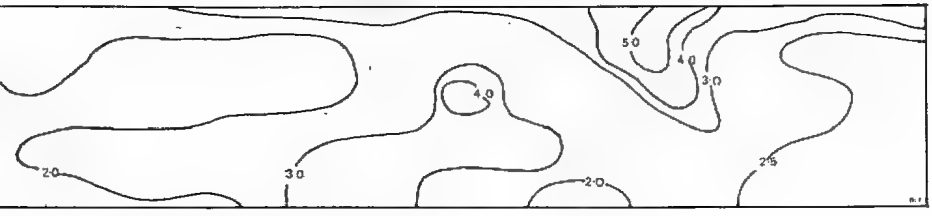
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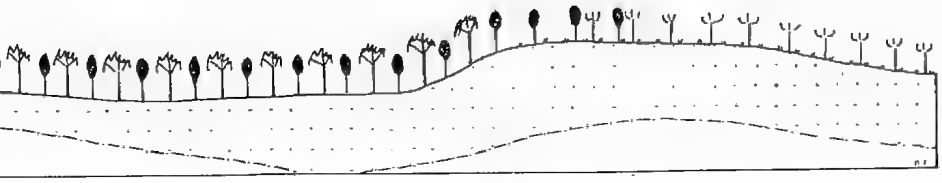

viable and worthwhile reserve, especially as it adjoins a Forests Commission reserve of about 660 acres on its western boundary. In summary, we strongly urge the creation of Crown Allotments 66 and 69 as a reserve. This would preserve populations of at least 158 flowering plant species, and at least one unique plant community as well as the native fauna present.

Acknowledgements

Our co-authors are the Botany II and Biology IIIB students at La Trobe University in 1970. Without their enthusiasm and stimulating discussion the work would not have been possible. We thank J. H. Willis for checking some of the plant identifications and J. Massey and J. Kirkpatrick for drawing our attention to this fascinating area and helping with the field work.

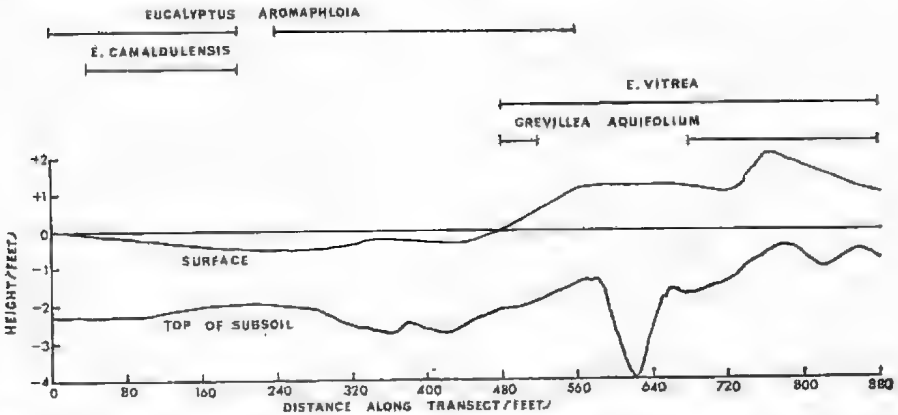

Fig. 3. Distribution of selected species along section C-D (shown on Fig. 2c). Vertical distance between surface elevation and elevation of top of subsoil represents depth of sandy horizons. The presence of *Grevillea aquifolium* is an approximate indicator of understoreys dominated by sclerophyllous shrubs.

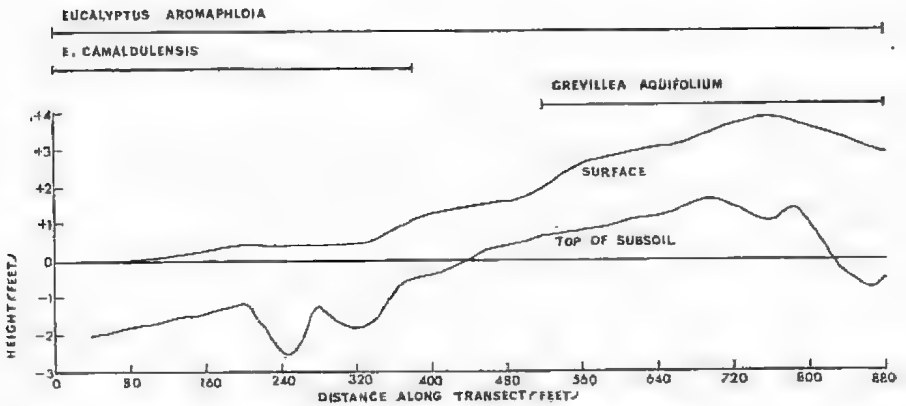

Fig. 4. Section E-F (shown on Fig. 2c) represented as for Fig. 3. *Eucalyptus vitrea* not present.

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Appendix 1

Angiosperm species found in the study area.

H = found mainly in areas with predominantly herbaceous understorey.

S = found mainly in areas with predominantly sclerophyllous understorey.

T = found throughout.

Unless otherwise stated, nomenclature follows Willis (1970) for monocotyledons and Eichler (1965) for dicotyledons. Voucher specimens are held at La Trobe University Botany Department Herbarium.

POACEAE

Agropyron sp. S, *Agrostis avenacea* S, *Aira caryophyllea* T, *Amphipogon strictus* S, *Briza minor* T, *Danthonia* spp. (including *D. eriantha* and *D. geniculata*) T, *Deyeuxia quadriseta* S, *Dichelachne* sp. H, *Enneapogon nigricans*, *Eragrostis brownii*, *Holcus lanatus*, *Microlaena stipoides* T, *Poa* sp. S, *Stipa* sp. T, *Themeda australis* S, *Vulpia bromoides* H.

CYPERACEAE

Carex breviculmis H, *Cyperus tenellus* H, *Lepidosperma carphoides* S, *L. laterale* S, *L. semiteres* S, *Schoenus breviculmis* S, *S. apogon*, *Scirpus antarcticus* H.

RESTIONACEAE

Hypolaena fastigiata S, *Lepidobolus drapetocoleus* S, *Leptocarpus tenax* T.

CENTROLEPIDACEAE

Aphelia pumilio T, *Centrolepis aristata* T, *C. strigosa* T.

JUNCACEAE

Juncus capitatus T, *J. pallidus* H, *J. subsecundus* H, *Luzula* sp. H.

LILIACEAE

Bulbine bulbosa, *Burchardia umbellata* S, *Chamaescilla corymbosa* S, *Dianella revoluta* S, *Dichopogon strictus* S, *Laxmannia sessiliflora* S, *Lomandra filiformis* S, *L. juncea* S, *Thysanotus patersonii* T, *Xanthorrhoea australis* S.

HYPOXIDACEAE

Hypoxis glabella H.

ORCHIDACEAE

Caladenia sp. S, *Corybas diemenicus*, *Glossodia major*, *Lyperanthus nigricans* S, *Pterostylis longifolia* H, *P. nana* S, *P. nutans* H, *P. parviflora* S, *Thelymitra antennifera* H.

CASUARINACEAE
Casuarina pusilla S.

PROTEACEAE
Banksia marginata T, *Grevillea alpina* Lindl. S, *Grevillea aquifolium* Lindl. S, *Hakea rostrata* S, *Isopogon ceratophyllus* S.

SANTALACEAE
Exocarpos cupressiformis.

POLYGONACEAE
Rumex sp. H.

CARYOPHYLLACEAE
Cerastium semidecandrum H, *Sagina apetala* H.

RANUNCULACEAE
Ranunculus robertsonii H.

LAURACEAE
Cassytha melantha S.

DROSERACEAE
Drosera glanduligera S, *D. peltata* S, *D. whittakeri* T, *D. pygmaea* S.

CRASSULACEAE
Crassula peduncularis (J. E. Sm.) Meigen H, *C. sieberana*.

ROSACEAE
Acaena echinata Nees. H, *Aphanes arvensis* H.

MIMOSACEAE
Acacia armata H, *A. dealbata* H, *A. mearnsii* H, *A. melanoxylon* H, *A. mucronata* H, *A. myrtifolia* S, *A. oxycedrus* S, *A. pycnantha* H, *A. verniciflua* H.

PAPILIONACEAE
Daviesia brevifolia S, *Dillwynia sericea* S, *D. glaberrima* S, *Gompholobium huegelii* S, *Hovea heterophylla* S, *Kennedia prostrata*, *Phyllota pleurandroides* S, *Pultenaea humilis* Benth. S.

GERANIACEAE
Geranium retrorsum L'Her. ex DC. H, *Pelargonium rodneyanum* H.

OXALIDACEAE
Oxalis corniculata T.

RUTACEAE
Correa reflexa S.

EUPHORBIACEAE
Poranthera microphylla H.

RHAMNACEAE
Cryptandra tomentosa S.

DILLENIACEAE
Hibbertia fasciculata S, *H. stricta* T, *H. virgata* S.

HYPERICACEAE
Hypericum gramineum H.

VIOLACEAE
Viola sieberana T.

THYMELAEACEAE
Pimelea sp. S.

MYRTACEAE
Calytrix tetragona S, *Eucalyptus aromaphloia* T, *E. camaldulensis* H, *E. melliodora* A. Cunn. H, *E. vitrea* S, *Kunzea parvifolia* Schlech. S, *Leptospermum juniperinum* H, *L. myrsinoides* S, *Melaleuca decussata* H.

HALORAGACEAE
Haloragis cf. *heterophylla* H, *H. tetragyna* S.

APIACEAE
Daucus glochidiatus H, *Hydrocotyle callicarpa* T, *H. foveolata* T, *H. laxiflora.*

EPACRIDACEAE
Acrotriche serrulata T, *Astroloma conostephioides* T, *A. humifusum* T, *Brachyloma ciliatum* S, *B. daphnoides* T, *Epacris impressa* S, *Leucopogon ericoides* S, *L. glacialis* Lindl. S, *L. virgatus* S, *Lissanthe strigosa.*

GENTIANACEAE
Cicendia filiformis H.

CONVOVULACEAE
Dichondra repens H.

RUBIACEAE
Galium murale H, *Opercularia varia* S.

CAMPANULACEAE
Wahlenbergia gracilenta H, *W. quadrifida* S.

GOODENIACEAE
Goodenia geniculata T.

BRUNONIACEAE
Brunonia australis S.

STYLIDIACEAE
Stylidium graminifolium H.

ASTERACEAE
Brachyscome perpusilla H, *Cirsium* sp. H, *Gnaphalium japonicum* T, *G. luteoalbum, Helichrysum obtusifolium, H. scorpioides* S, *Helipterum australe, H. demissum* T, *Hypochoeris glabra* T, *H. radicata* T, *Lagenifera* sp., *Leptorrhynchos squamatus, Millotia tenuifolia* T, *Podolepis jaceoides* S, *Rutidosus multiflora* T, *Senecio hispidulus* H, *S. quadridentatus* H, *Solenogyne bellioides* H, *Sonchus oleraceus* H, *Stuartina muelleri* H, *Toxanthes muelleri* H.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

book review

Australian Shells

Published by A. H. & A. W. Reed
by B. R. Wilson and K. Gillet
Price $12.95.

This book is written by one of Australia's leading malacologists, Dr. Barry Wilson, Curator of Molluscs at the Western Australian Museum, Perth, and illustrated by one of our best known natural history photographers Keith Gillet. It is therefore not surprising that they have produced the best illustrated text so far available on marine shells on an Australia wide basis. It is a book written primarily for the amateur naturalist and shell collector and therefore confines itself to the larger group of "pretty" shells most commonly collected by such people. Perhaps the biggest criticism that can be levelled against it is that it ignores the bivalves and concentrates exclusively on the gastropods. However, the Australian marine mollusc fauna is so large and the number of amateur collectors who seriously interest themselves in bivalve collection so few in number comparatively speaking, that such an omission, while being annoying to the bivalve enthusiast, is understandable on a space and cost basis.

The book has 168 pages, 56 full page colour plates of shell illustration and 48 magnificent colour photographs of living molluscs. Perhaps the highlight of the book (and I consider it is worth the money for these alone) is the series of photographs of living molluscs taken by Neville Coleman and Don Byrne. After short introductory sections dealing with the classification of molluscs, descriptions of the gastropod shell and animal, the distribution of marine molluscs of Australia and the conservation of Australian shells (with some good rules-of-conduct for collectors), the book deals in detail with 600 species of marine gastropods belonging to 34 families. The arrangement of the text is very good and easy to use in that the descriptions of the species are, in most cases, on the page facing the illustration. Each family is introduced with a general description and ecological notes. The species are then described individually with an indication of relative abundance and approximate distribution. The authors have gone to considerable trouble to use scientifically correct nomenclature and in many cases add short explanatory notes where taxonomic difficulties have occurred. Good specimens have been chosen to illustrate the species and where species show wide colour or form variation then a series of specimens have been figured to illustrate that variation.

All these factors add up to a very high quality text-book that is a must for both professional malacologists and amateur collectors who have any interest in Australian shells.

Brian J. Smith (Dr.),
Curator of Invertebrates,
National Museum of Victoria.

Amphibian Fauna of Victoria

Confirmation of the Records of *Litoria (-Hyla) Citropa* (Tschudi) in Gippsland

by

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Copland (1957) and Moore (1961) examined three specimens of *Litoria** *citropa* (Tschudi) from Aberfeldy, Victoria (Australian Museum Collection, Nos. 7560-7562) and confirmed that they were typical of this species, even though separated by about 480 km from Bundanoon, New South Wales, the nearest locality from which conspecific material had been obtained. Littlejohn (1969) had no records of *L. citropa* from East Gippsland, and Martin and Littlejohn (1969) considered it unwise to include *L. citropa* in the state list of amphibians because no further specimens had been collected in spite of a large amount of field work in eastern Victoria. Littlejohn (1971) listed *L. citropa* in the Victorian amphibian fauna, but did not provide any other information.

On the night of 24 October, 1969, while we were travelling along the Princes Highway from Eden, N.S.W., to Orbost, Vic., we collected specimens of *L. citropa* at three localities: Narrabarba, N.S.W.; Maramingo Creek, 7.0 km ENE of Genoa, Vic.; and Tonghi Creek, 9.0 km W of Cann River, Vic. Mating calls of *L. citropa* were heard at these localities and at four others along the Princes Highway: Timbillica, N.S.W.; the Thurra River, 11.7 km E of Cann River, Vic.; the Bemm River, 8.0 km E of Bellbird, Vic.; and the Brodribb River, 10.4 km E of Orbost, Vic. A specimen was also collected at Tianjara Falls, 38.4 km SW of Nowra, N.S.W. on October 23, 1969.

On the evening of 19 November, 1970, another specimen of *L. citropa* was collected, and others heard calling, by Shady Creek, 26.4 km N of Bruthen, Vic. On the following night, a road traverse was made from Walhalla to Moe, Vic., and although specimens of two other species of river frogs (*Litoria lesueuri* and *L. phyllochroa*) were heard calling and collected, no individuals of *L. citropa* were seen or heard. A survey of the Aberfeldy and Thomson Rivers in the Aberfeldy area on 9 and 10 April, 1971, failed to provide further evidence of *L. citropa*, but this may have been due to the unseasonal nature of the visit. These localities, together with the previously known southern limit of distribution in New South Wales, are shown in Figure 1.

Examination of the three specimens of *L. citropa* from Aberfeldy (in the Australian Museum Collection) allowed us to establish that they are conspecific with our specimens collected in East Gippsland. Thus, it seems reasonable to accept Aberfeldy as the correct locality for these specimens, since it is only about 128 km west of Shady Creek.

Kinghorn (1932) described colouration of adults of *L. citropa*, and Moore (1961) summarized the available information on morphology, life history and distribution. Clyne (1969) also provided a short description of an adult, including a colour photograph.

*Following Tyler (1971), Australian representatives of the Family Hylidae are now referred to the genus *Litoria*

Because of its great value as an aid to identification, a photograph of a living male is presented in this account (Fig. 2).

Very little is known about the biology of *L. citropa*. Fletcher (1889, 1891) noted that clasping was axillary, and that mating pairs were found during September and December in the central coastal area of New South Wales. Kinghorn (1932) observed mating in January and February in the same general area. Moore (1961) stated that he was wholly unfamiliar with the habits of *L. citropa* and Clyne (1969) added no new information. Our few observations are restricted to the calling behaviour of males.

At Tonghi Creek, 9.0 km W of Cann River, males were calling from sites on the rocky banks and marginal vegetation of the shallow, slow-flowing stream. The following temperatures were noted: dry air 11.1°C., wet bulb air 10.5°C., water 14.7°C. Mating calls of three males were tape recorded (Nagra IIIB recorder, Electro-Voice EV 644 gun microphone), but only two calls of one individual were sufficiently clear of background noise to allow subsequent acoustic analysis (Kay 6061-A audiospectrograph, Cossor 1049 dual-trace oscilloscope). However, these calls are believed to be representative of many others heard and recorded.

The mating call is long (3.2-3.6 seconds), of low intensity, and of relatively complex temporal structure. The dominant frequency varies from 1350 to 1800 Hertz, with a broad frequency band of lower intensity be-

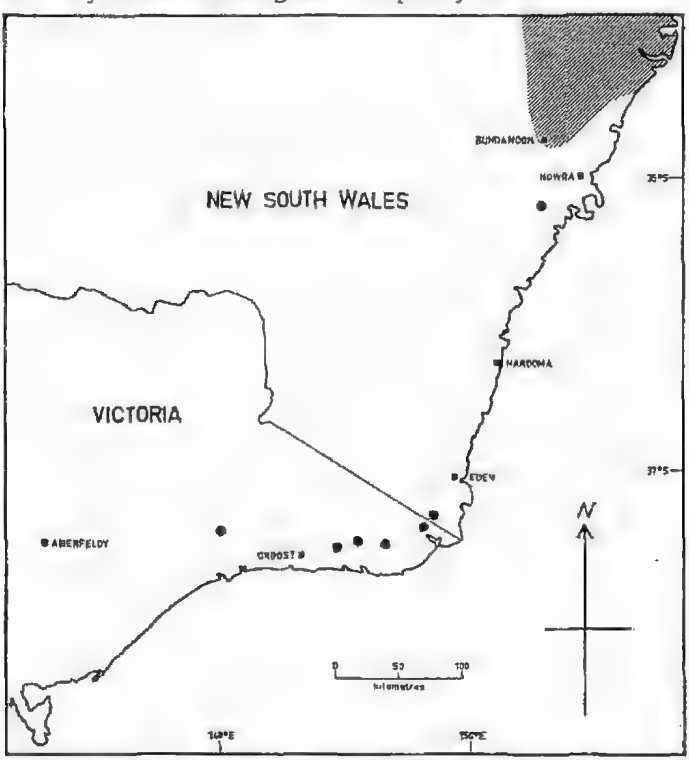

Fig. 1. Distribution of *Litoria citropa* in southeastern Australia. Solid circles indicate new localities; the hatched area shows the previously known southern limit of distribution in New South Wales.

tween 1250 and 3600 Hertz. Each call consists of three types of pulse train (note): one long note (910-920 milliseconds) of relatively high pulse repetition rate (45.8-46.4 pulses per second); two or three short notes (80-120 milliseconds) of similar pulse repetition rate (34.1-57.0 pulses per second); and three or four notes of intermediate duration (245-500 milliseconds) and low pulse repetition rate (10.2-20.8 pulses per second). A tracing of an oscillogram of a complete call is depicted in Figure 3.

Confirmation of the presence of *L. citropa* in Victoria, and the description of a new species of the *L. ewingi* complex from northeastern Victoria (Watson, Loftus-Hills and Littlejohn, mss.) means that the amphibian fauna of Victoria now includes 34 taxa: 12 hylids (one genus, 10 species, two subspecies) and 22 leptodactylids (eight genera, 20 species, two subspecies). Current research indicates that three other taxa may later warrant formal description.

Fig. 2. Adult male of *Litoria citropa* from Tianjara Falls, 38.4 km SW of Nowra, N.S.W. Photo: M. J. Littlejohn.

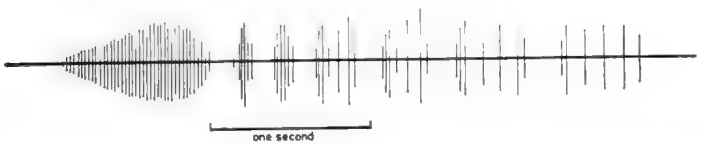

Fig. 3. Tracing of oscillogram of a mating call of *Litoria citropa* from Tonghi Creek, 9.0 km W of Cann River, Vic., recorded at a wet bulb air temperature of 10.5°C.

Acknowledgements

The support of the Australian Research Grants Committee (Grant 66/16172) and the University of Melbourne Standing Research Vote is gratefully acknowledged. The Australian Museum, Sydney, kindly loaned the specimens of *L. citropa* from Aberfeldy.

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Punta Arenas and Sir Baldwin Spencer's Grave

by ALDO MASSOLA

Punta Arenas, the most southerly city in the world, sees few visitors from Australia. Indeed, being in the same latitude as Heard Island, and its buildings being continually buffeted by fierce southerlies and roaring westerlies and covered with snow and ice almost the year round, it sees very few visitors from anywhere.

Its 40,000 odd inhabitants subsist mainly by an export trade in wool and mutton, and employment at the seat of administration of the National Company which operates the oil fields discovered in Tierra del Fuego, across Magellan Straits. A little lignite and gold is also mined locally.

The people of Punta Arenas are hard workers, and aside from the long national afternoon siesta, make full use of the hours of daylight, which last from about 5 a.m. to about 11.30 p.m. each day. But they are only joined to the rest of the world by lonely routes; even the 5,000 odd miles stretch which separates their city from New Zealand is lonely, and at one stage of the crossing the nearest ship to ours was over 1,000 miles away. It is therefore with a sigh of relief that the not-always-Pacific Ocean is left and the western Strait of Magellan is entered.

From the Pacific side the entrance is forbidding. On the north side there are a number of scattered islands, peaks of submerged mountains, rising abruptly from the ocean. These form part of Queen Adelaide Archipelago. To the south the precipitous and snow-capped mountains of Desolate Island loom in sight. Gaunt, stark, frozen, this large island does indeed present a most desolate aspect.

This western Magellan Strait is edged on both sides by the southern Andes, which conjure up the world of the Incas. Peak after peak, seldom rising less than 5,000 feet, with almost perpendicular flanks right to the water's edge, in which are mirrored the eternal snows and glaciers, the latter falling to the water like rivers of ice; they are a fantastic sight. It is obvious that the Straits follow a series of flooded valleys and gaps in the Andes; and though of varying width, they present no navigation hazards, allowing, of course, for the very variable winds and sudden storms.

When we came though the weather was favourable. Strong winds were driving fog banks backwards and forwards before them, and periods of sunshine were intercepted by falls of snow, hailstones and heavy downpours of rain, but these were of short duration and visibility was good and the majestic scenery rendered dramatic by the continually changing light. The water remained reasonably calm and the sudden storms one hears and reads about failed to materialize.

This was on the western side of the Straits, continuing for over 200 miles almost to Punta Arenas. The 110 miles of the Strait from that city to the Atlantic Ocean is edged by low, grassy tablelands, with not a tree in sight and nothing to relieve the monotony of the scene. This is the southern extremity of Patagonia's Pampas, a vast desert of grass.

The northern side of the Straits is the southernmost part of the South American mainland. The south side of the Straits is formed by the great island of Tierra del Fuego. Flat and windswept, the northern part of the island supports over a million sheep. The central part of the island is mountainous. Oil has been found there, and oil rigs and installations alter its original skyline. In the southern parts of the island there is little grass, or anything else, and this applies also to the smaller islands scattered to the south of Tierra del Fuego, which are only inhabited by a few roaming otter hunters, who just manage to keep themselves alive.

These islands include Horn and its famous Cape, as well as Navarino and Hoste, the latter where the great Australian anthropologist Sir Baldwin Spencer, scientist, explorer, author, and at one time Director of the National Museum of Victoria, died in 1929. He had gone to that spot, the end of the world, to interview one of the few remaining Indians, in an endeavour to investigate the feasibility of a once popular belief amongst men of science. Was the extreme south of South America colonized by Australian Aborigines? Alas, he was not destined to find out.

His grave at Punta Arenas was a Mecca for me, but I nearly did not get there. When the ship arrived at Punta Arenas roadstead the Captain wisely refrained from tying up to the only usable pier. In any case he would not have been able to do so. A sudden southerly had sprung up making it impossible to either approach the pier or for the Port Authorities to approach us. We had an uneasy anchorage in the roadstead. It was not until the next day, the wind having moderated, that a Chilean naval vessel came alongside and

offered to disembark any of the ship's passengers, so I made a safe landing, guarded by machine guns and anti-aircraft armaments.

In the Cemetery of Punta Arenas, as in all Latin cemeteries, people of the past generation have erected stupendous tombs for themselves and for the future use of members of their family. Some of these tombs are architectural jewels, many being built of various coloured marble expressly imported from Italy. In contrast, the handful of graves in the English section of the Cemetery look cold and unimaginative. Even the huge headstone erected over the mass grave of the Officers and men, the entire ship's company except the Captain, of the British Sloop "Dotterel", which blew up at Punta Arenas roadstead on 26 April, 1881, looks poverty-stricken by comparison. The Captain of this ill-fated ship was saved only because the explosion blew him out of the porthole of his cabin into the water, and he was immediately picked up.

Sir Baldwin's grave, however, has dignity in its simplicity. The retaining low wall of the grave is of hand-hewn unpolished grey granite. The headstone is composed of two joined upright slabs of the same material, and the grave is covered with a slab of polished porphyry, on which an inscription in gold letters, now pitted and faded through exposure to bleak winds and a covering of ice for months at a time reads:

SIR BALDWIN	SPENCER
K.C.M.G.	F.R.S.
JUNE 23rd	1860
JULY 14th	1929

It is a simple epitaph to a great man: the kind of memorial he would have written for himself.

Index of Victorian Naturalist

A cumulative subject index of the Victorian Naturalist from volume 1, 1884, is being compiled. So far the compilers have done the first fifty volumes. Mr. Baines has already made an author index from 1884. This is a card index to which he adds entries each month so keeping it up-to-date. It is available in the F.N.C. library.

The National Parks Authority has produced a duplicated index being sold for 60c. It was compiled by Mr. Saunders and has been valuable to many even before its publication. Mr. Jack Hyett has indexed birds in all volumes. Many others have indexed parts of interest to them.

The new subject index enables inquirers to find references to matter of interest to them, be it aboriginals, places, new species or other items. It has a section dealing with the locality on a grid map of Victoria of the places mentioned in the Naturalist. This map was shown to the members by Mr. T. M. Pescott when speaking on "a biological survey of Victoria" reported in 1970, 87, page 287. A copy of this map is being used as end pages in the second volume of *The Handbook to the Plants of Victoria* by Mr. J. H. Willis. This locality section of the index should be of use to any one inquiring about a district for historical or other purposes.

The index in process of compilation will be more comprehensive than others and has cross references. The inclusion of every detail together with exhaustive cross references would make the index so cumbersome

that room could not be found in our library, nor could it be completed in a reasonable time. A compromise has had to be made.

The index will be of use to a restricted number of workers. Whether the F.N.C. would be wise to publish it, is questionable. The decision needs discussion. If published, the index should be the same height as the volumes of the *Vict. Nat.* so that it can be placed on library shelves with cumulative indexes of this kind.

It is hoped that readers who have ideas to communicate will express them either to Miss Marjorie Butchart or myself.

K. E. HALL.

Field Naturalist Club of Victoria

Notice of Motion

In accordance with the Articles of Association notice has been given that the following motion will be put to the Annual General Meeting, to be held on 15 March, 1972:—

(a) That the *Victorian Naturalist* be reserved for the publication of—

(i) articles which add to the fund of knowledge of natural history;

(ii) articles which are concerned with methods and techniques for the gathering and processing of information which will contribute to the fund of knowledge of natural history;

(iii) articles which summarise or collate known information on any species or groups of species;

(iv) relevant book reviews, brief obituaries.

(b) That all clubs notes, excursion reports and trivial articles be published in a less expensive format for distribution, as a newsletter, to members of F.N.C.V.

This Motion is one of a number of proposals made at the December Meeting in the belief that the Club should be playing a more active part in the gathering, compilation and dissemination of factual information on Natural History. The articles at present published in the *Naturalist* fall into two broad categories:—

(i) Series articles contributing new information; and

(ii) Reports of excursions, etc., which are of widely varying standard, and are often of interest only to the participants.

These two categories are to a large extent mutually incompatible, as is borne out by the conflicting views expressed in the survey, and it is felt that the *Naturalist* should be reserved for the publication of serious articles on Natural History, while the other articles would be better placed in a newsletter. As the number of serious articles would not, at present, fill a monthly journal, the *Naturalist* would be published less frequently, probably quarterly, but its improved standing may well attract new authors.

On the other hand, the Newsletter could be prepared much more quickly, using modern techniques, and could give a much more immediate and fuller coverage of Club activities. Thus this policy would improve communications within the Club, would greatly enhance the standing of the *Naturalist* and would relieve the Editor of much of the pressure of meeting monthly deadlines.

R. H. RIORDAN,
Honorary Secretary.

General Meeting 10 January

The January meeting took its usual form, as the annual Members Night. In all 91 persons were present. At the beginning of the meeting the President read a list of new members names, and welcomed those of them in attendance to the club. He also extended a special welcome to Mr. Alec Burns, who has been a member since 1915, and was temporarily down from Queensland, where he now lives.

The early part of the evening was given to the presentation of members exhibits, and nature notes, which were the subject of some discussion. Exotic items displayed included some New Guinea daggers, carved in obsidian, and butterflies Mr. Burns had brought down from Queensland. Following the discussion of the exhibits and members nature queries and observations there was a showing of members natural history colour slides.

When general business came up the Secretary spoke about developments in Western Port, and the position of the New Holland Mouse (*Pseudomys Novaehollandiae*). This provoked much discussion, which led to a motion, moved by Miss G. Piper, that the secretary write to the Chief Secretary of Victoria asking A to reconsider the selection of personnel for the committee administering the Western Port survey: and
B when the survey would be completed?
An amendment to this motion added that a letter also be sent to the press pointing out the problems pertinent to the Western Port survey. With the amendment the motion was carried.

The Secretary then announced the club has been invited to do a nature survey of some 40 acres on the Gembrook-Pakenham road. He also announced that nominations for the annual election of officers closed that evening, and asked that any members interested in attending a survey camp over the Australia Day weekend contact him.

Mr. D. Lee outlined work of the Native Fauna Preservation Society in setting up a children's camp near Warburton.

A letter from the Royal Botanic Gardens' Director Dr. Churchill announced a gathering on January 28 to honour Mr. J. Willis on his retirement. Mr. R. Garnett moved that F.N.C.V. council make a suitable donation for the occasion. A letter from the Western Victorian Field Naturalists Association announced presentation of F.N.C.V. Honorary Membership to Miss L. Banfield.

the victorian naturalist

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F.N.C.V.

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

GENERAL MEETINGS

Wednesday, 15 March — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m. Annual General Meeting, (see agenda on p. 84).

New Members.

Ordinary:

Mrs. Sandra Cavanagh, 6/100 Hotham St., East Melbourne, 3002.
Mrs. M. Francis, 130 Normandy Road, East Kew, 3102.
Mr. Keith J. King, Flat 14, 302 Abbotsford St., North Melbourne, 3051.
Dr. David M. Churchill, c/- National Herbarium, South Yarra, 3141.
Mrs. D. G. Dunn, 3 Allfrey St., East Brighton, 3187.
Miss Jean E. Hood, 23 Salisbury St., Mont Albert, 3127.
Mrs. Mary Ritchie, 62 Riddell Pde., Elsternwick, 3185.

Country:

Mr. Graham P. Smith, Box E123, G.P.O. Canberra, A.C.T., 2600

Junior:

Timothy Farrelly, Assumption College, Kilmore, 3601.
David J. Tatnall, 8 St. Neot's Avenue, Northcote, 3070.

[It is regretted that last month, Junior and Country categories were inadvertently transposed]

Monday, 10 April — "Weather and Wildlife". Mr. Derrick Ried.

F.N.C.V. EXCURSIONS

Sunday, 19 March — Entomology excursion led by Mr. P. Kelly. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.70. Bring two meals.

Thursday, 30 March-Monday, 3 April — Easter excursion to King Island led by members of the King Island F.N.C. The plane will leave Tullamarine at 6.30 p.m. Thursday 30 March. Members making their own way to the airport should be there at least 30 minutes before departure time, members taking the bus from Melbourne should meet at Termini about 5.20 p.m. Bus leaves 5.40 p.m. Luggage is limited to one case per person plus airway bag or similar which may be carried by the passenger. The £35.00 already paid covers airfare and transport on the Island. Motel (room only) and meals are to be paid individually, cut lunches are obtainable at 60 cents each but members should bring a thermos for drinks. The programme arranged by the K.I.F.N.C. is as follows:

Friday morning: Forestry — Botany and Birds
„ **afternoon:** Sea Elephant River — Botany and Birds.
„ **evening:** Buffet tea with K. I. Field Naturalists.

Saturday all day: North of Island with Mr. Max McGarvie, everything.
„ **evening:** Slides.

Sunday all day: Yarra Creek Gorge, everything.
„ **evening:** Programme by F.N.C.V.

Monday morning: Grassy, King Island Scheelite with Mr. Jeff Gresham.
Depart 4.30 p.m. for Melbourne.

Saturday, 15 April-Sunday, 16 April — Weekend at Ararat. (see p. 83).

Preliminary enquiry, New Zealand?

Various members have asked if it would be possible to have an excursion to New Zealand so I have made enquiries. An excursion to New Zealand lasting 22 days, touring both islands and visiting Mt. Cook, Milford Sound, Fox Glacier, Rotorua etc., next January would cost between $500-$600 including airfare both ways. Are sufficient members interested for me to make bookings? Please let me know as soon as possible stating if you would be reasonably definite or are just generally interested in the idea. M. Allender.

GROUP MEETINGS

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

Thursday, 9 March — Botany Group. Mr. A. Fairhall will give the talk on "Propagation of Native Plants" scheduled for last month but cancelled through power restrictions.

Wednesday, 5 April — *Geology Group.*

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 3 8 March, 1972

CONTENTS

Front Cover:

This photograph of the Spotted Native Cat in an angry mood was taken by Hans Beste, through the courtesy of the Fisheries and Wildlife Department.

The Dunolly Fossil Wombat

by Edmund D. Gill*

The oldest recorded wombat remains in Victoria come from the gold diggings at Dunolly in Central Victoria. The specimen was found in September, 1856, 50 ft. (15 m.) from the surface of the ground at the bottom of a shaft on Slaughteryard Hill (called Gooseberry Hill in some newspaper reports of the time), near Burnt Creek, a tributary of Bet Bet Creek. Mr. Ferguson discovered it, and Mr. J. A. Panton presented it to the National Museum in Melbourne. Professor McCoy was very interested in this fossil, considering that it showed the "gold drifts" were not "alluvial" but belonged to much older Pliocene rocks to be compared with the Mammaliferous Crag of Britain. In those days the sediment of the present rivers was called The Alluvium, while Ice Age deposits were called The Diluvium, McCoy recorded the find in the Victorian Exhibition Essays (1861), repeating the entry but with the scientific name added in the Intercolonial Exhibition Essays (1866). The occurrence was also noted in a paper published in England in 1862 and another in Victoria in 1868. When giving his Presidential Address to the Royal Society of Victoria in 1861, His Excellency the Governor of Victoria, Sir Henry Barkly, referred to the Dunolly wombat as part of the evidence that, although Australia was antipodal to their homeland, it possessed the same succession of Palaeozoic, Mesozoic and Cainozoic rocks (Barkly 1865). This was a matter for wonder then, but is taken for granted now. Sir Henry used the fossil wombat as evidence of the existence of rocks here parallel to the Mammaliferous Crag of Britain.

In 1874 McCoy described the fossil jaw as *Phascolomys pliocenus*, and Brough Smyth noted it in the first Report of Progress of the Geological Survey. Etheridge (1878) listed it in his fossil catalogue, and Chapman (1914) illustrated it in his *Australasian Fossils*. When reviewing the geology of the alluvial gold deposits, Walcott (1920) discussed it. Tate (1951) referred it to *Vombatus*. So the Dunolly Wombat has received a great deal of notice for varying reasons.

Having been asked to check the chronology, I visited Dunolly in June, 1958. On the advice of the late Mr. W. Baragwanath, I contacted Mr. O. C. Smith, who put me in touch with Mr. M. Ramm and Mr. A. Cairns. I was thus able to see the original site, which during World War II was mined for "red ochre" (siltstone strongly pigmented with red iron oxide). The shaft had collapsed, but I was able to observe:

ft.	m.	
2	0.6	Red sandy gravel.
4	1.2	Mottled sandy gravel.
6	1.8	Whitish sandy gravel.
6	1.8	Red siltstone with some yellow pebbles.

The top of the red siltstone dips northwards at about 15°. It is probably a lenticle in the coarser sediments. The spoil heap indicated that whitish and yellowish sediments came from the lower part of the shaft.

* Deputy Director, National Museum of Victoria.

Some were very coarse with boulders up to one foot in diameter.

The fossil was in a calcareous siltstone with a slight reddish tint. Presumably the matrix was a lenticle of fine sediments (such as is formed by ponding) that were later calcified with secondary carbonates due to leaching of the sediments above. Except for degree of colour, the sediment containing the fossil is similar to that of the red ochre band in the same section. In that region it is not unusual to find carbonate accumulation at the base of permeable sediments. Thus the fossil fits into the general environment, and the presence of carbonate fits the claim that it came from the bottom of the shaft. The underlying rock is almost impermeable Ordovician slate.

Age of Dunolly Wombat

The formation containing the wombat jaw in Dunolly rests against the bedrock of Ordovician slate. There are no other fossils known from it, and no materials were discovered that could be used for dating. It was noted that the Ordovician outcrops are strongly ferruginized in places, which is evidence for powerful iron mobilization, because slate is so resistant to penetration. A search was therefore made for younger rocks that were ferruginized. These were discovered 5 miles (8 km.) N.N.E. of Dunolly at Painswick. There a formation of ferruginized river sediments was noted (Fig. 1) between the Ordovician bedrock and the formation which in Dunolly contained the wombat remains at its base.

The ironstone (which is non-magnetic) is judged to be the result of lateritization that occurred in Victoria in Lower to Middle Pliocene times. The youngest marine beds in Victoria to be lateritized are uppermost Miocene (Cheltenhamian), while the youngest rocks to show traces of it are 4.35 m.y. basalts near Hamilton which show partial lateritization (Gill 1957, 1964, 1971, Gibbons and Gill 1964, Turnbull et al. 1965). The solid ironstone is therefore given a Pliocene age, Lower or perhaps Middle. The accumulation of iron at Painswick suggests stable conditions over a long period of time. The overlying later formation containing the fossil indicates, on the other hand, a phase of instability. The local river was rejuvenated, and it cut a valley in the ironstone. The waters ran fast, carrying gravel and boulders up to one foot in diameter. The lateritization leached the terrain deeply, then uplift increased the power of the rivers which then eroded the weakened bedrock, releasing great quantities of gold from lodes. This accounts for the remarkably rich deposits of alluvial gold. This rejuvenation was the result of the Kosciusko Uplift, a phase of earth movement that had slow beginnings in the Lower Pliocene, but took place chiefly in the Upper Pliocene and Lower Pleistocene in

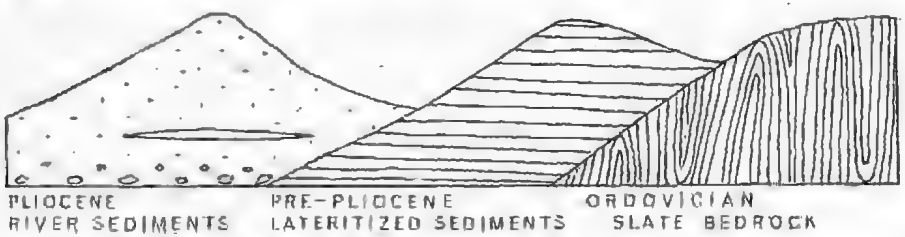

Figure 1. Diagrammatic section of the geology at Painswick 5 miles (8km) NNE of Dunolly, Victoria.

Victoria. It is therefore considered on present evidence that the Dunolly Wombat lived in Upper Pliocene times, soon after the main movements got under way, because the fossil occurs at the base of the sediments deposited by the rejuvenated river. Gold digging in the area turned over these sediments extensively, so that it can be seen that they are (1) mainly coarse but include lenses of fine sediments, (2) include heavy boulder beds, and (3) are poorly sorted. It is to be inferred that a large and powerful river flowed here, ripping into the countryside and carrying a mass of heavy waste materials towards the sea. The sediments include boulders of ironstone, and in places they overlie the ironstone, and so are younger, which their uncompacted condition also indicates. The present streams have cut into these uncompacted sediments, but are weak compared with the ancestral rivers.

Perhaps the wombat was drowned in this fast-flowing river. If its remains had been amongst the torrent gravels, they would probably have been destroyed. I imagine the cadaver was washed into a pond among the gravel banks. Its bones were washed apart so that in the shaft only the jaw was found. If the above interpretation be correct, it would be worthwhile to re-open the shaft and explore the siltstone for the rest of the skeleton.

In the Melbourne area this same change from stable to unstable conditions, resulting in the deposition of Kosciusko Epoch sediments, can be recognized. Marine beds are followed by poorly sorted clayey sands and gravels surmounted by basalt flows dated by potassium/argon assay as about 4.4 million years old. Likewise in the Hamilton district, marine rocks are followed by marshland deposits and tuffs, surmounted by basalt flows dated as about 4.35 million years ago (Gill 1957, Turnbull and Lundelius 1970).

In summary, it can be concluded that the fossil wombat came from the unconsolidated Kosciusko Uplift sediments that post-date the lateritization; also that it came from the base of these sediments (as claimed) because of the carbonate accumulation.

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Some Aspects of the Coastal Ecology of Kangaroo Island

by J. KIRKPATRICK*

The coastal vegetation of Kangaroo Island is interesting both because of its relative lack of disturbance by man, and its freedom from the scourge of rabbit grazing. This study describes the vegetation of ten coastal localities (Fig. 1) on Kangaroo Island. Relative exposure to strong salt-laden winds is assessed as a factor causing variation in the form and species composition of the vegetation described. A geological junction, coincident with vegetation change, is described and discussed.

Most of the coast is parallelled by cliffs. The cliffs on the south coast are mainly formed from calcarenite, which is often overlain by recent wind-blown sands. Along the north coast the cliffs are mainly composed of Proterozoic phyllites, Cambrian sandstones, the Kanmantoo group of Cambrian to Ordovician quartzites, argillaceous schistose quartzites, and schistose slates. Sand dunes are found along the rest of the coast, except for restricted stretches along the shores of Nepean Bay, the Bay of Shoals, and the Pelican Lagoon, which are marshy.

Womersley (1947) mapped two degrees of exposure for the Kangaroo Island coastline, using algal indicators. These are shown on Figure 1. In general the south and west aspects are the most exposed to strong salt-laden winds. The other aspects, especially the indented northeast, are sheltered by the Australian mainland which is, at its closest point, only nine miles from the island. The prevailing winds tend to reinforce the effect of water width on relative exposure.

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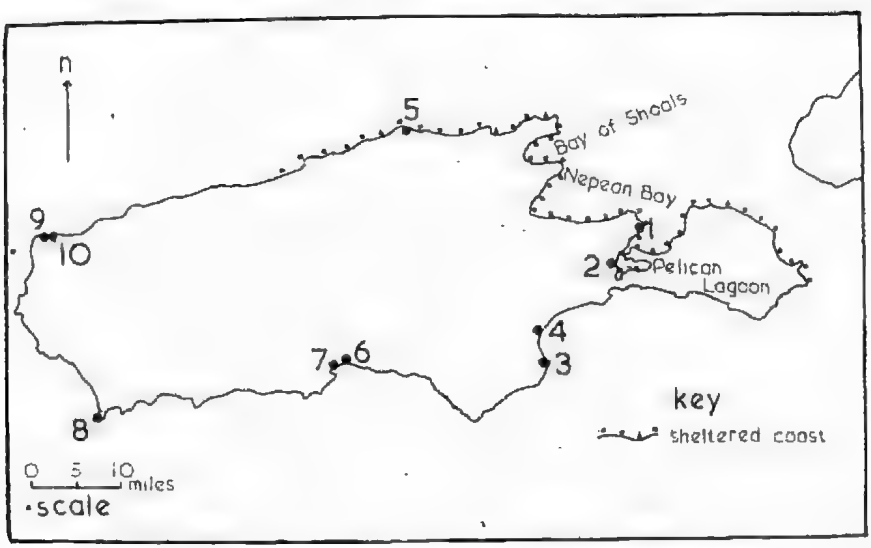

Figure 1. Kangaroo Island, showing the localities discussed.

At the ten localities, all relatively undisturbed, the following sampling procedure was used. The estimated line of the mean high water mark was tangential to the first quadrat, a circle of ten foot radius. Quadrats of the same shape and area were sampled at sixty-six foot intervals between their centres, along a line ninety degrees from the trend of the mean high water mark. The perennial species, and the dominants within each quadrat were noted. Those that could not be determined in the field were sent to the State Herbarium of South Australia for identification. Sampling ceased in most cases where the mallee eucalypts, so characteristic of Kangaroo Island, became dominant. A species list for the localities is appended.

It is probable that in coastal areas sodium chloride necrosis is the principal agent in the stunting of vegetation. This is suggested by the strong correlation between exposure to salt-laden winds and the degree of assymetry of form of vegetation on otherwise similar sites (Parsons and Gill, 1968). However the role of strong winds, causing high evapotranspiration rates, is probably also important, and stunting can be caused by other factors, such as nutrient deficiencies.

Figure 2 illustrates the zonation of the vegetation observed at the ten sites. The most immediate contrast is between those sites on the sheltered part of the coast (sites one, two, and five) and those on the more exposed part of the coast (Figure 1). Trees over fifteen feet tall were found in either the first or second quadrats at the sheltered sites (Plate 1). Among the exposed sites, four and nine had mallee eucalypts within the second quadrat, but these were severely salt-pruned, and less than six feet tall (Plate 2). Some of the exposed sites had a belt of coastal heath ranging from sixty-six feet to half a mile in width. This formation was completely absent on the sheltered sites.

Sites one and ten were both on the Kanmantoo group of rocks, yet contrast greatly in both the form and floristics of their vegetation; for they have only *Carpobrotus* sp., *Olearia axillaris* and *Haloragis tetragyna* in common in the first three quadrats. Although the soil was deeper at site one the rainfall was at least five inches per annum less than at site ten (Wood, 1930).

Site two, the most sheltered on calcarenite, similarly had the deepest soil, but the least rainfall of the sites on that particular substrate. Most of the species found in the heath formation on the other sites on calcarenite were absent in site two. The most severely exposed site on calcarenite appeared to be eight. Here both *Olearia axillaris* and *Rhagodia baccata*, which were found in either the first or second quadrats at the other sites on calcarenite, were found well back from the mean high water mark, in quadrats five and six respectively. The zone of coastal heath, absent at site two, was approximately half a mile wide at site eight, and 540 feet wide at site three.

Marked zonation is usually evident in exposed coastal areas. The species composition of vegetation on stabilized soils in areas exposed to salt-bearing winds seems largely dependent on relative resistance to sodium chloride necrosis (Boyce, 1954). Zonation is telescoped by decreased exposure to salt-laden wings (Fig. 2).

At several of the sites studied three zones could be distinguished. The zone nearest the shoreline was composed largely of species adapted to a coastal existence. These included halophytes such as *Threlkeldia diffusa*; *Salicornia quinqueflora*, *Carpobrotus* sp., *Disphyma australe*, *Frankenia pauciflora*, *Samolus repens*, and other

common coastal shrubs and herbs, including *Stipa teretifolia, Spinifex hirsutus, Muehlenbeckia adpressa, Rhagodia baccata, Tetragonia amplexicoma, Melaleuca lanceolata, Alyxia buxifolia, Myoporum insulare, Olearia axillaris, Calocephalus brownii* and *Ixiolaena supina*. The latter species has an interesting distribution, being found on Bass Strait islands including Curtis Island and along parts of the South Australian coast, but being absent from the Victorian coast.

Although the first zone varied in width (Fig. 2) it was found at all sites. However, the second zone, dominated by sclerophyllous shrubs generally less than three feet high, was present only at sites three, eight, nine, and ten. The species occurring most commonly in this heath were *Lasiopetalum schulzenii, Melaleuca gibbosa,* and *Helichrysum adenophorum*. Many of the species that characterized the first zone were found in lesser abundance in this second zone.

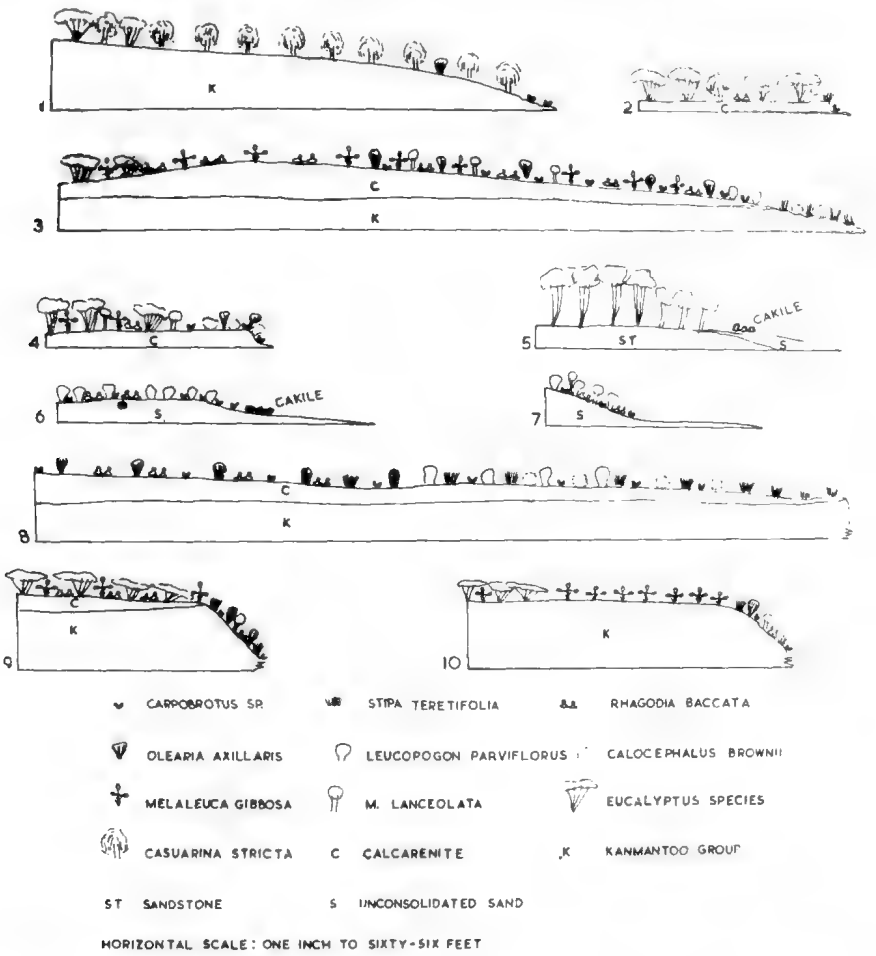

Figure 2. Cross-sections of the ten localities. Heights not to scale. Not all species are depicted.

The third zone was characterized by the presence of one or more of the various species of mallee eucalypt which dominate much of the island's vegetation. Although the most seaward of these eucalypts were generally asymmetric in form (Plate 2) their advent probably marks the limit of the major influence of windborne salt. The most common species was *Eucalyptus diversifolia*, which was found at five of the sites.

It is known that differing surface geology is often correlated with differences in the form and species composition of vegetation on otherwise similar sites (e.g. Harris, 1963).

This phenomenon is particularly evident at the geological junction found between sites nine, and ten. The cliff at these sites is carved from the Kanmantoo group of rocks, which on the clifftop at site nine are overlain by calcarenite. The marked con-

Plate 1. Site five. (Figure in middleground six feet.)

photo: Author

trast in the form of the vegetation on either side of the geological junction can be seen from Plate 2. The sparse low heath in the foreground is on the Kanmantoo group of rocks while the low mallee, dominated by *Eucalyptus diversifolia*, is on calcarenite. Ten species were recorded from quadrat two of site nine, which was situated in the clifftop mallee, on calcarenite. Of these species only *Melaleuca gibbosa* and *Lepidosperma viscidum* occurred among the fourteen species of quadrat two of site ten, in the clifftop heath. In the third quadrat of site ten *M. gibbosa*, *L. viscidum*, and *Eucalyptus cosmophylla* were the only species of the thirteen found in the quadrat to occur in the second quadrat of site nine, despite the similarity in vegetation form and structure between the two quadrats. The most feasible explanation for these differences seems to be that the soils formed on the two parent materials differ in their moisture holding characteristics and/or nutrient status.

However, the main contrasts in the form and species composition of the coastal vegetation of Kangaroo Island are probably due more to relative exposure rather than surafce geology, or other factors, such as precipitation.

Acknowledgements

I would like to thank Dr. R. F. Parsons for his invaluable help in the field and for critically reading the manuscript, Dr. E. C. F. Bird for his comments on the article and the staff of the State Herbarium of South Australia for their identification of specimens.

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Note: The State Herbarium of South Australia have corrected the determination of *Olearia axillaris* collected from Site 2 to *Beyeria lechenaultii*

Plate 2. Parts of sites nine and ten.

photo: Author

Appendix — Species List

The species identified by the State Herbarium of South Australia are asterisked. Nomenclature follows Eichler, H., 1965. *Supplement to J. M. Black's Flora of South Australia.* Gov't Printer, Adelaide, except where authorship is cited.

	Site Numbers									
	1	2	3	4	5	6	7	8	9	10
**Hibbertia stricta*	x									x
**H. aspera*			x							
**Frankenia pauciflora*								x		
**Pimelea serpyllifolia*						x				
**P. glauca*			x							
**Baeckea ericacea*										x
Melaleuca gibbosa	x	x	x	x					x	x
M. lanceolata		x	x	x	x		x		x	x
M. uncinata	x								x	x
Eucalyptus diversifolia		x	x	x	x				x	
E. lansdowneana				x						
E. cneorifolia	x	x								
E. cosmophylla									x	x
E. rugosa		x								
**Thryptomene ericaea*	x									
Calytrix tetragona									x	x
**Lhotskya glaberrima*										x
Haloragis tetragyna	x									x
**Astroloma humifusum*	x									
**A. conostephoides*										x
Leucopogon parviflorus			x			x	x	x		
**L. concurvus*										x
**Acrotriche cordata*								x		
Samolus repens								x		
**Alyxia buxifolia*								x		
**Prosanthera microphylla*										x
Myoporum insulare		x	x			x		x		
**Goodenia varia*			x							
Scaevola crassifolia			x	x				x		
**Olearia axillaris*	x		x	x		x		x	x	x
**Senecio aff. lautus*				x		x	x	x		
**S. cf. cunninghamii*						x				
Ixiolaena supina			x					x		
**Helichrysum adenophorum*			x	x		x	x			
**Ixodia achillaeoides*								x		
Calocephalus brownii			x	x				x		

	Site Numbers									
	1	2	3	4	5	6	7	8	9	10
Cheilanthes tenuifolia	x									
Stipa teretifolia		x	x					x	x	x
**Stipa sp.*								x		
Spinifex hirsutus						x				
**Poa crassicaudex* Vickery				x		x	x			
Scirpus nodosus						x	x			
Lepidosperma gladiatum							x			
L. viscidum	x								x	x
Dianella revoluta						x	x			
**Xanthorrhoea sp.*										x
**Orthrosanthus multiflorus*		x								
Casuarina stricta	x	x								
Isopogon ceratophyllus										x
**Hakea leucoptera*										x
**H. muellerana*			x	x						
**Grevillea pauciflora*			x							
Muehlenbeckia adpressa			x							
Rhagodia baccata		x	x	x		x		x	x	x
Threlkeldia diffusa		x		x						
Salicornia quinqueflora		x								
Carpobrotus sp.	x	x	x	x		x	x	x	x	x
Disphyma australe								x		
Tetragonia amplexicoma		x						x		
Clematis microphylla							x			
Cakile sp.					x					
Acacia armata	x									
**A. acinacea*			x							
**Eutaxia microphylla*									x	x
**Pultenaea rigida*									x	
**P. vestita*			x							
**P. acerosa*			x	x						
**Templetonia retusa*			x							
Swainsonia lessertiifolia						x				
**Zygophyllum billardieri*									x	x
**Boronia filifolia*										x
**Correa reflexa*				x		x	x			
**Pomaderris paniculosa*	x			x			x			
**P. obcordata*			x							
**Spyridium leucopogon*			x							
**S. halmaturinum*			x							
**S. halmaturinum var. scabridum*										x
**Lasiopetalum schulzenii*			x	x					x	x

reptiles of victoria–5

by Hans Beste

PLATE 9

Egernia striolata — Tree Skink

A robust skink of the inland, frequently found climbing tree trunks.

Length: to 9 inches.

Head pointed, distinct from body. Snout rounded. Ear-opening large and distinct. Five fingers and five toes. Legs well developed, with strong claws for climbing. Upper slate-grey with several longitudinal rows of black spots along vertebral line. Broad black stripe on flanks from below eye to hindleg. Under, including upper lip white to pale apricot.

Habitat: inland under bark, climbing trees or among debris.

Best distinguishing features — bulky appearance, short depressed tail; from *Egernia saxatilis* by grey back and absence of keeled scales.

PLATE 10

Egernia inornata — Desert Skink

A thick looking skink with a blunt head.

Length: to 9 inches.

Head blunt, thick, not very distinct from body. Ear-opening large and distinct. Five fingers and five toes. Legs comparatively weakly developed. Upper fawn. Sides pale rose with black bands and spots. Under white. Eye outlined with black. Eyelids pale cream. Tail long, tapering to a point. This lizard excavates extensive burrows with several escape tunnels.

Habitat: in sandy areas of the North-West of the State. Often associated with porcupine bushes (*Triodea sp.*).

Best distinguishing features — blunt head and pale pinkish colouration, also habitat.

Plate 9

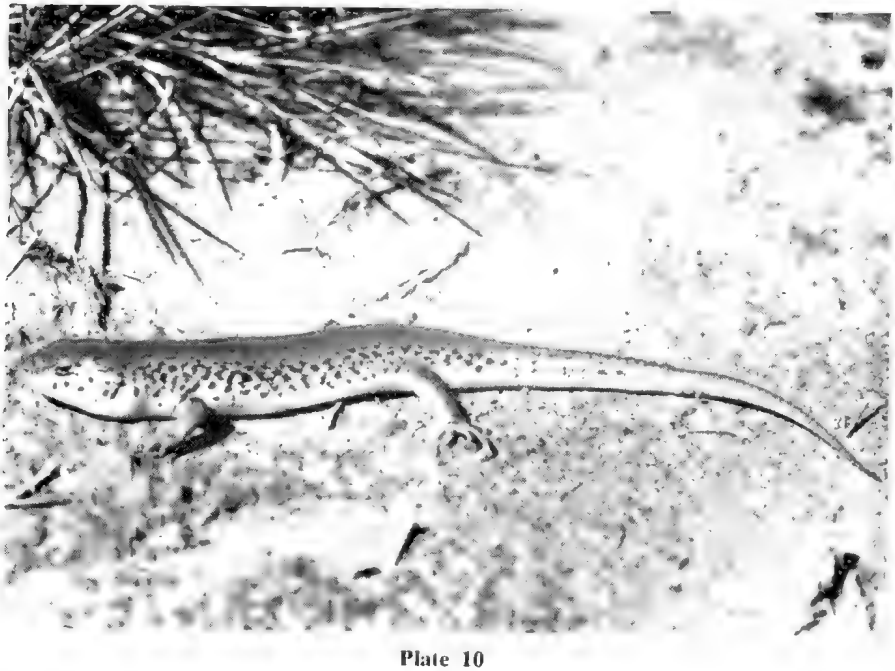

Plate 10

Victorian Occurrence of the Crab *Sesarma erythrodactyla* – Hess 1865

by S. W. Gunn

The crab illustrated is *Sesarma erythrodactyla*. Hess 1865, belonging to the family Grapsidae and subfamily Sesarminae. It is quite plentiful among the mangroves of the northern and eastern shores of Western Port Bay, where it burrows into firm mud.

The Marine Study Group of Victoria, which has recently completed a survey of the marine life of the littoral belt of Western Port Bay, (and which is now being compiled as a scientific publication), has collected a number of specimens of the animal. The genus Sesarma is characterised by a diagonal grille effect covering the pterygostomian regions (the side walls of the carapace).

Sesarma erythrodactyla is a very colourful animal. The overall colour varies from greenish-black to almost black, but the adults may often be found with an irridescently blue-green carapace. Contrasting with this is the bright orange-red of the fingers of the chelipeds. The species characteristically has two or three ridges on the upper anterior face of the chelipeds.

The most interesting part of this story is that previously the genus Sesarma was considered to have its distribution confined to warmer seas, occurring no further south than southern New South Wales.

Sesarma erythrodactyla is the only representative of the genus in Victoria, and its presence in Western Port Bay constitutes by far the most southerly record, not only of the species but also of the genus.

Confirmation of this has been received from Mr. B. Campbell, Senior Curator at the Queensland Museum, and an authority on Brachyura.

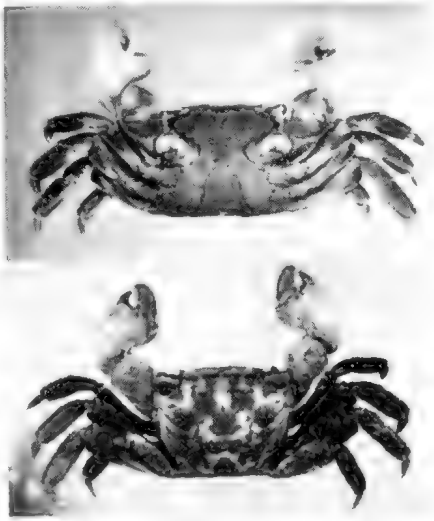

Plate 1
Photo N. A. Wakefield

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

F.N.C.V. Excursion to Mt. Napier and Mt. Eccles

(Easter 1971)

by E. COSTERMANS

Everyone had been saying for a week that the beautiful summery weather couldn't possibly last over Easter—but it did!—and at 8.30 on the fine sunny morning of Friday, 9 April, 25 members boarded the coach in Melbourne, and set out via the Western Highway for Hamilton. Passing through Ballarat, our driver, Frank, detoured to enable us to view from the bus the progress being made with the excellent reconstruction of the original Sovereign Hill mining settlement. We then took a quiet minor road past Mt. Emu, a granite outcrop, to Skipton, where we lunched in the shade of a plantation of Blue Gums (*Eucalyptus globulus*) in the swimming pool reserve. Here an unexpected find was a flowering specimen of *Calocephalus citreus*.

From Skipton we travelled along the Glenelg Highway. Here, the main features of the extensive Western Lava Plain were the many large plantations of Sugar Gums (*E. cladocalyx*) bordering the grazing properties, of such regular growth and even height as to give the appearance, at a distance, of clipped hedges. The suggestion of a brief stop at Lake Bolac was enthusiastically received. Those with binoculars were interested in the large number of Musk Duck on the lake, while other members studied the plants, which included *Rhagodia nutans*, the Rush *Juncus pallidus*, and the sedges *Scirpus maritimus* and *S. americanus*, or watched the Grey Fantails flitting among the Red Gums (*E. camaldulensis*).

Shortly after leaving Lake Bolac, the road crossed the Hopkins River. Here the flat lava plain gave way to a pleasant undulating landscape, with many large and picturesque Red Gums scattered over the paddocks and with the spectacular Serra Range of the Grampians as a back-drop.

On reaching Dunkeld at the southern end of the Range there was time to take a short run along the Victoria Valley Road, between the majestic sandstone peaks of Mt. Sturgeon and Mt. Abrupt. Here we were rewarded by seeing a few wildflowers, such as *Ixodia achilleoides*, Flame Heath (*Astroloma conostephioides*) and the red form of *Correa reflexa*, still in bloom.

Many members were very interested in making the acquaintance of the well-named Scentbark (*E. aromaphloia*) and in discovering that the bark really is aromatic.

Returning to Dunkeld, we continued our journey to Hamilton and the George Hotel-Motel, where we were to spend three nights. On arrival we were joined by three more members who had travelled to Hamilton independently, and we were met and welcomed by Mr. Lionel Elmore of the Hamilton F. N. C., who was to be our guide and mentor for the next two days. In the evening he returned to the hotel with Mrs. Elmore, and outlined and discussed with members the interesting programme they had arranged for us.

Leaving the hotel at 9.30 on Saturday morning and led by Mr. and Mrs. Elmore, we travelled the 8 miles to Mt. Napier, an extinct volcano (*Victorian Nat.* 80, 162-168). At the base of the hill we had to leave the bus. Here Mr. Elmore had a cattle truck with hay bale seats to help the private

cars ferry the party further up the rocky track, over successive layers of *aa* or blocky lava. The last section was a fairly steep foot track to the main crater and the summit (alt. 1453 ft.). The crater is about 446 ft. across and averages 80 ft. in depth, with a perpendicular rim, breached on the north-west.

From the summit, a forested area on all sides indicates the extent of the lava flows, and some other craters almost hidden by trees were pointed out to us. Except around the main crater, Mt. Napier carries a pure stand of Manna Gums (*E. viminalis*) with a ground cover consisting mainly of Bracken (*Pteridium esculentum*). The scoria surface is very rough and broken.

When Major Mitchell, who named Mt. Napier, climbed to the top in 1836, he noted that "trees and bushes grew everywhere luxuriantly" and he had to clear the scrub before he could set up his surveying instruments. Grazing has now denuded the top 300 feet of all but grass, and low herbage. Lower down, the Manna Gums grow tall and straight with smooth white bark, but near the base they become rough barked and more crooked. A

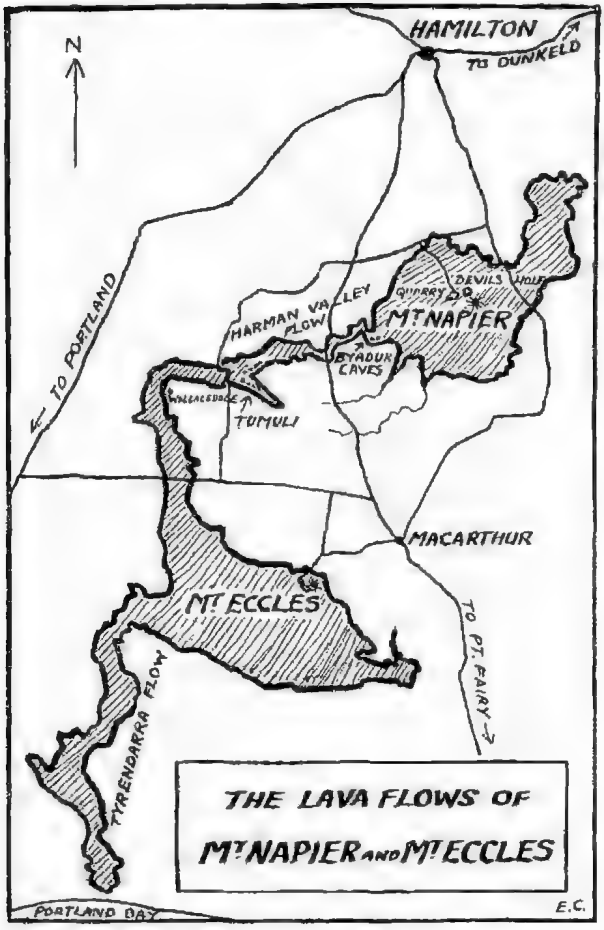

Figure 1.

Area locality map.

specimen of the multi-flowered, rough barked variety, *E. viminalis* var. *racemosa* was found and recognized by its buds.

A short distance beyond the recent lava flows, Swamp Gums (*E. Ovata*) were growing.

Mr. Elmore has spent much time in exploring and mapping almost forty eruption points on Mt. Napier, which is one of the youngest volcanoes in Victoria, probably last active less than 7,000 years ago. It is surrounded by the much older basalt plain. When the Recent volcano became active, there was first a lava flow, followed at intervals by successive waves of activity, ejecting scoria, lava, or cinders from various points; so building up the present cone. On the south-west, three lava streams have extended for some distance. The longest, the Harman Valley flow, completely filled a former river valley and continues for 15 miles. The others have associated lateral streams, Scott's Creek and Weerangourt Creek. We were told that the water issuing from the base of Mt. Napier is the purest in the Western District.

About 200 yards below the breach in the main crater is a lava tunnel which we reached by scrambling round the hillside after leaving the summit. At the entrance we were each provided with a candle and Mr. Elmore led the way with a pressure lamp as we climbed down to the floor of the tunnel.

Tunnels are formed in a flow when lava cools and hardens on the surface but continues to flow underneath the crust and so drains away, leaving a gas filled cavity. The collapse of portion of the roof provides an entrance.

As we walked along the tunnel, Mr. Elmore shone his lamp on the pitched roof to show us the numerous lava stalactites with which it was decorated. One theory on their formation is that the burning gases rose from the molten lava, and continued burning against the roof, thus melting the surface which dripped down and formed the stalactites. There was a low opening at the end of the tunnel not convenient as a way out, so our candle bearing procession retraced their steps to the bright sunshine outside. We then made our way back to our transport, admiring the distant view of Mt. Abrupt as we walked down the track.

Boarding the bus once more, we drove round the base of the Mount and along a track leading to another eruption point on the north-west flank, a hill of layered lava and cinders. Here quarrying had exposed the very colourful bright red scoria above the layers of black cinders. We had lunch in the quarry and one of the plants noted here was Creeping Mint (*Mentha satureioides*). After lunch, some members walked the short distance through shoulder high bracken to the Devil's Hole. This is an explosion crater 100-200 ft. deep, filled with tall trees and luxuriant vegetation with its own micro-climate, well worth preservation and study. Mr. Elmore and a few members descended to the bottom with the aid of a guiding rope, while others botanized among the rocks above. Finds here included Maidenhair Fern (*Adiantum aethiopicum*), Variable Rock Fern (*Cheilanthes tennifolia*), Necklace Fern (*Asplenium flabellifolium*), Mother Shield Fern (*Polystichum proliferum*) and Austral Bracken (*Pteridium esculentum*).

Returning along the track leading from the quarry we were shown several other eruption points, including a crater 250 ft. across and 30 ft. deep, and some scoria hills. Then after a very interesting day, we returned to Hamilton.

In the evening we were invited to join members of the Hamilton F.N.C.

in the lecture room of the town's fine modern Art Gallery. Here Mr. Elmore showed slides, including aerial photos, illustrating the many features we had seen, and some that we had been unable to visit, and told us more about them. There were also some interesting rock specimens on display. The evening concluded with supper kindly served by the ladies of the Hamilton Club.

On Sunday morning our hosts once more joined us and after guiding us on a brief tour of the town led us to the Byaduk Caves (*Victorian Nat.* **80**, 279-290) the weather still being fine and quite hot. These lava caves, about 12 miles south of Mt. Napier, are formed in the Harman Valley flow, the flat surface of which indicates very liquid lava.

Walking from the bus across the level unshaded surface, we suddenly found ourselves looking down into a rocky sink-hole filled with ferns and other vegetation. In one side of the hole was the entrance to Harman Cave 1. Some of us descended into the pleasant shade of the cave, led once again by Mr. Elmore and his lamp. Here in the walls were ledges left by earlier flows. On the floor was evidence of creatures, the probable existence of owls, which roosted on projections up above.

In the entrance Shining Shield Fern (*Lastreopsis shepherdii*) was found, and nearby grew Austral Filmy Fern (*Mecodium australe*) and Blanket Fern (*Pleurosorus rutifolius*). Also among the rocks on the floor of the cave, well beyond any other vegetation, an all white gilled fungus was growing in the darkness. Other plants found in the vicinity included Kangaroo Apple (*Solanum laciniatum*), Tree Violet (*Hymenanthera dentata*), Nodding Salt Bush (*Rhagodia nutans*), Shining Cassinia (*Cassinia longifolia*), Variable Groundsel (*Senecio lautus*), Sweet Bursaria (*Bursaria spinosa*) and Austral Pelargonium (*Pelargonium australe*). A few yards away was another sink-hole with similar vegetation but without a tunnel, Harman Cave 2. Here our eagle-eyed Excursion Secretary spotted an unfamiliar plant growing on a rock, which was later identified as the lichen *Parmelia cooperi*, the first record of this plant in Victoria.

Leaving Byaduk, we drove south to Mt. Eccles, another of the Western District's recently extinct volcanoes. The approach showed us a low bare hill scarred by a quarry. Reaching the shady picnic ground inside the crater, a different scene greeted us as we looked down on the beautiful and aptly named Surprise Lake, surrounded by many trees and dense vegetation and with steep walls nearly 100 ft. high!

Here we were pleased to meet unexpectedly our old friends from Ballarat, Mr. and Mrs. Bedggood and members of their family, who were enjoying a barbecue lunch. After greetings were exchanged we lunched in the shade of the Manna Gums. After lunch we took the upper track round the north end of the lake, giving us a fine view along its length towards the scoria cone. The lake, which is considered to occupy three craters, is 43 ft. at the deepest point and has no outlet. Although the water level rises and falls seasonally it has never been known to dry out.

Just off the track we had a look into the Tunnel Cave (*Victorian Nat.* **81**, 64-71; **85**, 350-356). An interesting feature here, apart from its almost perfect tunnel shape, are the roots, presumably from the Manna Gums growing about 50 ft. above, which hang like fringes from crevices in the roof. A little further along the track after leaving the cave we saw the beginning of the main lava channel—

locally called *The Canal* — of the Tyrendarra Flow, the longest lava flow in Victoria, which continues for 19 miles to the coast and then possibly a further 9 miles out to sea.

A channel is a flow which carried large quantities of fluid lava, building up a kind of levee bank on either side as the red hot stream in the centre continued cutting through previous flows, pushing dislodged pieces aside.

Leaving *The Canal* we took a track which led downwards to the lake, between tall trees and quite thick scrub. There was also plentiful bird life in contrast to Mt. Napier. Reaching the water's edge, where the Rush (*Juncus procerus*) and the Common Reed (*Phragmites communis*) were growing, the view along the lake brought the cameras into action once more. Returning to the picnic ground above, some members decided to climb to the trig. marker on the scoria cone (alt. 588 ft.).

The steep track led past some picturesque old she-oaks (*Casuarina stricta*) overlooking the southern end of the lake, and then through rough grass and herbage to the summit. From this vantage point we had a good view to the north of the cone of Mt. Napier, its gently sloping symmetrical sides rising gradually from the plain. To the south, with the aid of binoculars, we could trace the coastline at Port Fairy, marked by the sand-dunes standing out white in the bright sunshine. The flat lava flow forming Lady Julia Percy Island was clearly visible, as were the silos at Portland. We tarried here awhile, making the most of the clear air and warm sun, then returned down the track to the bus, remarking on the unusual deep green colour of the lake from this angle.

Some of the plants identified in this National Park were Blackwood (*Acacia melanoxylon*), Black Wattle (*A. mearnsii*), Sweet Bursaria (*Bursaria spinosa*), Blue-bell (*Wahlenbergia quadrifida*), Cutleaf Cranesbill (*Geranium solanderi*), Trailing Pratia (*Pratia pendunculata*), Sticky Boobi-

Plate 1. Mt. Napier. The rim of the main crater. The breach is on the right. The tree cover at the left indicates the extent of the lava flows.

photo: Author

alla (*Myoporum viscosum*), Creeping Wood Sorrel (*Oxalis corniculata*), Slender Knotweed (*Polygonum minus*), Sheeps Burr (*Acaena echinata*), Kangaroo Apple (*Solanum laciniatum*,), Black Nightshade (*S. nigrum*), Austral Carrot (*Daucus glochidiatus*), Ivy Leaf Violet (*Viola hederacea*), Cherry Ballart (*Exocarpos cupressiformis*) and *Desmodium varians*, the last-named being an addition to the Park's plant list. As at Mt. Napier, the only eucalypt is the Manna Gum and again the multi-flowered variety was found.

Leaving Mt. Eccles to return to Hamilton, we travelled via Wallacedale to see the remarkable lava "blisters" — or are they tumuli? They are a large number of domed mounds of lava rising 15-30 ft. above a flat slightly sloping paddock, part of the Harman lava flow. There are two suggested theories put forward as to their formation. Blisters could be formed by steam rising when hot lava flows over a swamp, whereas tumuli could be caused by varying pressures of solidifying lava on the still liquid parts of a flow that is slowing down, forcing the lava into hummocks. Tumuli are usually solid, although the centre and the outer crust may be differing textures, and sometimes the "skin" may be split on top. Some at least of the mounds here are probably tumuli, as they have been tested and found to have no cavity.

Returning to Hamilton, we partook of the Smorgasbord which is a regular Sunday night feature at the George Hotel, before packing, ready for an early start on our homeward journey.

Next morning, Easter Monday, our Hamilton friends were at the hotel to farewell us, and we all thanked them very sincerely for giving up so much of their time to arrange for us such an enjoyable and informative weekend.

At Dunkeld we detoured once more into the Victoria Valley for some more botanizing before leaving this lovely district in which we could easily have spent the whole day. However, with a little more time available than on our earlier visit, we were able to explore a little further at our previous stopping place. The trees here, in addition to Scentbark, mentioned earlier, which was in flower, included Brown Stringybark (*E. baxteri*), Broadleaf Peppermint (*E. dives*), Manna Gum and others. Five orchids were found, Bearded Midge Orchid (*Prasophylum morrisii*), Sharp Leek Orchid (*P. despectans*), Midget Greenhood (*Pterostylis parviflora*), Fringed Hare Orchid (*Leptoceras fimbriatus*) and Large Duck Orchid (*Caleana major*). Silver Banksia (*Banksia marginata*) was in full bloom. There were many plants of Holly Grevillea (*Grevillea aquifolium*) but not in flower. Other plants identified included Common Flat Pea (*Platylobium obtusangulum*), Holly Lomatia (*Lomatia ilicifolia*), the sedge (*Caustis pentandra*), Common Heath (*Epacris impressa*), Flame Heath (*Astroloma conostephioides*), Beard Heath (*Leucopogon ericoides*), Cone Bush (*Isopogon ceratophyllus*), *Pultenaea sp., Tetratheca ciliata*, Bundled Guinea Flower (*Hibbertia fasciculata*), *Phyllota pleurandroides*, Leafless Bitter-pea (*Daviesia brevifolia*), Manuka (*Leptospermum scoparium*), Giant Hop Bush (*Dodonaea cuneata*), Tassel Rope Rush (*Hypoloena fastigiata*), *Ixodia* and many others.

Reluctantly we moved on. A little later, a short walk ahead of the bus was suggested. Here a Stumpy-tail Lizard was discovered and duly admired, and some empty nests were found in the bushes, posing the unanswered question — possums or birds? On our way once more, Frank suddenly slowed down, having spotted an emu on the road ahead. Another

one then emerged from the bushes and as we slowly approached, ran off into the scrub, feathers flapping. A little later we passed a sign "Kangaroos Crossing" — but this time we watched in vain.

Reaching Lake Bolac once more, we stopped beside the lake for lunch. The Musk Ducks had departed, and there were only a few odd waders around the margin. An Eastern Swamp Hen was seen to take cover in the rushes as we arrived.

On our way again, we headed for home with only one stop, at Skipton, as we hoped to avoid the worst of the homegoing holiday traffic. So ended a lovely week-end, with many thanks to Marie Allender for arranging such an interesting excursion with such wonderful weather.

Mammal Survey Group

(Annual Meeting)

The Annual General Meeting of the Mammal Survey Group will be held on Thursday, 6 April 1972, at the Arthur Rylah Institute, 123 Brown Street, Heidelberg.

Ararat Weekend

Saturday and Sunday, 15, 16 April — Ararat. The Ararat Conference will be held this week-end and Miss Banfield will be presented with her Life Membership certificate on Saturday evening. There is a choice of two short excursions in the afternoon and an excursion to Mount Cole on Sunday. More details of the program will be in the next *Naturalist*. A coach has been booked for the week-end and motel accommodation on a bed and breakfast basis for Saturday night. Cost for coach and motel will be $12, cheques to be made out to Excursion Trust.

Field Naturalists Club of Victoria

*No General Meeting was held in February due to the S.E.C. power restriction on lighting in Public Halls.

Agenda for Annual General Meeting — Wednesday, 15 March, 1972.

1. Confirmation of Minutes of Previous Annual Meeting.
2. Election of New Members.
3. Election of Office Bearers.
   The following nominations have been received:—
   President: Mr. T. Sault
   Vice-Presidents (2): Mr. B. Cooper. Mr. D. Lee
   Secretary: Mr. R. H. Riordan
   Assist. Sec:
   Treasurer: Mr. H. Bishop
   Assist. Treasurer: Mr. H. Janssen
   Editor: Mr. G. Ward
   Assist. Editor: Mr. G. Douglas
   Librarian: Mr. P. Kelly
   Assist. Librarian: Miss G. Piper
   Excursion Sec: Miss M. Allander
   Residual (5): Mr. J. H. Willis, Mr. D. Reeves, Mr. M. Coulthard.
4. Secretary's Report.
5. Treasurer's Report.
6. Speaker — Mr. A. Dunbavin Butcher will speak on "The Western Port Survey".
7. Correspondence.
8. Announcements.
9. General Business. Notice has been given of a motion relating to the *Victorian Naturalist* (see February issue).

Letters to the Editor

To restrict the *Victorian Naturalist* to purely scientific articles for the experts, would be a retrograde step. To my way of thinking, in order to stimulate more people into a greater interest in natural history, the magazine has to have some articles for lay people like myself to start building their knowledge and in due course the more scientific articles will also become interesting to us as well as being informative to the experts.

If the club wishes to encourage young people to become active members of the club, the magazine as well as club activities should, I feel, cater for most levels of knowledge in the club, and not just for those already well informed professionals or experts.

I enjoy the *Victorian Naturalist* in its present format, and except for the distance from the city and the ties of dairy farming, I would be delighted to attend the meetings as well. However I would not find as much of interest if all articles were of a purely scientific nature, and would probably fall by the wayside in due course.

Being a relatively new member I did not feel qualified to voice an

opinion on the questionnaire, particularly as I have never attended a meeting of the club.

Thank you for your interest in my opinion, and hoping the club prospers in membership and worthwhile activities.

Val Lumsden
Fish Creek 3959

Dear Sir,

As one who spoke strongly against the motion moved by Mr. Munro at the club's meeting on 13 December, the passing of which would confine the contents of the *Victorian Naturalist* to strictly scientific articles and reports of investigations and new discoveries, permit me to elaborate on some of the vital arguments that I hope will defeat what I regard as a retrograde step when the adjourned motion is further discussed and voted on at the March meeting.

Housed in twin system card cabinets in the club library, National Herbarium, is an Author Index to all material published in the *Naturalist*, from Vol. 1 No. 1 (1884) to the current issue (1972), during the compilation of which I have gained a good knowledge of the type of material provided for members' enlightenment and pleasure throughout that long period. Enlightenment came from the recording of new knowledge, its dissemination within Victoria and scientific circles elsewhere in Australia and even overseas, since from the beginning the club's journal has been exchanged for similar publications emanating from many different sources. Pleasure came from reading of the personal experiences of fellow members gained on excursions, whether organized by the club or groups or even individual trips to unusual places, and the nature notes contributed by keen observers of the animate and inanimate, near and far. Humorous anecdotes, if relevant, were not excluded, and our journal has been the better for it.

From the beginning the Field Naturalists' Club of Victoria has been fortunate in numbering among its active members many distinguished experts in particular scientific disciplines, and these have contributed articles and original papers that have won for the club an enviable record unequalled by any similar natural history society in Australia. The *Victorian Naturalist* has had an unbroken monthly publication for nearly ninety years, and is constantly cited among references in scientific journals over a wide field, but this does not mean that its contents should consist solely of such serious matter. Scientists have their own journals, such as the published transactions of the Royal Society of Victoria and its counterparts in all the other States, Linnean Society of New South Wales, Kew Bulletin, Australian Journal of Botany, and Muelleria. Our club is for *naturalists*, a term that includes both professionals and amateurs, and if a poll were taken of our hundreds of members I am confident that there would be a huge majority for the retention of the more 'popular' writings such as the recording of club doings — in fact, such reporting is vital to keep a club alive, as many members, for reasons of distance, infirmity and other responsibilities, cannot participate as fully as they would wish, and some attend no meetings at all.

I would remind members that the assistant editor warned that action on the lines desired by Mr. Munro and his small group of vocal supporters posed a serious threat to the continued existence of the *Naturalist*. Perhaps it should also be said that the club rank and file should not be told how to run its affairs by someone who, by his own admission, has atten-

ded only six meetings in six years of membership!

I have just compiled the index to Volume 88 (1971), in which, for the first time for many years, only two groups have had reports of their meetings published during the year. Scattered in these reports over the years are many facts that otherwise would have gone unrecorded. I live in Oakleigh, and am fascinated when I read Charles French's 'Ramble through the Heathground from Oakleigh to Sandringham' (Vol. 7, pp. 71-75) recording species that have long gone from what is now a completely built-up area. Finally, a touch of humour from A. H. S. Lucas, an outstanding double-degree early member who recorded (Vol. 7, pp. 31-3) the excursion he led to Portarlington in 1890: "The excursion was, then, an interesting one. A large number of marine forms were observed, of which some were taken home alive for more leisured observation. It should perhaps be added that the party consisted of the leader only."

Yours faithfully,
James A. Baines

* * * *

At the December General Meeting, a motion calling for the establishment of a section to initiate systematic field survey activities within the Club, was passed.

A meeting of some 20 members interested in this move was held on 1 February. They decided that the main activities of the group would centre on weekend survey camps and a monthly meeting. Meetings will be held on the 4th Thursday of the month in the National Museum, beginning in March. The weekend of 15-16 April was selected for a preliminary camp in the Riddell area.

Instead of attempting to cover the whole field of natural history, the first camp will concentrate on a systematic survey of the Non-marine molluscs, Spiders, Reptiles, as well as various aspects of Botany.

A steering committee has been established to make further arrangements. Principal Office Bearers are:—

Chairman — Mr. Leigh Winsor
Secretary — Mr. Barry Cooper

Any interested members are welcome to take part in this group's activities.

A New Group

To cater for the leisured and retired Mr. Fairhall would like to form a new group of members. Are you nervous of getting to night meetings? The proposed group will meet by DAY. Contact A. J. H. Fairhall, 14 Wallen Rd., Carnegie. Phone 58 2009.

The initial meeting will take place on Wednesday, 22 March, at 10.30 a.m. Those interested should meet at the kiosk, corner Park St. and Domain Rd. Lunch and a stroll in the Royal Botanic Gardens will follow. B.Y.O.

Hawthorn Junior F.N.C.

Annual Report, 1971

Key Office-Bearers 1 January, 1972.

President — Michael Coulthard.
Secretary — Joan Hindle.
Treasurer — Carl Meyer.
Editor — Alan Burns.
Excursion Secretary — Caroline Durré
Program Secretary — Noel Disken

The year 1971 saw almost a complete change in Office-Bearers of the Club. However, despite this, membership is being maintained at about 150, and enthusiasm in the Club's Junior Council is greater than ever.

In August, Mr. D. McInnes relinquished the Presidency and in appreciation for his service to the Club, he was presented with an engraved tray. Mr. McInnes took on the Presidency and the main task of Club organization after the sudden death of Mr. P. Fisch in April, 1962, and was largely responsible for the complete re-organization of the Club in the 1960's. He has been a Life member since 1969.

Michael Coulthard was elected President at the October meeting. He joined the Hawthorn Juniors in 1957, as a junior member, and since entering Council in 1965, has served as Treasurer (1966-7).

Barry Cooper retired as Editor in December after being associated with the Club's publications since their beginning in 1962. The Club also lost the services of Jenny Forse as Treasurer.

With the retiring of Mr. McInnes, the post of Program Secretary has been created to organize a syllabus of speakers for our meetings. Noel Disken has capably filled this role and also is the Club's unofficial "Property Steward".

Meetings over the past year:

29 January—Member's Night.
26 February—"Plants of Port Phillip Bay Beaches" by Miss M. Lester.
26 March—"Aquatic Insects" by Mr. P. Genery.
30 April—"Mammal Survey in Victoria" by Mr. A. Howard.
28 May—"Fossils" by Mr. K. Bell.
25 June—"Reptiles" by Mr. P. Rawlinson.
30 July—"Aboriginal Remains from the Chowilla Dam area — N. W. Victoria" by Mr. K. Simpson.
27 August—Celebration of 28th Birthday.
24 September—"The British Badger" by Mr. R. Withers.
29 October—"Birds of Prey" by Mr. F. Stephens.
26 November—Conservation Film—"Multiply and subdue the Earth".

Excursions:

Administration of Excursions was altered during the year. In April, an Excursion Committee was set up, but when this failed to organize a trip, the single position of Excursion Secretary was revived with greater responsibilities. Caroline Durré has taken on this position with support from Barry Cooper.

Excursions organized during the year.

1 August—"Organ Pipes" (Sydenham)
3 October—Narre Warren/Beaconsfield.
16 October—Spring Gully, Bendigo.
14 November—Kinglake.
5 December—Lerderderg Gorge.

Easter Camp:

The 1971 Camp was held at Mt. Eccles and the Lower Glenelg area in S. W. Victoria. A bus was hired and some 58 members attended. The Club camped for one night at Mt. Eccles and three nights in the Lower Glenelg. A detailed report has been published in *The Junior Naturalist*. A special meeting was arranged on 10 July for the showing of photographs and colour slides taken on the trip. This was attended by 54 members.

The Club has a large group interested in Reptiles and on camps, Council has had to ban the collection of venomous snakes for safety reasons.

Publications:

The Junior Naturalist has completed Volume 7. In July, an article commemorating the 100th consecutive issue of a monthly magazine, was published. From a single duplicated sheet in September 1962, our magazine now includes 12 pages each month. Rae Trathen was appointed Asst. Editor during the year and her Nature Crosswords are a regular feature.

For the Nature Show, the Club printed a booklet on "Fungi" by Noel Disken, as well as reprinting a booklet on "The Collection and Preservation of Insects".

Nature Show:

The Club organized five exhibits at the F.N.C.V. Nature Show in September, Spiders, Fungi, Insects, Minerals and Reptiles.

Library:

F.N.C.V. Library Books have been borrowed by Members since 1965, most of this time through the efforts of Miss M. Lester. With her retirement in December and the continuing interest of members in the Library, Council has arranged for one of our parents to collect books and arrange borrowing in the future.

Subscriptions:

The Club is intent on retaining subscriptions at the present level, despite price increases. Present rates are:—

Junior Membership 80 cents per annum.
Adult Membership $1.20 per annum.

BALANCE SHEET AT 31st DECEMBER, 1971.

Year 1970	Liabilities		
422	Subscriptions paid in advance		397
—	Sundry Creditors		332
—	M. A. Ingram Trust grant in hand		72
	Special Funds and Accounts—		
3,100	Building Fund	$3,101	
4,770	Publication Fund	5,311	
100	Library Fund	100	
730	Club Improvement Account	923	
200	Excursion Account	200	
5,217	Estate M. Wright Legacy	5,217	
418	Estate Ruby A. Lewis Legacy	418	
200	Estate Miss I. F. Knox Legacy	200	
—	Estate C. M. Walker Legacy	500	
—	Estate R. S. Chisholm	20	
—	Wilfred C. Woollard Fund	514	
1,090	Microscope Project A/c.	608	
2,212	Flower Book Account	2,419	
			19,531
	Surplus of Assets over Liabilities—		
	Balance at 1-1-71	7,013	
	Transfer from Club Improvement Account	130	
	Surplus for year	775	
7,013			7,918
$25,472			$28,250

We report that in our opinion the accompanying Balance Sheet and Accounts of the Field Naturalists Club of Victoria are properly drawn up in accordance with the provisions of the Companies Act 1961 and so as to give a true and fair view of the state of the Club's affairs at 31st December, 1971, and of its operations for the year ended on that date, and that the accounting and other records examined by us have been properly kept in accordance with the provisions of the Act.

Melbourne
21 February, 1972

Signed:
Danby, Bland & Co
Chartered Accountants
Auditors

Year 1970	Assets		
976	Cash at Bank	1,861	
2,000	Commonwealth Bonds at cost	2,000	
1,094	Sundry Debtors	1,406	
32	Badges at cost	17	
197	Microscope Project Stock at cost	134	
575	Books for Sale at cost	577	
53	Flower Book Stock at cost	338	
			6,333
5,184	Library, Furniture & Equipment at cost		5,314
	Investment of Funds—		
	Publications Fund—		
1,800	Commonwealth Bonds at cost	1,800	
	Book Stocks at cost—		
52	Victorian Ferns	1	
666	Victorian Toadstools	559	
403	Wyperfeld National Park	312	
—	Wilson's Promontory National Park	129	
55	Sundry Debtors	1,360	
1,794	Cash at Bank	1,150	
			5,311
	Building Fund—		
2,100	Commonwealth Bonds at cost	2,100	
1,000	S.E.C. Stock at Cost	1,000	
1	Cash at Bank	1	
			3,101
	Library Fund—		
100	Commonwealth Bonds at Cost		100
	Legacy Estate M. Wright—		
5,200	Commonwealth Bonds at Cost		5,200
	Cosstick Reserve, Maryborough—		
140	at cost		141
	Flower Book Account—		
2,050	Commonwealth Bonds at cost		2,250
	Wilfred C. Woollard Fund		
—	M.M.B.W. Bonds at cost		500
$25,472			$28,250

FIELD NATURALISTS CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st DECEMBER, 1971

Year 1970	Receipts		
	Subscriptions Received—		
155	Arrears	61	
5,441	Current	5,529	
143	Supporting	134	
			$5,724
237	Sales of Victorian Naturalist		239
124	Advertising in Victorian Naturalist		112
	Interest Received—		
	Library Fund	5	
	Bank Account	100	
	Commonwealth Bonds	160	
	Bonds — M. Wright Legacy	333	
495			598
9	Sundry Income		54
	Amount transferred from Building Fund		
170	Part Payment of Rent		175
$6,794			$6,902

Year 1970	Payments		
	Victorian Naturalist—		
4,315	Printing	4,238	
727	Illustrating	1,013	
371	Despatching	309	
50	Editorial	20	
		5,580	
(957)	Less Ingram Trust Grant	1,000	
			4,580
	Working Expenses—		
179	Postage & Telephone	145	
106	Printing & Stationery	86	
40	Rent of Room for Storage	40	
68	General Expenses	103	
71	Affiliation Fees, Subscriptions and Donations	106	
22	Preston Junior Club Rent	22	
72	Natural History Medallion Expenses	76	
663	Typing & Clerical Assistance	578	
50	Audit Group Expenses		
50	Audit	50	
255	Rent of Hall, Library & Museum Museum Room	283	
51	Insurance	58	
			1,547
406	Mammal Survey Group Expenses	305	
(406)	Less Ingram Trust Grant	305	
711	Surplus for year		775
$6,794			$6,902

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31st December, 1970		3,101
Interest on Investment and Bank Account		175
		3,276
Less Amount transferred to General Account for payment of rent		175
Amount of Fund at 31st December, 1971		3,101

PUBLICATIONS FUND

Amount of Fund at 31st December, 1970		4,770
Interest on Investment and Bank Account		144
Surplus for the year from—		
Ferns of Victoria and Tasmania	45	
Victorian Toadstools and Mushrooms	50	
Vegetation of Wyperfeld National Park	74	
Wild Flowers of Wilson's Promontory National Park	229	
		398
Amount of Fund at 31st December, 1971		5,312

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31st December, 1970	730
Sale of Old Library Books and Epidiascope	58
Nature Show Profit	227
Booksales Account Profit	38
	1,053
Less Purchase of Library Books, Furniture and Equipment	130
Amount of Fund at 31st December, 1971	$923

Rates for Overseas Subscribers

Single Copy 45 cents plus 7 cents postage = 52c.

Subscription one year, including postage = *£6.00 (Australian Currency)

The Yearly subscription has been approved by council and the single copy rate is the present cost of overseas postage.

Field Survey Group

Thursday, 23 March — Field Survey Group Meeting at the National Museum at 8 p.m. in the small room next to the Theatrette. Inaugural Meeting.

Saturday, 15 — Sunday 16 April — Preliminary Field Survey Camp, Riddell Area (Contact the Secretary, Field Survey Group for details).

the victorian naturalist

Vol. 89, No. 4 APRIL, 1972

F.N.C.V.

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FIELD NATURALISTS CLUB OF VICTORIA

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

GENERAL MEETINGS

Monday, 10 April At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes.
2. Announcements.
3. Subject for evening:—"Weather and Wildlife": Mr. Derek Reid.
4. New Members. (These will appear in May issue).
5. Correspondence.
6. General Business.

Monday, 8 May—"An Introduction to Fossils": Mr. Ken Bell.

Wednesday, 14 June—"An introduction to Orchids": Mr. Jack Hyett.

F.N.C.V. SURVEY CAMPS

Friday evening—Sunday 14-16 April The Field Survey Group will hold a camp at Riddell. The camp site will be the Barringo Picnic Ground and those wishing to attend and who missed the March Group Meeting may obtain a circular with map and details from the Group Secretary, Mr. B. Cooper, 37 Bath Rd., Burwood (29 7379). Briefing will be given at the camp at 10 a.m. Saturday and 9 a.m. Sunday. Members unable to leave Friday may join the group at this time. Mr. L. Winsor will be Camp Commandant.

F.N.C.V. GROUP MEETINGS

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

Thursday, 13 April Botany Group. Speakers: Mr. K. Kleinecke and Mr. I. Morrison.

Wednesday, 19 April—Microscopical Group.

Thursday, 27 April—Field Survey Group. This group meets in the Library Conference Room next to the theatrette at the National Museum at 8 p.m.

Monday, 1 May—Entomology and Marine Biology Group Meeting in Library Conference Room, National Museum at 8 p.m.

Tuesday, 2 May—Geology Group.

Thursday, 4 May Mammal Survey Group meets at Arthur Rylah Institute, 123 Brown Street, Heidelberg, at 8 p.m.

F.N.C.V. EXCURSIONS

Saturday-Sunday, 15-16 April—Ararat. The Ararat Conference will be held on this weekend, and the program is as follows:—

Saturday; Assemble at Methodist Hall at 2 p.m. for general welcome; choice of two excursions: 1. McDonald Park. 2. Aboriginal cave. 5 p.m., tea facilities available at Methodist Hall for those bringing their own food. 6.30 p.m.: Meeting of W. Victorian F. N. Clubs (President Mr. A. Fisher). 8 p.m.: Official Welcome; Presentation of Life Membership Certificate to Miss L. Banfield. 8.30 p.m.: Subject of the evening "Mount Cole National Park" by Mr. J. Wheeler. 9.45 p.m.: Speeches and supper.

Sunday: 9.30 a.m.: Meet at Town Hall then proceed to Warrak Township and Mount Cole, walk to Ben Nevis lookout. Lunch at 12.30 at Victoria Mill Point, (hot water, milk, tea and sugar provided). 3.30 afternoon tea and farewells. 4 p.m. depart via Roylon to Western Highway near Beaufort.
A coach has been chartered for this weekend and motel accommodation booked for coach party on bed and breakfast basis. Cost for motel and coach $12.00 per person, payable to the Excursion Secretary by the April general meeting. The coach will leave from Flinders St. near Gas Corporation at 8 a.m. Bring a picnic lunch.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 4 6 April, 1972

CONTENTS

Front Cover:

This Southern Elephant Seal pup was photographed at Macquarie Island in 1965, by K. N. G. Simpson. *ANARE photo by Ken Simpson*

Botanical Survey of East Gippsland

by A. C. Beauglehole

Botanical exploration in the eastern-most sector of Victoria has been very active during the past one hundred years. A comprehensive report of the East Gippsland Symposium was published in the *Proceedings of the Royal Society of Victoria*, Vol. 82 Part 1, January 1969. Included was a Census of Vascular Flora Indigenous to East Gippsland, by J. H. Willis, which listed 1,435 species, of which about 200 were not to be found elsewhere in the State. Defining the boundary, Willis said: "For the purposes of this list, East Gippsland includes all that part of Victoria on the southern side of the Great Dividing Range and eastward from the Mitchell River Valley and its tributary, the Wentworth River. If, as for other papers of the Symposium, East Gippsland be limited to the region lying east of the 148th parallel of longitude, then its known indigenous flora still comprises 1,390 species."

Despite living at the extreme western end of Victoria, I became fascinated with East Gippsland long before I was able to investigate the region myself. My introduction to the floral wealth of the region came through two schoolteachers, who lived there at one time and who had an intimate knowledge of the plants. During the mid-1930's, Frank Robbins, then teaching at Orbost, travelled widely and made extensive collections of plants. His labelling, too, made interesting reading, for he collaborated with many botanists, (Hunter, Bibby, Hart, Morris, Willis, Wakefield, and others) and their comments were included. Frank moved to Bendigo, where he is still a well-known and prominent figure in natural history and conservation groups. Imagine my delight, when, in 1949, he offered to hand over his collections to me, for they included specimens from most regions of Victoria! During the 1940's and 1950's, Norman Wakefield, whilst teaching at Cann River and Genoa, also travelled extensively and built up a herbarium. He was instrumental in carrying out critical research on several difficult genera: *Hibbertia, Cassinia, Helichrysum, Galium, Hydrocotyle, Pomaderris, Juncus, etc.* — in all of which he described new species and published these in the *Victorian Naturalist*. Through his request for material from Robbins' and my collections, we built up a regular correspondence, which enabled me to become familiar with many plants.

Over recent years the National Parks service has engaged me to carry out botanical research in National Parks, firstly in western Victoria, then in East Gippsland. The built-up preliminary knowledge, coupled with the valuable Census of East Gippsland Plants, enabled me to enter the field with more confidence.

In the survey of these parks, along with the Grampians survey for the Botanic Gardens Research Trust, the recommended grid system (of 10 minutes of latitude and longitude) has been incorporated. Having covered the National Parks, I took full advantage of the opportunity of doing a cross section of all grids within East Gippsland — no less than 84 involved! The purpose of this was to obtain an over-

all distributional pattern of the flora for conservation purposes, i.e. to select areas having the maximum number of rare and interesting species within relatively confined segments of East Gippsland. Melbourne National Herbarium supplied me with maps with grids incorporated; also large numbers of abbreviated field lists, made out in alphabetical order for convenience.

In view of the value of this extended survey, the National Parks Service saw fit to engage me to carry out additional work for them. This included the Proposed Cobberas National Park, Proposed Snowy River National Park in the North, and extensions to existing Parks in the South. Comprehensive manuscript reports with maps have been completed, and when these have been typed, will be available for distribution by the N.P.S. In these individual projects, I was ably assisted by Colin Hutchinson, Technical Officer with N.P.S.; Eugene Finck, Heathmere; Keith Rogers, Wulgulmerang; and Jim Willis, National Herbarium.

In the overall East Gippsland survey, an average of fifty hours was spent on each of the 84 grids. Several lists and sub-lists were made and numbered, within each grid, in relation to habitat and/or confined area; and these were all indicated on a mapping system, with information about each, so that future workers would know where, and at what time of the year, work was done. After several months of analysis of this field work, an up-to-date Master List was drawn up, embracing both native and alien flowering plants and ferns of East Gippsland. There will be a Master List for each of the 84 grids. When the abbreviated field lists are keyed to these Master Lists, results can be set out on special grid maps — using a grid map of East Gippsland for each individual species. As the known flora has been increased by about 120 species (with a total now of 1,550 species of native flowering plants and ferns), plus the 250 alien species, there will be need for 1,800 maps. Thanks again to Melbourne Herbarium, these maps are already available for coding.

Among the added 120 species are several undescribed species, including a number of orchids; while others again are new to Victoria, and this group also includes orchids. Some of these orchids have already been dealt with in the *Naturalist* — a description of those remaining will come later.

Of other groups of plants the most exciting finds were:

(1) *Brunoniella pumilio*, belonging to a family not previously represented in Victoria — *ACANTHACEAE*. As far as is known, there is one colony only in Mallacoota National Park.

(2) The second known occurrence of *Olearia allenderae*, a Showy Daisy-bush (named by Jim Willis, in honour of Marie Allender, a few years ago from material collected at Wilson's Promontory). It occurred in abundance in wet heathlands near Cicada Trail, (between Mueller and Wingan Rivers). Associated with it was a Moss (*Trematodon mackayi*) new to Victoria.

(3) Several other plants recorded, for the first time, East of Melbourne, including the trigger-plant, *Stylidium beaugleholei*, also named by Jim Willis I should not be surprised if it turned up in N.S.W., for Jim and I found it east of Mallacoota Inlet. It was also located in two places on the Marlo Plains, and, since being named, has turned up in W.A.!

The pleasure of locating new species, at times with the assistance of other naturalists, in no way detracted from the satisfaction of extending the known range of some E. Gippsland

plants that were supposedly restricted. This was not surprising in view of the comprehensive nature of the survey. Naturally, there is tremendous scope for furthering the knowledge of the East Gippsland flora. One of the saddest aspects of the survey was in seeing the spread of undesirable weeds. Blackberries (*Rubus spp.*) alone are spreading at an alarming rate — extending for miles along a number of creeks and rivers, as well as occurring in jungles, sub-alpine bogs and good-timbered areas. Imagine if these areas are doubled each year! The Great Woolly Mullein (*Verbascum thapsus*) is covering hundreds of acres in the rain shadow belt. An area S.W. of Mt. Raymond, the only place in the whole survey where I saw three particular orchids, is quickly being covered by blackberries and the introduced Trefoil (*Lotus pedunculatus*). Several rich orchid areas, including Orbost, Marlo Plains, Cann River, Bendock and Wangarabell areas, are diminishing because of extended farming operations. This is unfortunate, because the survey has shown that the majority of grids are poorly endowed with orchids, and even those grids with good tallies often had only isolated pockets of them.

The area of East Gippsland is approximately 4,000,000 acres, with less than 40,000 acres set aside in National Parks. This represents only one per cent of the whole, and this is deplorably inadequate! If the Cobberas, Snowy River, Captain Cook Park extensions and Howe Range proposals become a reality, the total of protected plants would be about 1,250 species, whereas in the existing Park system only about 820 species are protected. This leaves about 300 species still unprotected, but minor reserves could be established to cater for these.

As there is an imperative need to preserve representative areas for the survival of flora and fauna, I urge you to support the extension of the National Park system: and to press urgently for these extensions in the immediate future.

In concluding, I do want to extend my sincere thanks to all of those people who have helped me in so many ways over the years.

Field Survey Group

Inaugural Meeting *23 March 1972*

Mr. L. Winsor chaired the meeting, which was attended by 16 people.

Mr. Winsor explained that the objects of the group were to survey the State in a systematic manner in different areas of natural history. Initially, this would be restricted to selected disciplines, so as to cover each field adequately. Invertebrate and Botanical studies would be the major emphasis on the first survey camp.

Mr. Cooper reported on the work done in organizing the group and announced that the F.N.C.V. had agreed to provide a $50 credit to cover secretarial and field expenses.

Details of the preliminary survey camp to Riddell—15 and 16 April were discussed at length. Mr. Cooper described the Geology of the area and Mr. Reeves reported on the mammals and other aspects. Maps of the survey area were distributed by Mr. Winsor.

Organization of the group was vested in a committee, to which the following were elected:—

Chairman—Mr. L. Winsor
Secretary—Mr. B. Cooper
Records Office—Mr. H. Janssen
Residual Committee—Miss L. Barraclough
Miss R. St. Clair
Mr. D. Barham
Dr. B. Smith

Dr. B. Smith, Curator of Invertebrates at the National Museum, was the Speaker for the evening.

He described the ways and means of doing systematic natural history surveys and went on to describe how this was applied to his own study of the State's non-marine molluscs.

Fossil Wood from Brighton, Victoria, Australia

by EDMUND D. GILL*

It is only when major engineering works are undertaken that discoveries are made of what lies at depth beneath the ground. Extensive tunnelling in connection with a new sewer main in the southern suburbs of the city of Melbourne has brought to light interesting fossils. Thus in 1964 excavations under Eddy's Grove on both the north and south sides of Centre Road, Bentleigh, near Elster Creek, revealed a bed plentiful with marine shells of late Miocene Age, including *Tylospira* and *Miltha*.

More recently Mr. F. Sarno, a geologist working with the Melbourne and Metropolitan Board of Works, brought to the Museum a piece of tree trunk found 35 ft. (10.7 m.) from the surface in a tunnel in North Road, Brighton, near Bambra Road. It was discovered during the construction of a pump well. Above the Silurian bedrock is gravel, which is succeeded by a carbonaceous silty sand. The latter formation contained the fossil wood. When obtained, the wood was wet, so a part of it was placed in water to prevent it drying out. The cells of fossil timber may collapse on drying, and so prevent identification. Samples were submitted to Mr. H. D. Ingle of C.S.I.R.O. Division of Forest Products (as it was called then). He found that the cells of both the dry and wet timbers were collapsed, making identification of wood structure impossible. This was unfortunate, but nevertheless four deductions can be made:

1. Our sample from the log is 2 ft. x 7 in. (60 x 18 cm.), so a tree grew in that area at the time the carbonaceous bed was deposited.

2. As the matrix is carbonaceous sand, the immediate environment at least must have been wet with plentiful plant growth to provide the carbon.

3. That the wood was collapsed before extraction from the earth probably means that the ground dried out at some past time or times. This could happen in a drought.

4. As such wood is partly decomposed when collapse occurs, it is likely that drying out took place some time after deposition. As the Pliocene period in this area was wetter than now (e.g. beech trees were common) the drying out probably occurred in the Quaternary.

Although limited information was obtained on this occurrence, it is recorded because if all such records were kept, a picture of the geology and palaeontology would in time be built up. We benefit today by such records made early in this century by Dr. T. S. Hall, Dr. G. B. Pritchard, and other workers.

Age of Fossil Tree

There remains the question of how old the wood is. Bayside cliff sections, records from earlier excavations, and bore logs indicate that the non-marine carbonaceous beds in this area are younger than the marine fossils such as were found at Bentleigh. The former deposits were studied when the age of fossil marsupial bones in the area was being investigated (Gill 1957, pp. 165-189). Carbonaceous beds at Red Bluff (Sandringham) and at Cheltenham yielded pollen and spores including three species of

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Nothofagus (Southern Beech) and two of the Conifer *Dacrydium*, indicating conditions very different from the present.

These carbonaceous deposits are post-Miocene and later than the lateritization that occurred mostly in the Lower Pliocene (Gill 1971). They are older than the basalts that date about 4 million years. Thus, if the deposit containing the wood is one of this series of carbonaceous deposits (as I think it is) then the wood is Pliocene in age, and perhaps in the middle of that period because they occur at the base of the Red Bluff Sands (Bell et al. 1967).

Hart (1893) found a possible conifer log 5 ft. x 1 in. x 9 in. (1.5 m. x 10 cm. x 23 cm) at Red Bluff, Sandringham, apparently in the marine bed underlying the carbonaceous layer (Gill 1957, text fig. 13b).

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THE DAY GROUP

Report of Inaugural Meeting

The Inaugural meeting of the newly formed group to cater for the leisured and retired members and those who are not able to attend night meetings, was held on Wednesday 22 March, and members, thirteen in all, met at the corner of Park St. and Domain Rd., South Yarra.

Mr. Fairhall, the convenor, was duly elected Chairman; Mr. Roy Dodd, Vice-Chairman; Mrs. J. Strong, Secretary; and Mr. J. Strong, Acting Secretary.

Prior to lunch which was taken on the lawns outside the Botanic Gardens in glorious sunshine, a stroll was taken to look at the many species of trees which abound in and around the Gardens.

The Party then walked through to the Oak Lawn and noted the many species of oak which are planted there. Mr. McInnes took us to see an unusual Chinese Oak tree. Various species of Eucalypt were inspected.

Members, all having thoroughly enjoyed themselves went their various ways about 3.30 p.m.

Further outings are being planned with visits to the Maranoa Gardens and the Museum in the future.

During the winter months meetings will be held indoors with various members giving talks on different subjects of interest to all members.

More members are welcome who are free in the day time to attend these outings and assure them of a most enjoyable and interesting time.

For further details of outings, please watch the *Victorian Naturalist*.

The Group meets once per month.

E. Strong, Secretary
56 2271

The next meeting of this Group will be held on 19 April at 11.30 a.m. Assemble at the Kiosk, corner of Park St. and Domain Rd., Sth. Yarra. Bring lunch. Inspection of Australian Native Plants will follow.

Further Observations on the Mountain Pigmy Possum (*Burramys parvus*)

by H. Dimpel* and J. H. Calaby*

Summary

Observations are given on the occurrence of *Burramys parvus* in the Kosciusko National Park, New South Wales. The animal is found in patches of shrubs and snow gum associated with boulders in the subalpine to alpine zone. The habitat is under several feet of snow in winter but the temperature at ground level does not go below freezing.

In captivity *Burramys* eats a variety of fruits, seeds and insects. Vitamin and calcium supplements appear to be necessary to prevent the development of a condition resembling rickets. Feeding behaviour is described. The large specialized premolars are used to cut up insects with hard cuticles, for opening hard-shelled seeds, and breaking up hard food. Seeds are stored in the nests.

Young are born in November-December and are independent by March. The normal litter is four. One captive experienced periods of torpor in winter but hibernation does not appear to be universal in *Burramys* as it is in pigmy possums of the genus *Cercartetus*.

Introduction

Since the first living mountain pigmy possum (*Burramys parvus*) was collected at Mt. Hotham, Victoria, in 1966, several more specimens have been taken, and the known range of the animal extended in the high country of Victoria and New South Wales. Dixon (1971) trapped a specimen in the Falls Creek area, Bogong High Plains, Victoria, in February 1971, and mentions another three caught at Mt. Hotham in the same month by the Department of Fisheries and Wildlife. Calaby, Dimpel and Cowan (1971) recorded the capture of three specimens in the Kosciusko National Park, New South Wales, in February and March, 1970. Since that paper was submitted for publication we have accumulated a considerable amount of new information on the species, which we feel will be of interest to naturalists and conservationists.

Range and habitat in the Kosciusko National Park

In the Kosciusko National Park we have live-trapped a total of 19 adult or sub-adult *Burramys* (11 males and 8 females) during October to March at four sites, two of which were reported by Calaby *et al.* (1971). The two new ones are: a small unnamed creek running into the Geehi River approximately 2.5 air miles north-northwest of Schlinck Pass at an altitude of about 4500 ft., and a small un-named tributary of Whites River about 0.6 mile downstream from the Whites River Hut at an altitude of approximately 5,500 ft. The former of these localities is the lowest altitude at which *Burramys* has been found. The distance between the two most remote of the four sites is about eight miles.

The habitat in all cases is characterized by a tree cover of snow gum (*Eucalyptus niphophila*), a dense or fairly dense shrub stratum two to four feet high, and large boulders protruding from the soil. The colony at the lowest altitude was at the upper

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edge of the alpine ash (*E. delegatensis*) zone and tall trees of this species were present in addition to snow gum. The results of much trapping in a variety of areas and habitats at a number of altitudes support our previous conclusion that *Burramys* is apparently restricted to patches of shrubs associated with snow gum and boulders in the subalpine to alpine zone. The habitat of the Falls Creek locality described by Dixon (1971) has essentially the same features as the three higher sites in the Kosciusko National Park. In spite of the recent discovery of *Burramys* as a living animal it is probably not rare in its restricted geographical range. Its density is low but suitable habitat is common and we feel that it would be found in most likely-looking places if they were trapped sufficiently.

The most accessible locality at about 5,000 ft. altitude was visited a number of times during the winters of 1970 and 1971. In the depth of winter the snow had a minimum thickness of three feet and, except for the very large boulders, all shrubs and rocks were covered. There were small holes in the snow adjacent to the protruding boulders, and tracks of small animals were seen around the holes and on the surface of the snow.

With two thermometers, temperatures were taken simultaneously in the air and in runways beneath the snow at a range of altitudes and in a variety of weather conditions. With snow cover more than 1 ft. 6 in. in thickness temperature at ground level never fell below 0°C. When the snow cover was less than one foot deep the temperature at ground level approached air temperature. The lowest ground temperature recorded was -4.5°C under snow one foot in depth, when the air temperature was -11°C. It is concluded that the small ground mammals including *Burramys* would have no problems in withstanding winter weather conditions beneath deep snow at high altitudes.

Burramys in captivity

Of the nineteen animals trapped, seven together with the young of one of them have been kept in captivity, and twelve were released at the points of capture. Three of these were caged for short periods before release. Cages are of wood with glass fronts, and the floor areas are either 6 or 8 sq. ft. They have externally-fitted detachable nest-boxes, and the floors consist of removable sand trays. The cages were originally equipped with sloping tree branches but later small rock piles were added.

The three original animals reported by Calaby *et al.* (1971) survived in captivity for different lengths of time. The single male died after 18 weeks, and there was no apparent cause of death. The two females lived for 31 weeks 5 days, and 36 weeks 6 days respectively. In both, the limb bones were soft and flexible at death, and in the last few weeks of its life one of them lost considerable weight in spite of eating normal amounts of food. It became paralysed in the hindquarters, particularly the legs, and dragged itself around by the front legs. The symptoms were similar to rickets in small domestic mammals. The proprietary vitamin supplement "Penta-vite" was given to them some weeks before death but did not arrest their condition. With subsequent animals, Penta-vite and calcium hydroxide have been given regularly in honey. With these dietary supplements animals have remained healthy and three of them taken into captivity on 27 November 1970 as very small young in their mother's pouch are alive and healthy at this date (December 1971).

In general wild-caught *Burramys*

are very shy and usually come out of the nest boxes only at dusk or in darkness when it is quiet. When they first appear they usually go to the food containers, pick up something quickly and run back to the nest box. If the cage contains a rock pile they carry the food behind or on to the rocks and eat it there. When handled frequently they may become docile. *Burramys* kept in very small cages quieten down quickly; in such circumstances they indulge in behaviour common among small mammals in inadequately small cages, such as endlessly turning back somersaults. Young ones raised in captivity are much tamer, often come out in daylight, and are not unduly disturbed by strange noises. There is considerable variation in temperament however, some animals are quiet and tame when first trapped while others are shy and nervous and bite savagely when handled. Two or more *Burramys* can be kept in the same cage and strange animals of the same or opposite sexes will share a nest box immediately without strife.

During the daytime the animals sleep in their nests with their heads bowed against the chest or abdomen, ears furled, and the tail curled up like a watch-spring against the body. At night when not feeding they spend most time on the rocks and it seems clear that they prefer to live among and hide in the rocks. They can climb and run upside down on the lower sides of small diameter sloping branches. The branch is gripped by both forefeet together alternating with both hindfeet together. A considerable amount of time is spent in grooming especially when they first emerge. Much of the body is scratched vigorously with the syndactylous claws and the forepaws. The fur is licked, and the face and back of the ears are rubbed with the forepaws after these have been licked.

Except on one occasion when a flea was observed, no parasites were found on newly-caught animals, but considerable numbers of the flea *Acanthopsylla rothschildi rothschildi* have been bred from nesting material taken from the nest boxes. This flea is a well-known parasite of the marsupial-mice (*Antechinus* spp.) and murid rodents.

Food and feeding behaviour

As reported previously (Calaby *et al.*, 1971) the faeces of our first three specimens, taken from the traps before the animals had fed, consisted largely of plant material, with some insect remains. With subsequent animals the faeces have contained mostly invertebrate remains, including worms, beetles, grasshoppers, and spiders. In captivity *Burramys* have been fed a variety of fruits and seeds such as sliced apple and pear, grapes, soaked raisins, walnut chips, raw peanuts, sunflower seeds, honey, and insects, such as mealworm larvae and moths. All of these are readily eaten. The tail never becomes incrassated as it does in *Cercartetus* species, even when the *Burramys* become very fat in captivity. *Burramys* takes a considerable quantity of water, lapping it up with the tongue.

Feeding trials in the first couple of weeks of captivity indicated that a greater amount of fruit and seeds was eaten than insect material. After this period such trials are of limited use. For example, individuals of *Cercartetus nanus* would eat only insects and honey when first brought into captivity and starved when only nuts or fruits were offered, but after a few weeks they readily ate raw peanuts if no insects were offered. It is probable that in the wild, *Burramys* feed on whatever palatable fruits, seeds, or invertebrates are available.

The feeding behaviour of *Burramys*

is of especial interest because of its possession of large grooved and serrated sectorial premolars. Teeth of this type together with associated dental adaptations occur in a variety of mammals of widely divergent relationships, most of which have been long extinct. There is no clear idea of the use of the teeth (Simpson 1933)

Food is picked up with the incisors then transferred to and manipulated with the forepaws while the animal squats on its hindquarters. The food may be held in one or both forepaws. The soft flesh of fruits is bitten off with the incisors and chewed with the molars. The skins are not eaten and *Burramys* have been observed holding pieces of apple and grape and removing the last fragment of flesh by pulling the skin with their forepaws against the lower incisors. Soft bodied insects such as moths are usually dealt with by the incisors. With insects having a hard cuticle such as mealworm larvae the animal may begin biting with the incisors but usually the insect is held in the forepaws at the side of the mouth and chopped up with the sectorial premolars. Hard-shelled seeds such as sunflowers are invariably held at the side of the mouth and bitten with the premolars. Usually the seed case is opened with a single bite. Peanuts are mostly nibbled with the incisors but the premolars are used also to break up fragments.

Calaby *et al.* (1971) and Dixon (1971) recorded that *Burramys* stores food in its nests. Only nuts and seeds are stored in these caches. Invertebrates are eaten when caught and if excess insects are provided they are never taken to the nests and stored. The nuts or seeds are held in front of the premolars, resting on the lower incisors. Animals may carry peanuts or sunflower seeds for as long as 15 minutes, and indulge in other activities such as scratching themselves or exploring their cages, before taking the food to their nests.

Breeding

The eight females examined by us and Dixon's (1971) single example had four teats. When the female is in breeding condition the pouch is deep, moist, and pink. The entrance may be almost invisible when the animal does not have young. In the non-breeding state the pouch appears to be much smaller and relatively dry and there may be some dark scale especially on the teats which are very small. There is a prominent tuft of hair around the teats, which is yellowish in colour presumably due to pigment stain. A female caught on 22 October 1971 was introduced to a male that had been in captivity since 7 January 1971. For the first hour he followed her closely sniffing at her cloacal area but then ignored her.

Four females with young have been examined and judging from the size of the young when first seen, the litters of three of them were born in the second half of November. As we wished to raise the young we handled the animals as little as possible and never caught and examined them more frequently than once a week. A female caught on 1 December 1971 had a moist tumescent pouch with prominent teats. On the following day she had four young. Another female, trapped on 11 November 1970, had a clean moist pouch and prominent teats. On 12 December one young was seen in the pouch and another with its head in the pouch and body outside. Two days later one young was found freshly dead on the floor of the cage; the other was still alive in the pouch. On 18 December the second young was found

dead and dry and partly eaten. All teats of the female were elongated and presumably it had a litter of four. Dimensions of the freshly dead young were as follows: head and body 11.6 mm, tail 12.2, ear 3.3, hindfoot 6.5 weight 0.9g.

A further female was collected on 27 November 1970. It had rained during the night and the temperature was below freezing point. The animal was cold to the touch and barely moved when handled but she revived when warmed and was fed honey and water and fully recovered. In her pouch were four pink naked young with head-and-body lengths estimated to be 8-10 mm. Growth was rapid and in three weeks the head-and-body lengths were approximately 25 mm. On 19 December the mother was lying on her back in the nest and the bodies of three young were outside the pouch with their heads inside. They had short dark fur on the head and back while the ventral surface was naked and pink. The young were never seen in the pouch after 21 December. On 2 January one young was observed for the first time with its eyes open and the following day all young had their eyes open. At this time the head-and-body lengths were 50-60 mm, the dorsal surface was covered with dark grey fur and there was white fur on the ventral surface. The rufous markings had not developed but began to show about a week later when the ventral surface took on a greyish tinge. By mid-March the young weighed between 30 and 40g and were considered to be fully grown.

At the time the young first left the pouch the mother spent almost all of her time with them and ate very little for several days. After that her food consumption increased greatly —up to 28 mealworms, 6-8 peanuts, 36 sunflower seeds and some honey, were taken daily. When she left the nest she spent a great deal of time cleaning and grooming her fur. On 8 January she abandoned the nest and lived under the rock pile. The following day the young left the nest box and went to live with her. The young were never seen clinging to the mother or riding on her back. At the time they left the nest box they began to eat mealworms and peanuts but continued to suckle for a few weeks. Two young were removed to a separate cage when the only female of the litter was found dead apparently from injuries.

When the pouch young are still attached they are carefully groomed by the mother. While squatting on her hindquarters she holds the pouch open with her forepaws, puts her muzzle into the pouch and licks the young.

Hibernation

Because of the severity of the habitat and the knowledge that hibernation is known in the nearest related genus, *Cercartetus* (Hickman and Hickman 1960, Bartholomew and Hudson 1962), it was thought possible that *Burramys* would hibernate. Three of the nineteen animals, two females and a male, were cold and torpid when taken from traps but all recovered quickly after warming. The three original animals were kept in the same room as three *Cercartetus nanus*, during the winter of 1970. The temperature of the room varied from 5 to 20°C. One *Burramys* died on 27 July. No *Burramys* showed any signs of torpor. All *Cercartetus* hibernated for various periods. For example, one animal caught as a juvenile in February remained active to 20 June and was torpid for the following four days. In July it was torpid for a total of 13 days, including one period of four days, and for single days only in August and September.

Three adult *Burramys* and the three grown young were kept through the winter of 1971 in a basement garage in which the temperature varied from 9-13°C. The mother of the three young was the only one that showed any inclination to hibernation. She was very fat and weighed over 70 g. She did not eat during the night of 28-29 April nor on the next four nights. During this time she remained in the nest box, was cold to the touch, and the respiration rate was much lower than normal. The respiration rate increased when she was handled, but she did not arouse except that she lifted her head slowly on one occasion when the nest was examined. Some food, less than the normal amount, was eaten during the night of 3-4 May. During the following week the animal and her nest box were placed in a small wire insect cage on a verandah where minimum temperatures were sometimes as low as -4°C. Her food intake and behaviour remained normal for a week and she was returned to her usual cage. During the night of 16-17 July she did not eat and was torpid in the nest box. She was put outside again in the small cage. This period of hibernation lasted three days, following which she remained active until the night of 28-29 July when she again became torpid. She remained so until the night of 4-5 August, a period of seven days, when she apparently, aroused, chewed a hole in the cage and unfortunately escaped.

This behaviour is indistinguishable from hibernation in *Cercartetus*, and providing the animal was physiologically normal it indicates that *Burramys* may hibernate under certain conditions at present unknown.

Acknowledgements

We are most grateful to the National Parks and Wildlife Service, New South Wales for permission to study protected animals in the Kosciusko National Park and to keep *Burramys* in captivity; and to the staff of the Park for the use of facilities and much helpful assistance and advice. The fleas were identified by Mr. D. K. Mardon.

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A New Race of the Butterfly, *Ogyris oroetes*

A new geographical race of *Ogyris oroetes* Hewitson 1862 (LEPIDOPTERA, Family Lycaenidae, sub-family Ogyrinae)

by W. N. B. QUICK

Ogyris oroetes apiculata, subsp. nov.

MALE

Antennae approximately half length of costa, black above, very finely banded grey-white at sides and beneath. Terminal portion distinctly flattened to spathulate. *Palpi* invested in dense grey-white indumentum, darker at terminal segment, and beset with scattered but conspicuous black bristles.

Upperside: Forewing metallic cyan blue. Area between vein 12 and costa grey-brown. Apex symmetrically from costa to termen at vein 4, black. Termen from vein 4 to vein 1a black, slightly convex. Cilia ash-white, darker at veins. Hindwing metallic cyan blue. Humeral lobe grey-brown. Apex broadly, and termen narrowly, black. Anal lobes black. Dorsum grey, darker towards tornus. Cilia light grey, darker at veins.

Underside: Forewing ash-grey at costa shading to grey-brown at dorsum. Cell dark brown, crossed by two short black bars, each outlined nacreous pale blue, to form two oblong ocelli. One discocellular bar, black, outlined nacreous pale blue, and extending shortly around cell along median vein. One discal bar, black, outlined grey, and angled towards base in area 1b. Subterminal line black, finely serrate and tapering towards apex. Hindwing grizzled grey-brown, crossed by four indistinct and broken brown bands, finely outlined black. Discal area suffused black. Subterminal line serrate, black.

Length of forewing 19 mms.

FEMALE

Antennae slightly less than half length costa. Black above, brown-black and very finely banded grey-white beneath. Terminal portion distinctly flattened to spathulate. *Palpi* invested in close grey-white indumentum, darker at the terminal segment.

Upperside: Forewing, lustrous cyan blue. Area between vein 12 and costa deep brown. Apex, symmetrically from costa to termen at vein 3, black. Termen from vein 3 to tornus, black. Termen slightly convex. Discocellular bar ill-defined, sooty black. Cilia ash-white, black at veins. Hindwing lustrous cyan blue. Humeral lobe grey-brown. Apex broadly, and termen, black, dentate. Anal lobes dark grey-brown. Dorsum grey, shading to dark brown towards tornus. Cilia ash-white, black at veins.

Underside: Forewing ash-grey at costa shading to grey-brown towards dorsum. Cell almost black, crossed by two short, broad black bars, each outlined nacreous pale blue. One discocellular bar, black, outlined pale nacreous blue, and extending around cell along median vein. One discal bar, black, outlined white, angled towards base in area 1b. Base of cell black. Subterminal line diffuse black, finely serrate and tapering towards apex. Hindwing grizzled grey-brown, crossed by four indistinct and broken brown bands, finely outlined black. A dark, irregular inverted 'V' in disco-cellular area. Subterminal line faint, serrate.

Length of forewing: 20 mms.

Fig. 1 *Ogyris oroetes apiculata*, subsp. nov. Holotype male, upperside. Kellerberrin, W.A.

Fig. 2 *Ogyris oroetes apiculata*, subsp. nov. Holotype male, underside. Kellerberrin, W.A.

Fig. 3 *Ogyris oroetes apiculata*, subsp. nov. Allotype female, upperside. Coolgardie. W.A.

Fig. 4 *Ogyris oroetes apiculata*, subsp. nov. Allotype female, underside. Coolgardie. W.A.

Type localities: Holotype male, Kellerberrin, W.A.

TYPES—Labelling and location.

Holotype male labelled 'Kellerberrin W. A., 12 Oct. 1958, W. N. B. Quick'; paratype male labelled 'Kellerberrin, W. A., 4 Oct. 1958, W. N. B. Quick' in the author's collection.

Allotype female labelled 'Coolgardie, Allotype female, Coolgardie, W. A. W.A., 21 Sept. 1967, K. M. Le Souëf'; paratype female labelled 'Eucla, W.A., 20 Oct. 1967, J. C. Le Souëf'; two paratype males labelled 'Kellerberrin, W.A., 3 Oct. 1958, Le Souëf', and three paratype males labelled 'Three Springs, W. A., 4 Sept. 1958, J. C. Le Souëf', 'Kellerberrin, W. A., 10 Oct. 1958, Le Souëf' 'Coolgardie, W. A., 21 Sept. 1967, J. C. Le Souëf', in the collection of J. C. Le Souëf, of Blairgowrie, Victoria.

Discussion

In August 1958, while on a collecting trip, Mr. Le Souëf and the author discovered at Kellerberrin, W.A., a number of *Ogyris* pupae. These were located under loose bark near the base of some large eucalypts on which the mistletoe *Amyema miquelii*, Lehm. was well established. Several additional pupae were later found in a similar situation near Three Springs, some 200 miles to the north of Perth.

In due course, these pupae produced butterflies, a number, all males, emerging during the latter part of the trip. These received only casual examination, and were stored for future attention under the impression that they were *Ogyris hewitsoni meridionalis* Bethune-Baker. When eventually the insects were set, it was noticed that while some specimens were indeed that species, two male insects were quite distinct, particularly on the underside, which resembled that of *Ogyris oroetes* Hewitson. Unfortunately no female counterparts of these insects were obtained, and it was not possible to ascertain their true status.

At a much later date the author learned that Le Souëf had in 1967 retraced much of the 1958 trip, and had succeeded in obtaining additional pupae and insects, subsequent examination of which showed that in addition to *O. h. meridionalis*, he had one male and two females of the second entity.

On the underside of the forewing, these female insects lacked any trace of the scarlet cell-spots, and with a relatively straight discal bar, quite clearly represented a race of *Ogyris oroetes*.

The present subspecies is distinguished

(a) from typical *O. oroetes* by the broadly black, and more symmetrically deltoid, apical area in both sexes, and by the clear blue colour, without purplish or lavender tones, in the male.

(b) from *O. h. meridionalis* in both sexes by the uninterrupted discal bar of the forewing beneath, and by the absence of scarlet cell-spots on the forewing underside in the female.

In some worn examples, the nacreous outlining of the black cell-bars of the forewing underside may be partly absent, and the cell-bars consequently ill-defined.

This species has been taken in a number of localities in Western Australia between the parallels of 29°S and 32°S, and a larva found by Mr. Charles McCubbin on Mt. Paterwerta in the northern Flinders Ranges, S. A., produced an insect* which, although it failed to expand fully, appears to be consistent with this race.

Pupae are not readily distinguishable from those of *O. h. meridionalis*, being chocolate-brown with darker dorsal and abdominal markings, and

quite characteristic of a number of the smaller *Ogyris* species. It is interesting to note that this race, as in the case of the typical (northern) race, appears always to be associated with other species. The larva located on Mt. Paterwerta in South Australia was accompanied by one of a race of *Ogyris genoveva,* with which species it is commonly associated in Queensland.

Acknowledgements

The author wishes to thank Mr. and Mrs. J. C. Le Souëf for their assistance in making their collection so freely available for examination, Mr. Charles McCubbin for his information on the South Australian insect, and Mr. D. F. Crosby, Honorary Entomologist at the National Museum, Melbourne, for making this insect* available for examination.

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The Mollusc *Caryodes dufresnii* in Tasmania

Caryodes dufresnii (Leach) (Mollusca, Pulmonata)

by

RON C. KERSHAW*

and

ALAN J. DARTNALL†

Summary

An account is given of the history of the study of the Tasmanian endemic snail, *Caryodes dufresnii* (Leach). Some account of the variation is given with information on the habits and eggs of the animal.

INTRODUCTION

Tasmania has an interesting fauna and flora not the least of which are the land snails. Many of these have interesting historical associations and they pose intriguing problems of identity, distribution and ecology.

Some of Tasmania's unusual animals are known to have lived in other parts of Australia in the past. But among the land snails are two species which, while related to mainland forms, appear to be truly endemic. One of these is *Anoglypta launcestonensis* (Reeve), a rare and beautiful snail, which is restricted to the temperate rain forests of north-eastern Tasmania. The second species, the subject of this article, is the *Caryodes dufresnii* (Leach). A highly successful species, it is found in a wide range of habitats throughout the state.

Historical Associations

In 1772 Captain Marion du Fresne brought his two small ships to anchor off south-eastern Tasmania. Marion Bay was named as a consequence of this visit. A sociological milestone of this visit was the first contact with the Tasmanian aboriginals. A cultural milestone, a pointer for the future perhaps, was the death of the first aborigine by gunfire. Less well publicised are the collections

*Queen Victoria Museum, Launceston
†Tasmanian Museum, Hobart.

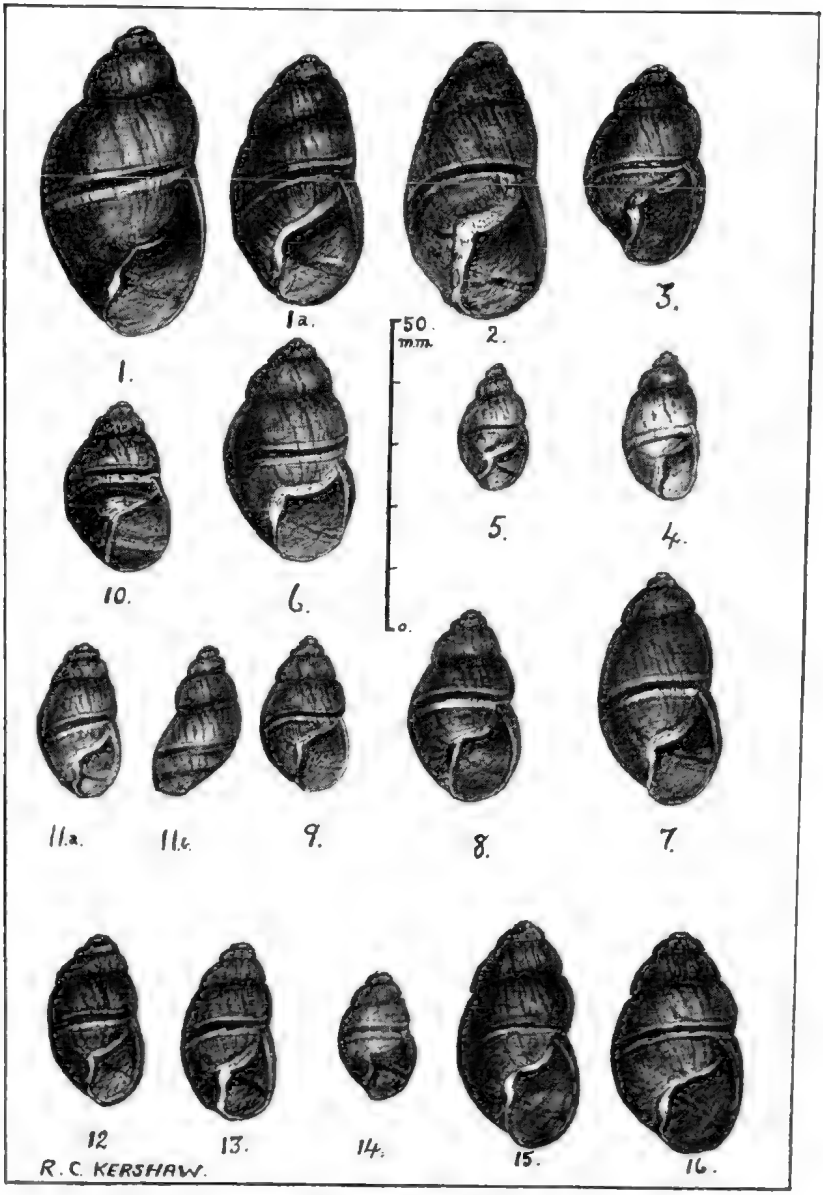

Figure 1. Some shell variations:

made by du Fresne's expedition. The du Fresne collection is now lodged, curiously enough, partly in the Museum d'Histoire Naturelle, Paris and partly in the Royal Scottish Museum, Edinburgh.

Messieurs Quoy and Gaimard, naturalists with the French explorer Jules Dumont D'Urville (Voyage Outour Du Monde De La Corvette L'Astrolabe, 1826-29) visited Tasmania in 1827. They also collected the *Caryodes dufresnii*, however it would appear from their rather unsatisfactory figure (1832) that their specimen was not typical and came from a different area.

Original Description and Identity

Specimens of a snail collected by the du Fresne expedition eventually reached Dr. Leach of the British Museum. They were described by Leach as the new species, *Bulimus Dufresnii*, (Leach, 1815). At the end of his description Leach remarked,

> "This new species I have named after M. du Fresne, in his collection (which is ever open for the use of naturalists) it occurs. Inhabits New Holland".

The locality 'New Holland' is hardly specific, and in fact led to confusion as Semper (1870) who first described the anatomy of this snail, gave the Sandwich Islands as the locality.

A tracing from Tab. CXX of Leach (1815) provided by the British Museum (G. L. Wilkins, pers comm. to R. C. K., 1954) has been compared with shells from Tasmanian localities. The form of the shell and the account of du Fresne's expedition leaves little doubt that the type locality is in South-east Tasmania.

The original description, also provided by the British Museum reads:

> *Bulimus Dufresnii* Tab. CXX.
>
> B. subviolascente-castaneus; anfractu basilari fascia e lineis duabus albis lineaque castanea confecta. Habitat in Australasia.
>
> Mus. Dom. Dufresne.

DUFRESNE'S BULIMUS

> Shell chestnut, slightly inclining to violet; the basal whirl with a band composed of one chestnut and two white lines.

The type specimen is apparently lodged in one of the Museums mentioned above; which has yet to be determined. Other localities given for the British Museum are:— Van Dieman's Land, Tasmania (Oyster Cove), and Patterson's River, N. Australia (sic.). The last locality should read:— N. Tasmania. (The authors wish to express their gratitude for the provision of the above information).

Key to Figure 1

1. Rain forest, River Leven Gorge, N. Tasmania.
1a. Rain forest, Strahan, Wst. Tasmania.
2. Wet Sclerophyll forest, Flowery Gully, Tamar Valley.
3. Wet Sclerophyll forest, Mt. Wellington.
4. Dry Sclerophyll forest, Swansea, E. Tasmania.
5. Dry Sclerophyll forest, Launceston.
6. Rain forest, Tarraleah, Central Tasmania.
7. Rain forest, Hartz Mountains, W Tasmania.
8. Wet Sclerophyll forest, Ben Lomond, E. Tasmania.
9. Dry coastal scrub, Greens Beach, Tamar Valley.
10. Dry Sclerophyll forest, Upper Nile R. N. Tasmania.
11a. & b. Dry forest near Launceston.
12. Wet Sclerophyll forest, Mt. Wellington.
13. Wet Sclerophyll forest, Mt. Wellington.
14. Dry Sclerophyll forest, Launceston.
15. Rain Forest, Tarraleah, Central Tasmania.
16. Rain Forest equivalent(?), Port Davey, S. W. Tasmania.

Subsequent Literature

As earlier authors have provided references a few important ones only will be quoted here. Iredale (1937) recognised the problems associated with this species but his attempt to divide it into races has not proved successful. Hedley (1892) figured the shell and gave a good description of the animal. Tenison Woods (1878) gave the first illustrated account of the variation. Olive Davies (1914) gave an account of the anatomy. Petterd (1879) also described several variations.

The Problem of Variation

The variability of the *Caryodes dufresnii*, was first noted by the Rev. Julian Tenison Woods (1878). His published findings illustrates a wide range of variation in this species. He felt that his observations could not be related to climate or situation. His figures are limited to shells from four distinct localities of which only three would possibly differ importantly on the knowledge of his day. He did note, however, that the shell colour was almost always a shade of brown with one or more yellow rings about the body. Accordingly, and this is the important conclusion from his work, he inferred the limits of colour variation in the species. Logically it has led to the study of the relationship between shell colour and environment being carried out by the authors.

In the course of study of a very wide range of shells, some of which are figured (Fig. 1-), the authors have been able only to distinguish two possible consistent forms. Many minor variations exist within populations making premature conclusions unwise. In fact the shell may be short and broad, long and narrow, or long and broad; while the apex may be blunt or sharp. The shell may be thin and fragile or strongly built. Preliminary thoughts suggest environmental controls.

A comprehensive programme to investigate the distribution of the *C. dufresnii* is under way. This may indicate whether the observed variation is due to habitat, geology, vegetation or climate, or combinations of these factors. The only conclusion offered at present is that specimens from the temperate rain forest are consistently heavier, larger and darker in colour than those from dry sclerophyll woodland. Logical implications of this are confounded by other complications.

Studies are in progress to evaluate growth changes with a view to eliminating these characteristics from the true variation observed. It must be kept in mind that not all of Tenison Wood's specimens were adult. It seems apparent from careful study that there may be much less real variation than seemed apparent in the past. An example of the problems met is the presence of an umbilicus in certain specimens. Normally there is no umbilicus present. But specimens are known from the vicinity of Ben Lomond in the north-east mountainous part of the State. Recently Mr. John Simmonds of Launceston collected an umbilicated specimen in dry forest near the east coast. A chromosome count from this animal by Mrs. Jean Dartnall revealed no difference between this and animals from the temperate rain forest. The shell has some resemblance to umbilicated specimens from the Ben Lomond area, but is much smaller than the normal rain forest shell.

The Animal

The body of the animal shows some colour variation. Quoy and Gaimard (1832) described the body of their specimen(s) as "brown or almost black, shot with reddish". The foot was yellow below. Charles Hedley (1892) gave the colour as slate, sometimes with a yellowish fringe with the foot greyish yellow. Miss

Davies (1914) recorded greyish brown colouration with a lighter grey foot. The authors have observed animals which are greyish like Hedley's specimens, brown specimens and animals with a distinct pinkish tint. The mantle is most often pale grey but brown animals have a yellow-brown mantle. These animals have all come from different areas. In time it is hoped to establish whether there is correlation between body colour and shell variation.

Habits

The animal withdraws into its shell folding its body inward upon itself until the mantle closes over it like an envelope. The tail as Hedley noted, is the last part to disappear and the first to reappear. The first sign of activity in an apparently dormant animal exposed to warmth is

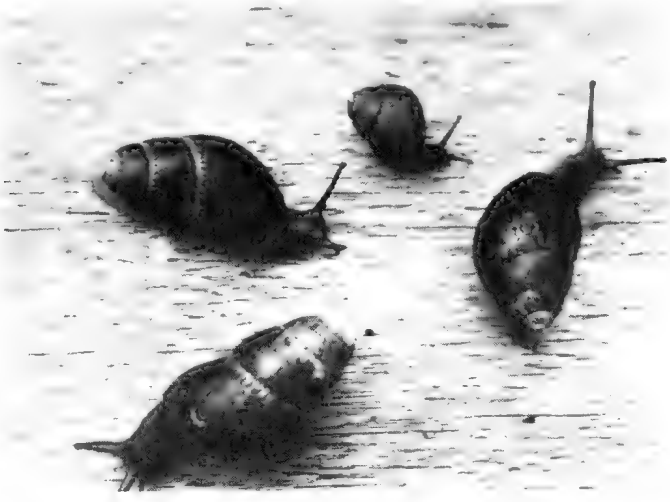

Plate 1. *Caryodes dufresnii*, (Leach). The largest specimen is 44 mm ($1\frac{3}{4}$ inches) long.

Plate 2 Wet Sclerophyll forest in Northeast Tasmania, haunt of *Caryodes dufresnii*.

the opening of the entrance to the pulmonary chamber. The aperture may remain open for thirty seconds to one minute or more before closing briefly. This rhythm may be maintained for some time, but some animals will begin to move almost immediately. Sometimes small bubbles of freshly exuded mucous may appear.

The darker coloured, tuberculate body surface then begins to appear. Sometimes only a small amount may protrude which then remains stationary for an indefinite period. Eventually the animal folds itself 'inside out'; the foot opening out below and the tentacles appearing as the head leaves the shell. Some animals move about boldly without delay. In alien surroundings there is a tendency to give up exploration in apparent bewilderment. In such cases the animal may return within its shell remaining there until returned to a natural environment. No amount of coaxing has any effect. Placed on grass some will move as close to the soil as possible in a relatively short time. Others may move about briskly without apparent concern.

Caryodes dufresnii is a particularly active snail during wet weather especially at night. It has also been observed climbing trees. Occasional animals are seen crawling on moist forest litter in the morning sunlight. However they are not normally visible during daylight.

Although there may be many snails in a particular area they are often hard to find. In the course of five visits to a study area twenty five live animals were found and thirty empty shells. This represented only one animal to some 40 square yards of forest floor. They are not obviously gregarious animals and seldom more than two are found together. However one of us (A.J.D.) found nine together beneath bark and leaf litter at the base of a large gum tree. At this site in a south-eastern fern gully, their tree climbing activity was also noted.

The most favoured haunt seems to be beneath rotting logs, or within accumulations of litter alongside logs. In addition to piles of litter at the foot of a tree, large stones in piles particularly when covered with litter are also favoured. In such places the snails may be found several feet down inside the pile.

There are large areas in which snails are not to be found. However, when studying these animals it is desirable to disturb the natural environment as little as possible. Consequently some individuals may escape attention. Only repeated visits especially to densely forested areas bring success. During periods of hot or cold weather the species may be found only in the most sheltered places. In rain forest warm weather after rain often encourages the animals to move about. Much more study of behaviour patterns is needed to explain behaviour patterns in the natural habitat.

Eggs

Tenison Woods (1878) was apparently the first person to describe the eggs of *Caryodes dufresnii*. The eggs are large in relation to the snail. This is one of the characteristics of the group to which the animal belongs. Eggs are reported as appearing in October and November. An egg in the collections of the Tasmanian Museum was taken from Mt. Wellington in July, 1889.

The authors found a "nest" of eggs in October, 1971. The clutch was found at the foot of a tree fern, *Dickinsonia antarctica*, in the dense rain forest of Mt. Arthur in north-eastern Tasmania. Seven eggs were found together just above the ground in the fibrous mat close to the fern trunk. The temperature of the nest

site was 8°C. A thick canopy of dead fern fronds hung beside the trunk providing complete shelter. In this dense and prolific forest the find can only be described as accidental.

The fresh appearance of the eggs suggested a recent laying and careful search revealed two adult snails close by. This lent weight to the idea that the two had recently mated and deposited their eggs there. The eggs were elongate oval, 11 mm by 7 mm and coloured dull greyish-white. In strong light they appeared slightly translucent and creamy in colour. It is possible that the egg shell is flexible and expands and hardens when laid. However egg laying and mating have not yet been observed.

Two eggs were retained by R. C. K. the remainder by A. J. D. to be placed in the Tasmanian Museum. The two eggs retained by R. C. K. were kept in litter maintained at approximately 8°C. These hatched in December 1971 between nine and ten weeks after collection. The following description was made of these specimens at about four weeks of age.

Whorls approximately three, ovately globose, surface glossy pale reddish-brown horn translucent. Body whorl encircled by one pale reddish-brown band and two pale translucent greyish bands, the width of the three less than 0.5 mm. Shell 10 mm wide, 9 mm high; aperture 8 mm high, 7 mm wide.

Protoconch about half a whorl, approximately 0.4 mm across at widest, depressed below level of next whorl with depressed nucleus. Protoconch sculpture obsolete traces of spiral riblets; colour glassy pale horn, smooth in texture.

Subsequent sculpture abruptly commencing at end of protoconch, about 18 spiral riblets by end of first whorl, bolder at the periphery. Riblets crossed by radial shallow furrows producing a wave like effect and breaking the riblets into slightly elongated tubercules. Interstices with extremely fine radial striae.

Animal with foot about 10 mm long, 3 mm wide; under side very pale translucent lemon, upper part of foot pale yellowish grey passing into black on the upper parts of the body and the tentacles; the whole ornamented with very weak elongate tubercules.

Base of shell smoother with weaker sculpture than upper surface. Umbilicus minute, deep, partly obscured by the columellar reflection.

Feeding Habits

The *Caryodes dufresnii* is apparently vegetarian, consuming decaying vegetable matter and fungi. In captivity the animals live well on a mixture of peanut butter, rolled oats and 'vegemite' seasoned with powdered calcium carbonate. They will also eat some green vegetable matter. The radula possesses about 170 rows of 85-90 simple teeth which would also indicate a herbivorous habit.

On three occasions, once in the field and twice in captivity, a specimen has been found with its head inserted within the shell of another in the manner of a carnivorous snail. On the second occasion this excited considerable curiosity because no dead shells had been placed in the container. A day or two later a similar event occurred and a search revealed further empty shells. A search for a suspected predator did not reveal such an animal. However the depth of litter may hide a dead animal long enough for the shell to become empty. The close search made revealed several in various stages of decomposition. No further cases of intrusion upon empty shells has been seen and the activity remains unexplained.

Predators

Birds and mammals are probably the most obvious predators of the

Caryodes dufresnii. Broken shells have been found in "runs" or scattered on the forest floor. The first situation suggests animal predators. A collection from such a site revealed several with a body whorl removed and one without a spire. Scattered shells may result from the activities of birds or possums. More observations are needed on this matter.

When carnivorous snails are the predators the shell is completely cleaned out. It is normally found undamaged beneath a log or other shelter. Species such as *Strangesta ruga* (Legrand) are commonly found in association with *Caryodes* animals. A description of the habits of the carnivorous snails is given by Smith (1971).

Dead shells are sometimes found in caves. In most cases there is little doubt that they have been washed into the caves. No live animals are known to have been found in such situations. A typical collection obtained from the Mole Creek area revealed only old, worn specimens most likely transported. Many years ago Mr. Edmund Gill of the National Museum collected both shells of *Caryodes* and an aboriginal implement from a cave at Flowery Gully near the Tamar River. He raised the point (pers. comm. to R. C. K., 1955) as to whether the aboriginals may have handled the shells. These people certainly would have been aware of this large and common mollusc.

Origin

Many members of the Tasmanian snail fauna have close relatives in Victoria. In some cases the species appear identical. There seems little doubt that during the last Pleistocene glaciation the faunas of Tasmania and S. E. Australia were continuous across Bass Strait. It is therefore an interesting exercise to ask why the *Caryodes dufresnii* is found only in Tasmania.

The acavid molluscs to which the species belongs have a number of representatives in Eastern Australia. They all possess widely different shell forms, but have similar reproductive anatomy and chromosome numbers (Dartnall and Dartnall, 1972). It is possible that the *C. dufresnii* evolved from an animal like the Victorian species *Pygmipanda kershawi* losing four chromosomes in the process (58-54). We now need to look for traces of parent populations that carry some resemblances to the mainland form. It is hoped that the study of variation at present in progress may shed some light on this idea. Fossil remains may also help. Enquiry of Dr. Brian Smith reveals that no fossil *Pygmipanda* are known in Victoria.

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F.N.C.V. Excursion to Bendigo

16-17 October 1971

by Elizabeth K. Turner*

Temperatures in the mid-60's, long periods of sunshine and a cold wind, kept the 33 Melbourne members invigorated during their visit to Bendigo.

The first wayside stop just south of the Eppalock weir disclosed extensive blue masses of *Glossodia major* (Waxlip Orchid) with *Thelymitra ixioides* and *Rubra* (Sun Orchids) growing freely from the quartzite gravel floor of a predominately Red Box and Ironbark forest.

Near Spring Gully Reservoir, south of Bendigo, where gold was mined between 1863 and 1890, our leaders, J. W. Kellam and F. Robbins, of the Bendigo F.N.C., had a display of Graptolites set out on the top of the "boot" of an automobile. We learned that Linnaeus had named these fossils because of their resemblances to writing on the slates in which their compressed remains are found. Mr. Kellam explained that these primitive animals belonged to the phylum Coelenterata and to the Hydrozoa, and lived in the ancient sea some 350-430 million years ago. The last of these animals perished some 300 million years ago. They were compound animals, consisting of a number of polyps inserted into cups which budded out in a line from a primary sicula, or conical chamber, giving the appearance of a fret-saw, with the teeth directed away from the sicula. Mud and sand were washed into the sea by the rivers and the Graptolites died and were covered with layers of silt during the Ordovician period. At the end of this period a great upheaval of the land mass forced the sea to retreat and the alternate layers of sand and mud gradually hardened into sandstones and shales. The lowest of these Ordovician slates and shales are the Lancefield series, and next the Bendigo series as we saw at Spring Gully. The original animal tissue has been replaced by a mineral such as calcite, carbon or iron sulphide, and in the rocks nearer the surface this sulphide has oxidised to brown iron oxide, limonite.

Very soon, at a spot about 300 yards up the track, figures kneeling on the pinkish-grey shale could be seen and heard hammering away, splitting the layers of rock and crowding around the leaders with specimens for identification.

Specimens found —

Didymograptus nitidus, D. protobifidus, D. extensus, Phyllograptus typus, Tetragraptus pendens, T. hartii, T. bryonides, T. serra, T. fruticosis, T. latus.

Mrs. Cameron discovered *Sigmagraptus crinites*, which was quite a rare finding.

Many people collected their Graptolites and then set off along the water-race for about a mile, through the dry sclerophyll forest to a hillside of pink *Boronia anemonifolia*. Along the route was a copious growth of Bendigo Wax flower (*Eriostemon verrucosus*) and Red and Yellow forms of *Grevillea alpina*; and so, back to the Shamrock Hotel and a four-course meal, after which some visited friends, some toured the town and others went to bed early.

*Acknowledgement is made to Miss L. M. White for checking plant list: and Miss Dorothy Dawson and others for their identification of species.

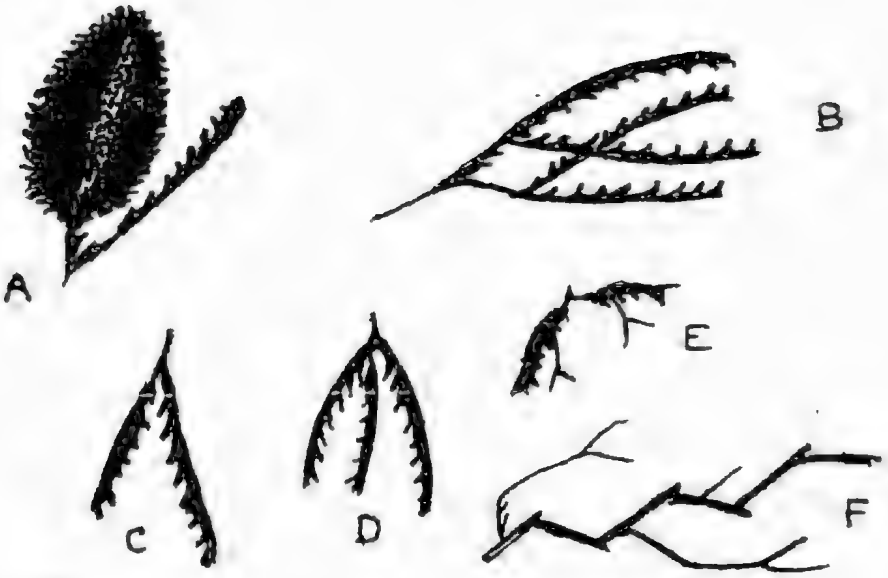

Fig. 1.

A. Phyllograptus typus.
B. & D. Tetragraptus fructiosus.
C. Didymograptus protobifidus.
E. Bryograptus.
F. Sigmograptus.

The following day, Sunday, we drove east along McIvor Road, and near the brick works we crossed the Whitelaw Fault which extends for 30-odd miles in a N.-S. direction, on to the Middle Ordovician or younger rocks where the fossils differ considerably from those of the older rocks on the western side of the fault.

At Longleat we crossed Axe Creek, which rises in Mt. Alexander and enters the Campaspe river below Axedale. Here, along the creek, we could see how the recent lava flows of approximately 10,000 to 1½ million years ago had covered the Ordovician rocks.

We turned left at Shingle Hut Creek and were able to see quite large erratics left about in the fields by the glaciers of the Permo-Carboniferous era, some 200 million years ago.

Before turning into the Tooleen State Forest we made a brief roadside stop by a mullock-heap, said to come from Costerfield and containing lumps of heavy steel-grey Stibnite (Antimony, Sulphide) and here also we witnessed two crows repeatedly swooping to attack a small fox as it ran uphill.

The State Forest is a dry, sclerophyll area of mainly Red Box (*E. polyanthemos*), Yellow Box (*E. melliodora*) and Iron Bark (*E. sideroxylon*) and several Mallees and patches of Grasstree (*Xanthorrhoea australis*) interspersed with heathlands on which grew large bushes of red and of yellow *Grevillea alpina*, some bushes being 5 feet high. Sun orchids flourished and there was much photographing of the glorious red *Thelymitra macmillanii*.

Although we failed to see any wallabies we found a recent camp where

8-10 animals had been lying in shallow, dusty areas, and we noted also how the echidnas had ploughed up the ant hills (or mounds) in their search for food.

A large scorpion, a funnel-web spider and a striped planarian were shown to us by Mr. Bob Allen, President of the Bendigo F.N.C., and young Edwin Bedgood successfully led several parties to the haunt of the Sacred Kingfisher in a long-dead eucalypt; later, Mr. Ian Morrison photographed an aggressive bearded dragon.

Bird calls were constant in the forest, these being chiefly of the Australian Thrush, White Winged Chough, Olive-backed Oriole and various Honey-eaters.

Special note is made about the Mini-Flora which was viewed through lenses, by kneeling on the ground and bending forward in the salaam position.

These included:—

Rutidores parviflora, a tiny white daisy.

Centrolepsis strigosa, about 2 inches high.

Crassula macrantha, approximately 1¼ inches high.

Stylidium despectum, about ¼ an inch tall.

Helipterum australia, yellow and about 1½ inches tall.

Brachyscoma goniocarpa, a charming white daisy about 2 in. high.

Myriocephalus rhizocephalus, a small, wooly-headed herb.

A field outside the forest boundary was covered with the Stinking Pennywort (*Hydrocotyle laxiflora*) and contained unusual rings of 7-10 feet diameter of *Dianella revolta*, adopting a growth rather resembling the Triodia or Spinifex Grass of Central Australia.

Here also was *Cynoglossum suaveolens* (Sweet Hound's-tongue) and masses of yellow Bulbinopsis Lily and *Podolepis jacinoides*, interspersed with myriads of small Vanilla lilies (*Arthropodium minus*).

Appended are lists of native plants observed by our party on these two excursion days:—

FERNS:

Cheilanthes tenuifolia, Rock lip fern.

Cyperaceae

Lepidosperma viscidum, Sticky Sword-Sedge.

Centrolepidaceae

Centrolepis strigosa, Hairy Centrolepis.

Juncaceae

Juncus pauciflorus, Loose-flower Rush.

J. bufonius, Toad Rush.

Lilliaceae

Lomandra effusia, Scented Matrush.

Arthropodium minus, Small Vanilla Lily.

Dichopogon strictus, Chocolate Lily.

Thysanotus patersonii, Twin Fringe-lily.

Bulbinopsis bulbosa, Bulbine Lily.

Burchardia umbellata, Milkmaids.

Dianella revoluta, Spreading Flax-lily.

Anguillaria dioica, Early Nancy.

Xanthorrhoea australis, Australian Grass-tree.

ORCHIDACEAE:

Thelymitra aristata, Scented Sun-Orchid.

T. ixioides, Dotted Sun-Orchid.

T. macmillanii, Crimson Sun-Orchid.

T. rubra, Salmon Sun-Orchid.

T. antennifera, Rabbits' Ears.

Calochilus robertsonii, Purplish Beard Orchid.

Diuris maculata, Leopard Orchid.

Microtis parviflora, Slender Onion

Orchid.

Caleana major (leaves only), Large Duck Orchid.

Acianthus exsertus (leaves only), Gnat Orchid.

Caladenia carnea, Pink Fingers.

C. dilatata, Green Comb Spider Orchid.

C. angustata, Musky Caladenia.

Glossodia major, Waxlip Orchid.

Pterostylis nutans, Nodding Greenhood.

P. longifolia, Tall Greenhood.

P. cycnocephala, Swan Greenhood.

PROTEACEAE:

Hakea sericea, Silky Hakea.

Grevillea alpina, Mountain Grevillea.

G. dryophylla, Holly Grevillea.

SANTALACEAE:

Exocarpus cupressiformis, Cherry Ballart.

LORANTHACEAE:

Amyema miquelii, Stalked Mistletoe.

CHENOPODIACEAE:

Enchylaena tomentosa, Barrier Saltbush.

COMPOSITAE:

Brachyscome goniocarpa, Dwarf Daisy.

Cassinia arcuata, Chinese Scrub.

Helipterum australis, Common Sunray.

Helichrysum apiculatum, Common Everlasting.

H. semipapposum, Clustered Everlasting.

H. bracteatum, Golden Everlasting.

H. obcordatum, Grey Everlasting.

Millotia tenuifolia, Soft Millotia.

Leptorhynchos squamatus, Scaly Buttons.

Rutidosis multiflora, Small Wrinklewort.

Podolepis jaceoides, Showy Podolepis.

Myriocephalus rhizocephalus, Wooly Heads.

Craspedia uniflora, Billy Buttons.

Senecio quadridentatus, Common Fire-weed.

Microseris lanceolata, Yam.

BRUNONIACEAE:

Brunonia australis, Blue Pincushion.

CRASSULACEAE:

Crassula macranthia, Rufous Stonecrop.

CAMPANULACEAE:

Wahlenbergia communis, Bluebell.

W. gracilenta, Graceful Bluebell.

DROSERACEAE:

Drosera whittakeri, Scented Sundew.

D. glanduligera, Scarlet Sundew.

D. planchonii, Climbing Sundew.

D. auriculata, Tall Sundew.

D. peltata, Pale Sundew.

DILLENIACEAE:

Hibbertia strica, Erect Guinea-flower.

H. exutiacies, Prickly Guinea-flower.

H. linearis, Large Guinea-flower.

H. australis.

EPACRIDACEAE:

Brachyloma daphnoides, Daphne Heath.

Acrotriche serrulata, Green Ground Berry.

Astroloma humifusum, Cranberry Heath.

Melichrus urceolatus, Urn Heath.

Leucopogon virgatus, Beard Heath.

GERANIACEAE:

Pelargonium australe, Wild Geranium.

GOODENIACEAE:

Goodena lanata, Creeping Goodeniae.

HALORRHAGIDACEAE:

Haloragis tetragyna, Poverty Raspwort.

LEGUMINOSAE:

Acacia aspera, Rough Acacia.

A. armata, Hedge Acacia.

A. acinacea, Gold-dust Acacia.

A. diffusa, Spreading Acacia.

A. flexifolia, Bent-leaf Acacia.

A. pycnantha, Golden Wattle.
A. lanigera, Wooly Wattle.
A. verniciflua, Varnish Wattle.
Daviesia corymbosa, Narrow leaf Bitter Pea.
D. mimosoides.
Dilwynia floribunda, Showy Parrot-pea.
D. glaberrima, Heathy Parrot-Pea.

LAURACEAE:
Cassythia glabella, Tangled Dodder Laurel.

LABIATAE:
Prostanthera denticulata, Rough Mint Bush.

LORANTHACEAE:
Amyema miquelii, Stalked Mistletoe.

MYRTACEAE:
Eucalyptus camaldulensis, Red Gum.
E. hemiphloia, Grey Box.
E. macrorhyncha, Red Stringybark.
E. polyanthemos, Red Box.
E. sideroxylon, Red Ironbark.
E. melliodora, Yellow Box.
Calytrix tetragona, Common Fringe-Myrtle.

PROTEACEAE:
Hakea sericea, Silky Hakea.
Grevillea alpina, Mountain Grevillea.
G. dryophylla, Holly Grevillea.

PAPILLIONACEAE:
Hardenbergia violacea, Sarsaparilla.
Gompholobium huegelii, Karalla.

PITTOSPORACEAE:
Cheiranthera linearis, Finger flower.
Bursaria spinosa, Sweet Bursaria.
Marianthus procumbens, White Marianth.

RUTACEAE:
Boronia anemonifolia, Sticky Boronia.
Eriostemon verrucosus, Bendigo Wax Flower.
Correa reflexa, Common Corea.

RANUNCULACEAE:
Ranunculus lappaceus, Common Buttercup.

RHAMNACEAE:
Cryptandra tomentosa, Prickly Cryptandra.

SCROPHULARIACEAE:
Veronica plebeja, Eastern Speedwell.

STYLIDACEAE:
Stylidium calcarata, Trigger Plant.
S. despectum, Small White Trigger Plant.
Levenhookia dubia, Hairy Stylewort.

SAPINDACEAE:
Dodonea cuneata, Wedge-leaf Hopbush.

TREMANDRACEAE:
Tetratheca ciliata, Pinkeye.

THYMELAEACEAE:
Pimelea glauca, Smooth Rice Flower.

UMBELLIFERAE:
Hydrocotole laxiflora.

VIOLACEAE:
Hymenanthera dentata, Tree Violet.

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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His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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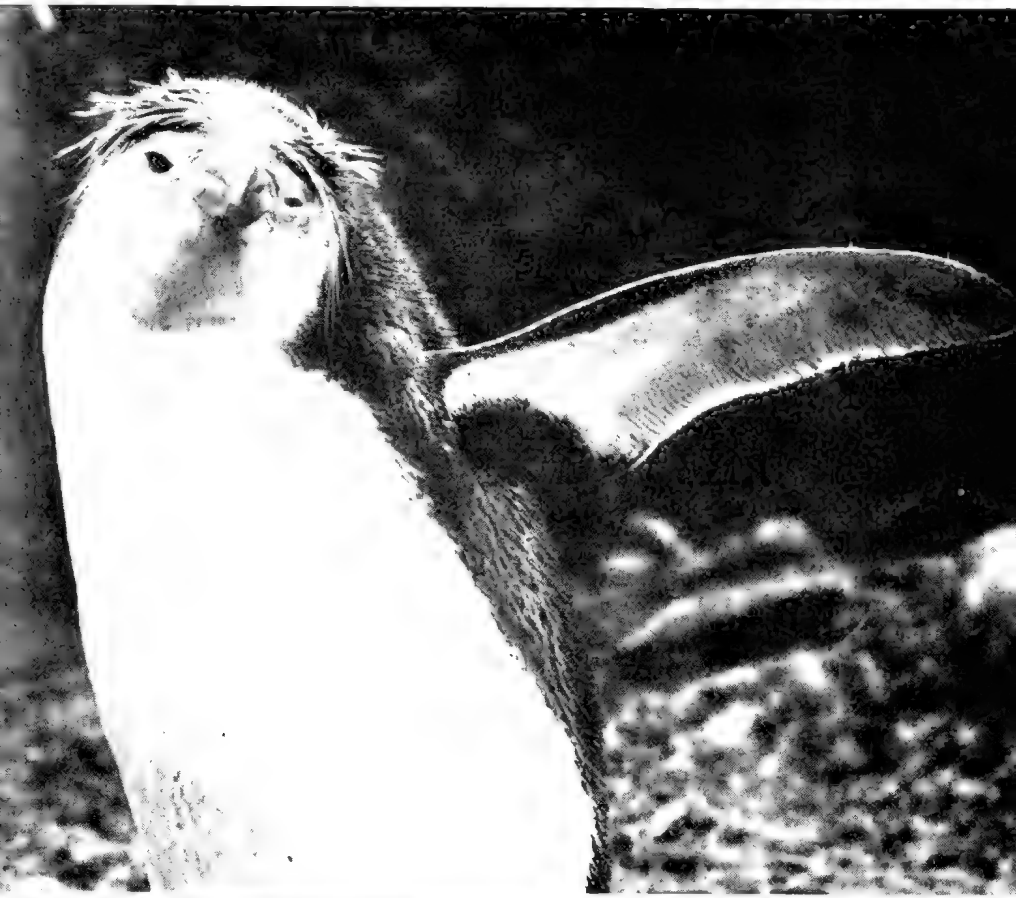

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

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

1. Minutes.
2. Announcements.
3. Subject for evening:—"An Introduction to Fossils": Mr. Ken Bell.
4. New Members (**March**).

Ordinary:

Mrs Margaret Finger, 45 Emerald Road, Belgrave. 3160
Mr Raymond J. Gibson, 8 Cluney Court, Blackburn Sth. 3130
Mr Jon G. Martindale, 15 Abercromby Road, Blackburn Sth. 3130
Mr John R. J. McDowell, 38 Montpelier Drive, Lower Plenty. 3093
Mrs Mavis R. Taylor, 7 Vardon Ave., Beaumaris. 3193
Miss Janna L. Thompson, 24/119 Atkinson St., Oakleigh. 3166
Mrs E. C. Warne, 147 Riversdale Rd., Hawthorn 3122
Mr J. V. Sullivan, 50 Lyons St., Carnegie. 3163

Joint:

Mrs Shirley Armstrong and Peter Armstrong, 39 Anthony Drive, Mount Waverley. 3149
Mrs Sharon L. Janssen, 29A Myrtle Grove, Blackburn. 3130
Mr Raymond P. King and Mrs Helen M. King, 38 Maggs St., East Doncaster. 3109

Country:

Mr Christopher J. Cole, 30 Tourello Rd., Mt. Eliza. 3930
Mr Charles H. Mangle, Box 36, P.M.G., Halls Gap. 3381
Miss Hazel M. Osman, "Illalangi", Coonara Rd., Olinda. 3788
Rev. C. J. Baulch, "The Manse", Penshurst. 3289
Mr Ian R. Power, 13 Hannah St., Frankston. 3199

Junior:

Master Shane F. McEvey, 5 Gissing St., Blackburn Sth. 3130
Master Allan Morrow, 62 Moonee Boulevard, Glenroy.

5. Correspondence.
6. General Business.

Wednesday, 14 June—"An introduction to Orchids": Mr. Jack Hyett.

GROUP MEETINGS

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

Thursday, 11 May — Botany Group. Mr. T. Sault will speak on "Some easily identified Seaweeds".

Wednesday, 17 May — Microscopical Group.

Thursday, 18 May — Day Group. Maranoa Gardens. Catch Mont Albert tram from Collins Street to Stop 54. Walk back to Parring Road. Bring lunch and meet at Beckett's Park gates at 11.30 a.m.

Thursday, 25 May — Field Survey Group. This group meets in the Library Conference Room next to Theatrette, National Museum, at 8 p.m.

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

Monday, 5 June — Marine Biology and Entomology Group meeting in Library Conference Room, National Museum, at 8 p.m.

Wednesday, 7 June — Geology Group.

Thursday, 8 June — Botany Group. Speaker: Mr. B. Fuhrer — Fungi.

F.N.C.V. EXCURSIONS

Sunday, 21 May — Daylesford. This excursion will be led by a member of the Daylesford and District Historical Society. The coach will leave Batman Avenue at 9.30 a.m. Fare $2.20. Bring two meals. Members travelling by private car may meet at approximately 11.45 a.m. at Daylesford Post Office.

JUNIOR MEETINGS

May — 8 p.m., Montmorency and District.

Friday, 26 May — 8 p.m., at Hawthorn Town Hall.

PRELIMINARY NOTICES

Sunday, 27 August-Sunday, 3 September — Stawell. Details next month.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 5 3 May, 1972

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Cover Photograph:

An adult Royal Penguin (*Eudyptes chrysolophus schlegeli*) drowses in the Macquarie Island sunshine. A.N.A.R.E. *photo by Ken Simpson*

Excursion to the Flinders Ranges

F.N.C.V.

21 August — 5 September 1971

by KATHARINE HOUGH

With the Flinders Ranges as their goal, and interests divided between botany, geology and ornithology, the party left Melbourne on Saturday, 21 August at 8.00 a.m. The tour of sixteen days was to cover 2065 miles, and as naturalists do not waste time, impressive lists of species and many exciting discoveries were made.

The first surprise was Ballarat, almost unrecognizable under what appeared to be a heavy snowfall. The 'snow' proved to be hailstones so thick that streets, houses and gardens were white with still unmelted hail from a very heavy storm the night before.

The bus reached Green Lake, near Horsham, where great numbers of Wanderer butterflies entertained the party at lunch. In the excellent Rotary Club plantation adjoining the lake, a number of interesting eucalypts and native shrubs were flowering well. Whilst on the way again, a '10 minute stop' was made between Kaniva and Bordertown. These stops usually extend to about half an hour, but are still much too short for the enthusiasts. Here mallee vegetation lined the road with some taller eucalypts — River Red Gum (*E. camaldulensis*), Yellow Gum (*E. leucoxylon*) and Black Box (*E. largiflorens*). Golden Wattle (*Acacia pycnantha*), Gold-Dust Wattle (*A. acinacea*), Spiny Acacia (*A. spinescens*) and Nealie (*A. rigens*) were flowering with Flame Heath (*Astroloma conostephioides*), Fringed Heath Myrtle (*Micromyrtis ciliatus*), Pink Velvet Bush (*Lasiopetalum behrii*) and Common Fringe Myrtle (*Calytrix tetragona*). The Climbing Sundew (*Drosera planchonii*) was noted, and two sedges, the Clustered Sword Sedge (*Lepidosperma congestum*) and the Black Rapier Sedge (*Lepidosperma carphoides*). Yellow-rumped Pardalotes were common with Chestnut-rumped Thornbills, White-eared, Brown-headed and Spiny-cheeked Honeyeaters. The first Black-winged Currawong (now considered a race of the Grey Currawong familiar to southern Victorians) was seen, and a large flock of Sulphur-crested Cockatoos were the last to be recorded by the party until it approached Renmark on the way home. Crossing the border, we arrived at Bordertown to spend the first night.

Another popular activity on these trips is walking ahead of the bus.

While walking down the road the following morning, the following birds were seen — Noisy Miners, Striated Pardalotes nesting in a cleft in a roadside tree, two White-faced Herons beside a dam, and White-backed Magpies still with us. In the bus again we drove through mallee country cleared for wheat and grazing, but with some large uncleared stretches. A stop in one of these before Tintinara proved rewarding.

Broombush (*Melaleuca uncinata*) and Broom Heath Myrtle (*Baeckea behrii*) grew amongst the mallee, three species of which were identified — Oil Mallee (*E. oleosa*), Yellow Mallee (*E. incrassata*) and Bull Mallee (*E. behriana*). Desert Banksia (*B. ornata*), Silver Banksia (*B. marginata*) and Austral Grasstrees (*Xan-*

(horrhoea australis) occurred with Slender Westringia (*W. grevillina*) and the Blue Daisy Bush (*Olearia ciliata*). The Blue Heron's Bill (*Erodium cygnorum*) was a rich intense blue in many places, and Tall Greenhoods (*Pterostylis longifolia*) were found. The scrub was fairly open with a number of tall eucalypts, and birds were plentiful. A Hooded Robin was seen, and a small flock of Striated Thornbills. These must have been near the northerly limit of their range in this area. A party of seven Black Cockatoos flew out of one of the tall eucalypts but gave no calls. They showed no tail colour, and as the yellow face-patches of the Yellow-tailed Black Cockatoo were not seen, it was thought they could possibly be some of the small population of Red-tailed Black Cockatoos occurring in the Bordertown area. However, disappointingly, exact identification was impossible.

At a later stop, at Coonalpyn, a pair of Weebills were busily building about seven feet up in a mallee. Weebills were to be common throughout most of the South Australian part of the trip. The first Crested Pigeon was seen here — we were to see many more of these. Between Coonalpyn and Meningie, Golden Wattle was flowering so profusely, that the perfume was everywhere. Three Mallee Ringnecks flew along the road, and a Red-tailed Thornbill was seen showing brilliant colour on the rump. The Common Correa (*Correa reflexa*) and Blunt Everlasting (*Helichrysum obtusifolia*) grew near Meningie with the Flexile Hakea (*Hakea muelleriana*) and Broom Ballart (*Exocarpus sparteus*). Introduced Onion Weed (*Asphodelus fistulosis*) showed masses of flowers in places. On a swamp edged with Samphire (*Arthrocnemum sp.*) and Saw Sedge (*Ghania deusta*) were hundreds of Silver Gulls. Arriving at Meningie, we travelled alongside the vast Lake Albert dotted with many water birds, amongst them White-headed Stilts and White Egrets. The lunch stop was at the northern end of Lake Albert in an area beside some bare sandy hills, where the introduced Tree Tobacco (*Nicotiana glauca*) flourished; as did the Broad-leaved Cotton Bush (*Asclepias rotundifolia*) with milky sap and interesting Hoya-like flowers. Some bushes had larvae of the Wanderer butterfly, and adult

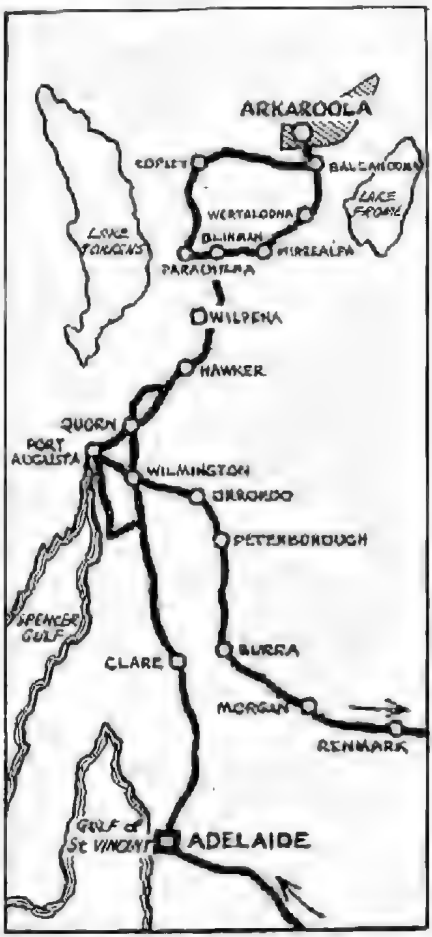

Figure 1. Map of route taken by F.N.C.V. party.

Wanderers were flitting about. A pair of Singing Honeyeaters were feeding young in a nest in the centre of a clump of Boxthorn.

Whilst on the road again, numbers of Ravens' nests were noticed in the cross-pieces of the S.E.C. poles. In the Western District of Victoria where Ravens adopted this habit, canny linesmen attached wire baskets to the main poles. The Ravens lost no time in making use of these, and everyone was happy. Passing through thick Murray Pine (*Callitris columellaris*) we were soon travelling alongside the Murray. A majestic sight was a flight of eighty Pelicans in V formation overhead.

After passing through Murray Bridge we reached the Mt. Lofty Ranges in the late afternoon — very green with little old stone buildings, beautiful Red Gums, and Fir plantations. Before long we were in Adelaide for our second night.

. . .

The next day we took the Main North Road to Quorn, travelling through country mainly cleared for agriculture, with some vines and olives. Lunching in a semi-wild park in the small town of Gladstone the botanists found the Eumong (*Acacia stenophylla*) with its long drooping 'leaves', and two Cassias — the Dense Cassia (*C. sturtii*) and the Silver Cassia (*C. artemisioides*) with their masses of little golden flowers. A large and noisy flock of Galahs fed on the ground across the road. In varying numbers we were to see these over the entire trip. Ravens of course were always with us, and Nankeen Kestrels were common.

At Laura we "refuelled" with excellent hot pies, then entered the wide Willochra Plains with the outline of the South (Lower) Flinders to the west, dominated by the striking Devil's Peak, and the southern section of the main Flinders Ranges away to the east. Mulga (*Acacia aneura*) was in evidence on the plain and clumps of the tangled, twiggy Nitre Bush (*Nitraria schoberi*). Along the watercourses — mainly dry — grew the wonderful, nobbly Red Gums so characteristic of the Flinders Ranges. Arriving at Quorn, we disembarked for the night at The Mill, an old flour mill beautifully restored with three floors given to restaurant, art gallery, and museum: and adjoining motel accommodation. Here we saw our first Black-backed Magpie since entering South Australia — one bird with several 'White-backs' on a tennis court. As we travelled north, the proportion of 'Black-backs' slowly increased with a number of hybrids, with a band of black across the shoulders, seen south of Wilpena. The most northerly 'White-back' was recorded between Wilpena and Oraparinna.

. . .

The next section, Quorn to Wilpena, was a day full of interest. We left the main road to do a loop through Warren and Buckaringa Gorges formed by tributaries of the Willochra Creek cutting through ridges of ancient quartzite. Entering Warren Gorge, the rough hillsides were bright with flowering acacias, Desert Cassia (*C. nemophila*), white starry mounds of Pimelia Daisy Bush (*Olearia pimeleoides*), the rare *Eremophila santalina* and Red Templetonia (*T. retusa*) with its beautiful coppery red pea flowers. The low-growing Thorn Acacia (*A. continua*) covered in rich golden balls was found here and in many places later, and the Spiny Flat Sedge (*Cyperus gymnocaulos*) was seen. Just through the cleft of the gorge with its high red cliffs, an area of beautiful Red Gums backed by slopes of Murray Pine was full of bird activity with many of them nesting. A

pair of Adelaide Rosellas in brilliant colour — much brighter than usual, with scarlet red breasts — were at a spout in one of the trees. Above them in an adjacent tree a pair of Galahs, one with its head just out of a spout, showed great interest in the watchers. A female Black-backed and a male White-backed Magpie were feeding two very small young in a nest nearby.

After a short visit to Buckaringa Gorge, with its long folded cliffs, the bus continued along a little-used road to rejoin the main road at Gordon. The track wound through low rolling hills, the uncleared areas covered with many Salt bushes (*Atriplex* sp.), Blue Bush (*Kochia* sp.) and Copper Burrs (*Bassia* sp.). A flock of twelve Cockateil flew beside the bus, and Little Corellas — the first of many hundreds to be seen later — were feeding on the slopes. We passed the grave of Hugh Proby, the founder of Kanyaka Station (the ruins of which were to be our lunch stop), who was 'drowned at the age of 24 while crossing the flooded Willochra Creek on horseback in 1852'. At a '10 minute stop' on top of a rise, Pipits were common and Brown Songlarks and Blue and White Wrens were in the saltbush. Sheets of tiny yellow and white everlastings with some taller, larger white ones, covered the more open spaces, with a few patches of the Copper Red Pea (*Swainsona stipularis*). This attractive plant was plentiful later after Copley and at Arkaroola.

Arriving at Kanyaka Ruins for lunch, many had no time to eat, due to exploring the fascinating remains of the 16-roomed homestead with its stone walls 18 ins. thick, numerous outbuildings, and old graveyard. The next stop was at Yourambulla Caves and their aboriginal rock paintings. After a long climb up a rocky hillside, with many Acacias, Emu Bushes (*Eremophila maculata*), (*E. alternifolia*), some Sugar Wood (*Myoporum platycarpum*), the Rock Fern (*Cheilanthes tenuifolia*) and Blanket Fern (*Pleurosorus rutifolius*), the shelters were reached under an overhang at the top of the ridge. The interesting paintings were in good condition thanks to a necessary wire screen in front.

Passing through Hawker, where a Fork-tailed Kite was sighted, we crossed a flat plain ringed by magnificent mountains and approached Wilpena, skirting the towering Rawnsley's Bluff. Here the Murray Pine began to dominate the landscape with Red Gums and the unfamiliar Gum-barked Coolabah (*E. intertexta*) along the water courses. Arriving at Wilpena Chalet after travelling so long through seemingly deserted country, we found ourselves amongst throngs of people and spent two nights in luxurious accommodation.

Some of the party the next day tackled the long hike and climb to St. Mary's Peak, enjoying magnificent views of the mountain-ringed pound, while others took the less testing climb up Mt. John above the Chalet. The lower slopes of Mt. John were a garden — with Acacias (*A. pycnantha*), (*A. continua*), Grevilleas (*G. lavendulacea*), (*G. aspera*) and Hop Bushes (*Dodonaea viscosa*), (*D. lobata*). The white bracts of Dusty Miller (*Spyridium phlebophyllum*) were so showy they equalled the effect of flowers. Many Grasstrees (*Xanthorrhoea quadrangulata*) and Mallee eucalypts provided the higher storey, while on the ground Erect Rice Flowers (*Pimelea stricta*) and Silvertails (*Ptilotus obovatus*) bloomed amongst the Porcupine Grass (*Triodia irritans*). Walking into the Pound and up to the Lookout in the afternoon, the magnificent *Acacia notabilis* with its enormous golden balls edged the track, with Shrub

Violet (*Hybanthus floribundus*) and Lavender Grevillea. Though not flowering, many leaves of the Garland Lily (*Calostemma purpurea*) were seen, and orchids grew under the Murray Pines which covered most of the floor of the Pound (*Pterostylis mutica, P. nana, Caladenia filamentosa, C. dilatata*). Prickly Templetonia (*T. aculeata*), the Cassia-like (*Petalostylis labicheoides*) and Adder's Tongue (*Ophioglossum coriaceum*) were notable finds. The Banded Greenhood (*P. vittata*) was found by the St. Mary's Peak walkers, and the Rush (*Baumea articulatum*) was identified. Birds were not abundant, although Weebills were common in the Red Gums near the Chalet, and on the walk to the Lookout. Yellow-throated Miners, Purple-backed Wrens, White-browed Babblers, and Rufous Whistlers were seen.

. . .

At 8.15 the next morning, we left on our last forward section to Arkaroola. On each side of some of the cattle grids stood a lifelike painted sheepdog cut out of tin. Known as 'scare dogs' these are intended to deter the sheep from going through and it appears they have the desired effect. Before long we entered Oraparinna National Park, surrounding Oraparinna Station, a wonderful area of 100 square miles of cleared flats, gum-lined watercourses and rugged mountains. Half was donated by the station owner, and the government contributed the other half. It seemed to Victorians that South Australia was much better endowed with National Parks than their home state. Here we encountered the wrongly-named 'wild hops'. Not a hop, but a dock better named Pink Dock (*Rumex vesicarius*), this is a malignant introduced pest which covers the countryside for hundreds of miles, but the effect of its massed pink-red hop-like bracts painting the mountains interspersed with the yellow-flowered cushions of Twin Leaf (*Zygophyllum* sp.) and grey-green saltbush, creates a landscape of incredible beauty, which was to stay with us throughout the rest of the North Flinders Ranges. Bluish Cattle Bush — in South Australia 'Bullock Bush' (*Heterodendron oleifolium*) — and Weeping Pittosporum (*P. phillyraeoides*) added to the unreal quality of the landscape. Passing the 'Great Wall of China', a long escarpment topping a steep hill, we continued to

Plate 1. Geologists paradise Arkaroola

Photo: Author

Blinman, almost a ghost town. Here an old copper mine has been re-opened and some time was spent by the party rummaging in mullock heaps for prized specimens of green copper ore.

Following the creek bed, mainly dry with some beautiful waterholes and majestic Red Gums, the road now turned west through Parachilna Gorge to join the main road north to Maree. With a good distance to go, time would not permit a stop in this gorge, but its beauty was impressive enough from the bus. Here one of the two Peregrine Falcons seen on the trip flew alongside for a short distance.

Turning north up the main road, at first across a flat and arid-looking plain, we were back in the mountains with their dock-covered slopes about Beltana and on to the Aroona Dam for lunch. Here a 'scare dog' by the cattle grid wore a Tailwaggers' badge. The slanting strata of the steep-sided valley walls red with dock, the still water with a Musk Duck disporting, and again the Red Gums made this a very pleasant place.

At Copley we turned east again on the last stretch to Arkaroola. For many of us this was the most interesting country with its outback flavour of occasional sprawling station homesteads, some gibber plains lightly greened over with bluebush, patches of buckshot gravel and always the backdrop of the red mountains. After Leigh Creek Head Station we noticed the first *Melaleuca glomerata* lining the watercourses, with twisted white papery trunks and graceful greyish foliage. This was to become very common later as was the Curly Mallee (*E. gillii*), first encountered near Nepabunna Mission. Large flocks of Little Corellas, numbers of Galahs, and a mob of donkeys added to the scene. A '10 minute' (½ hour) stop at Italowie Gorge was as usual much too short. A large Macrozamia Palm (sp. ?) grew on the cliff side — to our knowledge not recorded as occurring here — and Austral Hollyhock (*Lavatera plebeia*) and Water Bush (*Trichodesma zeylanicum*) were found. *Indigofera leucotricha* with dark rosy flowers, White Goodenia (*G. albiflora*), Yellow Tails (*Ptilotus nobilis*) and the first small patch of Sturt's Desert Pea (*Clianthus formosus*) excited the botanists, while Rufous

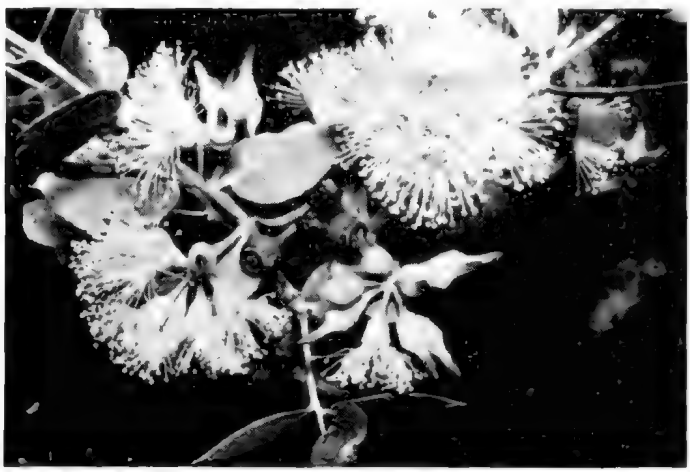

Plate 2. *Eucalyptus gillii* Curley Mallee

Photo: I. Morrison

Songlarks and Red-capped Robins were about. Topping a rise later, the flat whitish expanse of Lake Frome could be seen to the east. At Balcanoona we turned off towards Arkaroola. Heading into the mountains the track sometimes ran along the dry creek bed. Some of the steep crossings involved difficult manoeuvres for the bus, but our driver was equal to all occasions. At one of these crossings a magnificent plant of the Swainsona Pea (*S. tephrotricha*) grew on top of a mound, a mass of tall purple spikes. Budgerygahs became common, one flock was estimated at more than two hundred birds. Passing through the Arkaroola Station buildings, we continued a few miles to the motel-camping area, known as 'The Village', alongside the striking outline of the rugged hill named simply Griselda.

. . .

The next three days, though the weather was unkind, were a sheer delight for all. Set in the midst of the ancient red mountains the area was so interesting geologically the whole party became absorbed. Appendix 1 deals more fully with the geology. We were taken in Landrovers on the spectacular Ridge Top Tour following precipitous mine tracks through and around the wild Mt. Painter Section. The whole property of 225 square miles is now a Flora and Fauna Sanctuary, but this unfortunately does not protect it from mining. From the Landrovers perched on top of a mountain at Siller's Lookout, the view extended more than 50 miles over the wildest red mountains flattening out to Lake Frome. Visits were made to beautiful waterholes at Nooldoonooldoona, Bolla Bollana, Echo Camp and Arkaroola Bore. The botanists suffered from an excess of riches. Cassias, Eremophilas (*E. freelingi, E. latrobei*), and many Acacias including the intrigueingly named Dead Finish (*A. tetragonophylla*) were common. The Showy Groundsel (*Senecio magnificus*) was an important decoration. A rare form of fern *Gymnogramma reynoldsii*, the Native Orange (*Capparis mitchelii*), Quandong (*Santalum acuminatum*) and the Doubah (*Leichardtia australe*) were admired and listed; while Golden Everlastings (*Helichrysum bracteatum*), Fan Flowers (*Scaevola aemula*) and White Heliotrope (*Heliotropium asperrimum*) were amongst the ground dwellers. Around the motel area, Chestnut-rumped Thornbills, Zebra Finches and Whitefaces were in numbers; many nesting or feeding young. The Yellow-fronted Honeyeater was quite common. On a trip to Paralana Hot Springs the Cinnamon Quail-Thrush and Pied Butcher Bird were seen, also the Striated Grass Wren in the locality where a type specimen was taken by Mellor in 1911. Among rocks above the village Woolly Cloak Fern (*Cheilanthes lasiophylla*), and Bristly Cloak Fern (*C. distans*) were found.

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Reluctantly boarding the bus on Monday morning we started our return journey travelling down the eastern side of the ranges. Between Wertaloona and Tea-Tree Outstation a stop was made to admire wonderful stretches of Sturt's Desert Pea with different red colour forms. Specimens with red and white and all white flowers had been on show at Arkaroola. Going into the beautiful Chambers Gorge for lunch, the track crossed and re-crossed the creek. Botanists found *Eremophila duttonii*, the Dwarf Swainsona (*S. phacoides*), Round Templetonia (*T. egena*) and Wild Carrot (*Trachymene glaucifolia*). On top of one of the near hills a few weathered specimens of *Hakea ednieana* were covered with creamy flowers. Farther down the road, between Little Bob Monie and Wirrealpa

occurred one of those always-to-be-remembered moments for bird enthusiasts. Travelling through saltbush-bluebush plains with little straggly dead trees, we came upon a mass of birds. No-one left the stationary bus and we were able to enjoy the spectacle. The small dead trees were outlined solidly in birds. Budgerygahs, White-browed and Masked Woodswallows, and Crimson Chats were mixed together, while numbers were feeding on the ground. A Little Falcon came along, alighting on a tree close to the bus. It was surprising to see that a lot of the Woodswallows were feeding on the ground while Crimson Chats were perched in the trees. Whether there was some food supply in abundance or whether the Woodswallows and Chats were moving in company and joined by the local Budgerygahs is one of those questions which keep bird people occupied.

After passing Angorachina Homestead the bus was brought to a halt with a flat tyre. While sympathetic, this was a bonus opportunity for ineffectual females to scout around or walk ahead of the bus. The cause of the trouble, a small sharp stone, was identified as 'puncturite'. At Blinman we joined the main road and continued back to Wilpena for the night.

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From Wilpena we retraced our way through Hawker and Quorn and through the scenic Pitchi Ritchi Pass where *Eremophila scoparia* was listed, to Port Augusta where we were to spend two days making visits to areas in the South Flinders Ranges.* Here we were joined by Darrell Kraehenbuehl of Adelaide who was to lead us so capably on this section. Alan and Win Morrison also joined us for a few days on their way back from one of their many expeditions around northern Australia.

* See *Victorian Nat.* 88 (8).

A round trip took us first through Horrock's Pass to Hancock's Lookout and a magnificent view over Spencer Gulf. We passed whole hillsides of Grasstrees (*Xanthorrhoea quadrangulata*) endemic in South Australia, and many Sugar Gums (*E. cladocalyx*) growing in their native area. Here it is a large and beautiful spreading tree, easily distinguished on the hillsides from other eucalypts by its reddish-bronze foliage contrasting sharply with the dark green. Tree Martins were nesting in one of the Sugar Gums at the lookout, a Wedge-tailed Eagle circled lazily and a Black-shouldered Kite passed through the trees perching briefly.

We continued on to Alligator Gorge. After a long drive down through interesting bush we alighted at the parking area and climbed down – and later, up — many steps into the gorge itself. The almost vertical red walls were so cracked and broken one

Plate 3. Photo: I. Morrison
Clianthus formosus
Desert Pea, Red and white form.

section was aptly named Hieroglyphic Rock. The gorge was clothed mainly with the Slender Cyprus Pine (*Callitris preissii*) growing thickly on the floor and even up the steep sides. Walking along the stream to the Cascades, discoveries included the Shell Orchid (*Pterostylis robusta*) growing under the pines, and the edible fungus the Morel (*Morchella conica*). Having sampled the culinary delight of these cooked in butter, the writer found it difficult to pass on and leave them growing. *Acacia gracilifolia* was found and admired. This well-named graceful little acacia had been lost for fifty years, to be re-discovered here and at Mambray Creek where a specimen was seen later. On top again flowers and birds were plentiful, and time was as usual too short. Many orchids were flowering including the Mosquito Orchid (*Acianthus reniformis*), Blue Fairies (*Caladenia deformis*), Swamp Diuris (*D. palustris*) and Dwarf Greenhood (*P. nana*). Shrubs flowering were the Mint Bush (*Prostanthera baxteri* var. *crassifolia*), Velvet Daisy Bush (*Olearia pannosa*), Twiggy Bush Pea (*Pultenea largiflorens*), *Hibbertia exutiacies* and the Finger Flower (*Cheiranthera cyanea*) was found, although not in flower.

Next stop was at Mt. Remarkable. Walking into the foothills we seemed to be back amongst familiar Victorian birds — Grey Fantails, Red Wattlebirds, Grey Thrushes, Brown Treecreepers, White-plumed Honeyeaters, and Rufous Whistlers. Yellow-tailed Thornbills were feeding young at a very low hanging nest. Broom Bitter Pea (*Daviesia genistifolia*) was here, and further orchids listed were Pink Fingers (*Caladenia carnea*) and the Scented Sun Orchid (*Thelymitra aristata*). Returning to Port Augusta through Port Germaine Gorge the road ran along the floor of the gorge between steep cliffy sides. Mistletoe Birds and Yellow-faced Honeyeaters were common and the Gawler Range Wattle (*Acacia iteaphylla*) was noted; this was also found at Arkaroola.

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On the way next morning a stop was made at the Port Augusta Railway Station to see a planted specimen of the Crimson Mallee Box (*E. landsdowneana*) with flowers of an un-

Plate 4.
Roadside
South Flinders
Photo: Author

usual mauve-purple colour. A group of Pied Oystercatchers were feeding at the water's edge. Further south we stopped at a saltbush flat with scattered mallee and a few Umbrella Myalls (*Acacia sowdenii*) rising to foothills where masses of Dense Cassia showed yellow against the hills. White-fronted Chats and White-winged Trillers were in the saltbush area and a party of Chestnut-crowned Babblers entertained with their antics. These were fussing about a nest, but whether old or active it was not possible to say. Arriving at Mambray Creek National Park, to find the creek so high it was necessary to wade across the causeway, we found many nesting birds in the familiar old Red Gums, although here they grew lower and more divided. Red-backed Parrots, Galahs, White-backed Magpies and Striated Pardalotes were all domestically busy. Botanists found the beautiful naturalized grass Golden Top (*Lamarckia aurea*), Leek Orchids (*Prasophyllum patens*), Pink Fairies, the Leek Lily (*Bulbinopsis semibarbata*), the Tall Sedge (*Carex appressa*) and the Flat Sedge (*Cyperus vaginatus*). An interesting time was spent with the ranger in his office where he had specimens of a Hopping Mouse (sp. ?) caged for study.

* * *

Leaving Port Augusta the next morning, and heading for home, the weather, which had been threatening, became very gloomy and by the time we reached Morchard rain had set in. Between Burra and Morgan, through saltbush country which would normally have been of absorbing interest, the windows of the bus were obscured by mud, and the time was spent catching up on sleep, or photographing the patterns made by rain on the mud. The weather cleared as we approached our second overnight stop of Renmark, with its vines olives and oranges.

* * *

Near the border our first and only Emus (2) and Kangaroos (2) were sighted. We lunched at Hattah Lakes where the lakes were full, but the water birds were absent due to the food supply having not yet been established after the long dry period. Between Hattah and Swan Hill Lavender Halgania (*H. lavendulacea*) grew by the road and the Dwarf Emu Bush (*Eremophila glabra*), Stiff Westringia (*W. rigida*) and Small-leaf Mint Bush (*Prostanthera microphylla*) were identified.

Around Mystic Park water was lying on the paddocks, and hundreds of White and Straw-necked Ibis, Yellow-billed and Royal Spoonbills, Little Pied and Little Black Cormorants and White-faced Herons were taking advantage of conditions that suited them. Lunching on Bullock Creek at Lockwood South, Fuscous and Yellow-tufted Honeyeaters were around us, a Peaceful Dove was calling, and Dusky Wood-swallows fed flying young. The botanists found the Fairy Waxflower (*Eriostemon verrucosus*) and the Drooping Cassinia or Chinese Scrub (*C. arcuata*) — making a total of over 320 botanical species noted during the trip.

Now it was a straight run for Melbourne and home. And so ended, once again with thanks to Marie Allender our hard-working Excursion Secretary, an excursion providing quantities of natural history food for those fortunate enough to take part.

Appendix I

GEOLOGY

by T. D. Hagger

The main interest for geologists commenced at Wilpena. Here the awe-inspiring age of the rocks and the remarkable geo-morphology provided continuing fascination.

From any of the high points on the rim of the Pound one could not help speculating on the appearance of the ranges before they were eroded. Did the upturned edges of the Pound once continue in one huge anticline to the Elder and Chase Ranges on the horizon? The same strata are found there but with the opposite dip and, if this speculation were fact, the intervening mountains would have been high indeed.

Ripple-marked quartzite seen in several places inside the Pound was a reminder of the shallow seas which marked the greater part of the history of the Adelaide geosyncline. For one-fifth of the total age of the Earth as a solid body, this syncline continued to subside at an average rate of about one inch per thousand years, and through most of this 800 million years the rate of sedimentation kept pace with it.

What a change at Arkaroola! And what a rock-lover's paradise we met there. The 225 square miles of the Arkaroola-Mt. Painter Sanctuary is one vast geological museum. The unusual ancient granites and porphyries, plus the arid climate, have produced a landscape which must be among the most rugged to be found on the face of the earth. And where else would one find a whole mountain of quartz with such variety of colour and crystalline arrangements. A hole drilled through this mountain has shown quartz all the way, and also some enormous vughs up to 70 feet in diameter. Tourists some generations hence may be able to visit these fantastic cavities. What a breath-taking spectacle would greet their eyes!

Our hammer and pick enthusiasts found their greatest interest in the volcanics near Arkaroola Bore and in and near the granite intrusions at The Pinnacles. Some choice specimens were collected including *stilbite* and massive and beautifully marked *calcite* at the former, and gem quality translucent orange *albite* at the latter. Other specimens obtained by members were *tremolite, actinolite, actinolite marble,* large *barite* crystals, *magnetite, haematite,* some beautiful pink and brown *feldspar* in addition to the *albite, talc, malachite* and *azurite, muscovite, torbernite* and, of course, some of the interesting Mt. Painter granites and, last but not least, some Mt. Gee quartz.

Even with our lack of expert geologists it seems fair to say that on this trip our rock hunters had a greater feast than either bird watchers or plant classifiers.

Appendix II

ORNITHOLOGY

List of Species

Because of long periods of bus travel, some bad weather, and limited opportunities for concentrated work, the list of species is not extensive.

It follows the nomenclature and sequence of 'An Index of Australian Bird Names' published by the CSIRO Division of Wildlife Research, Canberra, ACT, 1969.

Magpies were seen over the entire trip but were not recorded unless definitely identified as black-backed or white-backed. The Australian Raven was recorded only when positively identified by hackles or call. As the Little Raven was never positively identified it was not recorded, although no doubt it was probably quite common.

KEY TO TABLE 1

M to B = Melbourne to Bordertown
B to L = Bordertown to Laura
L to W = Laura to Wilpena
W to A = Wilpena to Arkaroola
PA & SF = Port Augusta and the South Flinders Ranges.
W to R = Wilmington to Renmark
R to M = Renmark to Melbourne

S = single. F = few. FC = fairly common. C = common. Fl = flock.
n = nesting (building, incubating or feeding young in nest).
br = breeding (courtship or feeding young away from nest).
* = introduced species.

Species	M to B	B to L	Flinders Ranges L to W	Flinders Ranges W to A	Flinders Ranges PA & SF	W to R	R to M
Emu *Dromaius novaehollandiae*							F
Australian Pelican *Pelicanus conspicillatus*		1 Fl (80)				F	
Little Black Cormorant *Phalacrocorax sulcirostris*						F	FC
Little Pied Cormorant *Phalacrocorax melanoleucos*		F			S	F	FC
Little Grebe *Podiceps novaehollandiae*				S n			
Hoary-headed Grebe *Podiceps poliocephalus*							F
White-necked Heron *Ardea pacifica*				FC			
White-faced Heron *Ardea novaehollandiae*	F	F		F			F
White Egret *Egretta alba*		F					F
White Ibis *Threskiornis molucca*		FC FC					C C
Straw-necked Ibis *Threskiornis spinicollis*		F F					C C
Royal Spoonbill *Platalea regia*							FC
Yellow-billed Spoonbill *Platalea flavipes*							FC
Black Swan *Cygnus atratus*		F					FC
Black Duck *Anas superciliosa*		F		F		F	
Grey Teal *Anas gibberifrons*		F		F			
White-eyed Duck *Aythya australis*						F	
Wood Duck *Chenonetta jubata*							F

Species	M to B	B to L	Flinders Ranges			W to R	R to M
			L to W	W to A	PA & SF		
Musk Duck				S			
Biziura lobata							
Black-shouldered Kite					F	S	
Elanus notatus							
Fork-tailed Kite			S	F			
Milvus migrans							
Whistling Eagle				F			F
Haliastur sphenurus							
Australian Goshawk							S
Accipiter fasciatus							
Australian Little Eagle					S		
Hieraaetus morphnoides							
Wedge-tailed Eagle		S	F	FC	FC		
Aquila audax							
Peregrine Falcon				F			
Falco peregrinus							
Little Falcon				S			
Falco longipennis							
Nankeen Kestrel		FC	C	C	C	FC	FC
Falco Cenchroides							
Brown Hawk		F		F	F		F
Falco berigora							
Stubble Quail				S	S		
Coturnix pectoralis							
Dusky Moorhen		F				F	
Gallinula tenebrosa							
Swamphen		F				S	
Porphyrio porphyrio							
Coot		F					FC
Fulica atra							
Pied Oystercatcher					F		
Haematopus ostralegus							
Spur-winged Plover	F		F				F
Vanellus novaehollandiae							
Banded Plover			F				
Vanellus tricolor							
Block-fronted Dotterel				FC			
Charadrius melanops				br.			
White-headed Stilt		F			F		
Himantopus himantopus							
Silver Gull		FC			FC	S	FC
Larus novaehollandiae							
*Domestic Pigeon		F		F			
Columba livia							
Peaceful Dove							S
Geopelia striata							
Common Bronzewing				S			
Phaps chalcoptera							
Crested Pigeon		FC	F	FC		FC	F
Ocyphaps lophotes							
Black Cockatoo		1 Fl					
Calyptorhynchus sp.		(7)					
Sulphur-crested Cockatoo	1 Fl					1 Fl	
Cacatua galerita							
Major Mitchell							S
Cacatua leadbeateri							
Little Corella			C	C	FC	FC	
Cacatua sanguinea							

Species	M to B	B to L	Flinders Ranges			W to R	R to M
			L to W	W to A	PA & SF		
Galah *Cacatua roseicapilla*	FC	C	C	C	C n	FC	FC
Cockatiel *Nymphicus hollandicus*			FC	FC	FC		
Yellow (Adelaide) Rosella *Platycercus flaveolus*			F n		F		
Eastern Rosella *Platycercus eximius*							F
Ringneck Parrot *Barnardius barnardi*		F	F	S			F
Red-rumped Parrot *Psephotus haematonotus*			F	F	F n		
Mulga Parrot *Psephotus varius*				S			
Budgerygah *Melopsittacus undulatus*				C n			
Pallid Cuckoo *Cuculus pallidus*	S		F		S		
Fan-tailed Cuckoo *Cacomantis pyrrhophanus*			S S				
Horsefield Bronze Cuckoo *Chrysococcyx basalis*			S	F	S		
Boobook Owl *Ninox novaeseelandiae*			S				
Laughing Kookaburra *Dacelo gigas*		S	F		F	F	F
Sacred Kingfisher *Halcyon sancta*							S
Welcome Swallow *Hirundo neoxena*	F	FC	FC	FC	FC	FC	FC
Tree Martin *Petrochelidon nigricans*			F	FC n	FC n	F	
Fairy Martin *Petrochelidon aeriel*			F	FC br			
Australian Pipit *Anthus novaeseelandiae*	FC		FC	FC	FC	F	FC
Black-faced Cuckoo-shrike *Coracina novaehollandiae*	F		S	F	F		
White-winged Triller *Lalage sueurii*				F br	S		
Cinnamon Quail-thrush *Cinclosoma cinnamomeum*				S			
Chestnut-crowned Babbler *Pomatostomus ruficeps*					F		
White-browed Babbler *Pomatostomus superciliosus*			F	C n			
Brown Songlark *Cinclorhamphus cruralis*			F	F	F		
Rufous Songlark *Cinclorhamphus mathewsi*				C	FC		
Superb Blue Wren *Malurus cyaneus*	F	F					F
Blue-and-White Wren *Malurus leuconotus*			F	FC	F		
Variegated (Purple-backed) Wren *Malurus lamberti*			F	FC	F		
Weebill *Smicrornis brevirostris*		C n	C	C	FC		FC

Species	M to B	B to L	Flinders Ranges			W to R	R to M
			L to W	W to A	PA & SF		
Striated Thornbill *Acanthiza lineata*		F					
Brown Thornbill *Acanthiza pusilla*							F
Red-tailed Thornbill *Acanthiza apicalis*		S		F			
Chestnut-rumped Thornbill *Acanthiza uropygialis*	F			FC br			
Yellow-rumped Thornbill *Acanthiza chrysorrhoa*	FC	F	F	FC br	FC n		FC
Whiteface *Aphelocephala leucopsis*				FC br	F		
Striated Grass-wren *Amytornis striatus*				S			
White-fronted Chat *Ephianura albifrons*					FC	F	
Crimson Chat *Epthianura tricolor*				FC			
Jacky Winter *Microeca leucophaea*					S		
Red-capped Robin *Petroica goodenovii*		S		FC br			
Hooded Robin *Petroica cucullata*		S			F		
Southern Yellow Robin *Eopsaltria australis*							S
Grey Fantail *Rhipidura fuliginosa*	F	S		F	F		FC
Willie Wagtail *Rhipidura leucophrys*	FC	C	FC	FC	FC	FC	FC
Restless Flycatcher *Seisura inquieta*							F
Golden Whistler *Pachycephala pectoralis*		S					F
Rufous Whistler *Pachycephala rufiventris*		F	F	FC	FC		
Grey Shrike-thrush *Colluricincla harmonica*			F	F	F		F
Shrike-tit *Falcunculus frontatus*							F
Crested Bellbird *Oreoica gutteralis*				S			S
Wedgebill *Sphenostoma cristatum*				S			
Brown Treecreeper *Climacteris picumnus*			S		F		F
Mistletoe Bird *Dicaeum hirundinaceum*					F		
Spotted Pardalote *Pardalotus punctatus*							F
Yellow-rumped Pardalote *Pardalotus xanthopygus*	FC	FC	F				F
Striated Pardalote *Pardalotus substriatus*	FC n	FC	FC	FC n	FC n		F
Grey-breasted Silvereye *Zosterops lateralis*			F				
Singing Honeyeater *Meliphaga virescens*		F	F	S			
Fuscous Honeyeater *Meliphaga fusca*							F

Species	M to B	B to L	Flinders Ranges			W to R	R to M
			L to W	W to A	PA & SF		
Yellow-fronted Honeyeater *Meliphaga plumula*				FC br			
Yellow-faced Honeyeater *Meliphaga chrysops*					FC		F
White-plumed Honeyeater *Meliphaga penicillata*	F				F	F	FC
White-eared Honeyeater *Meliphaga leucotis*	S				S		
Yellow-tufted Honeyeater *Meliphaga melanops*							F
Brown-headed Honeyeater *Melithreptus brevirostris*	F	F			F		F
White-naped Honeyeater *Melithreptus lunatus*							F
New Holland Honeyeater *Phylidonyris novaehollandiae*		S			F		
Eastern Spinebill *Acanthorhynchus tenuirostris*					S n		
Noisy Miner *Manorina melanocephala*	F					F	F
Yellow-throated Miner *Manorina flavigula*			F	FC br			
Spiny-cheeked Honeyeater *Anthochaera rufogularis*	F	FC		FC	FC		F
Red Wattlebird *Anthochaera carunculata*	F	F			F	F	F
Zebra Finch *Peophila guttata*				FC br			
*House Sparrow *Passer domesticus*	F	F	F	F	FC n	FC	C
*Goldfinch *Carduelis carduelis*	F	F					
*Starling *Sturnis vulgaris*	C	FC	FC		FC	FC	C
*Indian Myna *Acridotheres tristis*							FC
Magpie Lark *Grallina cyanoleuca*		F		F		FC	FC
White-winged Chough *Corcorax melanorhamphus*						F	F
Masked Wood-swallow *Artamus personatus*				FC			
White-browed Wood-swallow *Artamus superciliosus*				FC			
Black-faced Wood-swallow *Artamus cinereus*				F			
Dusky Wood-swallow *Artamus cyanopterus*							F br
Grey (Black-winged) Currawong *Strepera versicolor*	F	F			S		
Pied Butcherbird *Cracticus nigrogularis*				S			
Grey Butcherbird *Cracticus torquatus*			S	S	S		
Black-backed Magpie *Gymnorhina tibicen*	FC		F n	C n	F	FC	C
White-backed Magpie *Gymnorhina hypoleuca*	F	C n	FC n	S	FC n	S	C
Australian Raven *Corvus coronoides*	C	FC n	C n	C	C	C	C

The Self-pollination of *Prasophyllum beaugleholei* W. H. Nicholls

by David L. Jones

In this paper it will be established that *Prasophyllum beaugleholei* W. H. Nicholls is a self-pollinating species. This is probably the first report of autogamy in the genus *Prasophyllum*, section Micranthum, although field observations suggest others may adopt the same procedure e.g. *Prasophyllum aureoviride* H. M. R. Rupp.

For those who may not be familiar with the features of *Prasophyllum beaugleholei* it has been well delineated by Nicholls in Orchids of Australia 158 (1969). Briefly it is a very slender, diminutive plant which appears after summer and autumn rains in N.S.W., Victoria and Tasmania. It grows in swampy situations or on well drained hillsides amongst tussocks of grass. The first flowers open when the plant is quite small. As they continue to open the peduncle elongates and by fruiting time may be 35 cm tall. The accompanying photograph by E. R. Rotherham superbly illustrates the flowers of the species and the characteristics of the inflorescence.

I am indebted to Mr. Collin Woolcock of Portland for my specimens of *Prasophyllum beaugleholei*. It was while dissecting one of these to draw that the writer first became convinced that the species is self-pollinating. I have since verified this process on specimens from Wulgulmerang in North eastern Victoria.

My reasons for concluding that the species is self-pollinating are based on the following observations—

1. The flowers are short lived, only lasting 2-3 days. In other species which are insect pollinated e.g. *P. morrisii*, *P. despectans*, each flower may last up to ten days depending on whether it is pollinated or not.

2. The pollinia are granular without much coherence and the individual grains separate easily even while in bud.

3. The attachment of the majority of the pollen grains to the short caudicle is very weak. Only a few basal pollen grains are strongly attached and it seems as if the others are quite free or haphazardly joined into small groups.

4. The gland where the caudicle joins the rostellum appears to lack any cement. This cement or glue is essential to attach the pollinarium to the insect for cross-pollination.

5. All of the ovaries on plants studied have swollen and contain seed. Generally with insect pollinated species few if any ovaries on each plant become fertilized.

6. The final reason is a poor one but worth mentioning. No insect activity around the flowers has been observed by the author or reported previously.

The mechanism adopted by the orchid can be seen from the accompanying drawings.

In the very early bud the column is erect, and the anther, containing the pale pollen, is closed. The rostellum lies close to the anther and is inclined at an angle of about 60°. The stigma is quite small and dry. At this stage there is no indication of the method of pollination adopted by the species.

The first signs that the species may be self-pollinating become evident in

the bud about two days before opening. The column is still erect and the anther closed. However the rostellum has moved away from the anther,

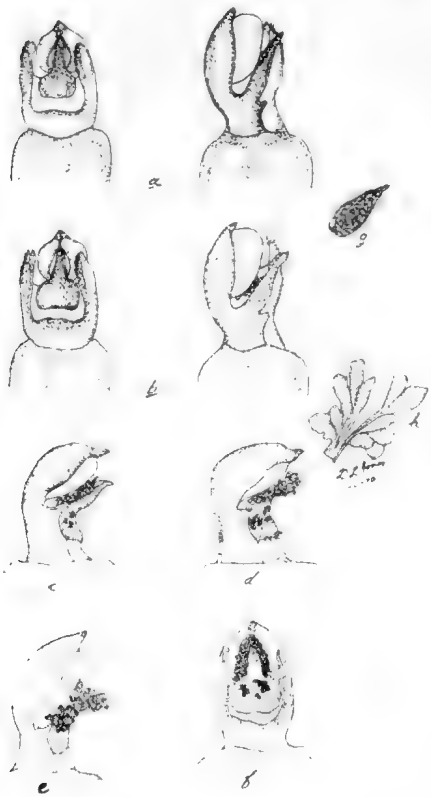


Fig. 1. Sequence of Self-Pollination in *Prasophyllum beaugleholei.*

(a) Columns taken from an early bud, front and side views. (20x)

(b) Columns from a bud about two days before anthesis. (20x)

(c) Column from a flower just opened, side view. (20x)

(d) Column from a flower opened for three days, side view. (20x)

(e, f) Columns from flowers about three days after closing. (20x)

(g) Pollinium showing granular construction. (20x)

(h) Base of pollinarium showing attachment of basal grains to caydide. (40x).

and the caudicle and pollinia can be clearly seen. The pollinia are now quite orange and even at this early stage the individual grains are evident. They do not give the appearance of a coherent mass but rather a collection of individual grains rather poorly joined together. The stigma is beginning to enlarge and appears moist but not sticky.

In the open flower a number of further changes have taken place. The anther is now inclined forward and the anther sacs are open wide. The pollinia rest completely on the upper surface of the rostellum and the anther sacs are empty except for a few adhering grains. The rostellum has moved further down and is inclined at an angle of 45° or less. Any semblance of uniformity in the pollinia is rapidly being lost and the first few grains can be seen on the stigma. The stigma itself has enlarged greatly and is now obviously very sticky.

The major act of pollination takes place over the 2-3 days while the flower is open.

In the finished flower about 3 days after closing, the column is hardly recognizable. The stigma is swollen out of all proportion and almost completely hides the rostellum. Its surface is very distorted and sticky and the remains of any pollen grains are barely distinguishable. Only a few odd grains remain on the upper surface of the rostellum or adhering to the anther sacs. The ovary is beginning to swell and stick out from the flowering stem.

This then is the method of self-pollination adopted by *Prasophyllum beaugleholei.* These observations are interesting and raise some important questions.

The movement of the rostellum relative to the anther, and the opening of the anther case serves to bring the pollinia into a position directly

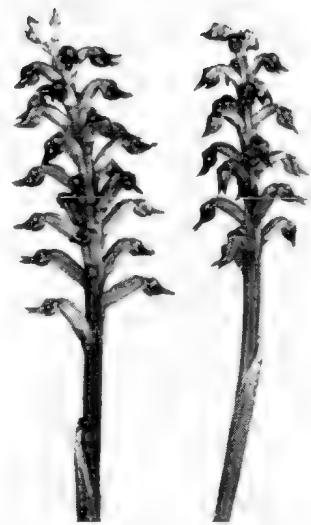
above the stigma. How does the pollen actually drop onto the stigma, or does the stigma grow to meet the pollen? Both methods have previously been reported in autogamous orchids.

The incoherent nature of the pollinia and the narrow rostellum, both suggest that pollen "bubbles over" onto the stigma. As well a few grains can often be seen on the stigma when the flowers are open. On the other hand the rapid growth of the stigma suggests that it grows to meet the pollen grains still sitting on the rostellum. The grains that fall may only be strays that act as a catalyst for its growth.

The question which self-pollinating orchids always raises in my mind is

"Why do flowers bother to open at all?"

The answer appears to be hidden somewhere in the realms of evolution.



Prasophyllum beaugleholei from Wulgulmerang. Note the swollen ovaries and small opening of the flowers.

Photo: by E. R. Rotherham

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Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Readers' Nature Notes and Queries

This note comes from Mr. A. Fellows of Alabama Hill, Charters Towers, North Queensland.

A bubbub in a Poinciana tree near my kitchen window resolved itself as an attack on a visiting Butcherbird by a very determined Peewit. As both birds normally pick up the scraps put out for them on a tray on top of a stepladder, the fracas seemed unusual.

Tolerant of each other and several magpies — young and old — who also are "regulars" here, such behaviour needed investigation.

Despite my calls to them the chase through the foliage continued until at last the butcher-bird departed to a telephone post some distance away. After a few flute-like notes it flew further off. Meanwhile the Peewit, *Cheeky* by name and nature, had perched high in the tree giving vent to several "peewit-peewit" calls, but not descending to the food tray. I looked upwards and all was explained. Until some weeks ago the peewit's nest had been in a neighbour's tree nearly a quarter of a mile distant. Our last violent storm must have played havoc with all mud nests, I concluded at the time. All birds had been absent for some time after the storm but gradually returned. As I watered my fruit trees *Cheeky* would pick up half-wet grass and soft leaves, and fly far away with a full beak to her distant nest. But lately her returns had been much quicker than usual; and even muddy waste had been transported at times. In the period when the bird was absent following the last storm, the bird had evidently been seeking another place to build again.

Then came the shorter trips with grass, and no wonder. The nest had been built in the tree over the food-tray. Three small boughs that met in a symmetrical triangle had been the base, the mud and grass nest embracing the union uniformly, while overhead about a foot higher, one huge flat green spray of leaves formed a perfect "parasol" that would have turned any heavy shower; and kept the hot sun off the nest too.

As I looked aloft, the peewit's mate looked down and I realised the reason for *Cheeky's* resentment of the butcher-bird's presence.

When I first arrived at this place, to prepare foundation stump-holes, the same bird had stayed around in the hope of getting something to eat, frequently sharing food with me.

Three well-grown chicks that *Cheeky* and mate had brought here last year are absent at present, and may have affairs of their own elsewhere.

Recently the peewit found an enormous grub, and after a tussle, devoured it. So the good work goes on, and whatever the other birds think of the change when they return as nature's foods become scarcer, it will be interesting to notice the result. Magpies will bring their pale-chested babies, butcher-birds their light brown and white babies also, and stay below the kitchen window looking up for morsels to be thrown out; and if the butcher-birds find nothing forthcoming, they give vent to lovely flutelike calls and peer down from higher vantage points as they get pieces thrown up to them on the rooftop, so beating the numerous magpies waiting below.

But whatever comes finds food of some kind. When a great number of magpies arrive at times, it seems as if the regulars have made it known to the others. The carolling at times is very lovely and now and then an older butcher-bird may do some mimicry.

Corrections

Victorian Naturalist, 88 (10)

p. 297 — Red-bellied Pademelons (line 4). "Great, Dog" should read "Great Dog".

p. 282 — Tasmanian Spiny Anteater, Cape Barren Island (line 3): 1728 should read 1798.

p. 283 — Table 1, *Tachyglossus setosus*. An "x" should appear for this species in the Cape Barren Island column.

The Field Naturalists Club of Victoria

Secretary's Report 1971-72

1971-72 has not been, I feel, a particularly good year for the Club. Certainly, it has continued to operate, but the brunt of the work has fallen on a few members, and the Club has achieved little of note. However, we do have a number of keen new people on Council —as well as some very serious vacancies—and a Field Survey Group has been formed, to enable members to make a positive contribution to one of the many problems of the day.

The pressure of work on the Secretary is great. Since July I have spent some two or three evenings each week on Club business—writing over fifty formal letters; compiling reports; making about one hundred 'phone calls and probably receiving even more; and making, collating and distributing some 350 photo copies. Most of this is routine work, but it does not leave any time for tackling the important problems of the day, or even for such mundane tasks as establishing proper machinery and reorganizing the records; though these would greatly simplify the work of the Club.

The most urgent problems facing the Club, as I see them, are:—

1. The secretarial work required to run the Club is clearly more than can reasonably be expected of an Honorary Secretary and Council.
2. The "Registered Office" (i.e. the Library) is totally inadequate, with no space for storage of records or blocks (these are at present scattered in a number of different locations around Melbourne); and
3. The running of the Club is left to a few individuals, most members being content to come along and listen, or just to read the *Naturalist*.

I feel that the Club must give urgent consideration to obtaining adequate office space, and appointing a paid part-time secretary. Most of the work could readily be handled by a competent girl, but it would occupy her for at least three mornings a week.

These proposals would substantially increase the running costs of the Club, but unless these problems are overcome, we will have increasing difficulty maintaining our present activities, let alone making any worthwhile contribution to the challenges facing us today.

R. H. RIORDAN,
Honorary Secretary.

Meeting of Field Naturalists Clubs

At the recent meeting of the Western Victoria Field Naturalists Clubs Association at Ararat it was decided to call a further meeting to discuss the proposal that a State body be formed to co-ordinate the activities of the various Clubs. This meeting is to be held in Bendigo on Saturday, 24th June. It is hoped that all Victorian Clubs will make every effort to attend this meeting, both to participate in the formal discussion and to meet members of other Clubs. The Bendigo Club is arranging a week-end programme of excursions, and further details will be circulated to all Clubs.

Defeat of Motion Affecting *Victorian Naturalist*

The outcome of the Motion moved at the Annual Meeting; notice of which appeared in the *Victorian Naturalist* for February, was defeated overwhelmingly. This means that the magazine will continue in its present form.

Country Club Report

Latrobe Valley F.N.C. Camp-out

January 1972

During the Australia Day Weekend the Bairnsdale and Latrobe Valley Field Naturalist Clubs combined in a camp-out at Howitt Plains. Mr. Alan Morrison was the leader and it was due mainly to his efforts that the weekend was so successful. There were seventy-three people present, representing six Field Naturalist Clubs —Bairnsdale, Traralgon, Warragul, Victorian, Sale and Latrobe Valley. Mr. Morrison set up camp on Wednesday and some members of the L.V.F.N.C. arrived on Friday, with the majority of people arriving on Saturday.

Saturday afternoon was spent viewing the "rock rivers" and the landscape, from a road zigzagging down the mountain to the headwaters of the McAlister River about 5 miles beyond Howitt Plains.

On Sunday morning almost all campers set out for Mt. Howitt. The weather was perfect and the flowers were in full bloom. Everyone set their own pace, and the arrival of the thirsty travellers back at camp varied from between 4 p.m. and 6 p.m.; the leader driving the last vehicle. Everyone said it was worth the long walk to see the flowers and the views.

Any spare time during the weekend was spent exploring the snow plain about the camp. Although 145 species of plant were already on the L.V.F.N.C. list for the Mt. Howitt area, another 95 species were added over the weekend. Miss Jean Galbraith's tent was the centre of much discussion, identification, and fellowship throughout the weekend.

Before breaking camp on Monday the Bairnsdale Club were thanked for their part in the arrangements and Mr. Morrison was applauded for his leadership. It was unanimously agreed that the weekend had been most enjoyable and rewarding. It was suggested that there should be another combined camp-out next year to a different area.

The first twenty miles of the homeward journey were slow due to many stops being made to inspect swamp areas or snow plains; photograph views; trek to lookout points, or just a general reluctance to leave the area.

BON THOMPSON
Publicity Officer L.V.F.N.C.

Day Group Report

Twenty-three members and a visitor from New Zealand attended the April meeting of the Group. It was very encouraging to see the numbers and we hope more members and friends will attend future outings. It was decided future meetings will be held on the 3rd Thursday of the month and should the weather be unsuitable an alternative will be arranged by the Programme Committee. This Committee met prior to the outing and a list of places to be visited was read out by the Secretary. Members were asked to give suggestions also. We look forward to some interesting excursions in the future. The meeting over, members lunched on the lawns of the Botanical Gardens in brilliant sunshine, after which a visit was made to observe a colony of fruit-bats which had flown in to the palm trees some days previously. Some of the members photographed this unusual observation, especially as they have not been seen there for about 18 years. The Native Plants Section of the Gardens were then visited and Mr. Fairhall described many of the flowers and plants which abound there. At 3.30 p.m. members went their various ways once again agreeing they had enjoyed a most pleasant and interesting afternoon.

Mammal Survey Group A.G.M.

6 April, 1972

At the meeting, attended by 18 F.N.C.V. members and four visitors, under the acting chairmanship of Mr. H. F. J. Janssen, the following Group office-bearers were elected.

Chairman: Mr. H. Janssen, 29a Myrtle Grove, Blackburn, Vic. 3130. Phone: 88 1080.

Secretary: Mr. G. Douglas, c/- Post Office, Riddells Creek, Vic. 3431. Phone: 059 28 5191.

Records Officer: Mr. B. Callanan, 29 Reynards Street, Coburg, Vic. 3058.

Equipment Officer: Mr. D. Barham, 14 Finnigans Road, Research, Vic. 3095. Phone: 437 1791.

A motion that the committee have the power to co-opt was carried. A motion that a letter be sent to the secretary of the Fisheries and Wildlife Department, to express the Group's desire to have a F. and W.D. research officer appointed to attend all future meetings and survey camps was also carried.

A vote of thanks was expressed to Mr. B. Callanan for his completed compilation of the Group's history since its inception in 1960.

Other main points of the meeting were: (1) Discussion on the probable confusion that may be caused in the future as a result of the formation of a new group, who have adopted a name similar to the F.N.C.V. Mammal Survey Group. The new group's name is the Mammal Survey Group of Victoria. (2) Discussion on the availability of the Group's equipment and records, which at present are not in the hands of the Group's newly elected committee.

Following these discussions it was resolved that: (a) Investigations be made to determine the feasibility of joining forces with the newly formed F.N.C.V. Field Survey Group. (b) Other than (a) above, no further action towards changing the Group's name be taken until replies are on hand, to the various letters written, regarding this Group's and the Mammal Survey Group of Victoria's activities.

Future survey camp reconnaissance reports were received for the Broadford, Mornington Peninsula, Mt. Disappointment and Mt. Baw Baw-Mt. Erica areas.

As equipment was not on hand, a fixed date for the next survey camp could not be established. It was decided that interested members join the Field Survey Group camp on 14-16 April, as this would contribute to the investigation mentioned earlier.

Geology Group

Annual Report 1971-72

An average of twenty members and visitors attended meetings throughout the year, the lowest attendance being fifteen, and the highest being twenty-seven. The Office-Bearers for the year were as follows:—

Chairman: Mr. R. Dodds.
Secretary: Mr. T. Sault.
Excursion Steward: Mr. N. Wigmore.
Programme Steward: Mr. L. Angior.

Most speakers were provided from within the Group. Only two speakers were engaged from outside. These were Mr. G. Carlos (Geology of Bulla and Tullamarine) and Mr. C. Goodall (The Ballarat Goldfields). Geological subjects were varied, often several short talks by different speakers. From within the Group were Mr. E. Nimmervoll (The Geology of the Lysterfield-Narre Warren area); Mr. G. Love (History of Nickel occurrences in W.A.); Mr. L. Angior (Bauxite Ore, History of Discovery and Treatment); Mr. R. Davidson (Coober Pedy and Andamooka Opal Fields); Mr. D. McInnis (Maribyrnong Terraces); Mr. R. Dodds (Facets of the Life and Work of Early Geologists) — (Slide Project on Building Stones) — (Slide Project on Volcanics); Mr. T. Sault (Cerberian Volcanics).

Excursions were held regularly each month, except on two occasions. These were well organized by Mr. Wigmore. Highlights were a week-end excursion to Creswick organized jointly by the Creswick Club and the Geology Group, and a visit to Mt. William to locate and map the Aboriginal Chipping sites. Two Surveyors in the Group (Mr. N. Wigmore and Miss L. Bennett) had charge of this operation. Other excursions were to Tullamarine and Bulla, Barfold, Waurn Ponds, Lysterfield-Narre Warren, Maribyrnong Terraces and Sovereign Hill.

The Group's contribution to the Nature Show was a scale model of the Maribyrnong River, showing the Geological and Physiological features including the River Terraces. Although most members gave valuable assistance in the project, Mr. McInnis was responsible for carrying most of the work through to successful completion.

Maribyrnong Valley Committee

A "Maribyrnong Valley Committee" of the Victorian National Parks Association has recently been formed to take an active interest in conservation matters generally and in particular the valleys of the Maribyrnong River and its tributaries.

Activity has already commenced at the newly open "Organ Pipes" National Park near Calder Raceway with the clearing of rubbish from the area by members of the group under the direction of the ranger Mr. J. Lyale, to be followed by weed control measures in the near future. Other efforts at rehabilitation such as tree planting are envisaged at a later date and for this purpose and to promote the growing of Australian native plants in private gardens and public places in the western and northern suburbs it is proposed to form a local group of the Society for growing Australian Plants.

Members of the V.N.P.A. and S.G.A.P. wishing to join these groups and other individuals or organizations interested in conservation and/or cultivation of Australian plants are invited to telephone Syd. Wheller on 338 2893 or call at Tullamarine Plant Farm, or 'phone Don Marsh on 379 4928 or Bob Osborne on 379 6746.

C. L. WHELLER.

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1972

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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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Field Survey: Mr. B. J. COOPER, 37 Bath Road, Burwood 3125. (29 7379)

Geology: Mr. T. SAULT,

Mammal Survey: Mr. G. F. DOUGLAS, "Knotanoll", Riddell's Creek 3431 (054-285191)

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

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Vol. 89 No. 6 JUNE 1972

F.N.C.V.

FIELD NATURALISTS CLUB OF VICTORIA

45c

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

GENERAL MEETINGS

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

Subject for evening:—"An introduction to Orchids": Mr. Jack Hyett.

New Members **(April)**—

Ordinary:

Miss Dorothy M. Bell, 17 Tower St., Mount Albert. 3127
Miss Jeanne N. W. Freeman, 4 McArthur Ave, Rushall Park, Nth. Fitzroy. 3068
Mr Martin Harris, 1 Campbell St., East Kew. 3102
Mr Peter King, 35 Myrtle St., Springvale. 3171
Dr Robert W. K. Rogers, 629 The Boulevard, Heidelberg. 3084
Mr Terrence W. Swalwell, 356 Burwood Rd., Burwood. 3125

(May)—

Ordinary:

Mr Clive M. Brownsea, 30 Gissing St., Blackburn South. 3130
Mrs Dora Scott, Flat 16, Tahara Rd., Toorak. 3142

Joint:

Mr Graham C. Morris and Mrs Alicia A. Morris, 89 Yarrbat Ave, Balwyn. 3103

Country:

Mr Lloyd R. Lobbe, 55 Anderson St., Dimboola. 3414

GROUP MEETINGS

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

Wednesday, 21 June — Microscopical Group: "Malaria and the Mosquito in Victoria" by Mr. P. Genery.

DAY GROUP

Thursday, 22 June — Field Survey Group. All meetings are held in Conference Room, National Museum, at 8 p.m.

Friday, 23 June — Junior meeting in Hawthorn Town Hall at 8 p.m.

Monday, 3 July — Marine Biology and Entomology Group meeting at Conference Room, National Museum, at 8 p.m.

Wednesday, 5 July— Geology Group.

Thursday, 6 July — Botany Group.

Thursday, 6 July — Mammal Survey Group Meeting held in Arthur Rylah Institute, 123 Brown St., Heidelberg at 8 p.m.

Friday, 7 July — Junior Meeting at Preston in Rechabite Hall, 281 High St., at 8 p.m.

Friday, 14 July — Montmorency and District Junior F.N.C. in Hall at Petrie Park at 8 p.m.

SURVEY CAMPS

15-16 July— Healesville/Toolangi area. (Details later.)

F.N.C.V. EXCURSIONS

Sunday, 18 June — Afternoon excursion to Sydenham Organ Pipes. The coach will leave from Batman Avenue at 1 p.m. Fare: $1.00.

Saturday-Sunday, 24-25 June — Weekend Excursion to Bendigo. This excursion has been arranged to enable members to attend the "Meeting of Field Naturalists Clubs" mentioned on page 148 of the May *Naturalist*. Accommodation has been book at the Oval Motel on a bed and light breakfast basis (cooked breakfast 50c extra). Bring picnic meals for Saturday and Sunday. Cost for accommodation and coach $11.00 to be paid to the Excursion Secretary, by 18 June. The coach will leave from Flinders St. outside Gas and Fuel Corporation at 9 a.m.

Sunday, 27 August-Saturday, 2 September — Stawell. The Stawell F.N.C. are planning an itinerary for this excursion and will provide leaders on some of the day trips, one suggested excursion being to the slate quarry which provided slate for Parliament House. Other trips will be made to the Grampians. Accommodation has been booked at the London Motel, room only $4.70. Members going should pay accommodation individually, and the coach fare of $20.00 to the Excursion Secretary by the August General Meeting. Cheques to be made to Excursion Trust.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 6 7 June, 1972

CONTENTS

Front Cover:

John Wallis photographed the Black-headed Python which inhabits the North of Australia, and as far south as Newcastle waters and the tablelands of North Queensland. It may exceed 9 feet in length.

Harmony Vale, Baron von Hügel, and an early Victorian Bird Collection

by N. A. Wakefield*

In the bird collection of the Museum of Zoology at Cambridge University, England, there is a series of specimens taken in 1874 by A. von Hügel in the Dandenong Ranges of central Victoria. This information was communicated (1) by C. W. Benson, who for several years has been compiling a catalogue of the birds in the Cambridge collection.

In subsequent correspondence Mr. Benson provided some bibliographical details of von Hügel, as well as a list of his Victorian bird specimens and their recorded data. The purpose of this article is to place these matters on record, for they comprise a little piece of Australian bird history which has until now escaped the attention of local ornithologists.

Harmony Vale

According to their labels, von Hügel collected most of the specimens in November 1874, at "Harmony Vale, Dandenong Mts.". This locality posed a problem, for Harmony Vale is not a current place name, and the Department of Lands and Survey in Melbourne had no record of it in their archives.

Amongst von Hügel's specimens were three of the Helmeted Honeyeater, and as this species used to live along Olinda Creek (2) it seemed likely that Harmony Vale might have been in that vicinity — about the north-eastern foothills of the Dandenong Ranges. This was confirmed by an enquiry to a one-time resident of that district, Mrs. Christina Mawdesley, who made these comments (3):

When my mother, Sarah Jane McEwin, was a girl at Silvan (then South Wandin), on the Monbulk Road near Queens Road, they were neighbours with the Richardsons, who had settled earlier on the lower slopes of Mount Dandenong, across the Olinda Creek. Richardsons called their property Harmony Vale.

I have often heard Sarah Jane say that Baron Ferdinand von Mueller had several times stayed at the Richardson homestead when on collecting tours in the Dandenongs.

When the list of von Hügel's Victorian birds came to hand, it was noted that a Miss Richardson was the actual collector of some of the specimens, and in this connection Mrs. Mawdesley wrote the following (4):

Sarah Anne Richardson (as described by my mother and aunts, her contemporaries) was an attractive personality, with good features, and an abundance of red hair. They (the McEwins) knew the family around 1880-1890. I remember seeing Sarah Anne in her old age. She and her sister, I should think then both in their seventies, walked across to beyond Parkers Road, Silvan, to see us — a long walk, crossing at Stony Ford (where the dam is now), climbing up to Silvan township and along the Monbulk Road about three miles further on.

Sar'anne, as she was always called, had a keen intellect to go with the red hair. Baron von Mueller was said to have thought highly of her; she helped him with his collections when he stayed at Harmony Vale. Her married name was Mrs. Bird, but the Birds passed on, 50 years ago or more, leaving no descendants.

Harmony Vale, then, was a name for part of the upper valley of Olinda Creek. Its position was at latitude 37° 49′ S., longitude 145° 22′ E.

* Monash Teachers' College, Clayton, Victoria.

Von Hugel's Collection of Victorian Birds

This list is essentially a transcript of a document sent to me by C. W. Benson (5). The vernacular names were not included in the document, and I have provided them to serve as headings for the data of each species. The catalogue number (Museum of Zoology, Cambridge University) is given, together with collection date; and in a few cases the sex or age is indicated. Most specimens — all those listed without qualification — were taken by von Hügel at Harmony Vale; others have the locality and/or collector indicated in parenthesis. The notes with quotation marks are from von Hügel's labels. Comments made by Mr. Benson are in brackets, with the prefix C.W.B. Statements not qualified in any way are my own.

Fan-tailed Cuckoo

Cacomantis pyrrhophanus (Cuculidae)

19/Cuc/1/d/15. Adult. 30 Oct. 1874.
"Not numerous. Shy and retiring. Note a prolonged tri, tri, tri, heard a long distance and not infrequently at night. Generally single but also seen in companies of 3-6."

19/Cuc/1/d/16. Adult. 6 Nov. 1874.

19/Cuc/1/d/17. Immature. Nov. 1874.

19/Cuc/1/d/21. Adult. Nov. 1874.

Horsfield Bronze Cuckoo

Chalcites basalis (Cuculidae)

19/Cuc/7/a/4. Nov. 1874.

Golden Bronze Cuckoo

Chalcites lucidus (Cuculidae)

19/Cuc/7/c/13. 10 Nov. 1874. (Miss Richardson.)

Sacred Kingfisher

Halcyon sancta (Alcedinidae)

25/Alc/8/ee/35. 15 Nov. 1874. (Coranderrk Native Mission Station, Barak Barak.). (6)
"Generally seen in pairs on dead limbs of high *Eucalypti*."

25/Alc/8/ee/36. 13 Nov. 1874. (Same locality as first specimen.)
"Killed on overhanging bough of a dead gum-tree in water hole along the Yatra. First specimen seen near water. Generally found in woods."

Dusky Wood-Swallow

Artamus cyanopterus (Artamidae)

27/Art/1/b/7. Adult. Nov. 1874. (Dandenong Range.)

27/Art/1/b/9. Juvenile. Nov. 1874.

[C.W.B.:—A specimen from von Hügel of *A. superciliosus* was also found with these two of *cyanopterus*, but it was merely marked "Victoria, Gaskell". There were also two of *A. leucorhynchus*, but these bore no data at all.]

Australian Magpie

Gymnorhina tibicen (Cracidae)

27/Cra/2/a/15. 1 Nov. 1874.
"Incubation time. Not numerous. Its melodious almost flute-like notes are chiefly to be heard at dawn and dusk."

[C.W.B.:—We have four specimens of this species marked "Victoria 1894" or "Murray River 1894", received from an A. J. Campbell of H. M. Customs, Victoria, on 5 March 1895.] (7)

Pied Currawong

Strepera graculina (Cracidae)

27/Cra/3/b/3, 5 and 6. Nov. 1874.

Grey Currawong

Strepera versicolor (Cracidae)

27/Cra/3/c/7. 5 Nov. 1874.
"Numerous, but very shy, frequenting the tops of high trees in small companies of 3 to 8-12 birds. Note like an ungreased wheel — kiau, ki, ki, kiau, . . ."

Eastern Spinebill

Acanthorhynchus tenuirostris (Meliphagidae)

27/Mel/1/b/16. 10 Nov. 1874.

27/Mel/1/b/17. 3 Nov. 1874.
"Not uncommon, chiefly about fruit trees and flowering Aster bushes."

27/Mel/1/b/18. 5 Nov. 1874.
(Dandenong Range.)
"Not numerous. Found about Peach and Aster bushes."

Red Wattle-bird

Anthochaera carunculata (Meliphagidae)

27/Mel/2/a/16. 9 Nov. 1874.
(Miss Richardson.)
"Not numerous."

27/Mel/2/a/17. Nov. 1874.

Helmeted Honeyeater

Meliphaga cassidix (Meliphagidae)

27/Mel/18/e/1. Female. Nov. 1874.

27/Mel/18/e/2. Male. Nov. 1874.

27/Mel/18/e/3. Female. Nov. 1874.

It was the discovery of these three specimens that stimulated Mr. Benson's original communication. After discovering some specimens of *Meliphaga melanops* (Yellow-tufted Honeyeater) and *M. cassidix* in the British Museum (Nat. Hist.), he made these comments (1) about the Cambridge specimens:

When I came across these three from Dandenong Mts. (i.e. Harmony Vale) I thought they might be *cassidix*, but took them up to the B.M. to check this, and Dan Freeman (8) and I got interested in them. They seem to agree with your diagnosis (9) of *M. m. gippslandica*, though apart from this they only differ from *cassidix* in being a little paler black above, the black central line on the chin and throat less pronounced, and yellowish white on inner rectrices only extending back for about 10 mm. as against 15 mm. In wing-length they seem intermediate between *cassidix* and *melanops*.

These comments add another link in a chain of evidence which will probably lead eventually to a revision of the taxonomic status of *cassidix*. I remarked on the situation several years ago (10) with the following observation:

It may be that our Helmeted Honeyeater is not a distinct species, but merely an extreme form of the widespread Yellow-tufted Honeyeater.

Yellow-faced Honeyeater

Meliphaga chrysops (Meliphagidae)

27/Mel/18/f/4. 5 and 6. Nov. 1874.

27/Mel/18/f/7. 29 Oct. 1874.
"Stomach small frags Coleoptera.

Not uncommon on fruit trees but now rare owing to the earliness of the season."

White-plumed Honeyeater

Meliphaga penicillata (Meliphagidae)

27/Mel/18/bb/6. Nov. 1874. (Dandenong Range.)

White-naped Honeyeater

Melithreptus lunatus (Meliphagidae)

27/Mel/20/f/7. 30 Oct. 1874.

27/Mel/20/f/8 and 9. Nov. 1874.

[C.W.B.:—No. 7 adult — olive above white below; chin and throat white, rest of head black, with a white band on the nape. The other two brownish olive above, tawny below; crown and sides of head brown. No. 8 has a narrow white band from behind the eye along the sides of the head; but this is lacking in No. 9.]

Noisy Friar-bird

Philemon corniculatus (Meliphagidae)

27/Mel/28/g/13. Female. 24 Oct. 1874.
(Tallarook; Dr. Bleasdale.)

27/Mel/28/g/14. Male. 24 Oct. 1874.
(Tallarook; Dr. Bleasdale.)
"Stomach elytra of beetles and seeds. Common in pairs and small companies. Note garrulous and very striking."

Superb Lyrebird

Menura novae-hollandiae (Menuridae)

27/Men/1/b/3. Juvenile male. Oct. 1874.

Southern Yellow-Robin

Eopsaltria australis (Muscicapidae)

27/Mus/14/a/8. Nov. 1874.

27/Mus/14/a/9. 4 Nov. 1874.
"Abundant, habits much like the British Robin. Remarkably difficult to skin owing to the feathers falling out."

Satin Flycatcher

Myiagra cyanoleuca (Muscicapidae)

27/Mus/33/g/2. Male. Nov. 1874.

27/Mus/33/g/3. Female. Nov. 1874.

Rose Robin

Petroica rosea (Muscicapidae)

27/Mus/41/j/2. No date.
(Tree Fern Valley, Dandenong Range.)

Rufous Fantail

Rhipidura rufifrons (Muscicapidae)

27/Mus/48/jj/2. Nov. 1874.

Grey Shrike-Thrush

Colluricincla harmonica (Muscicapidae, Pachycephalinae)

27/Mus(P)/1/b/16. 2 Nov. 1874.
"Abundant, but not easily procured owing to its rather shy habits. Note tu-tu-tui. Local: Whistling Dick."

Eastern Shrike-Tit

Falcunculus frontatis (Muscicapidae, Pachycephalinae)

27/Mus(P)/3/a/9. Male. Nov. 1874.

27/Mus(P)/3/a/10. Male. 28 Oct. 1874.
"Scarce. Only specimen seen." (11)

27/Mus(P)/3/a/11. Immature. Nov. 1874.
[C.W.B.:—Perhaps a discoloured male; might have been in spirit.]

Golden Whistler

Pachycephala pectoralis (Muscicapidae, Pachycephalinae)

27/Mus(P)/7/p/24. Male. Nov. 1874.

27/Mus(P)/7/p/27. Female. Nov. 1874.

27/Mus(P)/7/p/34. Nov. 1874.

[C.W.B.:—Apparently a juvenile male of this species. Above, it is mostly with pale whitish shaft-streaks, though with a few olive adult feathers. Chest similar. Abdomen plain tawny, lower abdomen white, throat yellowish white. Bill, legs and feet yellowish white.]

Rufous Whistler

Pachycephala rufiventris (Muscicapidae, Pachycephalinae)

27/Mus(P)/7/u/6. Male. Nov. 1874.

Spotted Pardalote

Pardalotus punctatus (Dicaeidae)

27/Dica/5/c/9. 30 Oct. 1874.
(Deep Creek, Harmony Vale.)
"Scarce. Specimen killed on a young Acacia tree. Habits like the Coal Tit though much less active. Easily approached." (12)

[C.W.B.:—There are also two specimens of *P. striatus* received from von Hügel, but without particulars of any kind.]

Olive-backed Oriole

Oriolus sagittatus (Oriolidae)

27/Ori/1/s/17, 18 and 19. Nov. 1874.

Satin Bowerbird

Ptilonorhynchus violaceus (Ptilonorhynchidae)

27/Pti/6/a/7. Male. Nov. 1874.
(Dandenong Ranges.)

White-throated Treecreeper

Climacteris leucophaea (Sittidae ?)

27/Sit/1/c/9. Female. 26 Oct. 1874.
(Lillydale, Dandenong Ranges.)
"Eggs nearly ready for exclusion. Common, chiefly about the larger eucalypti. Habits like *C. familiaris*.

Note tui, tui and a trill." (13)
27/Sit/1/c/10. Juvenile. 3 Nov. 1874.
(Dandenong Range.)
"Caught by a dog at the foot of a white gum — old birds about."

Spotted Quail-Thrush

Cinclosoma punctatum (Turdidae)

27/Tur/14/d/10. Female. Nov. 1874.

27/Tur/14/d/11. Male. Nov. 1874.

27/Tur/14/d/12. Male. 3 Nov. 1874.

27/Tur/14/d/13. Female Nov. 1874.

Chestnut Quail-Thrush

Cinclosoma castanotum (Turdidae)

27/Tur/14/b/1. Male Nov. 1874.
(Dandenong Range.)

As *castanotum* is a semi-desert or mallee species, a request was made for a check of the identity of von Hügel's specimen, and the following description of it was provided (14):

It is immediately distinguished from those of *punctatum* in having the back uniform, without any spots. The upper back is brown, the lower back and scapulars maroon, the rump brown like the upper back. The upper chest is glossy black, like the chin and throat, whereas in all four of *punctatum* the upper chest is grey, with black (in males) on the chin and throat.

The identification of von Hügel's *castanotum* is evidently correct, but it cannot be accepted that the specimen was collected in the Dandenong Ranges or, in fact, in central Victoria.

Eastern Whipbird

Psophodes olivaceus (Turdidae)

27/Tur/58/b/12. 7 Nov. 1874. "Not numerous. Note 'tuhip', often heard. Procured with nest and 2 eggs whilst cutting scrub (mimosa) and heard but not seen."

27/Tur/58/b/13. Nov. 1874.

27/Tur/58/b/14. Nov. 1874. [C.W.B.:—Apparently immature, much duller than the first two, and bill brownish horn rather than black in colour. Seems fully grown.]

Mountain Thrush

Zoothera dauma (Turdidae)

27/Tur/70/f/17. Nov. 1874.

27/Tur/70/f/18. 8 Nov. 1874. "Whilst scrub cutting. Very local and difficult to procure. Egg No. 8." (15)

Grey-backed Silvereye

Zosterops lateralis (Zosteropidae)

27/Zos/11/aa/18 and 19. Nov. 1874.

27/Zos/11/aa/20. 29 Oct. 1874. "Scarce. Said to be very common and do great harm to the cherry trees during the fruit season. Local 'white eye'."

27/Zos/11/aa/21. Nov. 1874. [C.W.B.:—This specimen is surely a juvenile, perhaps not yet fully grown (wing 57 as against 61, 61, 63 mm. in the other three). Moreover, no sign of the white eye-ring. One can note the same absence in recently fledged *Z. zenegalensis* in Africa.]

Pilot-bird

Pycnoptilus floccosus (Sylviidae)

27/Syl/68/a/2. Nov. 1874.

[C.W.B.:—Is this a rare bird? The British Museum (Nat. Hist.) has only one skin. We have another one received from a Capt. L. Harrison, M.D., University of Sydney, received 1 May 1919, and marked "Mt. Wilson, 13 April 1906".]

White-browed Scrub-Wren

Sericornis frontalis (Sylviidae)

27/Syl/78/d/4. 1 Nov. 1874. (Fern-tree gully, near Harmony Vale, Dandenong Mts.) "Extremely numerous in low thick scrub, but so retiring and unobtrusive in habit that it is difficult to procure specimens."

Southern Emu-Wren

Stipiturus malachurus (Sylviidae)

27/Syl/81/a/5. Female. Nov. 1874.

27/Syl/81/a/6. Male. Nov. 1874.

27/Syl/81/a/7. Female. Nov. 1874.

Brown Thornbill

Acanthiza pusilla (Sylviidae)

27/Syl/2/h/7. 28 Oct. 1874.
"Abundant. Found in small flocks, chiefly on low trees where it flits about much after the fashion of the European *Regulus*."

27/Syl/2/h/8. Nov. 1874. (Dandenong Mts.)

Blue Wren

Malurus cyaneus (Sylviidae)

27/Syl/48/d/10. Nov. 1874. Male.

27/Syl/48/d/12. Male. 30 Oct. 1874.
"Common in low scrub where its wren-like song is often heard. In habitat it is perhaps most like the whinchat." (16)

27/Syl/48/d/13. Female. 3 Nov. 1874.
"Common in low scrub."

27/Syl/48/d/14. Female. 29 Oct. 1874.

Addendum (C.W.B., letter 28 Feb. 1972):

Welcome Swallow

Hirundo tahitica neoxena (Hirundinidae)

29 Oct. 1874. Male.
(Richardson's Cottage, Harmony Vale.)
"Not numerous. Vale frequented only by one pair."

Baron A. von Hugel —Biographical

Sharpe (1906) provides these details of von Hügel and the bird specimens which he donated to the British Museum (17):

Hügel (Baron A. von)

4 Gannets (*Sula bassana*) from the Bass Rock. Presented. (73.11.4, 1-4.)
These were presented with the idea of forming a group of Bass Rock birds. Some of the specimens are in the great case in the Bird Gallery.

35 specimens from various localities. Presented. (73.12.3, 1-33; 73.12.26, 13-14.)
Very interesting specimens of Palaearctic birds, including the skin of a Griffon Vulture (*Gyps fulvus*).

16 birds from Hampshire. Presented. (74.3.14, 28-43.)

23 birds from New Zealand. Presented. (80.5.3, 1-23.)
The types of *Phalacrocorax stewarti* are included in this donation (cf. Cat. B., xxvi., p. 386).

Baron von Hügel is the son of the celebrated Baron Carl von Hügel, who wrote the well-known work of travel, "Kaschmir und das Reich der Siek", 1840-1848.
The donations to the British Museum were from his collection of British birds which the young Baron made before he went out to the Fiji Islands and New Zealand. Some of the specimens which he gave to the Museum were of great intrinsic value.

C. W. Benson (5) wrote these comments about von Hügel and his Cambridge bird collection:

Gadow (1910) gave an account of the collections here in Cambridge (18). With regard to von Hügel, there is a bare entry that there is a collection made by him in Fiji. There are indeed a good many specimens (? several hundreds) collected by von Hügel during May-August 1875. We also have a specimen of the rail *Nesoclopeus poeciloptera* collected by him there in July 1877. The date of receipt of this collection here is not clear, but obviously before 1910. I began to come across the specimens soon after I started

cataloguing the collections here in 1965. They had been dispersed and placed with their appropriate families. But I did not find the collection (19) which is the main subject of this letter until earlier this year, when, dumped together in one drawer I came across:

(a) The specimens on the attached list (19),
(b) Some specimens collected *for* von Hügel by one Cockerell on the Richmond River in Queensland in 1874 (no month ever given) (20),
(c) Some specimens collected *by* von Hügel in New Zealand between late Dec. 1874 and April 1875.

Some of the specimens in this drawer are marked as if they were received in 1932, though at that time I have the impression that little interest was taken in the bird collections here. Possibly these particular specimens were received on von Hügel's death. Anyway, it does seem that he did a grand tour, first visiting Victoria, then New Zealand and then Fiji (where he may have stayed until July 1877, i.e. more than two years!) I believe that von Hügel was a Fellow of some Cambridge College, though what his main interests were I do not know. I imagine that birds were only subsidiary.

The dates recorded on von Hügel's Victorian bird specimens indicate the following itinerary:

24 Oct. 1874. With a Dr. Bleasdale at Tallarook (37° 06' S., 145° 06' E.), where specimens of Noisy Friar-bird were collected.

26 Oct. At Lilydale (37° 46' S., 145° 23' E.), where a White-throated Treecreeper was collected.

28 Oct. to 10 Nov. At Harmony Vale (37° 49' S., 145° 22' E.), in which vicinity numerous specimens were collected. The "Dandenong Ranges" of some specimens may signify excursions to other parts of the mountains. The "Fern-tree gully" of 1 Nov., for the White-browed Scrub-Wren, may indicate a visit to the present Fern Tree Gully, 6 miles S.-W. of Harmony Vale. The specimens attributed to Miss Richardson are dated 9 Nov. and 10 Nov.

13 to 15 Oct. At Coranderrk Mission Station, near Healesville (37° 40' S., 145° 31' E.), where Barak Barak provided specimens of Sacred Kingfisher.

"Harmony Vale" Today

The original Richardson property is now part of a flower farm. The owner, Mr. Brian Tonkin, calls it Sylvan Vale. The farm is surrounded by a dense forest of Messmate (*Eucalyptus obliqua*), but this species gives way to Common Peppermint (*E. radiata*) a little way down the valley. Near the farm, on a little flat by Olinda Creek, there is a stand of Manna Gum (*E. viminalis*), and that would have been the habitat of the Helmeted Honeyeater when von Hügel was there.

Mr. Tonkin, though not an ornithologist, has been interested in the local birds for some thirty years, and he has not seen the Helmeted Honeyeater, Satin Bowerbird, Spotted Quail-Thrush or Southern Emu-Wren in the vicinity of his property.

As far as is known, the Bowerbird no longer visits the Dandenong Ranges, though it may be seen occasionally in the Healesville area 15 miles to the north-east. The Helmeted Honeyeater, Emu-Wren and Quail-Thrush are still to be found some six miles to the east, in the vicinity of Yellingbo (37° 49' S., 145° 31' E). The rest of the species which von Hügel collected during his fortnight at Harmony Vale are present-day residents of the Dandenong Ranges or else seasonal visitors there. The collection was by no means comprehensive of the local avifauna but represents something like half the species that would have been there at the time.

1. Letter, 16 July 1971.
2. See "The Camp Out at Olinda Creek". *Victorian Nat.* 1: 110 (Dec. 1884).
3. Letter, 18 Aug. 1971.
4. Letter, 29 Oct. 1971.
5. Letter, 11 Sept. 1971.
6. Barak Barak (or Berak) was the last of the Yarra Yarra tribe. He died at the Coranderrk aboriginal station near Healesville in 1903, aged about 85 years. See *Victorian Nat.* 76: 255 (Feb. 1960).
7. A. J. Campbell was the author of *Nests and Eggs of Australian Birds* (Melbourne, 1901).
8. D. J. Freeman, who was working at the British Museum (Nat. Hist.).
9. See p. 177 in "The Yellow-tufted Honeyeater. With a Description of a New Subspecies" (N. A. Wakefield). *Emu* 58: 163-194 (July 1958).
10. See "Helmeted Honeyeaters", pp. 119-121 in *Naturalist's Diary* (N. A. Wakefield). Longmans (Melbourne, 1967).
11. This note evidently applied to the day of collection.
12. C.W.B.:—The Coal Tit is *Parus ater* of the palaearctic.
13. C.W.B.:—The *C. familiaris* obviously means the palaearctic *Certhia familiaris*.
14. C. W. Benson, letter 15 Nov. 1971.
15. C.W.B. notes that the whereabouts of "egg No. 8" is not known.
16. C.W.B.:—The whinchat is the palaearctic *Saxicola rubetra*.
17. See R. Bowler Sharpe: *The History of the Collection Contained in the Natural History Department of the British Museum*, vol. 2, p. 389. British Museum (London, 1906).
18. H. Gadow: "The Ornithological Collections of the University of Cambridge." *Ibis* 4, 9th ser.: 47-53 (1910).
19. These references are to von Hügel's Victorian collection and the associated data.
20. This may refer to Richmond River, New South Wales.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Notes on some Tortoises collected in Northern Australia

by JOHN CANN *

After two hundred years of colonization, the distribution of Australian Chelids is far from being determined, particularly in the northern regions. Unquestionably, the remoteness of northern Australia, and the lack of interest in this section of our fauna, are responsible for so little being known on distribution limits, especially to interested students.

In September 1971, the author endeavoured to check for tortoises in waterways with visibility reasonably clear enough for skin diving and it was hoped that the fresh water turtle (*Carettochelys insculpta*) would be encountered. This species was first recorded from Australia in 1969.

This work was carried out with permits supplied by: Department of Fisheries and Fauna, West Australia; Northern Territory Administration, Primary Industries Branch; and Department of Interior, Animal Industries Branch, Darwin, N.T.

All tortoises lodged in the Australian Museum, Sydney, are identified by (A.M.) "after mention", followed by the registered museum number. Those still in the "author's collection" are identified by (A.C.) and specimens "released" by (R).

The total collection from this trip, covering some 9,500 miles, will eventually be lodged in the Australian Museum collection. In the event of a new species, the type specimens will be forwarded to the Darwin Museum, Northern Territory.

Our first river camp was at Daly River Mission, on the Daly River, approximately one hundred miles south of Darwin. Unfortunately the river was murky and visibility was restricted to approximately five feet. This made diving dangerous, because of snags, and a stick had to be waved in a circular motion in front and head high, to avoid a sudden encounter with sharp branches and other hazards. Surprisingly enough, tortoises were soon sighted, and in one hour and two hundred yards swimming, the following specimens were collected:

Two yellow-faced *Emydura Sp. 1* plate 1 (A.M. R31723, R31724). Length along carapace 102mm and 110mm.

One *Chelodina rugosa* (A.C.).

One *Emydura australis* (A.C.) No. 1. Head quite large. Carapace length 19.5cm.

Two *Elseya dentata* (A.M. No. R31725).

One specimen (R).

From the Daly River Mission we drove to Clarevale, also on the Daly River, approximately 65 miles from the sea of Anson Bay.

Once again the water was murky, caused by rain up river, and the chance to collect or sight *Carettochelys insculpta* seemed remote. Meeting a full-blooded aboriginal named Narbour raised our hopes, for he had lived by the river for many years, and when shown a photograph of *C. insculpta* he said he had often caught "Pig-nosed Turtle for food". Subsequent checking of his fire place revealed bone remains of this species, plate 2 (A.M. No. R31717).

The following morning Narbour arrived at our camp armed with fishing

* 26 Yarra Rd., Phillip Bay 2036

line and wallaby meat for bait. He quickly settled in the branches of an overhanging tree to fish and attempt to collect the $10 reward we had offered for the capture of a live *Carettochelys insculpta*. In half an hour he had caught a fine specimen, plates 3 and 4 (A.C.), and although we remained here for two more days, no further specimens were collected or caught, although every effort was made by Narbour and our party.

Narbour was quite familiar with both long-necked and short-necked tortoises, so when he stated he had seen *C. insculpta* basking on logs at times, is seems reasonable to assume this is a fact; and it is possible this species is nomadic in habit. Narbour knew nothing of the breeding habits of *C. insculpta*, but a police black-tracker of high intelligence gave us directions to a sand bar on the Daly River where the turtles came ashore to nest. The maze of roads along this river, together with our time running out, prevented us from finding this area. Local enquiries made by the author indicate

Plate 1

Plate 2

Plate 3

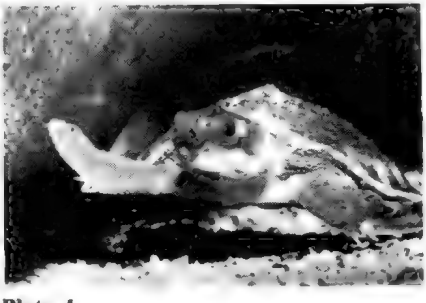


Plate 4

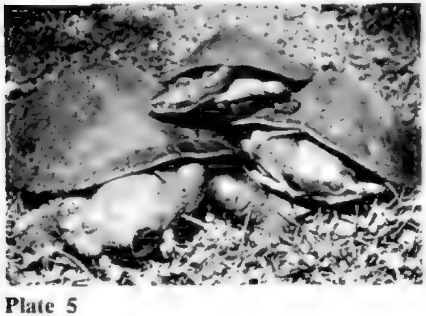


Plate 5

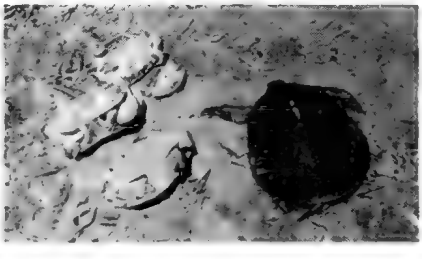


Plate 6

that this species could be found in the following river systems:

Daly, Darwin, Adelaide and McKinlay Rivers.

It therefore would appear *C. insculpta* may inhabit all large waterways in the western side of Northern Australia.

At the next camp, namely Edith Falls on the Edith River Northern Territory, the water was quite clear; and at depths of up to thirty feet *Elseya dentata* could be collected — two to each dive. These were all photographed then released with the exception of one specimen (A.M. RS1728). Only one specimen of *Emydura australis* was encountered at this camp; it was collected (A.C.).

Our next stop was at Katherine, on the Katherine River, Northern Territory, where one *Elseya dentata* was observed; and downstream from the lower river crossing, one specimen of *Emydura australis* was collected (A.M. R31718).

It had been planned to check as many waterways as possible in North West Australia, but time did not permit owing to the great distances between them; thus only a token visit was possible to Ivanhoe Crossing on the Ord River in West Australia. Here one specimen of *Emydura australis* (A.C.) was collected. Although it was 22.2 cm. carapace length, it had a much smaller head than the (A.C.) No. 1 specimen collected at Daly River. One specimen of *Chelodina rugosa* was also sighted at this stop.

From the Ord River, we drove non stop to Borroloola, Northern Territory, a distance of approximately eight hundred and fifty miles. Diving for one hour at Batten Creek four specimens of *Emydura* Sp. 2 were collected, (A.C.) and (A.M. R31726 & R31727). A dried specimen of *Chelodina novaeguineae* was also found on the bank of Batten Creek, (A.C.). *Emydura* Sp. 2 are identical with specimens sent to the author in 1969 from Settlement Creek region North West Queensland. Plate 5 shows the variations in characteristics in this species. Superficially, the facial and carapace colour of this species are almost identical with *Emydura australis*; but a close examination of the roof of the mouth will distinguish between the two. In *Emydura australis* a horny sheath covering the upper jaw extends to the centre line forming a secondary palate. In *Emydura* Sp. 2 the horny sheath is confined to a narrow band along the edge of the upper jaw.

On the return trip, the Bellingen River, central coast of N.S.W., was checked for specimens. Four specimens were collected here and these were lodged at the Australian Museum (A.M. R31719, -20, -21, -22). The author has doubts as to the correct name of these specimens, therefore for the time being will refer to them as *Elseya latisternum*. Dr. J. E. Gray published a paper in 1872 on the genus *Chelymys*, in which he described two tortoises one of which could be this oval-shaped *E. latisternum*. In his descriptions he named one *Euchelymys subclfera*, the other *Elseya spinosa*. Both were collected from Northern Australia and have since been declared synonymous with *Elseya latisternum*, which is why the author has placed them under this name until further work can be carried out on these specimens. If the Bellingen River specimens prove to be *E. latisternum*, there are certainly two distinct forms of this species.

It is the sincere wish of the author that students study these specimens at the Australian Museum, Sydney.

On future field trips they should remember that diving for tortoises is extremely effective, even in the shallows and along river banks. The favourable time is morning or eve-

ning for study or collecting purposes. Possibly there are other rivers, apart from the Daly River, which have at lease five species of Chelids in the same waterhole.

It is also worth noting, that the author found the five species, Plate 6, in the Daly River within a distance of only approximately two hundred yards. A systematic search of a larger stretch of the river could reveal more populations. This could also apply to many more Australian Rivers.

Acknowledgements

I would like to thank Mr. Raymon Mascord for his assistance with this article.

Nature Notes from the Gold Coast

by Alex. N. Burns

Introductory.

The area in which I am living is one that is richly endowed with all kinds of interesting flora and fauna. Situated as it is, one can view the southern extremity of South Stradbroke Island a few miles to the north; Tamborine Mountain embracing Eagle Heights, North Tamborine, and the southern end of the range to the west; Beechmont and Springbrook to the south-west; and fringing the coast itself the portion of the Gold Coast from Main Beach (near Southport) to Palm Beach on the highway to Coolangatta. To the north-east and east, can be seen the ever changing Pacific ocean. Across the road from our garden is the Burleigh Heads National Park; a beautiful still unspoiled area embracing much fine rain forest and some acres of eucalyptus forest. This park is a real sanctuary for many wonderful and interesting animals, birds, reptiles, and insects. As I write, in a small white barked eucalyptus tree some forty feet from the kitchen window, sleeps a half grown koala. At dusk, up to nine small rock wallabies will come down to be fed on bread and fresh fruit and vegetable scraps. These will be accompanied by a similar number of scrub turkeys who also come for their share of the good things. So tame are these lovely creatures that they will take the food from one's hand. Daybreak brings the voices of the currawongs, kookaburras, butcher birds and many other "feathered friends" who frequent this area along with many other fine and interesting species of wild life. Flowers in the garden attract many interesting insects representing many Orders; these are a never ending source of interest and delight. Only a few days ago no less than three females of the Richmond Birdwing butterfly (*Ornithoptera priamus richmondius*) were observed attending flowers of a male Papaya to obtain the nectar so rich in the flowers of these plants. Carpenter and leaf cutting bees are always in evidence on sunny days, as well as many species of Coleoptera and Orthoptera.

This initial note is mainly an introduction to the area from which my nature observations and notes for the future will be made.

Situated 187 feet above sea level with a 180 degree view of the ocean, coastline, and land, it is placed in a wonderful position for natural history observations covering a great variety of terrain.

Victorian Non-Marine Molluscs

by Brian J. Smith*

Victoria has only one native species of terrestrial slug, and even this is not considered a true slug by many experts, but a shell-less intermediate between a slug and a snail with most features more akin to the snail form.

Family Cystopeltidae

Cystopelta purpura Davies, 1912

This is a shell-less mollusc with the tail and visceral mass separate at the posterior end, the tail extending well beyond the end of the visceral mass. The animal can grow up to 25 mm. long and is usually a mottled greeny grey in colour with dark blotches. It is usually confined to native bushland and has a wide distribution throughout the forest areas of central and eastern Victoria from a few metres above sea-level to the tops of the ranges. Closely related species occur in New South Wales and Tasmania.

The average size of animals in any particular population and the predominent colour pattern can vary from place to place. Superficially there seems to be some correlation between colour pattern and habitat, a light coloured specimen being found in the dryer sclerophyll areas near the tops of the ranges, a darker animal inhabiting the wetter fern gullies, but too little collecting and accurate habitat data recording has been carried out yet to prove this. The animals are usually found under logs or litter in damp positions. However several times they have also been found climbing the trunks of trees and even in a quiescent stage inside the rolled-up free bark hangings of eucalypts.

Figure 1. *Cystopelta purpura.*
Drawing by Miss R. Plant.

Because of a superficial similarity to the *Helicarion* group of snails with fragile reduced shells, these animals have in the past been lumped with the Helicarionidae. However, anatomical studies have revealed many unusual features that make such an association untenable and the relationships and systematic position of this unusual group of molluscs, endemic to south-eastern Australia, is still very much an enigma.

* Curator of Invertebrates, National Museum of Victoria.

Submission for Preservation of Mt. Cole Reserve Forest

This is a reprint of part of the full Submission made by the Geelong F.N.C. and the Western Victoria F.N.C.'s Association.

Belmont, Vic. 3216.
24th March, 1972.

Minister for Forests.
Dear Sir,

The Geelong Field Naturalists Club, in conjunction with the Western Field Naturalists Club's Association, wish to submit this submission to you, for the preservation of Mt. Cole Reserve Forest, an area of approximately 28,000 acres, situated between Beaufort and Ararat, in central western Victoria.

The area of Reserve Forest already has two Scenic Reserves, that of Fern Tree Waterfall's Scenic Reserve with an area of 400 acres and the Victoria Mill Scenic Reserve with an area of 80 acres, and both have been developed by the Forests Commission and attract many picnic parties, naturalists groups and bush walkers throughout each year.

Early in 1969, the Geelong Field Naturalists Club commenced a survey of the fauna and flora of this forest, embracing the three main mountain regions, namely Mt. Buangor, 3247 ft.; Ben Nevis, 2876 ft.; and Mt. Cole, 2591 ft.

The survey took almost three years to complete, and a detailed list of fauna and flora is included in this submission.

Apart from the importance of the permanent preservation of particular regions within the forest, we have seriously considered other aspects of management such as the priority for hardwood extraction, and the employment of a local work force, so dependant on the forest for a livelihood, that the recommendations submitted have been kept to a minimum.

The recommendations are:

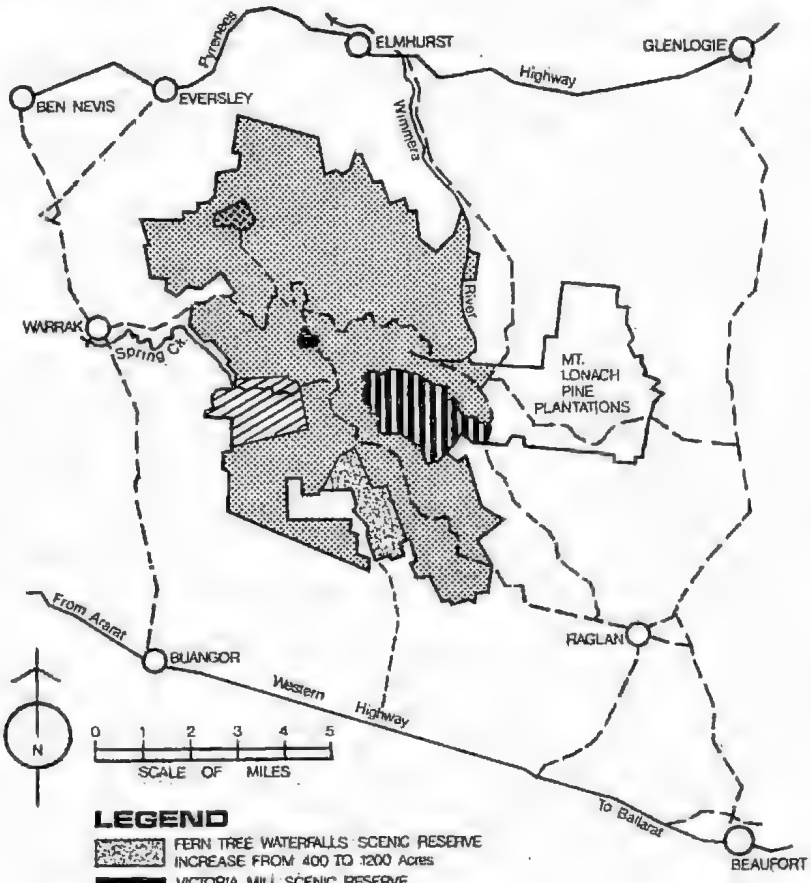
1. The enlargement of existing Fern Tree Waterfall's Scenic Reserve from 400 to 1200 acres.
2. The existing Victoria Mill Scenic Reserve of 80 acres to remain as at present.
3. The establishment of a new Flora and Fauna Special Purposes Reserve taking in the Ararat Reservoir reservation, Green Range and Mt. Buangor, an area of 1500 acres.
4. The establishment of a new Forest Park, in the areas known as The Glut and Lookout Hill, a total of 2000 acres.
5. The establishment of a new Scenic Reserve on the summit of Ben Nevis of 300 acres.
6. The balance of 23,000 acres we recommend to continue to be managed as a hardwood forest as at present.

The finding of several species of plants closely linked with Grampian species, and a magnificent endemic *Grevillea* sp. covering many acres, is sufficient guide for setting aside special reservations.

The future of populations of local Grey Kangaroos and two species of Wallaby, together with long standing herds of introduced deer, is seriously being endangered by continued planting of pine plantations on adjoining Mt. Lonach, so much so that their

MOUNT COLE RESERVE FOREST

APPROX. AREA 28000 ACRES



LEGEND

- FERN TREE WATERFALLS SCENIC RESERVE INCREASE FROM 400 TO 1200 Acres
- VICTORIA MILL SCENIC RESERVE 80 Acres (NO INCREASE)
- 'THE GLUT' PROPOSED NEW FOREST PARK 2000 Acres
- 'THE RESERVOIR' PROPOSED NEW FLORA & FAUNA RESERVE 1500 Acres
- 'BEN NEVIS' PROPOSED NEW SCENIC RESERVE 300 Acres
- REMAINDER OF MT. COLE FOREST FOR HARDWOOD MANAGEMENT 23000 Acres
- MAJOR ROAD
- MINOR ROAD

FLORA & FAUNA OF THE AREA		
PLANTS	336	species
BIRDS	120	species
MAMMALS		
Native	17	species
Introduced	5	species (including Sambur and Red Deer)

designer mark hackleton

dependance on Mt. Cole forest is of greater significance.

Despite the suitability of areas of Mt. Cole forest for pine planting, we consider that such would seriously limit the value of this forest as the natural ecological unit, as we know it today.

Not only would the planting of pines in this forest represent an unnatural intrusion, but the buffer zones of thinned and control-burned forest to protect pines, would also take a considerable share of valuable natural forest.

The recent announcement by you, Sir, of a new Forest Park for nearby Mt. Langi Gheran is applauded and welcomed and we would like to point out that despite the close proximity of Mt. Langi Gheran to the Mt. Cole Reserve Forest both differ greatly ecologically and each has an entirely different concept, and should have no bearing on any recommendation made in this submission.

Listed herein are the full flora and fauna lists as completed by the survey, reasons for particular recommendations, geological and forestry descriptions, and all bodies and organisations supporting this submission, concluding with a brief outline of the history of this fine area.

We acknowledge the assistance at all times of officers and staff of the Forests Commission during the survey.

In submitting this application, we trust that the recommendations for preservation as detailed will meet with favourable consideration by your Forests Commission, and that decisions made will benefit in general the rightful owners of our forests, the people of Victoria.

We are, Sir,

Yours faithfully,

JOHN R. WHEELER,

President Geelong Field Naturalists Club and Convenor of Submission.

GORDON MCCARTHY,

Secretary Geelong Field Naturalists Club.

JOHN HUNT,

Vice-President Geelong Field Naturalists Club. Delegate of Western Victorian Field Naturalists Club's Association.

Copies of the full Submission may be obtained from the President of Geelong F.N.C.

Field Naturalists Club of Victoria

Field Survey Group — *25 May, 1972*

Mr L. Winsor chaired the meeting, which was attended by 18 members.

The Secretary announced that the Group was trying to find a Speaker on botanical survey techniques for the June Meeting. In future, it is hoped to have a visiting speaker every second meeting.

Dr B. Smith invited members to take part in the workdays held at regular intervals in the National Museum. Several members agreed to attend.

Details of the Mt. Disappointment Survey Camp to be held over the Queen's Birthday weekend were discussed in detail, with Maps of the area being distributed.

Further results of the Barringo Camp were then discussed. Dr Smith listed and briefly described the Non-marine Molluscs found on the camp, while Mr. Winsor reported on his study of the Flat Worms.

During the last part of the evening, Mr Winsor described the procedures of fixing and preserving Invertebrates, before the meeting adjourned for coffee.

Mammal Survey Group

The May meeting was attended by seventeen members and six visitors. The Secretary informed the Group that replies had not yet been received to important queries in recent outward correspondence.

Reports were received from those members present who attended the F.N.C.V. Field Survey Group camp in April, as part of investigations being made to determine the feasibility of the two groups joining forces. These investigations will be taken a step further with the holding, for our mutual benefit, of a joint camp by the two groups over the Queen's Birthday weekend, 10 to 12 June. This survey camp will be on Mt. Disappointment. It should be noted each group will be doing survey work on their own special interest.

It was decided at the meeting on 4 May that those members who had the ability to do so would undertake a special study on a particular mammal. This could be done either as an individual study, or by a small number of members working together. The advantages of these studies are obviously many — it is hoped they will result in production of field guides for use by the group; and eventually provide it with at least one specialist on each native mammal in Victoria. In order to avoid duplication of studies the Group Secretary is keeping a list of who has undertaken to study each mammal. The mammals selected for study to date are —

Platypus
Ornithorhynchus anatinus
Long-nosed Bandicoot
Perameles nasuta
Short-nosed Bandicoot
Isoodon obesulus
Feathertail Glider
Acrobates pygmaeus
Ringtail Possum
Pseudocheirus peregrinus
Tuan
Phascogale tapoatafa
Bush Rat
Rattus fuscipes
Swamp Rat
Rattus lutreolus
Swainson's Antechinus
Antechinus swainsonii
Echidna
Tachyglossus aculeata

Enquiries about, or contributions to these studies should be addressed to the Secretary.

Subsequent to the April meeting the committee was able to obtain a loan of the necessary equipment for a survey camp to be conducted at Mt. Hickey on 6 and 7 May. Unfortunately the equipment was available for only a short period of time, and notice of the date of the camp could not be given until 4 May. With such short notice, a smaller number than might otherwise have been expected, were able to attend. Despite this, the weekend survey was most successful. In all, eight native, and three introduced mammal species were identified in the area. The measurement and weight of the twenty animals captured were taken in the course of the survey, and post-mortem examinations were made on two rats of the introduced species *Rattus rattus*. In addition endo and ecto parasites were collected from captured animals. A detailed report will be published later.

The May meeting of the group adopted a programme for survey camps during the remainder of the year.

Calendar of Mammal Survey Group Camps for 1972 —

10—12 June
8—9 July
29—30 July
26—27 August
23—24 September
21—22 October
18—19 November
23 Dec.—2 Jan. '73.

Club Improvement Committee

Recently, the Club Improvement Committee recommended to F.N.C.V. Council that a "Reporter" be appointed to write up items of general interest to members, and make comments on club activities — particularly those of Council and the Club Improvement Activity. Council approved the recommendation, and subsequently appointed a club reporter. Below is the first of his reports, which will appear regularly.

From your Reporter

The Club Improvement Committee has been quite busy, and will be for a considerable period of time. They have been given a great deal of work to do. Among the jobs they are doing is a complete review of the Memorandum and Articles of Association, and the By-Laws of the club, with the object of recommending amendments to them. This in itself is a major task, but in addition they are examining ways to improve the structure and performance of Council, and the club. They are analysing the secretarial workload to see how it may be better handled, the format of meetings, and excursions; and looking into the need for more audio-visual aids at meetings. Other things being investigated include a club equipment register. All this does not mean things will change completely, or immediately; but wherever change is recommended, and approved by Council or a general meeting, it will be implemented.

It appears that various field naturalist clubs are looking for a State body to co-ordinate their activities. Could the F.N.C.V. be such a co-ordinating body — it certainly has the status — but has it the means?

At present it probably does not; although all that appears to be required is additional manpower. The C.I.C (Club Improvement Committee) is looking at the feasibility of employing a professional person, either full or part time, to handle routine correspondence, and other tasks such as co-ordinating meetings. This could well prove to be the answer. Also, hand in hand with this, is a search for a suitable office, with reasonable rental.

Did you know that earlier this year a number of Mammal Survey Group members broke away from F.N.C.V. and formed their own group called the Mammal Survey Group of Victoria? In spite of this the F.N.C.V. Mammal Survey Group is still strong and active, with an average of more than twenty people at each meeting. It is hoped that through co-operation and co-ordination much will be achieved by both groups.

I heard a whisper that the Hon. Editor was running short of material for the *Victorian Naturalist* — yours are needed.

The Field Survey and the Mammal Survey groups informed me that they would like to see country members, and affiliated clubs attend their survey camps. Interested members and clubs should contact the respective Group Secretaries for details of future surveys. It is felt that with their local knowledge, country members, and district clubs could, by participating in them, contribute much to the activities of these groups.

It is with dismay that I note that very few, and often as not, no volunteers answer the many requests for assistance in various tasks that are made at our general meetings. The load thus falls on the reliable few, who are already overworked. This is a great pity.

Proposed Excursion to New Zealand

Sufficient interest was shown in this proposal to justify booking accommodation tentatively, but a greater number of excursionists will be required before this can be regarded as definite. If you are interested please make a firm booking as soon as possible in order that arrangements may be confirmed. The cost ranges from $582 for twenty passengers to $554 for thirty or more. This includes return air fares, all main meals and accommodation in New Zealand, and all travel specified in the itinerary. A deposit of $40 per person should be paid by the 19 June. Cheques to be made payable to Excursion Trust.

The excursion will be based on the following itinerary, but some details may be altered.

Saturday, 6/1/73 — *Melbourne/Wellington*. Stay at Sharella Motor Inn.

Sunday, 7 — *Wellington/New Plymouth*. Travel north through Wanganui and continue on to the Mount Egmont area. Stay at Mount House.

Monday, 8 — Coach available for local sightseeing.

Tuesday, 9 — *New Plymouth/Auckland.* Continue north crossing Mt. Messenger; en route visit Waitomo Caves. Stay at De Bretts Hotel.

Wednesday, 10 — *At Auckland.*

Thursday, 11 — *Auckland/Rotorua.* Travel south through Hamilton and continue on to the thermal region. Stay at Brents Hotel.

Friday, 12 — *At Rotorua.* Your tour includes a visit to a model Maori Village and the Whakarewarewa Thermal Reserve. Also visit the famous trout springs. In the evening attend a Maori Concert.

Saturday, 13 — *Rotorua/National Park.* Continue south through Wairakei and Taupo to the central National Park. Stay at Drumlin Lodge.

Sunday, 14 — *National Park/Wellington.* Leaving the National Park you continue southwards through beautiful beech forests and native bush until the country opens up into sheep and dairy farms. Continue on to Wellington, New Zealand's capital city. Stay at Sharella Motor Inn

Monday, 15 — *Wellington/Picton/Nelson.* Cross the Cook Strait to the South Island by ferry to the small holiday centre of Picton. From there travel by coach to Nelson. Stay at Nelson Hotel.

Tuesday, 16 — *Nelson/Greymouth.* Travel south through the Buller Gorge down the West Coast to the old gold mining town of Greymouth. Stay at Revingtons Hotel.

Wednesday, 17 — *Greymouth/Fox Glacier.* The drive down the West Coast is one of the loveliest in New Zealand. The road climbs around the side of steep mountains and continues south through Hokitika to Fox Glacier. Stay at Fox Glacier Motel.

Thursday, 18 — *At Fox Glacier.* Today there is a guided excursion on the Glacier and a visit to tranquil Lake Matheson.

Friday, 19 — *Fox Glacier/Wanaka.* From Fox Glacier the road climbs through impressive forests and mountain scenery to the Haast Pass and then drops down the east side of the Southern Alps to Lake Wanaka. Stay at Wanaka Hotel

Saturday, 20 — *Lake Wanaka/Milford Sound.* Continue south through the central Otago area until you reach Te Anau, gateway to Fiordland National Park. From there the drive continues through the famous Homer Tunnel to Milford Sound. Stay at Johnstons Hostel.

Sunday, 21 — Launch excursion on Milford Sound.

Monday, 22 — *Milford Sound/Queenstown.* We retrace our steps as far as Te Anau and then swing north skirting Lake Wakatipu to Queenstown. Stay at View Motel.

Tuesday, 23 — For part of the day you go sightseeing by coach to Coronet Peak and then to Arrowtown, once a thriving goldmining town. Rest of the day at leisure.

Wednesday, 24 — *Queenstown/Mt. Cook.* Continue north to Otematata and then into the Mt. Cook National Park. Stay at Lake Tekapo Motor Inn.

Thursday, 25 — *Day Excursion to Mt. Cook.* The whole day in the spectacular Mt. Cook National Park, within its boundaries 17 peaks over 10,000 feet; including New Zealand's highest, Mt. Cook.

Friday, 26 — *Mt. Cook/Christchurch* Continue across the colourful Canterbury Plains to Christchurch, premier city of the South Island. Stay at Avon Motor Lodge.

Saturday, 27 — Time will be made available for duty free shopping before you return to Australia by air.

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 Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1971-1972.

President:

Mr. T. SAULT

Vice-President: Mr. B. COOPER

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.

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the victorian naturalist

Vol 89 No 7 JULY 1972

F.N.C.V.

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

GENERAL MEETINGS

Monday, 10 July — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

Subject for evening—'Reptiles and the need for Conservation':
Mr. P. A. Rawlinson, of La Trobe University.

GROUP MEETINGS

Botany Group

Thursday, 13 July (not July 6 as published in June *Naturalist*): John Robin (La Trobe University): 'Sherbrooke'.

Thursday, 10 August: Members' night (including display of 150 Alison Ashby wildflower cards).

Thursday, 20 July — Day Group, Burnley Horticultural College, Swan St. Includes guided tour of inspection. Meet at 11.30 a.m. inside grounds. B.Y.O. lunch. Take Wattle Park tram in Batman Ave.

Friday, 28 July — Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m.

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

Friday, 4 August — Junior F.N.C. meeting in Rechabite Hall, 281 High St., Preston at 8 p.m.

Monday, 7 August — Marine Biology and Entomology Group meeting at Conference Room, National Museum at 8 p.m. Mr. H. B. Wilson, Senior Entomologist V.P.R.I. — 'Pheromones" (Hormonal secretion and behavioural response in insects).

Wednesday, 9 August — Geology Group Meeting.

Friday, 11 August – Junior F.N.C. meeting in Hall at Petrie Park, Montmorency, at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 16 July — Sovereign Hill, Ballarat. The coach will leave Batman Avenue at 9.30 a.m. Fare $2.20, plus admission. Bring two meals.

Sunday, 27 August - Saturday, 2 September — Stawell.

26 December - 1 January — Leongatha. Details will be published later.

6-27 January, 1973 — New Zealand. See June *Naturalist* for details.

Thursday, 27 July — Field Survey Group in the Library Conference Room, National Museum, at 8 p.m. Briefing for Cape Liptrap/Waratah Bay Survey.

Survey Camps

15-16 July — Murrindindi River.

12-13 August — Cape Liptrap/Waratah Bay (more details from Secretary, Field Survey Group).

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 7 5 July, 1972

CONTENTS

Front Cover:

This delightful photograph of the Sugar Glider (*Petaurus breviceps*) was taken by John Wallis.

Beach Gravels

by E. C. F. Bird*

Beaches composed of pebbles and cobbles are quite rare on the coast of Australia, where most beaches are sandy. By contrast, many of the beaches of south-east England consist of well-rounded gravels, termed shingle. At seaside resorts such as Brighton or Eastbourne on the Sussex coast, shingle beaches are a surprise to Australian visitors who journey down from London for a day by the sea, expecting the beach to be sandy. The reason for these pebble and cobble beaches is the abundance of flint, a hard siliceous rock, in the Chalk formation which outcrops on the Sussex coast. Irregular nodules of flint released by erosion of the Chalk are gradually worn and rounded by wave action. Similar shingle beaches are found on other Chalk coasts, for example in northern France.

Beach gravels are also common on coasts where frost shattering or glacial action have produced stony drift deposits that are worked upon by the sea. Pebbles and cobbles derived from glacial drift are common on the coasts of Scotland and Ireland, in British Columbia, and in the South Island of New Zealand. In some places the gravelly material is carried down to the coast by rivers, then built into beaches by wave action. Pebbles washed down to the coast by the River Spey in Scotland are added to the shingle beach on either side of the river mouth, and some of the beach gravel which lines the shore of the Canterbury Bight in New Zealand has been delivered by rivers, notably to Rakaia and Rangitata, in times of flood.

Sandy beaches are formed where coastal cliff erosion yields sand-sized material, where rivers are delivering sandy loads to the coast, or where sand has been washed up from the sea floor. Beach gravels are more localised, and can usually be explained in terms of some local source of material of suitable size and hardness in the rocks that outcrop along the coast.

In Victoria, beach gravels are frequently found on basalt coasts, and on sectors where coastal rock outcrops include granitic rocks, ferruginous sandstone, or calcrete layers which can be disintegrated by weathering or marine erosion into rock fragments that accumulate as beach material. They are not found where the coastal rock outcrops are homogeneous, as on the massive granites of Wilson's Promontory, or on the soft Tertiary sediments which form the cliffs of the Port Campbell district.

On basalt coasts, beach gravels are found where the rock outcrops in cliffs and shore platforms show closely-spaced joints and bedding planes. Near Flinders, polygonal columnar basalt

*Reader in Geography, University of Melbourne

NOTE: There is some confusion in the terms used to describe beach sediments coarser than sand (i.e. having grain size diameters larger than 2mm). On the Wentworth Scale the terms used are granules (2-4mm), pebbles (4-56mm) and cobbles (56-256mm), but others have defined these terms differently. Gravel is a less specific term, which some have attempted to restrict to a particular size range, but it is convenient to use it as a general term comprising granules, pebbles and cobbles as defined on the Wentworth Scale. The British term shingle usually refers to well-rounded gravel, whereas the American term beach gravel can also include angular material. The latter term is more appropriate in Victoria, where beach sediments coarser than sand are often poorly rounded.

Plate 1.

Photo: Author

exposed on the shore disintegrates to form angular blocks which, under the occasional effects of storm wave action, become rounded as cobbles and gradually worn down to pebble size (Plate 1). Similar features can be seen at many places in the Portland district and near Port Fairy, as well as at Cape Schanck and on the shores of Phillip Island. Often the larger cobbles have been thrown by strong wave action to the top of a 'storm beach', as on the western side of Cape Schanck (Plate 2). Some such beaches, above the normal range of wave action, develop subaerial weathering features, such as pitting and flaking of cobble surfaces, and may be colonised and eventually covered by vegetation.

Coastal outcrops of granitic rocks will also yield beach gravels if the pattern of jointing is sufficiently close. The massive granites on Wilson's Promontory do not yield beach gravel; instead they flake superficially to produce fragments which are added to adjacent sandy beaches. On the western side of Cape Woolamai the granite

Plate 2.

Photo: Author

Plate 3.

Photo: Author

is intricately jointed and yields gravel beaches, and similar features are seen in the cove cut in jointed granodiorite north of Safety Beach, Mount Martha (Plate 3), and on the granite shore north of Mornington. Weathering and disintegration of these rocks yields initially angular fragments, which gradually become rounded and reduced to cobble and pebble size as they are incorporated in adjacent beaches.

Plate 4. Photo: Author

Dune calcarenites, produced by the partial lithification of superimposed coastal dunes of calcareous sand, have been trimmed back as cliffs, fronted by shore platforms, on several sectors of the Victorian coast. The finest examples are on the coast near Warrnambool, and again between Point Lonsdale and Cape Schanck. Within the dune formations exposed in such cliffs are layers of hard calcrete, and lithified structures preserving the shapes of roots and stems of ancient plants (phyto-concretions). These more resistant elements weather out to form broken irregular fragments of calcareous rock, which can be rounded and accumulated by wave action in gravel beaches on sectors of the shore (Plate 4).

Layers of dark brown ferruginous stone are prominent in the Upper Tertiary Sandstones of central Victoria. On the Bellarine Peninsula, coastal outcrops of this material have disintegrated to form beach gravels on the shore between Portarlington and St. Leonards. Similar features are seen on the east coast of Port Phillip Bay between Brighton and Beaumaris, at Mount Eliza (Plate 5), and near Mornington, as well as at Crib Point, Stony Point and Corinella on the shores of Westernport Bay. Each of these sectors is subject only to low or moderate wave energy, and the hard ferruginous gravels remain poorly sorted and angular to subangular.

Other coastal outcrops which have yielded material to form local beach gravels include Tertiary limestones at Portland, Eocene conglomerates at Pebble Point near Princetown, well-jointed sectors of Jurassic arkose on the Otways coast, pyroclastic material near Airey's Inlet, and Palaeozoic metamorphic rocks in Gippsland, notably near Cape Liptrap and at Shipwreck Cove near Mallacoota.

Supply of gravels to the shore by river action is unusual in Victoria, because most rivers enter the sea by way of estuaries and lagoons that act as sediment traps for the coarser material carried downstream. On the steep coast of the Otway Ranges several streams bring down cobbles and pebbles of Jurassic arkose to the shore, and these accumulate as beach gravels (often mixed with, or overlain by, sand) at their mouths. The pebble spit at the mouth of St Georges River includes material supplied in this way.

Beaches fringing coastal lagoons are usually sandy, but there is an exception to this along the northern shores of the Gippsland Lakes. On Banksia Peninsula (Plate 6) and Raymond Island near Paynesville, and on the northern shore of Lake King, beach gravels are extensive. The pebbles consist of various rock types, including quartzites, schists, gneisses, and crystalline and volcanic igneous rocks, all of which can be matched with rock outcrops in their original source area, the highlands to the north. The gravels were brought down during Pleistocene times by rivers far larger and more powerful than those which now flow into the Gippsland Lakes, and spread

Plate 5.

Photo: Author

Plate 6.

Photo: Author

Plate 7. Photo: Author

across aggrading valley floors. Subsequent river incision has dissected these into terraces. A capping of water-worn and well-rounded fluvial gravel is exposed in the upper part of the river cliff bordering the Mitchell at Eagle Point Bluff (Plate 7), marking a terrace about 70 feet above the present valley floor, and there are similar gravels interbedded with sands in younger river terraces at lower levels on the north side of Lake Victoria (exposed in cliff sections near Tannin Point) and on the north side of Lake King.

The beach gravels on the present lake shores have been eroded out of these fluvial terrace deposits and spread along the shoreline by wave action. Locally they have been built into spits and cuspate forelands on the lake shore: Point Scott, on Raymond Island, is a fine example of a cuspate foreland with beach ridges marking stages in its growth (Plate 8).

With the exception of these Gippsland Lakes beaches, beach gravels on the Victorian coast can be related directly to local sources of resistant rock material that disintegrate on weathering and erosion into fragments of suitable size for wave working.

They are restricted in comparison with sandy beach material, both calcareous and quartzose, that has accumulated on our coast in such large quantities during Quaternary times.

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Plate 8. Photo: Author

reptiles of victoria–6

by Hans Beste

PLATE 11

Leiolopisma mustelinum — Weasel Skink

A common skink found also in suburban areas of Melbourne.

Length: to 5 inches.

Short, triangular head, distinct from body. Movable eyelids. Distinct ear-opening. Five fingers and five toes. Upper grey-brown. Narrow white line on each side of body from just in front of hind-legs, merging into a coppery stripe along each side of tail. Cream-coloured spots on head below eyelevel. Also spots along upper lip. Under white.

Usual Habitat: under logs and debris.

Best distinguishing features — a cream coloured spot just behind eye and others in front of ear-opening, if present. Movable eyelid separates family from *Cryptoblepharus* species.

PLATE 12

Delma frazeri — Fraser's Legless Lizard

A snake like lizard with only rudimentary hindlegs.

Length: to 18 inches.

Oval head, distinct from body. Legs absent except for scale like hindlegs. Distinct ear opening distinguishes these lizards from snakes in the field. Normal sized scales around entire body. Colour olive to olive-grey on top and sides. Under creamish. Body scales in 16 rows.

Usual Habitat: under logs, in triodea bushes (spinifex).

Best distinguishing features — ear opening. Head shields.

PLATE 11

PLATE 12

Eruption Date of Tower Hill Volcano Western Victoria, Australia

by Edmund D. Gill*

Abstract

A radiocarbon date of 7,300 ± 150 years B.P. has been obtained for the shells of an Aboriginal midden within the Tower Hill Tuff at Warrnambool.

Description of Volcano

One of the largest and latest volcanic craters in Victoria is that of Tower Hill, which stands beside the Princes Highway between Warrnambool and Port Fairy, Western Victoria. The crater is 3.4 by 2.6 km., with its axis directed N.E. The Tower Hill Tuff is spread over the surrounding countryside, greatly enriching it. Plant foods are plentiful in the tuff, it is young enough not to be leached, and is of such a texture as to facilitate penetration by roots. As the volcanic pipe has been punched through lime-rich rocks, there is no shortage of lime.

The geomorphic features of the crater are very young. The rim is sharp, and the walls almost unchanged, although in some places there are shallow rills. The accumulation of hillwash at the base of the steep walls is not large. In the centre of the crater is a complex of over 20 cones and craters. These show no obvious geomorphic modifications. However, all these rocks are extremely porous, and so absorb rainwater rather than suffer erosion by it.

A crater lake is present that varies greatly in extent. The surface appears to be a function of water table, and the extent a result of wetter or drier years. The S.W. part that always has a lake has subsided a little along a fault, and so is the deepest area (Gill 1967 and references).

Volcano in Eruption

The eruption was a fierce one of the explosive type. The activity was more or less continuous as is shown by the thousands of uninterrupted layers of ash and lapilli. No soil was able to form, and not even the mobilization of the free lime, which would occur very quickly. No sign of vegetation has been found between the layers. Long unsuccessful searches have been made for such materials, as they are ideal for radiocarbon dating, and would date a time of actual eruptive activity. By reason of their intense activity, such vents do not remain active for very long, so any radiocarbon date in the tuff sequence provides a good idea of the time of eruption.

Nevertheless, the geologic evidence is clear that the eruption did not simply phase out, as has happened with many basaltic eruptions on Mauna Loa, Hawaii, within historic times (I saw a two-day eruption in December 1969). At Tower Hill the seemingly innumerable layers of ejectamenta are succeeded (sometimes with erosion between) by a conglomerate. This consists of a mixture of tuff, lapilli, pieces of basalt, angular fragments of Miocene limestone, Lower Cretaceous arkose, and

* Deputy Director, National Museum of Victoria.

such. The same kind of conglomerate occurs on the central island, although the cones there are built of scoria and cinders.

Volcano Classification

When a volcanic pipe is opened up, the superheated gases (mostly steam) roar out at high pressure with frightening force. The molten magma below coming into contact with ground water could provide the immense volumes of steam emitted. This steam often condenses in rain, which probably caused the erosion noted between the tuff/lapilli sequence and the conglomerate. A simple explosive volcano consisting of a vent and a ring of tuff is called a *maar*. This type of landform was originally described in the Eifel district of Germany, where crater lakes lie below forested tuff rings. Professor Martin Schwarzbach of the University of Cologne kindly showed me this beautiful and scientifically interesting terrain.

Such a volcanic pipe works well only when it is of restricted size, because the larger it gets, the more its force is dissipated. So a maar does not normally exceed about 0.4 km. in diameter, and is not nested (i.e. does not contain a central complex of later cones). For this reason, the writer considers that Tower Hill should be classified as a nested caldera (for further comment see Ollier and Joyce 1967). My theory is that the country rock of Portland Limestone is like a slab of natural concrete (albeit weakened by joint planes) that stood firm while the friable marl below it (found in the tuff) was scooped out by the violent eruption. Then the roof of competent limestone collapsed, causing a temporary cessation of activity. Pressure built up again under this blockage of the volcanic pipe until the volcano erupted once more, resulting in the formation of the central complex of cones and craters. In the quarry across the road

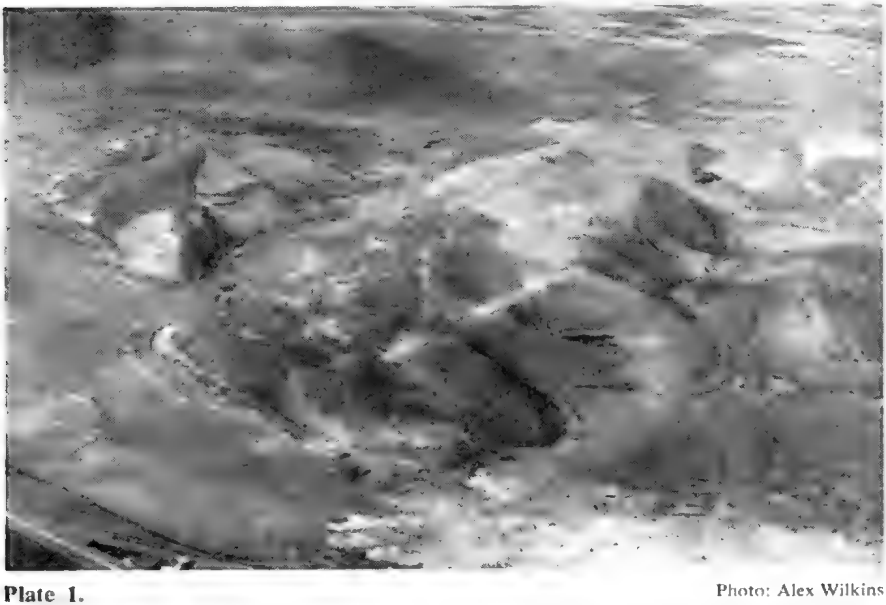

Plate 1. Photo: Alex Wilkins

Aerial view of Tower Hill nested caldera. Parts of the outer rim are shown, and the central complex of cones and craters.

from the exit of the Tower Hill tourist drive, numerous pieces of the Miocene marine marl have been seen, especially in the lower layers. On the other hand, the conglomerate is characterized by pieces of the marine limestone that forms the country rock. Moreover, the ejectamenta of the central complex are exceptionally rich in free lime. A sample of cinders from a quarry in one of the cones yielded 16% by weight of carbonates (Gill 1953, p. 83). These facts appear to fit the theory.

Age of Eruption

Since 1950, when radiocarbon dating was invented, the writer has searched in vain for datable materials in the stratified ejectamenta; therefore dating thus far has had to be limited to samples from above and below the tuff. From above the tuff at Tower Hill beach, numerous samples have been dated up to 5120 years B.P. (Gill 1967, 1971). The eruption was some time before this, because at the site a few feet of deposits lie between the horizon of the sample and an eroded surface of the tuff. Only one date has been obtained for a sample below the Tower Hill Tuff, viz., bones from Bushfield that gave an age of 6605 years B.P. (Gill 1971). This date is not very satisfactory, however, because the bones yielded insufficient organic matter for dating, and the carbonate fraction was used. This is therefore expected to be a minimal date. Because bones of various ages have given radiocarbon dates on carbonate of a similar number of years, it is now suspected that a Mid-Holocene pedogenic activity (that supplied the carbonate) is being dated rather than the bones themselves. Thus bones from a low energy lake deposit covered by a presumably Late Pleistocene parna dune gave a carbonate date of about 6435 years (there being insufficient collagen for a date), while the accompanying shells dated about 25,300 years. The site is at Lake Weeranganuck about five miles N.E. of Camperdown (Gill 1971, dates 61, 101). The Ingram Trust has provided funds to help sort out this problem.

Last year, during a study of the coast at Warrnambool in Western Victoria, an Aboriginal midden was found in solidified but unstratified Tower Hill Tuff of the cliff top on the east side of Thunder Point. The cliff concerned forms the east side of the small embayment that includes Table Cave. More midden material remains for further tests. As insufficient charcoal could be collected for a dating, solid unweathered marine midden shells were used for the assay. The result was 7300 $\pm$ 150 years B.P. (GaK-2856).

Dr. A. W. Beasley found in the matrix the typical Tower Hill Tuff heavy minerals such as hackly olivine grains. Some dune sand was mixed with the tuff. This unstratified tuff merges on the West side of Thunder Point into a stratified deposit contained in a sheltered hollow East of the Trigonometrical Station, but no middens were found there. Over the years the dating of this volcano has

Plate 2

Upper: Tower Hill Tuff mixed with sand forming top of cliff on East side of Thunder Point, Warrnambool. The overlying dune has been blown away. This soil contained the midden dated by radiocarbon.

Lower: Close-up view of Tower Hill Tuff that contained fossil midden dated 7,300 years. It overlies the calcrete of a terra rossa from which the topsoil was stripped before the tuff fell. Most of the hard pieces standing out from the tuff are pieces of calcrete, but some are midden shells. Scale: 3 ft. rule.

photo: Author.

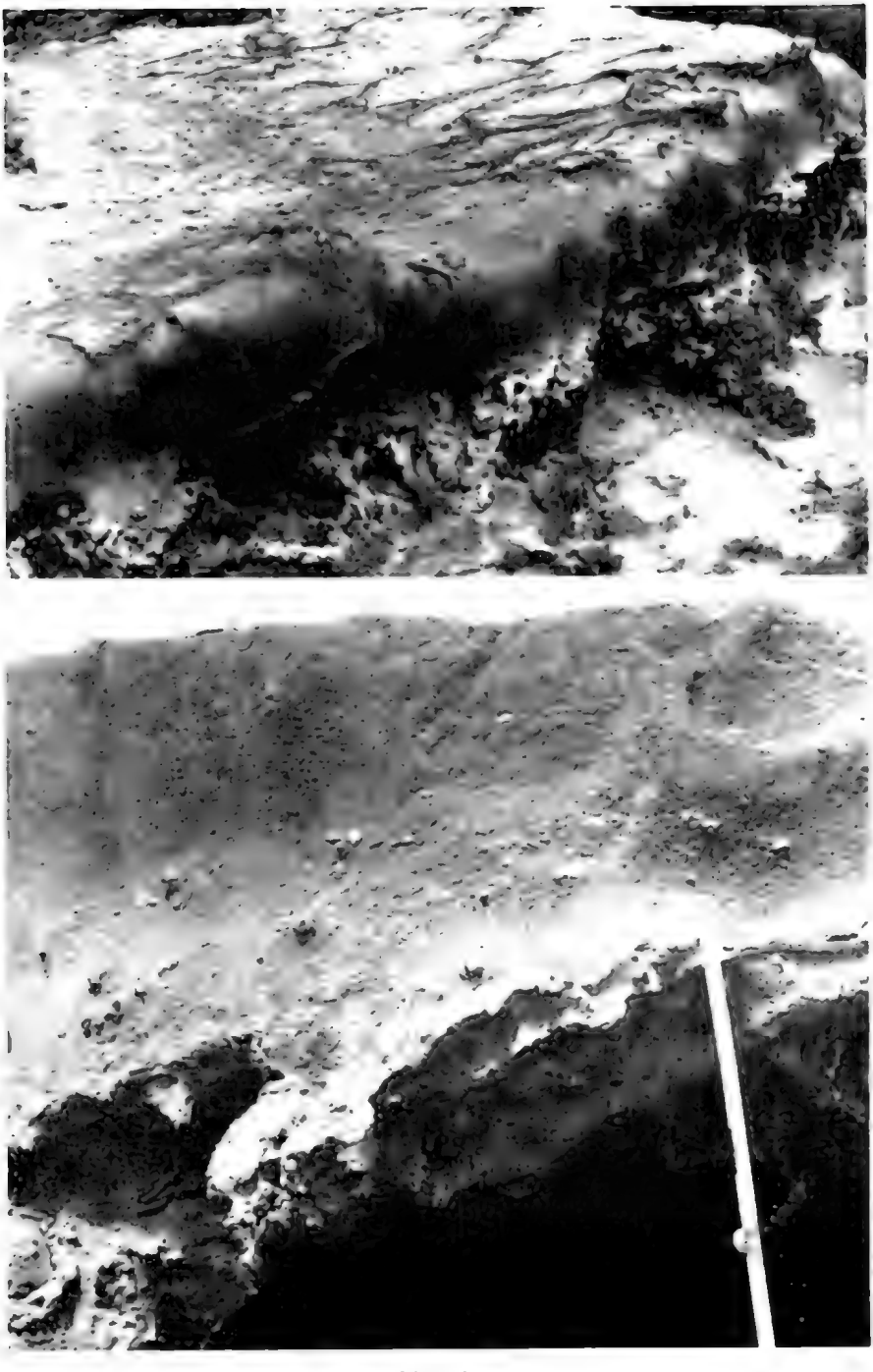

Plate 2.

been gradually refined. The date reported here is the most accurate so far, but it is still hoped to discover suitable materials for assay from the stratified tuff.

Aboriginal Activity

Our site proves that Aboriginals collected shoreline molluscs for food about 7300 years ago, and ate them on the cliff top during the period of eruption. The prevailing winds that distributed the ash were south-westerlies as at present, but Warrnambool is South-East of the volcano, so ash would fall there only intermittently. That is why the tuff is so thin at Warrnambool. This is the oldest coastal midden with marine shells reported from Victoria. Older ones are probably now under the sea, drowned by the advancing seas of the Flandrian Transgression.

Change in Prevailing Wind Direction

Many years ago (Gill 1950) it was noted that many volcanoes and lakeside dunes in Western Victoria had their sediments emplaced by West to North-West winds, whereas the prevailing winds now are from the S.W. On the limited information then available (before radiocarbon dating) it was thought that the time of different prevailing wind direction might be the Mid-Holocene. Tower Hill was then thought to be a couple of thousand years old. The new date for Tower Hill (which is oriented to the present prevailing winds) indicates that the time of changed direction is probably in the Late Pleistocene. This is supported by other evidence. For example, a date on charcoal from the base of the dune on the East and S.E. sides of Lake Colongulac near Camperdown (presuming W. and N.W. prevailing winds) has recently been obtained, viz., 20,100 years B.P. (Gill 1953, 1971).

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Correction

On page 133 Vol. 89(5) reference is made to a visit to Italowie Gorge. It is stated that "a large Macrozamia palm (sp. ?) grew on the cliff side." This particular plant is well known and is actually a clump of the commercial date palm *Phoenix dactylifera*. It is estimated at being about 40 years old and presumably has grown from a stone or stones which have either been washed down the creek, or discarded by some early travellers. Your reporter is quite right in assuming that it is not known from this locality, and in fact the nearest Macrozamias are those to be found in Palm Valley.

T. R. N. Lothian,
Director, Botanic Garden,
Adelaide.

A Study of Enviroment

A brief account of a week-end course organised by the Environment Studies Association of Victoria.

This was a course on "Coastal Ecology and Environment" during the week-end of Friday 28 April, to Sunday 30 April, 1972.

About 60 people attended plus about 12 staff. Ages ranged from 16 to beyond 60, but one third to a half were in their twenties. We were housed in the National Fitness Camp at Anglesea, with meals included; and attended to light camp duties such as serving at meals, washing up, preparing vegetables.

We booked in between 8 and 9 o'clock on Friday evening, paid the balance of our fees (total $10) and received our study kits consisting of general information re aims and procedure of the study, programme, locality, several maps, all clipped into a neat folder. We paid a modest $1.50 for these kits. They made us happily conscious that we were there to work, not for leisure.

At 9 p.m. the programme started as scheduled with the ESA president (Dr Malcolm Calder), telling us of the purpose of the week-end, and that we were to be divided into four groups, each with two leaders. A list of students in those respective groups was already pinned on the notice board.

The four study groups were: Sand dune ecology—Planning coastal development (dealing with the holiday township)—Forest and heathland ecology—and Creek ecology. The study area was at Mogg's Creek, about 10 miles west of Anglesea. It is an area that has not yet received much popular use, but heavier use is expected in the future.

At 9 a.m. on Saturday, after a brief explanation by the President of the day's plans, we set off in a dozen cars to tour the study area. We got out at several relevant spots while one leader or another told us the activities to be undertaken by his particular group. Thus we all saw typical sections of the whole study area and had an idea of the various ways it was to be studied.

Lunch was brought to a shelter in our study area, so we did not have to waste time going back to Anglesea. After lunch we divided into our four groups and set to work.

I was with the group on Sand dune ecology. Our leaders were Dr Malcolm Calder of the Botany School, University of Melbourne, and Mr Alex Mitchell of the Soil Conservation Authority. We divided into two parties. One party made several plant transects of the dunes and in the other party we made a soil transect.

We went in a line from the beach up the dunes and across the road to the heathland. We took soil samples at designated points along that line. Our hand-operated auger/bore could go to a depth of six feet. Presence or absence of calcium carbonate, soil colour, and acidity (Ph) were measured and recorded at various depths at each bore, and any additional organic matter or minerals, plus immediately surrounding plants, insects, snails, and the like. The angles, height of dunes, and distances were measured. All was recorded.

At 9 a.m. on Sunday we returned to the job. The previous day we had more or less found out what the

natural environment consisted of. This day we were to assess man's impact on the area, possible future impact, and devise means of preserving at least part of the area from that future impact.

Meantime, the other groups had been working at their projects.

The group on Creek ecology tested the creek for salinity at various points, pollution, examined aquatic life, noted plants, birds and insects. Forest and heathland group made quadrats for plants, birds, insects, evidence of animals. Both groups tried to assess man's impact, future impact, and how to control it.

In relation to a shire map of the area released for town development, and other maps of the surroundings, the Coastal development group surveyed existing houses, assessed fire hazards, and looked critically (and disapprovingly) at some of the sections allocated for development.

After lunch, again brought out to our study area, a member from each group reported to the rest of us a summary of the findings and recommendations of his particular group. A committee has been formed (consisting of a representative from each group) to collate the various findings and produce a co-ordinated report of the entire study. This report is to be sent to members with the next ESA Newsletter.

We returned to Anglesea and had swept out our huts and departed by 5.30 p.m.

It was a very instructive and most stimulating week-end. Interest was high, and eagerness to do the job thoroughly on all aspects carried through to the collecting and classifying of litter! And there was some of the best organisation, planning and forethought which I have seen—overall and in detail.

The Environment Studies Association is planning more study week-ends. Information may be obtained from the Honorary Secretary: Mr J. M. Truran, 191 Royal Parade, Parkville, 3052.

M. J. LESTER

Notes on the European Rabbit Flea (*Spilopsyllus cuniculi* Dale) in Victoria

by ROSAMOND SHEPHERD* and JOHN EDMONDS*

Myxomatosis in south eastern Australia is largely dependent on mosquito vectors for its efficient spread. The European rabbit flea was brought into Australia in 1960 by CSIRO in an attempt to reduce the dependence of myxomatosis on mosquitoes for transmission and to provide a vector which was thought to have other epidemiological advantages as well.

The flea was bred successfully by CSIRO Division of Animal Genetics (Sobey and Menzies 1969). Fleas supplied by the Division were first released in Victoria in the Werribee District, in August 1969. Later releases were made in the Mallee, Gippsland and North Central regions.

*Keith Turnbull Research Station, Department of Crown Lands and Survey, Frankston.

These releases were purely experimental. They were designed to provide information on, firstly, the establishment and spread of the flea and, secondly, the flea-myxoma-rabbit relationship. This work is continuing but it is now clear that the flea will readily establish and slowly spread in widely different climatic and topographical regions of Victoria.

If we can establish the rabbit flea so readily in our wild rabbits why did it not become established with the original introductions of rabbits? It seems certain that rabbits which were sent to Australia carried fleas in England. Sobey (personal communication) has suggested that the care given to rabbits during the voyage from England may have included removal of fleas. However, it seems unlikely that the flea did not reach Australia on rabbits during the seventy years over which many attempts were made to introduce and establish rabbits.

Presumably no rabbits which carried fleas on arrival in Australia contributed to the present wild rabbit population.

The introduction of a non-indigenous insect raises the question of the wisdom of this sort of action. In this case the remarkable host specificity of the rabbit flea reduces the possible risk to a minimum. The flea can breed only after a blood meal from a pregnant rabbit (Rothschild, 1964), not from other mammals. The flea can live on, but cannot breed on the European hare, *Lepus europaeus*. It occurs as a straggler, generally a starved straggler, on other animals. It has been found on cats and foxes in Australia; on dogs, cats, foxes, martens, ermine and rats in the United Kingdom. Native animals are unattractive to the flea (Sobey and Menzies, 1969).

It is expected that in Victoria the flea will eventually occur in all except the most isolated rabbit populations. It spreads from a release site at a rate of about one mile per rabbit breeding season. Even with planned releases and other spread by man it is likely to take many years to reach its final range. Clearly any observations of flea occurrence on rabbits or on other animals will be of interest.

Almost every rabbit in 'flea' areas carries fleas—up to several hundreds on pregnant does. It is likely that even the least observant rabbiter will see them especially as they tend to congregate on the head and ears. However, when fleas are present in very small numbers they are usually seen only by experienced observers. It is especially important that observations of fleas should be reported and the fleas identified.

We expect to receive many reports of fleas. Many of these reports will be difficult to check because they will be made by untrained people. We would be very grateful to receive any reports from naturalists, particularly when flea specimens are available.

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F.N.C.V. CAR STICKERS

F.N.C.V. Car Stickers are now available from Mrs. Strong, Book Sales Officer, at a cost of 25c each.

Car owners travelling in the country or interstate can identify other members quickly in this way.

It also helps to advertise the Club.

Honeysuckle Creek No. 4 Aboriginal Shelter

by ALDO MASSOLA*

Honeysuckle, or Devil's Creek, rises near the crest of the Victoria Range, in the Western Grampians, a little more than 3 miles north-east of that peculiar rock formation known as the Chimney Pots. The creek rises in particularly rough country, and at first descends the western slopes of the Range in a northerly direction, then runs an erratic north-westerly course through heavily timbered and wild country, and finally loses itself in the desolate and swampy ground to the north of Ming Ming Swamp.

It is on this remote creek's watershed that the latest reported shelter bearing Aboriginal paintings has been discovered, its finder being the dedicated and well-known naturalist and Grampian 'tramper', Mr. Ellis Tucker, of Brit Brit: and he kindly consented to take a small group of us† to his new find.

The 'shelter' is a large but shallow overhang on the face of a huge sandstone for about 100 feet long and at least 50 feet high. The floor is rocky. The 'walls' of the overhang were once extensively painted, at least judging by the traces that remain, but the paintings have been almost completely faded out by exposure to the elements and ruined by mineral stains caused by water seepage, and only a few motifs can be made out with any degree of certainty. All appear to having been done in red ochre.

The recognisable paintings are divided into three panels, of which the one on the left covers a space of wall about 3 ft. high by 3 ft. 6 in. wide, and the design consists of a human figure 12 in. high flanked by 6 perpendicular strokes about 6 in. high.

The central panel is 6 ft. 6 in. to the right of the previous, and measures 3 ft. 6 in. in height and 4 ft. in width and shows 2 human figures 12 in. high, flanked by a group of what I have elsewhere called 'broad arrows', ranging from 9 in. to 10 in. in length.

The third panel is 3 ft. 9 in. to the right of the central one and covers a space about 3 ft. 6 in. high by about 2 ft. wide, and consists of 5 broad arrows 9 in. to 10 in. in length rendered perpendicularly in two lines, two broad arrows on the left and three on the right line.

These broad arrows are not a new motif in the Grampians, they having first been recorded (and illustrated) by me for the Shelter of the Camp of the Emu's Foot (*Vict. Nat.* 77, Nov. 1960), where I stated their meaning to be 'a puzzle'

At this new shelter Mr. Tucker advanced a very realistic theory regarding their significance. When he first discovered the shelter he became aware of the similarity of the broad arrows to the outline of swifts, a number of which were then rushing through the air overhead, silhouetted against the sky. Swifts, he told us, generally fly around in the Grampians during late February and March when they herald the change of weather.

Swifts and weather are associated by many bird observers, who have noticed that thunderstorms are often

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†Ian McCann, of Stawell; G. K. Smith, my brother Silvio, and myself, of Melbourne.

coincidental with the appearance of swifts; and this observation has earned them the name 'thunder birds'. In my book, Bunjil's Cave (Lansdowne Press, 1968), I have recorded that this belief in swift-storm association was also held by the Aborigines of the Western District.

Using as an analogy the recorded fact that one of the totems of the Aborigines of Arnhem Land is the 'Monsoon Wind', and that its symbol is a design representing the sail of a Macassar vessel, the prahus, which used to arrive in numbers in northern waters at monsoon time—the prahus and the wind being thus associated by the Aborigines—I am now tempted to impute to the swift the symbolism for thunder, rain, clouds, lightning; in other words, 'storm', which, in this part of Victoria, was a sub-totem or division of the Crow totem. If this is correct, then it may be legitimate to suppose that this shelter had some special significance to that sub-totem. When we eventually have enough information to draw conclusions on the function of painted shelters and on the distribution of motifs in the Grampians, this theory must not be overlooked.

This shelter has been named Honeysuckle Creek No. 4 with some misgivings, since Mr. Tucker has expressed a doubt that the previous three shelters bearing this name are on Honeysuckle Creek at all. He is of the opinion that they are on an unnamed creek situated further south.

Mr. Tucker had to drive back to Brit Brit that night, and he therefore was not with the rest of the party the next day at Stawell, where we pondered over and carefully examined the air survey photographs of the locality; but we found that the two creeks in question arise so close to each other, in such wild, broken and confused country ("it appears to have been the centre of a conflagration" are the words I used in the paper reporting their discovery, *Vict. Nat.* 84, July, 1967) that we could not decide whether the three shelters were on the watershed of one creek or of the other. Therefore, with the reservation that Mr. Tucker might be right, we decided not to change the catalogue numbers, especially since this would create confusion. However, future workers in the area, please take note.

Shelter No. 4 is undoubtedly on the Honeysuckle Creek watershed, but much further down stream and about two and a half miles north-north-west of the others.

The discovery of other shelters in the region should prove to be of the utmost interest, especially should they depict broad arrows, or swifts!

Photo: Author

Plate 1. Aboriginal shelter No. 4 at Honeysuckle Creek. (Note size of people in lower left.)

An Aboriginal Axe-grinding Rock near Mount Macedon, Victoria

by Alan L. West*

The most significant Aboriginal relic within the former territory of the Wurundjeri (the so-called Yarra tribe) is the diabase axe-stone 'quarry' at Mt. William, near Lancefield. (For a description of this site by D. A. Casey, see the October 1971 issue of this journal.) The purpose of this paper is to provide details of a sandstone axe-grinding rock which was almost certainly used by the owners of the Mount William quarry to grind sharp edges on their axe blanks.

The grinding rock is situated near Mount Macedon and some 18 miles south-west of the axe-stone quarry. This places the site within the boundaries of the Kurnaje-berreing, a subgroup of the Wurundjeri, who owned and worked the axe-stone deposit (1). At the time of first European settlement this clan was headed by Billibilleri, a man who was to become a respected figure for at least some officials.

Mt. William diabase was of excellent quality for axe making. Pieces of the rock were chipped roughly to shape at the quarry site and then traded as blanks, in return for such items as reed spears and animal skins, to neighbouring and even distant tribes. Recipients would sometimes have to refine the shape of the blanks and then they would grind a sharp edge on the stones. In some areas this grinding was done on portable stones but in places where suitable fixed rocks were located these were used and were no doubt preferred. Axe-grinding rocks still exist in the Otway Forest, the Western District, Gippsland and in north-central Victoria. As the distribution of Mount William axe-blanks has yet to be established it is not being suggested that these distant grinding rocks were necessarily used to complete Mount William blanks. There seems little or no doubt, however, that the grinding rock near Mount Macedon was used for this purpose. Six small stone fragments were collected at the site and of these two have been identified as diabase by Dr. A. W. Beasley, Mineralogist, National Museum of Victoria. The other chips are of quartzite and impure vein quartz.

The rock is now situated on farm land south of the Macedon range. It is on the margin of what was originally an extensive swamp about 1½ miles long by ½ mile wide. The swamp has been drained and water from it now flows into the headwaters of Riddells Creek. The site is on the slightly rising ground which confines the swamp on its northern side. It is nine feet above the general level of the swamp and about 20 yards from its edge. The slope behind the rock is lightly covered with eucalypts, mainly peppermints (*E. radiata*) and candlebarks (*E. rubida*).

William Blandowski, who was appointed to assist in the formation of a Museum of Natural History in Melbourne, spent three months in Central Victoria in 1854 observing the natural history of the area and collecting specimens. During this period he not only observed the Mount William quarry (later becoming the first man to write about it), but also made

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Plate 1. General view of the axe-grinding rock (ordovician sandstone) near Mt Macedon, Victoria. In the middle ground the former swamp is evident.

Photo: D. A. Cass

Plate 2. Some of the smooth depressions on the rock surface caused by axe-grinding activity.

Photo: A. L. West

notes about the 'sheltered places at the base of Mount Macedon'. He reported that in the middle of July this area became the resort of swarms of birds of every class (2). "The natatores (water birds) in particular," Blandowski wrote, "congregate in vast flocks on the swamp plains". This whole area would thus have been an attractive place for Aborigines and the site of the axe-grinding rock which projects somewhat into the Bolobec swamp would have been a most desirable camping place.

The rock (Plate 1) measures 9 feet by 6 feet and outcrops about 6 inches above the ground. The long axis runs north and south and is slightly tilted beneath horizontal at the southern end. The dominant colour of the exposed surface is dark grey, while that of the smooth grinding depressions is generally a lighter pink to yellowish grey.

Thirty-one grinding hollows (Plate 2) mark the surface. The shallowest is a depression of 3/16 in., whereas the deepest measures ¾ in. In length the grooves vary from 4 in. to 14 in., but most are about 10 in. There is a variation in width from 2¼ in. to 5½ in.

This is the only axe-grinding rock known to exist in the former tribal territory of the Wurundjeri. Its importance arises out of this fact and also from its highly probable association with the well-known axe-stone quarry at nearby Mount William.

Appreciation is expressed to Mr. R. Law-Smith, of 'Bolobek', Macedon, for permission to visit and record the site and to Mr. D. A. Casey, whose assistance in the field and discussion of the manuscript have been most helpful.

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Field Naturalists Club of Victoria

General Meeting, 14 June

The President, Mr. Tom Sault, took the chair at the June meeting of the Club, and welcomed about seventy members and visitors. He also announced the forthcoming marriage of two members, the Treasurer, Mr. Harry Bishop, and Mrs. E. Pedrana, and wished them well on behalf of the Club.

The speaker for the evening was Mr. Jack Hyett, who gave an 'Introduction to the Orchids'. This was one of the series of 'Introductions' organised by Miss Lester, who introduced the speaker. The talk was designed to be informative to beginners in the subject, as well as to the more knowledgeable. It was illustrated with a series of slides.

Among correspondence received was a letter from the Port Phillip Authority requesting information from club members about areas of the bay shoreline which they consider worthy of preservation. Mr. Sault appealed to members for help in this, there being a particular need for well documented, factual information.

A full list of correspondence was displayed on the notice board, as well as copies of several letters. The notice board was introduced earlier in the year at the suggestion of the Club Improvement Committee, and is proving a valuable asset in keeping members informed of Club activities. It is available for use by kindred associations as well as for all Club groups. An innovation this month was the display of a copy of the minutes of the last Council meeting. These will be available regularly in order to keep members in touch with Club business.

During general business a Club mem-

ber, Mr Ralph, spoke on the use of the poison 1080 by Australian Paper Manufacturers' foresters in areas near Bulga National Park. Mr. Ralph reported that a campaign by local residents has met with only partial success, and suggested that the Club should look more fully into the many aspects of this. He said he felt that there was a great need for reliable information on the effect of 1080 baiting on native fauna. On the brighter side, Mr. Ralph was happy to report that plantings on one block adjoining the park would be of Eucalyptus regnans, instead of pines, as originally proposed by A.P.M.

In replying to Mr. Ralph the president said that the Club had already had correspondence with A.P.M. and the National Parks Authority on the use of 1080 in this area, but promised to again raise the question in Council.

Mr. Sault also gave details of a proposal by the Fisheries and Wildlife Department for a 13,000-acre reserve on French Island. The proposed area is believed to include a pelican rookery and also one of the few habitats in Victoria of the potoroo. It was agreed that the Club should write to the Premier supporting the establishment of this reserve. Individual members were also urged to write to their own State Member in support.

Before closing the meeting the President said he regretted being unable to announce a speaker for the July meeting. He proposed the formation of a small panel of members, not on Council, to take over the organization of programmes for general meetings. This would ease the Secretary's work load and assist Council.

Report of Botany Group for the Year 1971, F.N.C.V.

Current Office-Bearers:—(Held office throughout 1971, re-elected for 1972.)

Chairman: Mr. Karl Kleinecke.

Secretary: Mr. James A. Baines.

Program Steward: Miss Marie Allender (1971 only).

ANNUAL REPORT

Meetings were held regularly each month, with the exception of January, the average attendance being 20 members (with a maximum of 32).

In February, Mrs. Margaret Corrick spoke on 'The Botany of the Victoria Range, Grampians'; in March, Mr. Alan Morrison spoke on 'Uncommon Native Plants'; in April, Mr. Fred Woodman spoke on his first visit to Kenya and second trip to South Africa, with emphasis on botanical aspects, but with considerable coverage of wild game also; in May, Mr. Bruce Fuhrer's theme was Victorian orchids; in June, Miss Helen Aston continued her explanations of botanical terms (begun at the November, 1970, meeting); in July, Miss Laura White spoke on Proteaceae; in August, Mr. Neville Walters spoke on 'The Role of Fungi'; in Sept. Mr. Ian Morrison showed many slides of Proteaceae (the Botany Group's theme in the club's annual nature show); in October, Miss Madge Lester spoke on 'Coastal Plants'; in November, slides taken in the Flinders Ranges by Messrs. Ian and Alan Morrison, Miss Joan Forster and Miss M. Allender were shown. December meeting was a members' night, in which the topics dealt with were: 'Canberra Botanic Gardens' (Mr. J. A. Baines), 'Phyllodes and Cladodes' (Mrs. Phyllis Matches), 'Simpson Desert and Central Australia' (Mr. Bill Corrick) and 'King Island' (Mr. Ian Cameron, who lived there for 16 years). Slides were shown at all these meetings, and a number of speakers had also prepared illustrative charts.

Excursions were held as regularly as transport limitations would permit, some of the destinations being the Botanic Gardens, Seaford, Blackburn Lake, Tecoma and Sherbrooke Forest, South Warrandyte (Mr. W. King's native garden), Dixon's Creek and Mt. Slide, Western Port (Corinella area), Maranoa Gardens.

Nature Show: The group's exhibit was very favourably commented upon, there being many genera and species displayed, mainly with live plants but some pressed species of particular interest from the Herbarium collection, charts by Miss L. White on characters separating the various genera native to Victoria, and a comprehensive chart prepared by Mr. J. Baines setting out the phylogeny of proteaceous genera throughout the world range of the family, chiefly of course in Australia and southern Africa.

Exhibits: Every meeting gave opportunities for examining and discussing interesting specimens from near and far—for example, Mr. L. Fell showed a great number of plants he collected in the Flinders Ranges during the F.N.C.V. ex-

cursion, and Mr. A. Morrison many unusual species gathered on his North Queensland and inland trips.

Victorian Naturalist: Only two reports of Botany Group activities appeared in the club's journal, as it was misunderstood that monthly group reports were to be no longer published. However, Botany Group reports will appear monthly.

Mammal Survey Group

The group spent the long week-end for the Queen's Birthday, June 10-12, at Mt. Disappointment. This was the third visit by the group to the area. On this occasion the camp was a joint affair with members of the Field Survey Group. There were 12 M.S.G. members present, of whom four also belong to F.S.G. In addition to other F.S.G. members, two M.S.G. visitors and prospective members attended the camp.

Spotlighting on the first night was spoilt by fog and rain, but even though better conditions prevailed on the Sunday results were not particularly good. The only new animal reported for the area was a bobuck possum, *Trichosurus caninus*, spotted on Sunday evening. Six species of native mammal were seen by spotlight, but the numbers sighted were so few no pattern could be discerned in their distribution.

The trapping results were far better. On each of the two nights 80 traps were set, and a total of 81 animals were caught—45 on the first night, and 36 on the second. There were no new species to the area caught in the traps. All the trap lines produced a large number of bush rats, *R. fuscipes*. *Antechinus stuartii* was also prevalent in the area, and one specimen each of *Antechinus swainsonii* and house-mouse, *M. musculus*, were caught. All animals taken in the traps were sexed, weighed, and measured before being returned to the bush.

After the success of weighing and measuring animals at the Mt. Hickey camp in May, the group purchased its own equipment for doing this. It was in use at Mt. Disappointment, and will be at all future camps. The new four-way ball-type trap tags produced by equipment officer D. Barham were in use for the first time at Mt. Disappointment, and proved far easier to spot in the bush than the old flat triangular ones.

The monthly meeting of the group at the Rylah Research Centre, Heidelberg, was attended by 17 members. Seven members presented chance sighting reports. Dr. L. Winsor gave a short talk on the symptoms and precautions to be taken in cases of rat-bite fever—which can be got from bites of either *R. rattus* or *R. fuscipes*. There was discussion on methods of anaesthetising animals caught in the bush to enable them to be handled more readily. Mr. J. Seebeck, of Fisheries and Wildlife Department, gave advice on this, and also on standard methods of measuring animals.

The camp at the beginning of July on the Mornington Peninsula will be reported in next issue. The camp following that, on July 29-30, will be at Siberia, on the Murrindindi River near Siberia Gap. Camp site maps will be available at the group meeting on July 6.

Day Group Report

May—

Despite the inclement weather 19 members attended the Maranoa Gardens, Mt. Fairhall, Leader for the day, gave a brief history of the gardens. They originally grew from a private garden, and over the years enlarged to 3½ acres, and Australian and New Zealand native plants were raised there. The F.N.C.V. have had a hand over the years in the development of the gardens, and Mr. A. Swaby, a well known member of the Club, has taken a leading part.

The Gardens now cover 7 acres and contain 2,500 native plants and trees, most of them named. After lunch the group inspected *Melaleucas*, *Proteas*, *Grevilleas*, *Hakeas*, *Banksias* and numerous other plants which space will not permit listing. The highlight of the Gardens this time of the year is a magnificent bush of *Buckhausia*. This plant belongs to the Protea family and at first sight resembles a Grevillea. It is a tropical flower having banana shaped inflorescences of many creamy flowers, and is the only one of its genus in the world. At the conclusion of the inspection members discussed the various plants seen. At about 3.30 p.m. members left for home and all agreed it had been a most interesting day despite the rain. We would welcome any country members visiting Melbourne to join us if they are free on our outing day.

June—

Despite the heavy fog in the morning 12 members met at the entrance to the Zoological Gardens and were welcomed by Mr. Fairhall.

The sun broke through later in the morning and members took a pleasant stroll through the new Australian Fauna Section. Many native trees and shrubs

have been planted with a view to protecting the well cared for animals and birds living in the natural environment. A lot of work is going on improving the grounds generally, and it is a credit to the authorities.

The Australian parrots are beautifully housed and the birds at the moment are in gorgeous plumage. Lunch was partaken of in the sunshine, after which the Meeting was held. Mr Fairhall told members we hope to visit the Burnley Horticultural Gardens for our outing in July, and Mrs. Strong has written to the Principal to obtain permission to view the various sections there. Mr. and Mrs. Strong will be away in July, but Mr. Fairhall will be in charge of arrangements.

Suggestions for places of interest to visit were asked for by Mr. Fairhall, and Mrs. Strong was able to add some more names to her list. Some of the outings will necessitate the use of cars, and enquiries will be made as to the availability among the members.

Lunch completed, members moved around and inspected various imported birds and animals and the new baby hippopotamus showed himself having a swim in the pool.

As it was nearing 3.30 p.m. members wended their way home after a most enjoyable day. Country members will be very welcome to join us if they are in Melbourne and free, on the third Thursday of the month.

"Overheard in the Bushes"

This, the second article by the Club reporter, will in future, as for this issue, be entitled as above. The title was selected from many suggestions by the Club improvement committee, and originated from the honorary secretary, Mr. R. H. Riordan.

At the June general meeting of the Club it was requested that these reports show the name of the author. So be it. However, as reporters will change, and his or her name is not as important as the article itself, I have adopted the appropriate nom de plume, "Durran Durra", which I understand to be Aboriginal for "messenger".

The back page of the *Victorian Naturalist* is not often read. Please do. You will note that there are some significant changes to the subscription rates. Two new rates have been introduced, one for full-time students and the other for supporting members. The benefits are purely financial, for both the students and the Club. Let us hope, however, that supporting memberships exceed student memberships, or else the Club will be on the losing end financially.

Supporting members receive no more privileges than other members. However, with a smile on their faces and pride in their hearts, they are really supporting the Club which can well do with additional funds.

Not only did I read the back page of the *Victorian Naturalist*, but the front page as well. It states, "Published by the F.N.C.V. in which is incorporated the Microscopical Society of Victoria". This leaves me somewhat at a loss. Why the need to perpetually publish this fact of incorporation? Old pride? After incorporation the M.S.V. became the Microscopical Group.

Whilst on the subject of groups, it was good to see the Mammal Survey Group again contributing to the *Victorian Naturalist* articles other than papers, in particular the calendar of coming survey camps. These calendars should likewise be published by the other groups. It takes very little effort.

Is it really true that the Entomology and Marine Biology Groups have not had a field survey for over one year? And is it also true that they and the Microscopical Group have not published a paper for a long, long time?

If it is true, then some action is urgently needed. How about it?

We also have a Geology Group. Also? Yes! The Council of Adult Education has one. Where do we fail the C.A.E. members? Perhaps they could not get in touch with the Group Secretary. His address, unlike the other Group Secretaries, is not published in the *Victorian Naturalist*. There are probably good reasons for this, and therefore behind his name I would like to see at least "C/- F.N.C.V. Registered Office".

That brings me to another point. The address of the F.N.C.V. registered office is not shown in the *Victorian Naturalist*, either.

Mr. Leigh Winsor, organiser of this year's nature show being held at the Camberwell Civic Centre, 3rd to 5th September, is not very happy with progress. More and better co-operation and participation is needed. With all the trouble Leigh has to go to, as did Mr. Dan McInnes in the past, I ask myself, do we need it?

Council has been approached by an organisation to co-administer a property which the organisation hopes to acquire for parabolic reflector testing. If agreement is reached this would involve the restoration of some 80 to 90 acres of river red gum near Wollert. Such agreement could be mutually beneficial.

Both the newly-formed Field Survey Group and the C.I.C. are seriously looking at field activity co-ordination. A news sheet, or publication of some sort listing all present and future activity details of all affiliates and other bodies interested in natural history, is being sought.

—Durran Durra.

WESTERN VICTORIAN F.N.Cs. ASSOCIATION

Report of individual Clubs for year 1971/72

ARARAT

President: Mr. Stan Kelly. Secretary: Miss Z. Banfield.

Membership 15 adults.

This year a determined effort was made to eradicate as much of the noxious weed boneseed as is possible. With the help of some of the teachers and primary school children a total of over 3,000 plants was pulled. Again this year three trainloads of primary school children (300 children) from Croydon schools were conducted on nature walks in McDonald Park.

BALLARAT

President: Mr. P. Fry. Secretary: Mr. R. Thomas.

Membership 40 *Meetings first Friday in month at School of Mines. Excursions* Sunday after meeting each month.

Interest is being taken in the preservation of local forests and a close eye is being kept on areas marked for pine planting. Guest speakers have covered a wide range of topics, and excursions held to interesting localities including Sherbrooke Forest, Airey's Inlet, Lerderderg River, Mt. Beckworth and Bendigo Whipstick. A "specimen table" introduced at meetings has proved popular. Several members are compiling flora/fauna lists for certain areas and it is hoped these help in the conservation of our environment.

BENDIGO

President: Mr. R. B. Allen. Secretary: Mr. P. Ellis.

Membership 120.

1971 was Bendigo's "Year of the Whipstick". A printed report of this was compiled with the object of pressing for the area to become a Forest Park. Greater

contact was made with Government and local government bodies with mutual improvement in co-operation for both. We joined W.V.F.N.C.A. and have enjoyed the excursions and these have had a bearing on our thoughts and actions. We look forward to 1972 in the W.V.F.N.C.A. and hope to reciprocate with the hosting of a week-end in the future.

COLAC

President: Mr. R. Missen Secretary: Mrs. G. Skinner.

Membership 33 Junior Branch 8 *Excursions* conducted by Mr. Hodges to places of interest in the area.

Diversity has been the keynote in our programme. Travel talks, birds, Victorian native orchids, native freshwater fish, New Guinea, Land Conservation Council of Victoria, opal mining, geology of the Otway coast are topics covered by speakers. Our job as caretakers of Wonga and Barongarook reserves continued. Bird counts at Lake Burrumbete by Monash University are three-monthly and assistance given by members of C.F.N.C. Congratulations to Mrs. L. Wheal on the M.B.E. award. The club lost a foundation member, Mrs W. Denny, late this year.

CRESWICK

President: Mr. S. Williams. Secretary: Mr. H. Barclay.

Membership 30

Club meetings attract almost full membership. Speakers included Mr. J. Clements (F. & W. Dept.)—European carp infestation and eradication, Mr. and Mrs. L. Millar — Mt. Cole survey. Members presented prepared lectures and covered a wide and interesting range of topics. Excursions took place to Porcupine Ridge, Mt. Beckwith, and with the Native Orchid Society to dig up orchids prior to clearing to replant them in a forest reserve. A week-end campout with F.N.C.V. geology group showed us the highlights of the mining era and Mr. E. J. Semmens (a club foundation member) was presented with an Honorary Life Membership.

W.V.F.N.C.A. week-ends have been attended and interest is maintained in the workings of the Association

DONALD

President: Mr. J. Falla. Secretary: Mrs. R. Falla.

The main project has been the Mt. Jeffcott Reserve. Members have forwarded pressed plant specimens to the Melbourne Herbarium for identification. Five different orchids have been found. Mr. J. Proctor spoke on the plants of St. Arnaud and led an excursion to the St. Arnaud hills in October.

GEELONG

President: Mr. J. Wheeler. Secretary: Mr. G. McCarthy.

Membership 467

April saw 10th Birthday celebrations and a get-together of old and new members. This month, too, we played host to a W.V.F.N.C.A. week-end. An S.G.A.P. nature show in spring was very successful—2,548 people visited. The Otway Survey Group have conducted six campouts. One also to Steiglitz in the Brisbane Ranges. A mutton bird banding week-end was spent at Port Fairy. Another enjoyable week-end was spent at Labertouche. Monthly meetings and excursions were well attended. The Club has been active in conservation projects, principally Mt. Cole and the Otways. A busy year is planned for 1972 and we hope to see the fruitful outcome of some of our projects.

HAMILTON

No report.

HORSHAM

President: Mr. C. Kroker. Secretary: Miss S. Robertson.

Membership 47 *Meetings fourth Thursday Horsham Technical School*

The Club again conducted an essay competition in the primary schools. We played host to W.V.F.N.C.A. in October, 1970. Excursions took place to Toolando Aboriginal Fish Traps, Dergholm, Laharum Cave, proposed Mt. Zero Reserve. Speakers included Mr. N. Wakefield "Marsupial Evolution", Mrs N. Cross "A Field Nat's Wandering around Australia", Mr. L. Jones "National Parks in U.S.A.", Mr. I. Smith "Work of the Forestry Commission in the Grampians", Mrs. Kroker "Noumea, New Hebrides, Fiji", taped commentary by Mrs. W. Pearce "Geological Features seen on a World Tour", Mr. A. West "Aboriginal Sites of Victoria", Mr. E. Barber "Aspects of Field Naturalist Interest in the Portland District". A function arranged by the Wimmera National Council of Women to which we are affiliated saw funds go to the biological survey of Western Port.

MARYBOROUGH

President: Rev. E. Deutscher. Secretary: Mrs. L. Courtney.

Membership 66 adults and 10 juniors *Meetings first Monday.*

The most pleasing aspect to report is the growing membership. Meetings, for which we have been fortunate in procuring good speakers, and excursions were well attended. Negotiations to have the Dalyenong leasehold declared a wildflower reserve are nearly complete. Once again a natural history display was held during the Golden Wattle Festival.

MID-MURRAY

President: Mrs. A. Fisher Secretary: Miss G. Willoughby.

Membership 43 adults, 7 juniors *Meetings third Friday, Wood Wood.*

Speakers at meetings included Mr. T. Henshall, Mr. F. J. C. Rogers, Mr. J. H. Willis, Dr. I. Stone, Mr. Tom Lowe, Mrs. P. Salau. A Club campout was held at Annuello. Two members, Mr. A. Fisher and Mrs. N. Macfarlane, are president and secretary respectively of W.V.F.N.C.A. for the second year.

A small area at Boundary Bend is now a Flora Sanctuary. Two Special Purpose Reserves have been declared near and at the Wakool Junction. We hope soon to be able to report the purchase of 4,000 acres of mallee country (Wandown Faunal Reserve) principally as a mallee fowl refuge. Two members are still compiling a herbarium for the Club.

PORTLAND

President: Mr. G. Baker Secretary: Miss J. Collishaw.

Membership 35 *Meetings second Friday, Town Hall.*

Guest speakers at meetings were Mr. B. Hardy "Sea Shells of Portland Area", Mrs. Woolcock "Orchids of W.A.", Miss L. Watson "The Mammals of Australia", Mr. P. Roach "Balance in Nature", Mr. R. Pickard "Gemstones", Mr. C. Aslin "The Bent Wing Bat", Miss H. Aston "From Gibbers to Greenery", Mr. G. Raynor and Mr. N. Young "Bird Banding and Observation", Miss Poole "Orchids of Victoria" and Mr. J. Taylor "Land Conservation Council". Members give five-minute lectures on a variety of topics.

Excursions were to Mt. Richmond, Mt. Clay, north bank of the Glenelg River, Casterton and Dergholm areas. Our member, Mr. Cliff Beuglehole, won the Natural History Medallion for this year.

ROBINVALE

President: Mrs. K. Grose. Secretary: Mrs. L. J. Arnott.

Membership is small and excursions are the main activity. These included ones to Lake Benance, Tammit Station and the Wandown area.

STAWELL

President: Mr. I. McCann. Secretary: Mr. N. Bennett.

Membership 22 adults and 5 juniors. *Meetings fourth Monday, Stawell Technical School. Excursions* one full and one half day per month.

The Club has continued to be active in supporting conservation projects. Club members supported efforts to have the Deep Lead School Site of 4 acres reserved as an Endowment Plantation to be used for an arboretum. Once again slide nights at Halls Gap over Christmas were conducted, and we are to host Photoflora in March.

SUNRAYSIA

No report.

(Remainder will appear next month)

NEW CONSERVATION SOCIETY

The Lysterfield Conservation Society has recently been formed, primarily to oppose proposals to use 114 acres of the Lysterfield Catchment area for quarrying.

Further details are obtainable from the Secretary—

Mr. A. Hill,
Lot 24, Major Rd.
Lysterfield 3156

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 Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1971-1972.

President:

Mr. T. SAULT

Vice-President: Mr. B. COOPER

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 Road, East Malvern, 3145

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

Hon. Librarian: Mr. P. KELLY, c/o National Herbarium. The Domain, South Yarra 3141.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161. (52 2749).

Magazine Sales Officer: Mr. B. FUHRER, 25 Sunhill Av., North Ringwood, 3134.

Group Secretaries:

Botany: Mr. J. A. BAINES, 45 Eastgate Street, Oakleigh 3166 (57 6206).

Day Group: Mrs. J. STRONG, 1160 Dandenong Road, 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: Mr. B. J. COOPER, 37 Bath Road, Burwood 3125. (29 7379)

Geology: Mr. T. SAULT.

Mammal Survey: Mr. G. F. DOUGLAS, "Knotanoll", Riddell's Creek 3431 (054-285191)

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 1972.

Ordinary Members	$7.00
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The cost of individual copies of the Vict. Nat. will be 45 cents (52 cents — overseas requests).

Full-time Students between 18 and 21 years pay at Junior Member rates.

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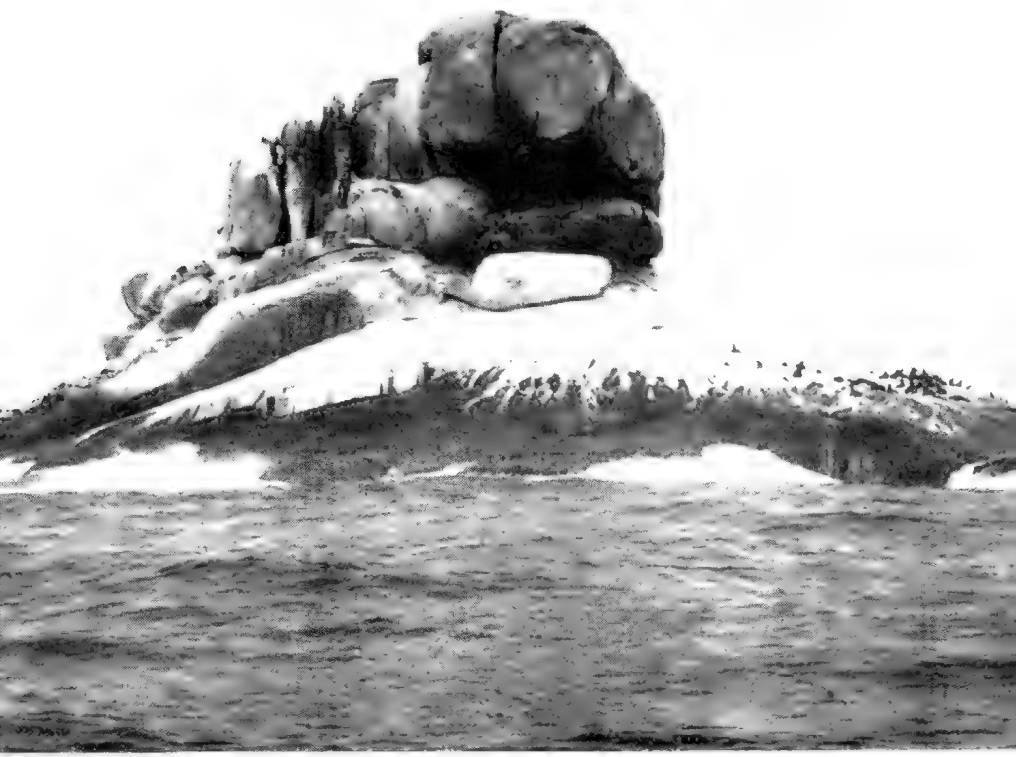

F.N.C.V.

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

GENERAL MEETINGS

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

1. Subject for evening —"Trees of Northern Australia": Dr. Alan Parkin.
2. New Members:

(July)

Ordinary:
Mr. Alan Crocombe, 9 Boongarry Ave., Blackburn 3130.
Miss Joan M. Dixon, National Museum of Vic., Russell St., Melbourne 3000.
Miss G. D. Riddiford, 88 Guildford Rd., Surrey Hills 3127.
Mrs. Sheila Houghton, 4 Lorna St., Cheltenham 3192.
Miss Monica Ward, 12 Loller St., Brighton 3186.

Country:
Mr. Robert G. Taaffe, 11 Boston Ave., Lockleys, Adelaide, S.A. 5032

Junior:
Simon E. Townsend, 13 Parkstone Ave., Pascoe Vale South 3044.

(August)

Ordinary:
Mr. Rodney G. Sullivan, 111 Asling St., Gardenvale 3185.

Joint:
Mr. Geoffrey A. Comber }
Mrs. Laurice A. Comber } 3 Cash Gve., East Oakleigh 3166

Country:
Mr. Robert C. Andrews, 8 The Angles, Yallourn 3838.
Mr. Paul Kelly, Research Station, Rutherglen 3685.

GROUP MEETINGS

Thursday, 17 August — Day Group. Cheltenham Park. Meet 11.30 a.m. at entrance 50 yards west of Cheltenham Railway Station. Bring your own lunch.

Thursday, 24 August — Field Survey Group meeting. "Botanical Survey Techniques" and briefing for Gembrook survey camp.

Monday, 4 September — Marine Biology and Entomology Group meeting in Conference Room, National Museum, at 8 p.m.

Wednesday, 6 September — Geology Group meeting.

Thursday, 7 September — Mammal Survey Group meeting in Arthur Rylah Institute, 123 Brown St., Heidelberg, at 8 p.m.

Thursday, September 14: Ian Cameron: 'Some Aspects of the Native Flora of New Zealand'.

JUNIOR MEETINGS

Friday, 25 August — Hawthorn Town Hall, at 8 p.m.

Friday, 1 September — Preston Rechabite Hall, 281 High St., at 8 p.m.

Friday, 8 September — Montmorency and District, Scout Hall, Petrie Park, at 8 p.m.

F.N.C.V. EXCURSIONS

Survey Camps — 12-13 August, 1972. Cape Liptrap - Waratah Bay Area.
9-10 September, 1972, Mortimer Park, Gembrook.
Further details and map available from Secretary of F.S.G.

Sunday, 13 August — Geology Group Excursion to Bacchus Marsh area. Leader Mr. Stan Rowe. Meeting place, Flinders St., opposite C.T.A. Building, 9.30 a.m.

Sunday, 20 August — Geelong area. Subject: Fossils. This excursion will be led by Mr. K. Bell of the National Museum of Victoria who gave the recent introductory talk on Fossils. The coach will leave Batman Avenue at 9.30 a.m., Fare $1.80. Bring one meal and a snack. Members travelling by private car can meet near comfort station behind Geelong Town Hall.

Sunday, 27 August - Saturday, 3 September — Stawell. This excursion will be led by the Stawell F.N.C. and the programme includes visits to Heatherlie Quarry and Warrenmang Slate Quarry, Mt. Zero, Wonderland, Deep Lead, Iron Bark Ranges, Fyans Creek, Wannon Valley and Jimmys Creek. Accommodation has been booked at the London Motel at $4.70 per person, **room only.** Coach fare of $20 should be paid to the Excursion Secretary by the August General Meeting. Cheques to be made out to Excursion Trust. The coach will leave from Flinders Street near Gas and Fuel Corporation at 9 a.m. Bring picnic lunch.

6-27 January — New Zealand. There are still some vacancies on this excursion. The itinerary was published in the June *Naturalist* and the excursion secretary would like all bookings confirmed as soon as possible.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 8 9 August, 1972

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Front Cover:

Wright Rock from the north. Note the seal colony on the right. (See pp. 212.)

photo: S. Murray-Smith

Craggy Island, Bass Strait

by M. A. Marginson and S. Murray-Smith*

The 'Bassian Isthmus' is a chain of islands, formerly mountain tops and plateaux, which runs across Bass Strait from Wilson's Promontory to the north-east corner of Tasmania. A light aircraft flies out from the Promontory, over the shell-backed Hogans, then across to the Kent Group some twenty miles south-east, and from the Kent Group to Flinders Island and so down through the Furneaux Group and across Banks Strait to Tasmania. This, too, is the presumed migration route of the Tasmanian Aboriginals.

The largest gap in the chain, and one which has caused some perturbation to the cross-Strait canoeists who have recently been seeking new ways of self-immolation, is between the Kent Group and the northern end of Flinders Island. This is a gap of some thirty miles of open sea, broken only by three small but—for the early mariners in particular — dangerous obstacles: Wright Rock, Endeavour Reef and Craggy Island. Inshore of Craggy Island, but set to the eastward, are two larger islands, the Sisters, which lie off the north-east point of Flinders Island.

From the thousand-foot elevation of the lighthouse on Deal Island, the main island of the Kent Group, we have often seen the dramatic granite tors of Craggy Island gleaming through the haze, and an additional enticement has been the prominent white horn of Wright Rock, often mistaken in olden times for a sloop in sail, which lies on the line between the Kent Group and Craggy Island.

On the morning of 6 January 1971 we set off from West Cove in the Kent Group in the well-known 48-foot lighthouse supply vessel *Marjorie Phyllis*, skippered by our old friend and colleague in many Bass Strait trips, Frank Goold. As we steamed out of Murray Pass and turned south-eastwards we met a long and strong north-easterly swell: no white water but quite enough roll to make us all hang on tight and some of us reach for our travel tablets.

We set course direct for Wright Rock, some twelve miles from the Kent Group and two-thirds of the way to Craggy Island, our plan being to turn back at this point if the nature of the sea and the weather made it seem pointless to proceed to Craggy. Gradually Wright Rock (124 feet) rose up out of the sea on our starboard bow, and as we came closer we saw that it consisted of an immense granite pinnacle rising out of massive foundations, steep-to on the north-east side, along which we were to pass, but running out to the south-west, for hundreds of yards, in as nasty a mess of concealed reefs and boiling water as we had seen. Frank told us nonchalantly that, in his fishing days, he used to trail his shark-lines out over those reefs as he fished round the rock. The *Sailing directions* speak of tide races, irregular depths

*Both of the University of Melbourne. We wish to thank Mr. Brian Stackhouse, of Flinders Island; Mr. and Mrs. Fred Armstrong, of Deal Island; Mr. Frank Goold, of Port Albert; and Mr. Jim Willis and Mr. Rex Filson, of the National Herbarium, Melbourne, for the identifications which accompany this article.

Previous articles in this series are: "First Footing on a Bass Strait Island: An investigation of Dover Island in the Kent Group" (*Vic. Nat.* 84 (8), August 1967); "Further Investigations in the Kent Group" (*Vic. Nat.* 86 (9), September 1969); and "South West Island, and other investigations in the Kent Group" (with Jack Jones) (*Vic. Nat.* 87 (12), December 1970).

Miss Joyce Wood, of the University of Melbourne, very kindly drew the maps both for this article and for the last-mentioned article above.

and short seas, and succinctly comment: "If there is any swell at all, even in fine weather, the place should be given a wide berth".[3]

Matthew Flinders discovered Wright Rock in the final stages of his voyage round Australia in the *Investigator*, on 31 May 1803. Returning to Port Jackson from Timor, with a ship going to pieces under him and eighteen men of his small crew sick below (several "almost without hope"), he had experience of passing the rock at eleven o'clock at night, close enough "to hear the growling of the seals".[1] The earliest reference to the actual name that we have seen is in the log of the survey ship *Beagle* for 1842 ("Wright's Rocks").[2] (This too is the earliest reference we know for the name "Craggy Island".) And as we ourselves lay hove to and rolling horribly in what seemed to all of us (except Frank Goold) quite alarmingly close proximity to the great explosions of surf over the base of the rock, trying to organise one hand for ourselves and one for our cameras, we saw Flinders' colony of seals taking their pleasure at the same place on the rock, no doubt, that they did in his day.

There were about forty seals on the north face of the rock, and more in the water: about four patriarchal wigs, with their clapmatches and the youngsters grouped around them. High up on the north side of the rock, sheltered from the prevailing winds by a slight overhang at the peak, we observed a patch of succulent plants with pink flowers. Through binoculars the patch appeared to be entirely composed of the Rounded Noon-flower (*Disphyma blackii*, previously *D. australe*); the size of the patch was difficult to estimate, but was probably about twenty feet square—not extensive compared with the area of Wright Rock itself, but a fine example of the tenacity of this plant under most rigorous conditions.

By now it was clear that the sea was behaving reasonably, that the weather was holding, and that a landing on Craggy might be feasible, so we pressed on. A new point of interest soon came abeam, this time on the port side: the long, ominous line of Endeavour Reef, with Beagle Rock standing out some three miles on the Craggy side of the reef.

Endeavour Reef, which is about two and a half miles from Wright Rock, was discovered in 1817 by Captain Hammant of the *Endeavour* brig. As Hammant rather graphically put it, he "saw a reef with two small rocks on it, visible at the rebound of the sea . . . directly in the track recommended by some navigators for passing through the Strait."[4] As far as one could judge from a small ship giving the reef a reasonable berth, it consists of a considerable area, perhaps hundreds of acres in extent, of barely-covered rock: a horrible place to come to grief, but perhaps a fascinating place to explore in a dead-low tide and a dead-calm sea, if you could ever find anyone silly enough to take you near it. Beagle Rock, which is just awash at high water (but was clearly visible as we passed), was charted by Lort Stokes in his famous *Beagle* expedition in 1842.[5]

Craggy Island

We had had plenty of warnings not to attempt a landing on Craggy Island. Bass Strait folk-lore, which is no more reliable than any other sort of folklore even though it has to be taken into account, had it that a landing on its toothed rocks could only be safely achieved on a very few days in the year. As we sailed from the Kent Group a fisherman who had just returned from potting around Craggy warned us that the swell would be unmanageable and that landing from our

dinghy would be out of the question. Frank Goold, in his usual imperturbable way, agreed that we might as well go and have a look.

As the island got closer it began to appear more likely that we might be able to use our twelve-foot aluminium dinghy, which had been impatiently yawing from side to side, on the end of its painter, all the way from the Kent Group. The north-west end of the island, with its deeply indented and eroded mini-coves and rock platforms, appeared to offer the only practicable landing place, and fortunately the combination of easterly swell and low tide gave us a good chance here. The *Marjorie* hove to a few hundred yards from the shore, and our nine horse-power outboard was screwed onto the dinghy. The advance party of our group of eight soon managed to find a protected rock shelf on which it was possible to jump ashore, despite a slight wash. Although probably the easiest landing we had made on a Bass Strait island, it was clear to us that, but for

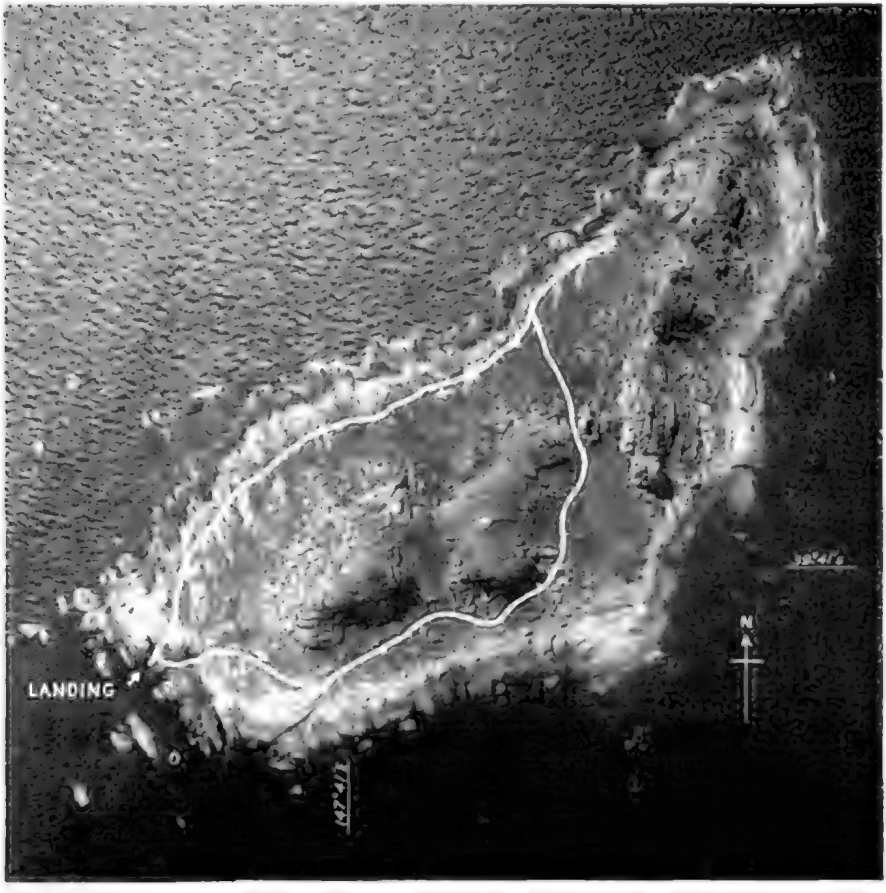

Plate 1. Craggy Island from the air. The route of the main party is indicated.

the flat sea and the easterly nature of the swell, a landing on Craggy would have been much more difficult.

Craggy Island, Lat. 39° 41′, Long. 147° 41′, and perhaps two-thirds of a mile long and a third of a mile wide, has its modest place in history. It is easily visible from Flinders Island and was certainly well known to the itinerant sealers—many of them escaped or time-expired convicts—who roamed the Straits in the first half of last century, and who named the island "The Stacks".

French explorers named Craggy "La Brioche" (actually a kind of bun or bread roll, made of two lumps of dough, the smaller surmounting the bigger).[6] Whether or not the island in those days supported a sizable seal population is impossible to say, but it certainly appears probable enough. George Augustus Robinson, the 'Protector', tells of the sealer John Day, with two of his mates (all resident on Deal Island), being wrecked on Craggy Island in February 1831. They had been on a stores trip to Launces-

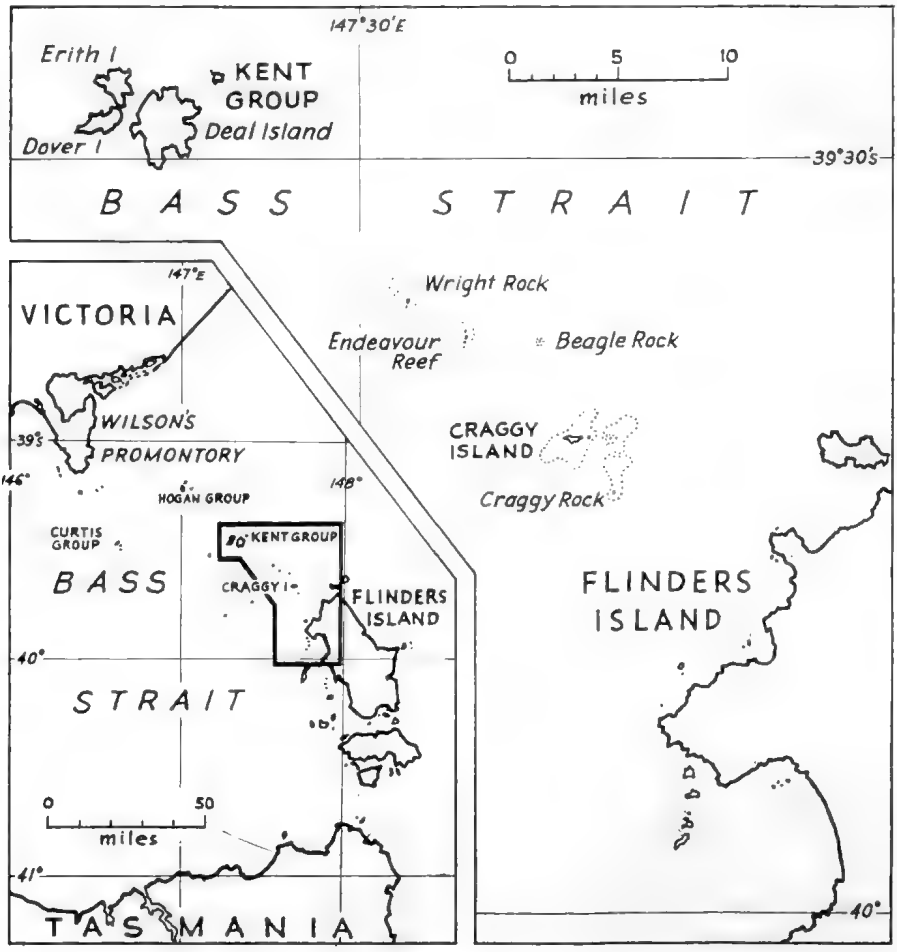

Figure 1.

Plate 2.

The landing spot on Craggy Island, showing eroded rocks characteristic of the island.

photo: S. Murray-Smith

ton, and were cast away on their return voyage to the Kent Group, being rescued after making smoke.[7] A visitor to the Furneaux Group in the 1880s reported that "The half-castes still go sealing in the season to some of the small rocky islets off Clark Island and Craggy Island, known as the 'Stacks'."[8] In 1891 D. Le Souef reported that Craggy was a breeding ground for seals; however, we saw none there.[9] Craggy has in all probability never been inhabited, though we have been told that Flinders Island farmers have attempted to run sheep there in the past[10]; certainly we saw no signs of a building. There has been some shakily-based gossip of pirate loot on Craggy (the celebrated case of William Campbell and the *San Francisco*, in 1805[11]), but, though we looked hard, we found nary a doubloon.

To anyone who observes Craggy Island from abeam, it is obvious why the sealers called it "The Stacks". Essentially the island consists of four great eroded granite towers, descending in height from the west to the east, linked by saddles and skirted by a talus of fallen rock and granite gravel. From the feet of the towers a glacis of vegetation sweeps down to the littoral zone and then to a spectacular tidal zone of water-smoothed granite slipping into the sea, set off by

Plate 3.

Cape Barren Geese taking off above a typical stretch of Craggy Island coastline.

photo: S. Murray-Smith

eroded, free-standing monoliths along the water's edge. One member of our party summed up the geological 'feel' of Craggy Island by calling it a "crumbly" island; certainly we all recognised a venerable character about the stone.

For, although all the Bass Strait islands are beautiful in their own ways, there is a special feeling to Craggy that we sensed within minutes of landing—a feeling compounded of that sense of 'age' we have just referred to, of its isolation, its solitude (this is apparently the first report ever written on the island), the Wagnerian backdrop of the 'stacks' themselves, weirdly sculpted and imposing as you stand beneath them, the magnificent panorama southwards to the long north coast of Flinders Island, some twelve miles away, and of its sounds, smells and colours, subtly different to those of other islands we are familiar with. And here, in particular, we will not forget the characteristic sound of Craggy Island—the mewing of the Pacific gulls whose domain the island was. We saw no silver gulls at all, which was again a new experience for us.

Our most immediate surprise, however, was the nature of the rocky point on which we had landed. Immediately behind the granite outliers and protectors of the little cove we motored into lay an extraordinary tidal zone: a series of wave-cut rock platforms, prolific in marine life, deeply dissected and tessellated; needing some careful high-stepping to avoid cuts and scratches, but capable of providing many days of happy hunting to the marine biologist. The floor of these platforms was scooped out in sharp-edged, scallop-like, shallow cavities, the origins of which would be interesting to learn. Certainly we have seen nothing like them elsewhere.

The party assembled above high-water mark, changed into scrub-bashing clothes, cached its beer and surplus belongings and, splitting into several groups, set off to explore the island.*

After leaving the tidal platform the main party (from now on 'we') entered a prolific and rank growth of the Coast Saltbush (*Atriplex cinerea*), growing over penguin runs and a friable and collapsible soil. Here and there in this dense and vigorous growth we found small patches of the Bower Spinach (*Tetragonia implexicoma*) and of the Rounded Noonflower (*Disphyma blackii*), with some Sea Celery (*Apium prostratum*), Variable Groundsel (*Senecio lautus*—the cut-leaf form, *dissectifolius*, which appears to be in synonymy with *S. capillifolius*) and the Beaded Glasswort (*Salicornia quinqueflora*).

At about the forty-foot level we came on a zone of mixed vegetation, which contained all those species mentioned above, as well as the Seaberry Saltbush (*Rhagodia baccata*), Bulbine Lily (*Bulbine bulbosa*) and a white-flowered hollyhock, subsequently identified as a *Lavatera plebeia*, the Native Hollyhock. Slightly higher, at 50-60 feet, we encountered the Karkalla or Angled Noonflower (*Carpobrotus rossii*), Blue Tussock-grass (*Poa poiformis*) and the Tall Daisy (*Brachycome diversifolia*, var. *maritima*).

At the edge of the relatively flat littoral area there was a sudden cessation of the saltbush, its dominant

*The route of the main party is indicated on the accompanying map. This party was concerned with an attempt to investigate the principal areas of vegetation by means of a circular tour. Other parties ascended the two westernmost stacks, and entered a large open-mouthed cave on the side of the main peak. On this peak (371 feet) a round bronze plaque was found, cemented to the base of a small cairn, and reading:

HYDROGRAPHIC BRANCH
TRIANGULATION STATION
1945
R. A. N.

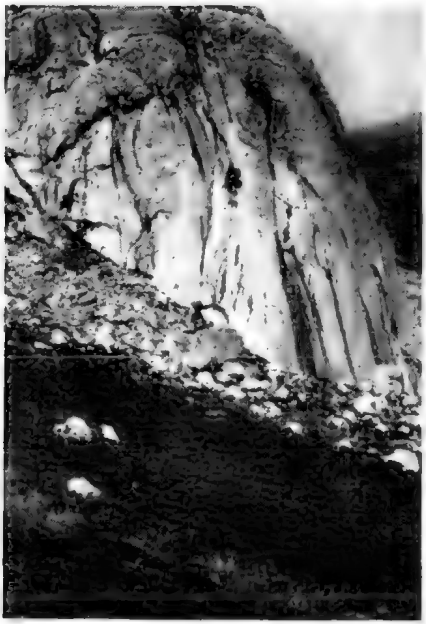

Plate 4.
Coated with yellow lichen, Craggy Island's third 'stack' here stands as a background for a dense colony of Variable Groundsel.
photo: S. Murray-Smith

place being taken by the Variable Groundsel, interspersed with Bower Spinach. Our general impression was that this type of vegetation continued up the slopes of the first 'stack', which was now before us. This impression was not contradicted when we later examined plants brought back from the 'heights' by the other two parties.

Bearing now around the south of the island, we came to a small saddle, and noted here that the *Poa* became dominant. The extensive patches of this grass were characterized by their fine stems and marked blueish appearance: the most pronounced tints we have seen in this grass—in the islands we have visited the 'Blue' Tussock-grass is rarely blue. Another feature of this grass was the squashed nature of the individual tussocks. We did not have to look far for the explanation, for there was plentiful evidence of the presence of the Cape Barren Goose, and we disturbed about half a dozen individuals as we crested the rise.

From this point, looking eastwards, the vista was dominated by the massive eroded granite stacks of the island's backbone. These tors are heavily encrusted with lime-green lichens (*Caloplaca* sp. (undescribed)), our attention being drawn especially to a strikingly-eroded pinnacle outlier of the second highest stack. From this point the island's stacks can be seen sweeping down to the sea, allowing a vegetation zone averaging some three hundred feet in breadth before reaching massive wind-eroded slabs of granite, covered with black and brilliant-yellow lichens. Beyond these smooth, lichen-encrusted slabs there came the water-eroded tidal zone.

Plate 5.
A dramatic pinnacle standing out from Craggy Island's second-highest 'stack'.
photo: S. Murray-Smith

much as we had seen it at the landing point, and then the sea itself.

We continued skirting the southern bastions of the two westernmost stacks, and noted for the first time, at the height of about a hundred feet, the Austral Stonecrop (*Crassula sieberana*), in small patches on the exposed rock surfaces. Somewhat further on, below the second stack, and at a height of a hundred to 150 feet, we found a large colony of the Native Hollyhock, all of a hundred feet by ten feet in dimensions.

We now traversed up the slope towards the saddle between the second and third stack (counting from the west), with the object of switching to the north side of the island and making our way back to our landing place. On the way we had a fine view of the north side of Flinders Island, from Cape Frankland to the Sisters Islands. As we climbed well up into this second re-entrant we found ourselves over-viewing a great domain, many acres in extent, of the Variable Groundsel. These lush green bushes had taken complete charge of the whole valley below us, stretching from the island's divide down almost to the high tide mark before being replaced by low-flying succulents such as the Bower Spinach and the Noonflower.

We were now between the Groundsel domain and the foot of the decaying granite. The friable nature of the soil, mixed as it was with numerous fragments of flaked rock, made walking difficult, and almost invariably we followed the penguin runs. As we entered the saddle from the southern side the Groundsel ceased abruptly, and was replaced by a pure stand of Native Hollyhock. Immediately beyond the saddle, and again with striking abruptness, the Hollyhock was replaced by a large, thick-stemmed and woody thicket of Cape Leeuwin Wattle (*Albizia lophantha*), growing to six feet, by far the biggest plants we had seen on the island, and obviously of considerable age.

For us, in these eastern Bass Strait islands, this was a new botanical experience: traversing, within a few hundred yards, three quite distinct and well-established domains. Crossing the ridge of Craggy Island and suddenly finding the little forest of Cape Wattles made us aware of a real divide, and of the remarkable difference the marginally more hospitable northern slopes of the island had made to the vegetation. It was a case of 'over the ridge and out of the wind', with the difference (to us) that here on Craggy more benign conditions had nurtured different species, whereas on islands like Dover Island (in the Kent Group) the same conditions tended to give rise simply to a more lush growth of existing vegetation.

We struggled through the Cape Wattles some distance down the northern slope of the island, and after some fifty yards found the Native Hollyhock invading this otherwise pure stand. Finally the Wattle disappeared entirely, and the dominant vegetation, from half-way down the slope almost to its foot, comprised Native Hollyhock and a lushly growing form of the Seaberry Saltbush, the latter gradually becoming more prevalent. However, at about 75 feet, the Seaberry Saltbush ceased, and was succeeded by Coast Saltbush, still interspersed with Native Hollyhock. The final stage in the succession came about when the place of the Native Hollyhock was taken by the Variable Groundsel, about fifty feet above high water mark.

Descending to the rocks immediately above the tidal zone we worked our way some distance east, towards the north-east point of the island. Time being short, and the vegetation showing no new features, we turned back along the rocks of the littoral zone,

Plate 6.
On the north side of Craggy Island a member of the party negotiates a flourishing stand of Native Hollyhock. In the background is a colony of the Cape Leeuwin Wattle, and the central of the island's three saddles.
photo: S. Murray-Smith

making for our landing point. There were new delights on this milder northern shore of the island. We were fascinated by a series of rock pools, stained by some unknown agent to a mahogany-red colour. The life generally in this littoral zone was prolific, and we saw many species of algae and some large crabs. We also surprised a large, immature bird, over two feet long and with brown and white mottled feathers, and a large, black, hooked beak, sheltering in a rock declivity. This has subsequently been identified as a young Pacific Gull (*Larus pacificus*).

Another pleasure of our journey back along the rocks was to see the uninhibited way in which many plant varieties, already familiar to us from the Kent Group, were here co-existing in small communities in the rock crevices. For instance, we saw mixed communities of the Bulbine Lily (flowering prolifically), Angled Noonflower, Bower Spinach, Variable Groundsel, Shore Spleenwort (*Asplenium obtusatum*), and *Poa*, within a relatively small compass of a few square yards, and all obviously happy in their close association. In addition, we collected in these miniature gardens two small succulents: the Coast Sand-spurrey (*Spergularia media*) and the deliciously-named Glaucous (or Pale) Goose-foot (*Chenopodium glaucum*) with its tiny lilac flowers. Surrounding these little bowers, orange and yellow lichens made vivid splashes of colour on the rocks.

Plate 7.
One of Craggy Island's natural 'gardens', with a number of plant species growing in unusually close association.
photo: S. Murray-Smith

Rounding the west point of the island, and approaching our landing stage, we returned to the harsher *milieu* of the weather side, wading through the dense cover of Coast Saltbush to return to our landing place. Here we re-embarked without incident. The chief pleasure of our homeward run was to see the play of evening light around the cliffs and crags of Deal Island as we made for the south end of Murray Pass and our home haven of West Cove.

* * * *

To the passer-by in the ocean liner or fishing vessel, as indeed to the explorers of long ago, the Bass Strait islands appear from a distance as 'much of a muchness'. Our experience, limited though it has been, is that intimate contact with these islands makes one aware of how different they are one from the other, and what infinite pleasures and profit must emerge as they are studied, as they progressively will be, in greater depth. Our brief reconnoitre of Craggy Island, for instance, introduced us to the Pacific Gull hegemony, to the stands of the Cape Leeuwin Wattle (which, our other parties informed us, grows almost to the top of the island's main peak), to the eroded rock structure of the island, and to the peculiar nature of the plant domains; with the larger plants, often highly specific and differentiated; with the smaller plants, often cosily intermingled. All of these experiences were new to us. And even plants well known to us took a puzzlingly different form here. The Seaberry Saltbush, for instance, included a small-leafed form which was almost unrecognisable as *Rhagodia* (though we had seen similar on South West Island), while the Rounded Noon-flower we saw on Craggy Island had characteristically small leaves which moved us to want to christen it "var. *minima*".

We are no experts in bird observing and no doubt a number of pelagic species we did not see are present on the island. We have mentioned the Cape Barren Geese and the Pacific Gulls; as well there were a number of Sooty Oyster Catchers, cormorants were observed near our landing point, about twelve albatross were seen on the way to Craggy Island, and the island itself was of course well colonised by penguins. Mutton-birds were also presumably in occupation. We also saw several quail, with their characteristic whirring noise, a pair of hawk-like birds over the main peak, and several birds of a starling or blackbird type.

Lizards were prolific on the island, and we were particularly struck by the number of tiny turrets of spider (?) holes we saw, protruding a quarter to half an inch above the surface of the ground.

photo:
Julie Marginson

Plate 8
Mycenastrum corium — (see final footnote). **At Left:** the fruiting body from underneath, with an indication of size. **At right:** the fruiting body from above.

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APPENDIX

Plants collected on Craggy Island

Coast Saltbush	*Atriplex cinerea*
Bower Spinach	*Tetragonia implexicoma*
Rounded Noon-flower	*Disphyma Blackii* (formerly *D. australe*)
Sea Celery	*Apium prostratum*
Variable Groundsel	*Senecio lautus* var. *dissectifolius*
Beaded Glasswort	*Salicornia quinqueflora*
Seaberry Saltbush	*Rhagodia baccata*
Bulbine Lily	*Bulbine bulbosa*
Native Hollyhock	*Lavatera plebeia*
Angled Noon-flower	*Carpobrotus Rossii*
Blue Tussock-grass	*Poa poiformis*
Tall Daisy	*Brachycome diversifolia* var. *maritima*
Austral Stonecrop	*Crassula sieberana*
Cape Leeuwin Wattle	*Albizia lophantha*
Shore Spleenwort	*Asplenium obtusatum*
Coast Sand-spurrey	*Spergularia media*
Glaucous Goose-foot	*Chenopodium glaucum*

Lichens collected comprised *Xanthoria ectanea* (Ach.) Ras. ex. R. Filson; *Teloschistes spinosus* (Hook f. & Tayl.) J. Murray; *Anaptychia pseudospeciosa* f. *tremulans* (Müll. Arg.) Kurokawa; *Lecanora* aff. *sulphurea* (undescribed), and the widespread *Caloplaca sp.* (undescribed).

The following correction to a previous article (with Jack Jones), published in the *Victorian Naturalist* for December 1970, should be noted:

Mr. J. H. Willis informs us that the mentions we make (p. 349 ff.) of the Tree Hollyhock (*Lavatera arborea*) on South West Island are incorrect. The revised identification of this plant is that of a lilac-flowered and woolly variety of the Native Hollyhock, i.e. *L. plebeia*, var. *tomentosa*. This is an important distinction to us, as *L. arborea* is an introduced plant, and we were at a loss to account for its well-established presence on remote South West Island.

We should also like to report our collection of an unusual, brown, tough fungal growth on Erith Island during the summer of 1970-71. Gathered on the northern slopes of the Vale of Erith, on the track from West Cove to Deepwater Cove, this has been identified as *Mycenastrum corium*, the Leather Puffball. Typically, a plant of arid mallee country, it is unusual in such an environment. Our specimen measured about eight inches across the 'dome'.

In our article "Further Investigations in the Kent Group" in the *Victorian Naturalist* for September 1969, we reported the Tree Broom-heath (*Monotoca elliptica*) as new to Dover Island. In fact this plant was reported on Dover Island by Colin Garreau, in the *Victorian Naturalist* for December 1958 (p. 129).

Further Notes on Kent Group Birds

by JACK JONES

This contribution is an addition to the article published in the *Victorian Naturalist* 1970 (1) on birds of the Kent Group of Bass Strait islands. It has been compiled from information published and personal communications received since then. It names new species, confirmed species and disputed species; and provides brief comment on occurrence of land species in the Group.

SPECIES RECORD

All of the species named below as new or confirmed, except White Egret, Azure Kingfisher and Striated Pardalote, are records of J. S. Whinray, made during one or both of two visits of a month each in November/December 1970 (2) and 1971 (3). The White Egret and Azure Kingfisher are very old records, published 1855 (4), of specimens shot by Mr. Belbin at Kent's Group, Bass Strait. The Striated Pardalote was identified by L. Abbott (Dept. of Zoology, Monash University) at a two-week's visit to Deal Island in March/April 1971 (5) concerned with occurrence of birds in the eucalypt forest and scrub.

North-east Island was included on Whinray's 1971 visit. New records made there by him were Black Cormorant (confirming the species for the Kent Group) and Blackbird, *Turdus merula*, one bird of each species, and a tentative record of the Nankeen Kestrel, *Falco cenchroides*, one bird.

New Species

Species not previously named in published records known to me for the Kent Group are —

Caspian Tern, *Hydroprogne caspia*
Banded Plover, *Zonifer tricolor*
Australian Snipe, *Gallinago hardwickii*
White Egret, *Egretta alba*
Azure Kingfisher, *Alcyone azurea*
Spine-tailed Swift, *Hirundapus caudacutus*
Skylark, *Alauda arvensis*

Confirmed Species

Species now recorded for which published records were not positive or for which non-published records known to me were tentative are —

Black Cormorant, *Phalacrocorax carbo*
Australian Gannet, *Sula surrator*
Green Rosella, *Platycercus caledonicus*
Horsfield Bronze-Cuckoo, *Chalcites basalis*
Black-faced Cuckoo-Shrike, *Coracina novae-hollandiae*
Striated Pardalote, *Pardalotus striatus*
White-naped Honeyeater, *Melithreptus lunatus*

Each of the series confirmed above was named as a Kent Group species in the Le Souëf/Campbell articles (6) reporting their 1890 visit, but other than for the White-naped Honeyeater the reporting was in a manner causing doubt as to whether or not the species was actually seen (an aspect mentioned in the 1970 article). A specimen of the Honeyeater was collected at the 1890 visit (the location of the skin appears to be unknown), but the record remained in dispute.

Disputed Species

The White-naped Honeyeater was seen by Whinray at close range during his 1970 visit, his description matching National Museum skins. He saw it again during the 1971 visit. Abbott, who knows the species well in its occurrence in Victoria, saw it on Deal Island during his 1971 visit.

Abbott's observations of Acanthizidae species mist netted by him at his visit to Deal Island has caused his comment (7) that the Thornbill occurring there, usually identified as the Tasmanian, *Acanthiza ewingi*, occurring Flinders Island, King Island and Tasmania, is the Brown Thornbill, *A. pusilla*, also occurring King Island, Tasmania, mainland Australia; and the Scrub-Wren occurring there, usually identified as the Brown Scrub-Wren, *Sericornis humilis*, occurring King Island, Flinders Island and Tasmania, is the White-browed Scrub-Wren, *S. frontalis*, also occurring mainland Australia, but Abbott states ". . . it is possible *humilis* is not a good species, in which case variation of *Sericornis* over south-east Australia and Bass Strait is clinal . . . the Deal Island population is intermediate in many respects between the Victorian and Flinders Island populations".

Whinray has commented (3) on Abbott's assessment of the Thornbill: "After examining the specimen which I obtained on Deal Island in December 1971 I agree with his opinion. As well, I consider that the Brown Thornbill, and not Ewing's Thornbill, is the species present on Erith and Dover Islands."

LAND SPECIES IN KENT GROUP

The real nature of occurrence of land (including shore) species of birds in the Kent Group, particularly for the "centre three"— Deal, Dover, Erith — of the five islands, will remain uncertain until it has been determined (a) which species are *usual* there in breeding occurrence as residents and as migrants; and (b) the regular and "accidental" occurrence of other species — assessment by David Thomas (8) is that distance from the mainland and Tasmania is only minimal as a barrier preventing occurrence of various of possible species from the mainland and recorded in such occurrence in Tasmania.

The uncertainty is likely to persist, as full-time residence in the Kent Group of an experienced observer or a succession of such observers for a long-enough period appears unlikely.

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4. *Papers and Proceedings of Royal Society of Van Dieman's Land*, 3: 157. (Noted by I. Abbott, and conveyed by him in personal comment to J. Jones, July 1972.)
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6. D. Le Souëf and A. J. Campbell, "Expedition of Field Naturalists' Club to Kent Group, Bass Strait", *Vict. Naturalist*, 7: 122-131, 132-136.
7. I. Abbott: Letter 6/4/72 to Dr. S. Murray-Smith.
8. D. Thomas: Letters 20/2/71 and 30/3/71 to J. Jones

Statewide Convention

A Convention of Field Naturalists Clubs will be held at Bairnsdale from 30 September-1 October, 1972. The venue will be announced later.

Seaside Rocks out of Place

by Edmund D. Gill*

Nothing looks more conspicuous than a white rock among a multitude of black ones. Between Port Fairy and Cape Reamur in the Western District of Victoria (Australia) the shore platforms are of basalt, and the boulders are black. Well above high water level, boulders have been accumulated by sea action, and occasionally among the hundreds of dark boulders a white one appears. Such an exception is intriguing, and it was decided to find out the reason.

The white boulders were found to owe their lack of colour to biologic encrustations, viz. the remains of marine animals and plants that secrete white calcium carbonate. The plants are white calcareous algae. The animals include two kinds of marine worms—*Galeolaria*, which lives in irregular white tubes that are a conspicuous part of the life below mean sea level, and *Spirorbis*, which grows a minute smooth shell, coiled like a pearly nautilus. Barnacles are commonly present, and if so, usually occur in large numbers. Molluscs also are generally present. All are species that live in the lower part of the tidal range.

Origin of White Boulders

Having discovered what makes the boulders white, it remains to explain from where they came. *Galeolaria* occurs no higher than mean sea level. Bird and Dent (1966) used it as a marker by which to measure coastal features. Because the life position of this genus is strictly zoned, we can say with certainty that the white boulders had their origin at mean sea level or below. The barnacles, molluscs and calcareous algae belong to the lower half of the tidal range, and some of them to the lowest quarter of it. However, I have found on such boulders none of the species that live only below low sea level. From this it appears that the boulders had their origin between low sea level and mean sea level.

The Sea as Weight-lifter

The sea has a remarkable ability to lift heavy weights. By Archimedes' principle, rocks weigh less in water than in air, but even so, the weights that storm waves can lift are almost incredible. At Wick in Scotland in 1872, for example, the end of the concrete breakwater weighing 1350 tons was torn loose and deposited in the harbour. The Scots were not amused, and built a new solid end to the breakwater weighing 2600 tons (2640 metric tonnes), but five years later this suffered the same fate. On the coast between Port Fairy and Cape Reamur, the basalt lava flow is broken by numerous cooling joints, and so there are no really large boulders. The biggest boulder lifted by the sea observed by me in that area was calculated to weigh on the order of 24 tons. However, the white rocks are usually comparatively small, weighing within the range of 50 to 200 lb (25-100 kg).

*Deputy Director, National Museum of Victoria.

A rocky coast can be divided into a series of zones parallel to the sea. One is the zone from which boulders are stripped by marine quarrying, then hurled higher up the profile by storm waves. The second, higher zone is that in which the boulders are deposited—a very coarse sediment!

It is significant that the white boulders have their origin between low sea level and mean sea level, because that is where the storm waves break. Moreover, just below sea level is a rich biotic zone where boulders tend to be anchored by marine overgrowths.

Telltale Boulders

So the white boulders have a story to tell, and to read their story is to increase our understanding of the coastline—that fascinating place where rock, sea and atmosphere meet. White boulders are not common on the aeolianite coast around Warrnambool in Western Victoria, because these soluble rocks create their platforms in a different way (Gill 1972). However, they are not uncommon on the Otway Coast of Victoria, for example, and on the South Coast of New South Wales. An interesting investigation would be to gather data on (1) the encrusting organisms—their species, the weight of mineral they add to the rock, and the extent to which they protect the rock from abrasion; and (2) the size, weight and lithology of these boulders that the sea has painted white, then heaved ashore.

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Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Nature Notes from the Gold Coast

by Alex. N. Burns

Since the previous Nature Notes, the advent of exceptionally cold weather for this time of year has caused several marked changes from normal behaviour in a number of the fauna creatures which inhabit this area. Colder nights have caused the koalas to disappear from the lower areas and seek feeding and resting trees on higher ground. This has been especially noticeable in the Burleigh National Park where the bears have congregated on and near the top of the ridge that runs from north-west to south-east across the centre of the area. On the other hand the rock wallabies are coming closer to civilization, seeking food and scraps from residents and visitors each day from about 4 p.m. until dusk. Often five or more of these small animals come to the edges of the roads bordering the park.

Many spiders are still active in the bush and gardens; and unusually plentiful at present are the large Golden Web Spinners (*Nephila* spp.), whose webs, each with its occupant (females only) are distributed in the more open parts of the rain forest and along its borders. Some of these webs are of long standing—one observed a few days ago held the crumpled wings of no less than three (two male and one female) Richmond Birdwing butterflies (*Ornithoptera priamus richmondius* [Gray]). The supporting strands to this web extended for fully 20 feet.

Late specimens of the Blue Tiger butterfly (*Danaus hamata hamata* [Macl.]) are still plentiful and in good condition; normally this species has disappeared by the end of May, as also has the Eastern Brown Crow (*Euploea tulliolus tulliolus* [Fab.]), many specimens of which are still in evidence.

In the eucalyptus forest especially on high ground, the Mount Morgan or Queensland Silver Wattle (*Acacia podalyriaefolia*) is at present in full bloom, some exceptionally fine specimens are to be seen, and on sunny days the air is fragrant with perfume from them. Many specimens of the Paper bark (*Melaleuca leucadendron*) are still flowering profusely. The flowering season has lasted since last January, thus providing a copious supply of nectar for the honey feeding Lorikeets which are in numbers everywhere; the Rainbow lorikeet being by far the most plentiful.

On the lagoons at the Currumbin Bird Sanctuary the number of wild ducks is much less than usual for this time of year. This is accounted for because of the amount of rain since the beginning of the year. As the dry season approaches and the smaller lagoons dry up, the birds concentrate on the larger areas of water. One particular lagoon under observation normally has about 500 birds on it in June; to date not more than 300 birds have appeared.

One of the most perfect examples of insect camouflage is present on the native holly bushes (*Heterodendron* sp.) in the rain forest; these are half grown larvae of the Common Acroplane butterfly (*Neptis shepherdi shepherdi* Moore). These larvae feed on the terminal branches of the wild

holly, and in so doing cause the partly eaten leaves to wither and dry, curling in the process. These are greyish-brown in colour, and when not feeding, the butterfly larvae rest on these dry leaves. So closely do the larval colours match the dry leaves that it is almost impossible to see them unless one looks very closely. The anterior end of these larvae is "humped" and much larger than the posterior end, and each extremity bears two short darker coloured appendages which add considerably in completing a perfect camouflage. The butterflies from these larvae should appear on the wing about the end of August. Now that the shortest day is past we can expect early species of some of the native orchids to appear in bloom by the middle of July. Plants of some interesting epiphytal species are already under observation.

A Naturalist's Journey to the Flinders Ranges

An Ecological Discussion

by L. A. Fell

A Field Naturalist, preparatory to making a journey into a personally unknown climatic, geological and ecological region, is usually well rewarded for making a prior study of such imponderables as rainfall, temperature and the like. For this reason, an isohyet map of the area was obtained, and also some general knowledge of the geology and soils. The isohyet map of the Flinders Range for instance, beginning east of Spencer's Gulf, is one of the most interesting in Australia. It consists of a huge cone running north and south with the 10 in. line to the west of and south of Arkaroola, the northern tip. On the escarpment at the head of the gulf, the rainfall drops from 20 in. to 8 in. just west of Port Augusta, in about 30 miles; and at the extreme northern end of the range drops to about 6 in. near Arkaroola. This rainfall pattern is the reason for the change in the ecology of plants and animals seen on the journey. The area is bounded by the parallels of latitude 33° to 30°; and as a comparison Kalgoorlie is 31.5° and Broken Hill 32°.

South Australia being a dry State without any high country, is floristically poor compared with the other States, but in many cases the flora there provides an interesting link between the east and West Australia. By checking against Black's flora with the principal genera, one can define some of the specific relationships between east and west. One of the most fruitful observations in a journey from north to south is to compare the flora with that of other States in the same latitude and rainfall areas.

As might be expected the isohyet lines, rather than the geology, determine the boundaries of the various plant types. D. A. Herbert in the *Aust. J. of Science* concludes ". . . that the distribution of eucalypts is primarily affected by rainfall, temperature variation, and soil". . . . In WA for example, the 20 in. isohyet determines almost exactly the eastern limits of the Jarrah (*E. diversicolor*), and in all States the Mulga (*Acacia aneura* complex) belt in general, is inside the 10 in. isohyet. Of course, the soils themselves are modified by the

amount of rain, when and how it falls, and the temperatures experienced.

In looking at this landscape it has always to be remembered that it has been influenced by man's interference for at least 120 years, during which time it has been mined, grazed by livestock, and largely denuded of its timber and natural flora. Compared with WA and the eastern States few traces of wild fires were seen—most of the damage having been done by stocking with sheep and ill-advised attempts at cultivation in low rainfall areas. Outside the wheat paddocks there does not appear to be much soil erosion by either wind or water.

Following the low price of wool, some of this land has been given to the nation for National Parks, and if wool remains unpayable, more of it will be abandoned. The questions here are who will assume responsibility for its management, and what will fill the gap left by the removal of domesticated grazing animals? The countryside is plentifully stocked with exotic weeds; will they fill the gap, spreading out of control? In many places in the lower rainfall country, responding to the changed environment, mulga and the larger *Eremophilas* are dead or dying. Why? Is it because of drought, grazing, insect attack, fungus disease? Can this tendency be reversed?

In far western Queensland the late Henry Lamont noted that a mature mulga grew 2 ft. in the 50 years during which he watched it. How will mining and tourist developments affect these areas; for both of them defile what they pass over. On the answers to questions like these depends the ecological future of the Flinders Range.

It is fairly obvious that eucalypt and acacia are the two genera most prominent among the trees and taller shrubs, but it was surprising to find Chenopodiaceae and Azoiaceae (succulents) so well represented on the ground. This was due to the heavy and widespread rainfall for that season; for in places the ground was carpeted with these interesting plants many of which were in flower. Twenty-three species were collected from the Aroona dam northwards. Similarly, many of the dry country grasses (Poaceae) were seen in flower but not collected.

EUCALYPTS.

In "Evolution in Eucalypts", 1960, J. D. Prior states:

> "from this pattern it is apparent that very many species are highly adapted to the site which they occupy and that they must have been produced by an effective and long process of selection".

He also states that the eucalypt is extremely sensitive to its natural environment. If the above remarks are borne in mind, it makes it easier to follow the eucalypt pattern in the Flinders Range. Black lists around 50 eucalypts for SA, of which about 9 are endemic. Of these 50, some 16 are found in the Flinders Range, and a further 10 are common to both SA and WA dry country areas.

In Australia, *E. camaldulensis* is the dominant tree over most river systems, and over most of the clay plain country with a better than 20 in. rainfall; and this pattern is repeated in SA. The further north, the more this tree is confined to the run of valleys with gravelly creek beds where moisture is available. At Arkaroola, *E. obtusa* grows in the creek beds as a non-typical upright bushy tree resembling *E. tereticornis*. Further north, *E. camaldulensis* is found in the stream beds with *E. microtheca* (coolabah) occupying the drier alluvial banks above. Further north the interesting mallee *E. gillii* grows on the dry ridges out of the creek beds, displaying all the characteristics of a survival dry country plant with coriaceous and brownish grey leaves with a twisted trunk. Remembering Prior's statement, why should this bush grow only in this

area and adjacent NSW? Due east of Port Augusta on the escarpment in an 18 in. rainfall, grows *E. cladocalyx* (sugar gum). The fact that this tree has been widely planted for shelter all over temperate Australia seems to refute Prior's conclusions in part. Many eucalypts grow well outside their natural range (e.g. *E. pauciflora*), but the reasons for this do *not* seem to have been satisfactorily established.

Acacias

Few acacias in the Range are spectacular when in flower, but they provide an interesting group ecologically. Of the ninety *acacias* found in SA, twenty-five are also found in WA; the balance being endemic or found also in the eastern States. Two of the *acacias A. ligulata* and *A. iteaphylla* are found through the whole length of the Range, from an 18 in. rainfall east of Port Augusta to a 6 in. rainfall around Arkaroola. They both adjust to the climatic change by adjusting habits of growth and variations in width and thickness of the phyllodes. Many of the hot country *acacias* are shy seeders with poor germination. *A. gracilifolia* is in a class by itself, as for some ecological reason it is found only in the Mowbray reserve area. It may be a relict, and although first determined in 1900, was then lost for 50 years. Both it and *A. iteaphylla* are beautiful garden shrubs.

Cassia, Eremophila

These are prominent and often beautiful flowering shrubs usually from hot dry climates and tolerant of low rainfall. All over Australia where the climate is suitable, *eremophilas* are found often as the last surviving plant after continuous over stocking erosion. In the harsh climate of the Victoria Desert in WA there are numerous bushy *eremophilas* with thick sticky inedible leaves. There are about forty species in SA in or north of the Flinders Range, and it is noticeable that the small tree forms are mostly dead or dying due no doubt to some interference with their environment. In WA, *Templetonia retusa* is looked on as a coastal or limestone area plant, so it was interesting to see it growing in the central Flinders Range on hillsides.

Very few native animals were seen, and birds were scarce. This is often a function of water supply as much as feed; but many of these are nomadic, so that in any particular district their numbers vary. The mining companies usually forbid their employees to shoot or to take guns into the areas.

It appears that a definite plan for the management of this region is a matter of urgency. Conditions are rapidly changing, and the ecology of the whole area is in a state of stress.

Thanks are due to Mr. Court of the National Herbarium for help with determinations of plant 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.

Some Observations on the Den Litter of Foxes (*Vulpus vulpus* L.) in Victoria

by Brian J. Coman*

Analysis of fox den litter has been used, as an aid in food habits investigations, by a number of workers. Errington (1937), Scott and Klimstra (1955) and Lund (1962) are amongst some who have collected and recorded food items found in the immediate vicinity of dens.

Although the method has many limitations, it is of some use in the determination of fox food habits during the denning season. The main criticisms of using such data stem from the fact that large carcases, because they are less likely to be eaten entire, comprise a disproportionately large percentage of the estimated food. Lund (1962) has shown that smaller prey species, especially small rodents and insects, are seldom found amongst food remains at the den but are quite important in dietary analyses based on the examination of faeces and stomach contents.

Since early 1968 the author has been engaged in a survey of food habits of the fox in Victoria. The investigation has been centred mainly on stomach contents analysis, but from time to time, it has been possible to record food remains found in the vicinity of breeding dens. These den litter records do not include any examination of faecal material but are based solely on the identification, in situ, of carcases and other uneaten material. All dens mentioned were active when visited and many were subsequently dug out and the cubs taken.

From the list of food items, it would appear that smaller mammals, birds and sheep remains are common foods. The importance of sheep remains and small mammal carcases compares favourably with the findings of Mackintosh (1963) which were based on the analysis of stomach contents. The major discrepancy lies in the apparent high dietary intake of birds suggested from the den litter observations. Most food habits studies based on the other methods of analysis suggest that birds are a minor item of diet.

Such a conflicting result could be explained in a number of ways. Many people are of the opinion that foxes will often kill birds or remove bird carcases without utilising them for food. The carcases might then simply be carried to the den and used as a "plaything" by the cubs. A further possibility is that foxes avoid ingesting feathers when eating from larger bird carcases. In the absence of feathers from stomach contents (or faeces), bird remains would be difficult to distinguish. It should be stressed that the presence of bird carcases near a den does not necessarily imply that the birds were killed by foxes.

Although the data from these den studies are limited, there is some presumptive evidence of the opportunistic nature of the fox's feeding. The den examined at Tandara (Dec. 1968) was situated in a paddock of wheat stubble adjacent to a large swamp. Numerous waterbirds and quail (*Coturnix pec-*

*Vermin and Noxious Weeds Destruction Board, Department of Crown Lands and Survey, Keith Turnbull Research Station, Frankston, Victoria 3199.

toralis) were seen in the immediate vicinity. Again, the dens examined at Sutton Grange (Nov. 1970, Dec. 1971) were in a well-known nesting area of the white cockatoo (*Cacatua galerita*).

Plate 1

Food remains and faeces collected from a den at Tandara, Victoria (Dec. 1968). Flattened grass is in cubs' "play area".

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Mackintosh, D. L., 1963. Food of the fox in the Canberra district. *CSIRO Wildl. Res.* **8**: 1-20.

Scott, T. G., and Klimstra, W. D., 1955. Red foxes and a declining prey population. Southern Illinois Univ. Monogr. Ser. No. 1, 123 pp.

FOOD REMAINS AT DENS OF THE FOX (*Vulpes vulpes* L.) IN VICTORIA.

Date and Location	Food Item	Minimum Number
Sept. 1968 Redesdale	Rabbit (*Oryctolagus cuniculus*)	1
Sept. 1968 Kyneton	Mouse (*Mus musculus*)	1
Oct. 1968 Shepparton	Hare (*Lepus europeaus*)	1
	Ibis (*Threskiornis spinicollis*)	1
Dec. 1968 Tandara	Black Duck (*Anas superciliosa*)	1
	Grey Teal (*Anas gibberifrons*)	1
	Blue Crane (*Notophoyx novae-hollandiae*)	1
	Unidentified bird—possibly snipe (*Gallinago hardwickii*)	1
	Quail (*Coturnix pectoralis*)	1
	Sheep	1
	Rabbit	1
	Blue-Tongue Lizard (*Tiliqua scincoides*)	1

(*continued*)

Nov. 1969	Sheep	1
Kyneton	Mouse	1
	Rabbit	1
Nov. 1970	Rabbit	4
Patchewollock	Unidentified bird	1
Nov. 1970	Sheep	1
Sutton Grange		
Sutton Grange	Sheep	1
	Rabbit	1
	Cockatoo (*Cacatua galerita*)	1
Sutton Grange	Rabbit	1
	Cockatoo	1
Sutton Grange	Rabbit	5
	Magpie (*Gymnorhina hypoleuca*)	2
Sutton Grange	Sheep	1
	Rabbit	2
	Household bones	
	Magpie	1
Sutton Grange	Rabbit	1
	Sheep	1
	Rat (*Rattus rattus*)	1
	Magpie	1
	Unidentified bird	1
Nov. 1970	Rabbit	3
Kyneton	"Crow" (*Corvus* spp.)	2
	Magpie	2
Oct. 1971	Rabbit	2
Gisborne		
Oct. 1971	Brush-tail Possum (*Trichosurus vulpecula*)	2
Sutton Grange	Rabbit	2
Dec. 1971	Rabbit	1
Sutton Grange	Brush-tail Possum	1
	Sheep (bones)	1
	Magpie	1
	Cockatoo	1
	Hawk (possibly *Falco berigora*)	1

Conservation Council of Victoria

In an effort to make its work better known among its member organisations the Conservation Council of Victoria commenced publication of a newsletter, Conservation News, in June. The limited funds available to C.C.V. prevent it being distributed to individual members of the bodies in C.C.V. So that F.N.C.V. members will know what C.C.V is doing the last meeting of our council decided an extract of their newsletter should appear in the *Victorian Naturalist*.

In the first issue of Conservation News it was reported that the long awaited Western Port Regional Survey conducted by C.C.V. was almost complete, and the report on it would be presented to the Western Port Regional Planning Authority before the end of June. The report is to be published, and will be available to the public.

The C.C.V. has also produced a policy statement on the Alpine Region of North-Eastern Victoria. It advocates that wilderness areas in the region be kept in their primitive state, and that land uses which could damage the environment of country over 4000 feet above sea level be banned. They are in addition taking action to see that an ecological survey will be made of the Dartmouth Dam site on the Mitta Mitta river.

In conjunction with the V.N.P.A., the National Parks Authority, and Mr. D. Goode, the C.C.V. has presented to the Parliamentary Public Works Committee evidence on the proposed site of the Mitchell River Dam, and the risk it presents to the Mitchell River Gorge, adjacent to Glenaladale National Park.

In association with Dr. Elder of the Anthropological Society representatives of C.C.V. have discussed with the Chief Secretary the need to amend the Aboriginal Relics Preservation Act to protect sites before their legal declaration.

The council has been collecting written submissions on areas in Port Phillip Bay which should be managed for their conservation by the Port Phillip Authority. These were presented at the end of June. The president of C.C.V. has urged on the Minister of Forests and the F.C.V. the use of marginal farmlands for pine plantations instead of crown land, which usually carries native flora supporting native fauna.

Fear was expressed in Conservation News that pressure on municipal councils may, through their influence on M.M.B.W., defeat the conservation aspects of the new plan for the future growth of Melbourne.

The C.C.V. has recently heard submissions on the need for extra protection of Victorian wetlands, and the Viking-Razor wilderness. These were put forward respectively by the Field and Game Association and the Federation of Victorian Walking Clubs. They have also been discussing the desirable limits on Melbourne's population growth.

Notice to Country Clubs

It is proposed that the names and addresses of the Presidents and Secretaries of all F.N.C.'s should appear in the *Victorian Naturalist*. It would therefore be appreciated if these could be lodged with the F.N.C.V. Secretary when convenient.

"Overheard in the Bushes"

"Gee, isn't it cold." "I hope it won't rain before we finish." These were much uttered comments at the combined FSG and MSG camp at Mt. Disappointment which I attended recently. The fact is, it was indeed cold. Very cold. The maximum temperature on Sunday reached only 40° F. Brr. . . . and not only did it rain, but we had sleet also.

These are the conditions under which these hardy field Nats operate in winter. The weather being neither pleasant nor helpful in their survey activities. The nature of their task is further impaired by the lack of comprehensive equipment.

"What we need is a trailer." These were the words of the Assist. Editor, Mr. Graeme Douglas, commenting on the equipment and species handling task. I gave this much thought. The work being done by these groups not only deserves a trailer, but equally important, it deserves thanks. Thanks that I felt could best be expressed and would be best appreciated by the donation of funds towards a trailer.

As a result of this, I am launching the:

"DURRAN DURRA SURVEY TRAILER APPEAL"

In order to give all members the opportunity of showing their appreciation by contributing towards this appeal, the trailer has been disassembled, financially, into five $50 components and one component that is open for contributions of $1 upwards.

All contributions will be acknowledged in this column. Contributions of $50 and over will be further acknowledged on a plaque to be fixed to the trailer.

You will now ask "Well, what does this trailer look like?" Not knowing whether you mean financially or physically I will show you both, first financially:

Axle, Wheels, Tyres and Tubes	$50
Mainframe and Drawbar Fittings	$50
Subframe and Cabinet Fittings	$50
Overhead Canvas Cover	$50
Electrical Wiring and Special Fittings	$50
Equipment to fill the Cabinets	$Open

Physically it consists of a normal looking box trailer with a canvas top. However the canvas top can be raised and extended to give overhead shelter. Further, in place of the normal sides, each side will consist of equipment compartments with extending tops to form a work table around the trailer. The central portion of the trailer will be used to house either specimens or larger equipment. Thus the Groups can operate effectively, efficiently and under cover — even if it snows, which no doubt, next camp I attend, it will.

Please address all contributions to:
"DURRAN DURRA SURVEY TRAILER APPEAL",
C/- G.P.O. Box 5169 AA,
MELBOURNE, VIC., 3001,
or to the Treasurer at the next General Meeting, who will pass them on to me.

Needless to say, I thank you for your support.

DURRAN DURRA.

Letter to the Editor,

Dear Sir,

In common with many other members to whom I have spoken, I feel it is very unsatisfactory to have unsigned articles.

While none of us are likely to doubt the authenticity of these reports, in principle most people are very suspicious of the reliability of unsigned articles.

Of course the reporter will change from time to time, but surely, the signature can also change. If a contributor has given of his best he ought to be proud to sign his or her name, and be available to answer any comments.

Yours,

L. M. M. BEADNELL

Although there may be a sound basis in part for the comments made, I think one should not be too hasty in condemning the use of a pseudonym. After all, the late Crosbie Morrison, as editor of *Wild Life*, accepted the credibility of such contributors as "Scrutarius", "Safelight", and "The Bookworm"; an excellent guide on bushcraft appeared bearing the author's name as "Wontolla"; and even Thomas Alexander Browne preferred the name of Rolf Boldrewood for his writings. [Ed.]

Request for Information

Bell-Miners (*Manorina melanophrys*).

The Bell-Miner Mapping Survey of the Victorian Ornithological Research Group is interested in mapping colonies of these birds in the Melbourne metropolitan area, and is also requiring information on colonies away from the Melbourne area. We are particularly interested in finding out the history of colonies — when they originated (if known) and whether they are static, decreasing or increasing. It is fairly apparent that over the years there have been fluctuations in numbers in some areas. Any general notes on the species would also be appreciated. Survey forms are available from Frank Noelker, 10 Kathleen Street, Blackburn 3130.

Ellen M. McCulloch (Mrs.), Survey Convenor, 6 Bullen Avenue, Mitcham, Vic. 3132.

Bendigo Meeting of Field Naturalists Clubs

Following a long discussion, the meeting of Field Naturalists Clubs held at Bendigo on June 24 decided to ask the F.N.C.V. to organise a Convention to be held early next year. A Steering Committee was set up to plan for the Convention and work out an acceptable proposal for machinery for improved co-operation between Clubs.

Any suggestions, particularly relating to date and location of the Convention, would be welcomed by the Committee.

R. H. RIORDAN,
Honorary Secretary F.N.C.V.
For Steering Committee.

CORRECTION

On page 202 of the June *Naturalist* in the Report of the Day Group's May visit to Maranoa, *Buckhausia* should be *Buckinghamia celsissima*.

Field Naturalists Club of Victoria

General Meeting July, 1972

The President, Mr Tom Sault, took the chair at the July meeting of the Club and welcomed about sixty members and visitors.

The guest speaker for the evening was Mr. Peter Rawlinson, lecturer in Zoology at Latrobe University, who spoke on "Reptiles and the Need for Conservation". The talk was illustrated with an excellent series of slides of Victorian reptiles. In moving a vote of thanks to the speaker, Mr. Sault said that he felt the Club should press for legislation to protect the State's reptiles.

Among the exhibits was a colourful tray of stones which Mrs. M. North had collected from the mouth of the Rakai River in New Zealand. Several members also displayed specimens of garden grown native plants. Mr. Ross Garnet drew members attention to a recent application for a mining exploration licence covering a large area of the Grampians, and displayed a map of the area.

The President announced that the Club Librarian, Mr Peter Kelly, had tendered his resignation after seven years' service. Mr. Sault paid tribute to the large amount of time which Mr. Kelly had put in to the running of the library. This would greatly facilitate the work of his successor. Mr. Sault appealed for a volunteer to take on the job. A vote of thanks to Mr. Kelly was passed with acclamation.

A brief report of the State meeting of Naturalists' Clubs at Bendigo on 24 June was given by the Secretary. The Steering Committee formed at the meeting will hold its first meeting shortly. This Committee is to further examine proposals for co-ordination and co-operation between clubs. It is hoped to hold a State-wide Convention early in 1973.

During General Business Mr. Barry Cooper, Vice-President and Convenor of the newly formed Field Survey Group, spoke about staff shortages at the National Museum of Victoria. It was resolved to write to the Chief Secretary urging that the Government appoint more staff, particularly to the Curatorial positions. During discussion it was suggested that Club members should consider donating their collections to the Museum, unless they were actively working on them. Many rare and interesting specimens were retained by private collectors, thus depriving students and others of access to material not represented in the Museum collections.

Mammal Survey Group

On the weekend of July 1-2 eight members of the group carried out a survey on the Mornington Peninsula. They, and one visitor, camped by Main Creek, a little over two miles inland from Cape Schank. Despite rain falling during the time the spot lighting parties were at work a large number of animals were seen. The majority were Ringtail possums; *Pseudocheirus peregrinus*. Trapping results were also above average. In all three native species were seen by spotlight, and three more, plus two introduced species were caught in the 80 traps used. A total of 30 animals was trapped. As at the last two camps all captured animals were weighed, sexed, and measured before being returned to the bush. A detailed report will be included in a paper to be prepared about the area.

At the monthly meeting of the group on Thursday July 6 colour slides of several native mammals were shown, and six members presented chance sighting reports. Full reports were presented on the camps at Mt. Disappointment and Main Creek, and details were given of access to the following camp at Siberia. There was also a report of a camp at Rosslynne Reservoir, near Gisborne, carried out using group equipment by two members working with the Macedon Range Conservation Society. Possible sites for future camps were mentioned. The need to correlate various grids which different groups are using was discussed, and Mr. R. Warneke of F.W.D. said he would take this up with L.C.C. The meeting was attended by 15 members and four visitors.

Field Survey Group

Meeting — Thursday, June 22, 1972:

Mr. L. Winsor chaired the meeting, which was attended by 14 members. The major part of the evening was taken up by the briefing for the ensuing Murtindindi River Camp. Later on Miss Barra-

clough spoke on the broad vegetation types found in the central highlands of Victoria, typically exemplified by the Mt. Erica area. The results of the Mt. Disappointment survey were also discussed.

Survey Camp Reports:

1. Mt. Disappointment — June 10-12. A joint camp with the Mammal Survey Group was held over the Queen's Birthday weekend. This was the first camp using the grid system. Eight localities were chosen to provide a full coverage of the various geographical features in the region. Although weather made collecting difficult many specimens of invertebrates and plants were collected, and a bird list compiled. Non-marine molusca, insects, and spiders gathered during the survey were lodged with the National Museum, after their tentative identification. Flatworms, millipedes and centipedes were retained by members for detailed study.

2. Murrindindi River — July 15-16. The second survey done working to the State grid system, was held in the Murrindindi River area, North of Healesville. Despite adverse weather conditions the camp was very successful — 25 localities, including farmland areas, were visited. A feature of the camp was the division of the group into two working parties. This enabled collecting to be done at a larger number of localities. The camp was attended by 11 members.

Details of specimens collected at both camps will be published later.

While the group has a number of people willing to collect and identify botanical specimens there is a paucity of people sufficiently interested in invertebrates to undertake detailed studies of various animals. Mr. L. Winsor is studying flatworms with respect to their identification, habits, and distribution. Mr. A. Brooks is making detailed studies of frog populations. Mr. B. Cooper is collecting millipedes for study purposes. The group would like people prepared to carry out work on freshwater life, particularly crustacea and spiders to join its ranks. Close association with the Curators of invertebrates and insects at the National Museum results in expert knowledge and advice being available to members of the group, whose work is helping to increase and augment the museum's collections.

Latrobe Valley Naturalists' Report

(to June, 1972)

President — Mr. T. Moretti. *Hon. Secretary* — Mr. S. Belgraver.

Members have enjoyed a busy and interesting half year, beginning with a week-end at Mt. Howitt in January in which all five Gippsland clubs, as well as F.N.C.V., participated.

The club organised a successful screening of Photoflora in Morwell in March. About one tenth of the slides shown came from Gippsland with Latrobe Valley members well represented

In April, Editor Mrs. L. Padfield brought out the 100th issue of the Latrobe Valley Naturalist, a journal that serves all Gippsland clubs. All aspects of natural history are covered in its pages, as well as excursion reports, and personal items. Talks have been given to the club by authoritative speakers dealing with many subjects, and, when possible, the monthly excursion has been led by that speaker. There is also an exchange of speakers between local clubs.

A memorial cairn has been erected on a high point north of Tyers in memory of the late Jim Peterson, a staunch club member who was an active conservationist. Rocks were collected and work done on the cairn by fellow members. Several parties attended the dedication of a picnic area at Yellingbo commemorating our bird man, the late Frank Jones.

The club arboretum, an extensive area round the shores of the S.E.C. cooling pond on the Midland Highway, is nearing maturity. It contains a good selection of native trees.

Observers attended the Western Naturalists Association week-ends recently at both Ararat and Bendigo, and much enjoyed meeting people with similar interests from all over Victoria. Naturalists from other clubs are assured of a warm welcome when visiting Gippsland.

E. LYNDON,
for *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 Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1971-1972.

President:

Mr. T. SAULT

Vice-President: Mr. B. COOPER

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 Road, East Malvern, 3145

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

Hon. Librarian: Mr. P. KELLY, c/o National Herbarium. The Domain. South Yarra 3141.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161. (52 2749).

Magazine Sales Officer: Mr. B. FUHRER, 25 Sunhill Av., North Ringwood, 3134.

Group Secretaries

Botany: Mr. J. A. BAINES, 45 Eastgate Street, Oakleigh 3166 (57 6206).

Day Group: Mrs. J. STRONG, 1160 Dandenong Road, Murrrumbeena. (56 2271)

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

Field Survey: Mr. B. J. COOPER, 37 Bath Road, Burwood 3125. (29 7379)

Geology: Mr. T. SAULT.

Mammal Survey: Mr. G. F. DOUGLAS, "Knotanoll", Riddell's Creek 3431 (054-285191)

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 1972.

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
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Junior Members receiving Vict. Nat.	$4.00
Subscribers to Vict. Nat. (Aust. only)	$5.00
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Supporting Members	$10.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the Vict. Nat. will be 45 cents (52 cents — overseas requests).

Full-time Students between 18 and 21 years pay at Junior Member rates.

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

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

GENERAL MEETINGS

Monday, 11 September – At National Herbarium, The Domain, South Yarra, commencing 8 p.m.

Subject for evening — "The Natural History of the Murray River tract between Mildura and Renmark": Edmund D. Gill.

New Members:

Ordinary:

Mr. F. A. Wilkinson, 4/78 Wellington Rd., Clayton 3168.
Mr. Walter A. Dey, 3 Dorothy St., Pascoe Vale North 3044.
Miss Rosalie Strother, 14 Hollywood Grove, Carnegie 3163.
Mrs. Mary E. Wilson, 940 Burke Rd., Balwyn 3103.
Mr. Mark Benjamin, 1 Freeman St., Caulfield 3162.

Joint:

Mrs. Pearl Whitta and Susan and Julian Whitta — 6 Hastings St., Hampton 3188.
Mr. Dennett Meier and Mrs. Joyce Meier — 73 Grey St., East Melbourne 3002.

Country:

Mr. B. Walters, P.O. Box 71, Corryong 3707.

GROUP MEETINGS

Thursday, 21 September — Day Group: Monash University. Meet 11.30 a.m. at bus terminus. Bring lunch. Inspection of Native Plants in and around Campus. Mr. J. Cranwell, Curator, will act as guide.

Thursday, 28 September — Field Survey Group.

Monday, 2 October — Marine Biology and Entomology Group.

Wednesday, 4 October — Geology Group.

Thursday, 5 October M.S.G. — F.N.C.V. meeting in Arthur Rylah Institute, 123 Brown Street, Heidelberg.

Thursday, October 12: Botany Group: Dr. Greta Weste (Botany School, University of Melbourne): 'The Invasion of Victorian Forests by *Phytophthora cinnamomi*'.

Wednesday, 18 October — Microscopical Group.

JUNIOR MEETINGS

Friday, 29 September — Hawthorn Town Hall at 8 p.m.

Friday, 6 October — Preston Rechabite Hall, 281 High Street, at 8 p.m.

Friday, 13 October — Montmorency and District, Scout Hall, Petrie Park, at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 17 September — Cardinia Creek. Leader: Mr. D. McInnes. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.70 — bring one meal and a snack.

Saturday, 30 September-Sunday, 1 October — Bairnsdale. A Convention of Field Naturalist Clubs will be held this week-end and we hope as many club members as possible will attend. Delegates from the clubs will hold a meeting but otherwise the week-end will provide an opportunity for members of the various Field Naturalist Clubs to enjoy a combined excursion. A bus has been chartered and motel accommodation booked on a bed and breakfast basis. Inclusive cost $15. Leave at 8.15 a.m. from Flinders Street.

Tuesday, 26 December-Monday, 1 January — Leongatha. This excursion will be led by members of the Latrobe Valley F.N.C. who are preparing an interesting week's programme. Motel accommodation has been booked and a coach chartered for this excursion. The coach fare ($20.00) should be paid to the Excursion Secretary by the end of November, cheques being made out to Excursion Trust.

6 to 27 January — New Zealand. This excursion is filling up, but a few seats remain at time of publishing. The itinerary was published in the June Naturalist.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 9 6 September, 1972

CONTENTS

Victorian Non-Marine Molluscs – No. 9

by Brian J. Smith*

The common, high spired, non-operculate freshwater snails can be easily divided into two groups. Those which show left-handed coiling (sinistral) belong to the family Planorbidae, while those which show right-handed coiling (dextral) belong to the family Lymnaeidae. The direction of coiling is easily determined by holding the shell upright with the aperture facing you—planorbids have the aperture to the left of the spire, lymnaeids to the right.

Family Lymnaeidae

There are two species of right-handed, non-operculate snails with high spires to be found in freshwater localities in Victoria. One is of extreme importance as it is the intermediate host of the sheep liver fluke.

Lymnaea tomentosa, Pfr. 1855

This is the smaller of our two species of lymnaeid and is found commonly in ponds and streams all over the State. It has an extremely thin, fragile, almost transparent shell with aperture and body whorl approximately half the total shell length. An average length is about 8-12 mm. Apart from the direction of coiling of the shell, the lymnaeids also differ from the other freshwater snails in having a large fleshy body with wide flat tentacles. Another feature is that when the snail crawls its mantle is often expanded into lateral folds which are extended back over the sides of the shell.

This species is the intermediate host for the sheep liver fluke and as such is

*Curator of Invertebrates, National Museum of Victoria.

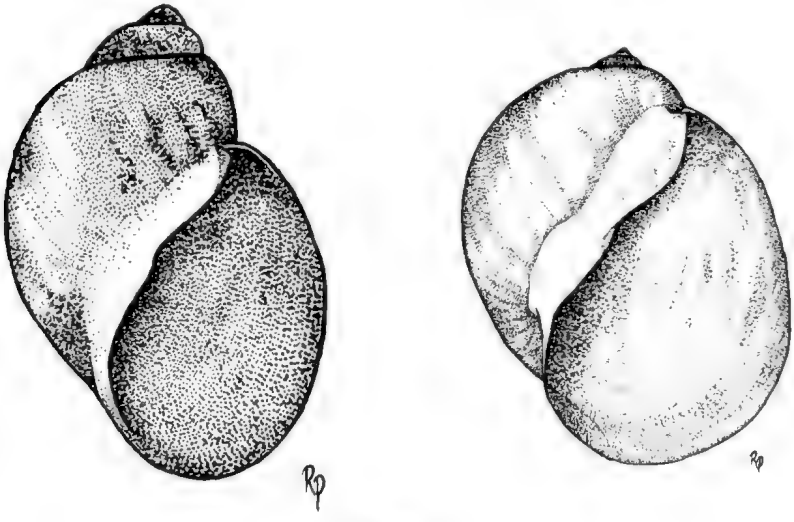


Figure 1

(a) Lymnaea tomentosa x 6. (b) Lymnaea lessoni x 2.

(Drawing by Miss Rhyllis Plant)

of great economic importance. It can spread very quickly into flooded pasture, where it is easily picked up by sheep, thus enabling the fluke to complete its life cycle. Apart from Victoria, this species is found in New South Wales, southern South Australia, Tasmania and New Zealand.

Lymnaea lessoni, Desh. 1830

This is a much longer, more bulbous species than the previous one, and usually has a pale fawn or buff, opaque shell. The body whorl is greatly enlarged with a wide aperture, while the spire is very short. Shells can grow as big as 25-30 mm in length. The animal is usually pale in colour, and very soft and fleshy. This species is not an intermediate host of the liver fluke.

This species can be found in small ponds in central, northern and eastern Victoria. It also occurs over most of Australia except the southern part of Western Australia and in Tasmania. However, it is not common, and appears to have a very discontinuous distribution.

Malacological Society of Australia

Victorian Branch

FLORENCE MURRAY MEMORIAL FUND

First Annual Award

In 1970 the Victorian Branch of the Malacological Society of Australia established a Fund to perpetuate the memory of the late Miss F. V. (Fay) Murray in recognition of her contribution to both the Society and to the science of malacology.

Applications are now invited for the first Award under this Fund which will be in the form of a grant of up to $75 in cash or in such other manner as the Trustees may decide.

Any person irrespective of age, amateur or professional, who is genuinely engaged in the study of molluscs, may apply. Preference will normally be given to an applicant engaged in the study of the molluscs of South Eastern Australia and more particularly in studies on reproduction as it was this branch of malacology in which Miss Murray specialised.

Applications giving relevent details of studies being undertaken and the purpose for which the grant is required, together with the names of two referees, should be addressed to:

The Trustees,
Florence Murray Memorial Fund,
C/- Mr. R. C. Robertson,
40 Jasper Road,
MOORABBIN, Victoria, 3189.

Applications will close on 30th September, 1972. All applicants will be advised of the Trustees decision in writing. The decision of the Trustees shall be final.

F.N.C.V. Second Expedition to King Island

Easter, 1972

by Elizabeth K. Turner

(Illustrations by Author)

In contrast to the F.N.C.V. expedition to King Island in November, 1887, when 27 men left Melbourne by steamer at 9.25 p.m. and arrived off Yellow Rock Beach, King Island, at 9.30 next morning, and camped near the estuary of Yellow Rock River; this year's F.N.C.V. expedition of 36 persons left Tullamarine Airport at 6.45 p.m. on Thursday, 30 March, by Fokker-Friendship plane and arrived one hour later at Currie, King Island. Here they were met by a fleet of cars driven by local Field Naturalists and conveyed to the new motel over-looking the golf links on the coastal sand dunes and the rocks of Admiral Beach, with Fitzmaurice Bay and Cataraque Point at its southern end. This is an area where many people were ship-wrecked and drowned. A small map of King Island shows 57 wrecks in which more than 700 persons perished within the last 150 years—surely it lives up to its name of the Marine Graveyard of Bass Strait!

Initially it was difficult to orientate oneself to the idea that 55 miles north of the island lies Cape Otway, and 53 miles south lies Cape Grim, Tasmania—King Island occupying the middle 40 miles.

When the sea level dropped in the Pleistocene Age, King Island was joined to Australia by a land bridge, and is thought to have separated from it about 11,000 years Before Present.

The island is an "inclined plateau of subdued relief", covered by Old dunes and surrounded by a rim of coastal sand dunes of the Holocene Period. The western flank of the plateau is buried beneath a broad belt of dunes 2-3 miles wide, on which the motel is built.

We Visit A Forest And Fern Gully And The East Coast As Far North As Sea Elephant River.

On Good Friday, a school bus and some private cars conveyed the party east to Pegarah to the Tasmanian Forestry Commission Plantations, where there are 2470 acres of forest, mostly *Pinus radiata*. There were stacks of green-stained logs which had been treated with copper chrome arsenate. We were pleased to learn that there were also 734 acres of Eucalypt forest. The native species, *E. viminalis*, *E. ovata* and *E. globulus*, seemed to have hybridized in many instances, and *E. obliqua* has been introduced.

Along the track were stands of tall *Leptospermum scoparium* which forms the most common vegetation of the island. Also, there were bushes of *Acacia verticillata*, *A. mucronata* and *A. melanoxylon*, interspersed with tall, green, pointed bushes of *Phebalium squameum* (Satin wood) and pink-tipped *Eleocarpus cyaneus* (the Blueberry). We were surprised by the height of the *Monotoca scoparia* (Prickly Broom Heath), one being at least 23 feet high. The party descended downhill through a largely *Pomaderris apetala* forest to see a large nest of White-breasted Sea Eagles in an *E. viminalis*.

Plate 1

Currie Harbour.

In the fern gully were soft (*Cyathea australis*) and hard (*Dicksonia antarctica*) tree ferns and some Austral Mulberry (*Hedycarya augustifolia*). The large, fallen tree trunks, now covered with moss and filmy fern, *Hymenophyllum cupressiforme*, suggested the presence of a former extensive eucalypt forest. There were fine clumps of Hard Water Fern (*Blechnum procerum*) and the Shield Haresfoot Fern (*Rumohra adiantiformis*). In the soft, leafy floor of the gully there were many small diggings made by echidnas in search of food, but no animal was seen. A very large *Cordiceps* (Vegetable Caterpillar) was found.

Indigenous Tasmanian birds seen here were the Green Rosella, the Yellow-throated Honeyeater, the Strong-billed Honeyeater, the Brown Scrub Wren, the Dusky Robin and many Ewing's Thornbills.

Plate 2

Currie Coastline and Lighthouse from Motel.

We lunched on a small log bridge over Yates Creek and then proceeded east to the coast just north of Naracoopa where we had a fine view over Bass Strait and Sea Elephant Bay from Pegarah Hill. Devastation has been caused by the Rutile mine which has poured silt into the Fraser River, completely blocking its flow and killing much of the surrounding vegetation.

We then travelled north to the Eldorado Creek where Professor Baldwin Spencer and other Field Naturalists had camped in 1887. Here there were extensive rolling sand dunes covered by short, heathy scrub. Mr. Paul Barnett introduced us to several orchids; amongst these were Parsons Bands (*Eriochilus cucullatus*) which grew in abundance in many places and *Orthocercus strictum*, the Horned

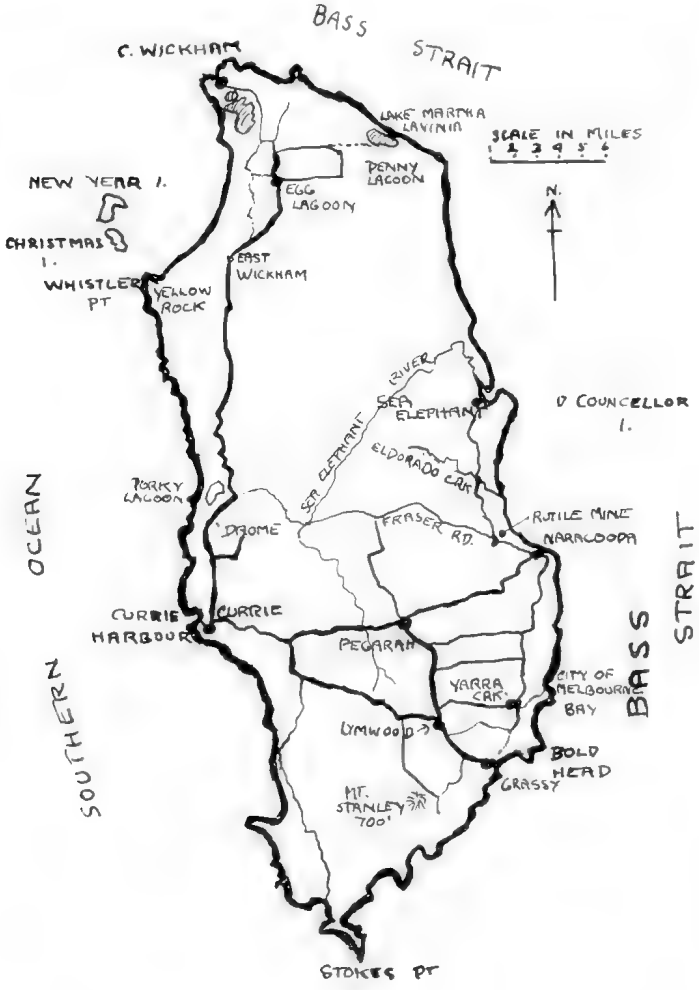


Figure 1

Location Map of King Island.

Plate 3

Remains of *E. globulus* forest, King Island.

Orchid. Here also was *Sprengelia incarnata* (Swamp Heath), *Personia juniperia* (Prickly Geebung), *Phylloglossium drummondii* (the Pygmy Club Moss), *Pultenea juniperina*, *Lobelia elata*, *Casuarina monalithera*, the seeds of *Patersonia fragilis*, *Leucopogon ericoides* and the dwarf *Bauera rubioides*. There were dry clay pans where the Tassel Cord Rush (*Restio tetraphyllus*) was growing, and nearby the *Acacia suaveolens*. Here we also saw and photographed a beautiful green Tasmanian White-lipped snake.

Further north, to the mouth of the Sea Elephant River, the tide was high, covering the remnants of the wrecks of the Kalahone 1879, the Bruthen, 1898 and the Europa 1867. Black Swans and Cormorants were plentiful on the estuary, and we saw several Pademelons and a Californian Quail. On the sand dunes grew the Pig Face (*Carpobrotus rossii*) and a peculiar, sickly-sweet odour pervaded the tea-tree swamps—this was due to a black fungus on the stems.

In the evening, the King Island Field Naturalists and the Victorian party enjoyed a meal and a conversazione at the local Chinese cafe in Currie. Jim Patterson, President of King Island Field Naturalists, in welcoming the F.N.C.V., said he thought that 85 years was too long a period between visits to the island.

Northward To The Wickham Lighthouse, The Lagoons And The Nook.

Easter Saturday was spent in the northern part of the island, beginning with the Wickham lighthouse which, at a height of 280 feet, is said to be one of the tallest in the Southern Hemisphere. Breakers far out on the Navarin and Harbinger Reefs were the scenes of some of the most disastrous shipwrecks—in 1835 the Neva, conveying convicts to Sydney, foundered with the loss of 219 lives, and later, the Loch Leven in 1871. There are two headstones below the lighthouse, and one marks the grave of the Captain of the Loch Leven. Specimens of black, crystalline tourmaline, feldspar and mica were obtained from the granite rocks facing the beach.

We then drove to Egg Lagoon, now drained, and met Max McGarvie in his Land Rover. He guided us along sandy tracks to Lake Martha Lavinia

Plate 4

Shipwrecked mariners' graves near Wickham Light.

—named after a schooner wrecked nearby in 1871. The waters of this lake were pale-brown, like weak tea, but tasted fresh; and there was a good stretch of clean white sand at the eastern end. We had lunch at Pennys Lagoon and were then conveyed, mostly by Land Rover, over the bracken-covered sand dunes, from whence we walked in single file into the Nook. This is an area of 3800 acres of almost virgin bush, now set aside as a Reserve. Here the *Leptospermum scoparium* grew 20 to 30 feet high and there were some tall *Eucalypts* in one of which we saw another White-breasted Sea Eagle's nest at about 20 feet elevation. Below were the discarded remnants of mutton bird, penguin and blue-tongue lizard. Along the greyish, stagnant water of the swamp were fine stands of the King Fern (*Todea barbara*), the Coral Fern (*Gleichenia microphylla*), Fishbone (*Blechnum nudum*), Ground Ferns and *Blechnum procerum* (the

Plate 5

Eastern shore of Lake Martha, Lavinia.

Hard Water Fern). The sharp edges of the *Gahnia* leaves made the narrow tracks difficult at times. Covering the swampy ground were mosses, *Salaginella* and lilac flowering *Mazus pumillo* and a minute *Solaria*. The Brush Bronzewing, Pallid Cuckoos, Swamp Harrier, Black Swans and Musk Duck were seen during the day, and a dead Copperhead snake was found on the beach at Martha Lavinia.

In the evening at Currie, Max McGarvie showed transparencies of King Island's natural features, and Jim Patterson had some recent photos of Lake Pedder in S. W. Tasmania, soon to be inundated by water from the Serpentine for the Tasmanian Hydro-electric scheme, with the loss of at least 53 endemic species.

Three Alternatives:

Yarra Creek Gorge — City of Melbourne Beach — Mutton-Birding.

On Easter Sunday the F.N.C.V. party split into three groups—14 had an adventurous 6-hour descent of Yarra Creek Gorge where the walls are sometimes almost 250 feet high. No new species were found, but many unusual ferns were listed.

18 members went to City of Melbourne Bay, so-called from the wreck of the steamer of that name on its way from Melbourne to Tasmania in 1853. Here rock hounds found quartzites of varying colour, pink slate and multi-coloured conglomerates containing phorphynoids and iron stains, and heavy bags of stones were brought up from the beach.

Four members joined Jim Patterson and his family and, with other locals, went mutton-birding near Bold Head. Here there is a vast rookery of more than 60 acres and it was impossible not to fall into some of the burrows in which the chicks, still covered with blue-grey down, waited hungrily for their parents to return from the sea. Wearing a leather glove, the arm was plunged into the burrow, often to shoulder length and the bird withdrawn and quickly despatched and the head removed. Immediately orange-coloured oil poured from the crop which bulged with about 2-4 ounces. This was collected in a drum and is used for treating saddles and harness. Later, the bird was skinned with its thick layer of fat, and the cleaned bird opened out like a kipper and roasted over a fire built of driftwood on the beach. Grilled mutton-bird seems to be an acquired taste, but the visitors found it at least acceptable.

In the evening, F.N.C.V. members provided entertainment with a viewing of slides in the School Hall.

Grassy And The Scheelite Mines.

On Easter Monday our school bus took us eastward 16 or so miles to Grassy, where a new breakwater, constructed of overburden from the mine, has extended out into the sea to connect with Grassy Island, formerly a Penguin and Prion rookery. Rats quickly decimated the bird population and we saw two penguins only, determinedly trying to find a home midst rocks and stones from the mine.

A young English geologist, Phillip Phee, conducted us over the mine, patiently answered questions, and by use of his hammer, provided rock samples. Scheelite, a mineral composed of tungsten, calcium and oxygen, was first discovered on the beach

Plate 6

The main street of Currie.

at Grassy in 1911. Since then the mine seems to have flourished during the later stages of the two world wars, and collapsed between them, until the last few years when eventually King Island Scheelite N.L. was taken over by Peko-Wallsend, and appears to be operating successfully, selling ore concentrates containing about 73 per cent tungsten oxide to West Germany for making such things as alloy steels, cutting tools, and electric filaments.

We inspected the open-cut over No. 1 ore-body which has been found to extend out into the sea and will later be mined there. We were told that the rocks in the No. 1 ore-body were middle to upper Cambrian, intruded by Upper Devonian granite stock, bearing tin and tungsten. We were shown samples of the scheelite rock fluorescing under ultra-violet light and later, on the new breakwater, we were able to obtain rock samples.

Plate 7

A young Short-tailed Shearwater (Mutton Bird).

Plate 8

No. 1 Ore body — Grassy scheelite mine.

After lunch by the wayside near Mt. Stanley, 550 feet, the highest point in the island, Mr. Paul Barnett led us into a fern gully where we saw *Aristotelia pedunculata*, a member of the *Eleocarpus* family which is represented in Tasmania but not in Victoria. A television aerial has recently been erected on Mt. Stanley and King Islanders can now obtain their programs from Launceston.

From the S.E. end of King Island, the islands of the Hunter Group and Three Hummock Island were clearly visible. Numerous other rocks and outlying reefs a mile or more from the shoreline were visible because of breakers, and it was not difficult to realize why the water around King Island should prove so treacherous to shipping.

Our return party of 34 members almost filled the Fokker-Friendship airplane which took 50 minutes to convey us from King Island to Tullamarine.

Conclusion

The first sentence of the 1887 expedition report, published in the *Victorian Naturalist*, Vol. IV, No. 9, January, 1888, seems appropriate to conclude a report of the 1972 excursion . . . "It is a matter for congratulation to all concerned that the expedition was a complete success".

Appended is a list of 54 species of birds observed during the visit, 31 March to 3 April, 1972, supplied by Miss D. Dawson.

A complete list of Birds of King Island by R. H. Green and A. M. McGarvie is available from the records of the Queen Victoria Museum, Launceston, No. 40.

In order that the account of this visit may be of some value to other intending visitors, a list of plants has been supplied by Mr. Ian Cameron, former President of the F.N.C.V. of King Island and now a member of the Melbourne Club. This list will be published in the October issue of the *Victorian Naturalist*.

Appendix

Birds Observed at King Island, 31 March to 3 April, 1972

Brush Bronzewing
Little Pied Cormorant
Black Cormorant
Australian Gannet
Silver Gull
Pacific Gull
Spur-wing Plover
White-faced Heron
Black Swan
White-breasted Sea Eagles
White-breasted Sea Eagles' Nests
Brown Hawk
Nankeen Kestrel
Green Rosella*
Fantail Cuckoo
Welcome Swallow
Grey Fantail
Dusky Robin*
Golden Whistler
Grey Shrike Thrush
White-fronted Chat
Tasmanian Thornbill (ewingii)*
Brown Thornbill
Blue Wren
Silvereye
Strong-billed Honeyeater*
Yellow-throated Honeyeater*
Crescent Honeyeater
Yellow-winged Honeyeater
Pipit
White-backed Magpie (introduced from Victoria)
Double-banded Dotterel
Musk Duck
Swamp Harrier
Spine-tail Swift
Pallid Cuckoo
Flame Robin
Olive Whistler
Black Currawong*
Little Raven
Brown Scrub Wren*
Eastern Swamphen
Crested Tern
Short-tailed Shearwater
Ground Thrush
Little Penguin
White-breasted Cormorant

Introduced foreign species

Blackbird
House Sparrow
Goldfinch
Starling
Pheasant
Californian Quail
Greenfinch
Skylark

* Tasmanian endemic species.

The Wildlife of Westernport

by W. Davis

The following is part of an address delivered on the subject of Westernport by Mr. W. Davis.

Before mentioning the features of this giant wildlife nursery we must bear in mind that Westernport is the largest estuarine ecosystem existing along the Victorian coastline. It has a very delicate ecological balance about which little is known. Ecology is the study of the intricate relationships existing between all living things and the environment. Living things, of course, include mankind. Man, whether he likes it or not, is part of nature's social union, subject to nature's laws, part of a huge global ecosystem. Man, for the first time in his relatively short history has the capacity per media of his technology to alter or destroy his own environment. This must result in the eventual breakdown of the life support systems of space ship earth — clean air, clean water and uncontaminated food.

Returning to Westernport, we find that the mudflats, mangroves and saltmarshes teem with minute animal and plant life. Microscopic diatoms and alga provide the beginning of a basic food chain which supports juvenile fish, crustacea, wading birds, waterfowl, penguins and seals. Most of our commercially important species of fish, shell fish and crustacea, as well as game fish start their lives at the very meeting point between land and sea in esturine ecosystems. Many of them spend most of their life cycles in these waters. Victoria has few such fish nurseries, and none of the size of Westernport. Destruction of marshlands in San Francisco Bay, U.S.A., caused such dire depletion of fish and wildlife that authorities had to embark on a most expensive program to restore them.

Closer to home at Myall lakes in New South Wales it has been estimated that ninety per cent of common fish caught between Stockton Bight and Kempsey commenced their life cycle within the lake system. It is therefore obvious that Westernport is of vital importance to the fishing industry and thus to Melbourne man, the final recipient of the food chain started in the mangroves.

The diversity of fish species inhabiting the bay is well known. Several species of shell fish previously unknown to science were recently discovered. Great potential exists for further such discoveries. Many streams draining into the bay between Hastings and Tooradin contain a rare species of Native Trout.

Victoria's only species of Mangrove, commonly called the White Mangrove enjoys its greatest development in the sheltered North Western corner of Westernport. Twelve and a half miles of this foreshore are now zoned industrial. The species is almost extinct in polluted Port Phillip Bay. A small surviving pocket at Barwon Heads may also suffer similar fate. Westernport could well become the Western range limit of this fascinating mangrove — saltmarsh — mudflat association. These plant communities are particularly sensitive to oil, chemical and therminal pollution.

Other botanical features worthy of special mention are the magnificent stands of *Banksias* and other typical coastal plant habitats at Sandy Point and Hans Inlet. This vast area is one of the few viable conservation units left on the Mornington peninsula. It is one mile from the 17,000 acres allotted to industry. Native plants are abundant throughout the Westernport. Several orchids, namely the Duck Orchid, Scented Leak Orchid and Onion Orchid are common, although rare elsewhere.

The region also carries many fascinating marsupials. Sandy Point supports tremendous populations of Black Tailed Wallabies, Ring-tail and Brush-tailed Possums. The tiny New Holland Mouse was thought extinct in Victoria until recently rediscovered at Tyabb, almost at the centre of the area proposed for industry. Primitive Quail Island has large numbers of Echidnas. This wildlife sanctuary adjoins the industrial estate. French Island has excellent habitat for Potoroos, and many communities of this marsupial occur there. Phillip Island is world famous for its Koalas, Mutton Birds, Seals, and unique evening Penguin parades. It is only nine miles from the breeding burrows of Penguins and Mutton Birds and the Seal colony on Seal Rocks to industrial areas! As industry expands, ship traffic must increase, and so the threat of oil spillage grows.

Considerable research in the region has been directed towards the avifauna. The Victorian Ornithological Research Group has had four survey and bird banding teams active since 1962. Combined with work by other observers, a total list of over 220 species has been compiled. The exact status of most of these is known and documented. The mangroves and marshes provide haven and home for shy Crakes, Rails, Bitterns and Snipe. The adjoining mudflats are feeding grounds for Ibis, Spoonbills, Egrets, Herons and migratory wading birds. Swans, Pelicans and Cormorants feed offshore. Terns, Gulls, Gannets and Albatross ply the bay waters. Four major breeding rookeries of Ibis, Spoonbill and Cormorants are known to exist. The Rhyll swamp on Phillip Island is seven miles from industry! Little Heifer swamp on French Island last year supported over 1,000 breeding pairs of Ibis, our greatest allies in agricultural pest control. This and numerous other swamps are a mere five miles from industry, and directly in the path of any development that may be considered for the area. Two breeding colonies of Pelicans, an endangered species, are known. French Island has the last remaining primitive areas of swamps, marsh and heathlands close to Melbourne. Much is yet to be learnt of its natural history.

The unique man-made Coolart Lagoon is less than two miles from the new industrial boundaries. The preservation of this bird sanctuary is imperative and presents a real challenge to planners. Other species rarely seen near the city, yet occurring at Westernport, include the King Quail, Blue Billed Duck, Southern Emu Wren, Royal Spoonbill, Brush Bronze Wing, Eastern Curlew and Green Shank.

It is inconceivable that this varied array of flora and fauna, and indeed the whole ecosystem should be threatened. If industrial development is not immediately frozen, this will happen. The fracturing of just one link in the food chain could result in the collapse of the web of life in this area. Without doubt the greatest initial threat is water pollution. Hydraulic equalibrium studies carried out by Monash University indicate the bay is tremendously pollution prone. Effluent discharged at the Northern industrial zone would travel no more than four or five miles on the ebb tide before

being returned almost to the point of discharge on the flow tide. On this basis it is estimated it would take six weeks for the pollutants to reach the open sea. Even experts can only ponder the effect on the wildlife of a stagnant industrial soup, or accidental oil spillage.

It is also worthy of note that mangroves act as important accumulators of fine sediments and thus form a natural barrier against storms, thereby assisting in the stabilising of tidal flows. It may well be that the removal of this natural barrier at Westernport will cause silting up of the deep water channel eventually reducing its usefulness for shipping.

Towards the end of 1971 three crucial events occurred, each having a profound effect on the region and its natural resources. On 29 October the announcement of a complete environmental study costing one million dollars, and taking two to five years to complete, was greeted with great enthusiasm. This is indeed a first for Australia, and it appeared that some sanity had prevailed in government thinking. However it soon became apparent that development would not be curtailed during the survey period. Confirmation of these fears came on the 17 November when the Westernport Regional Planning Authority granted a permit to the Independent Oil Company for yet another refinery, before the environmental study had even begun.

On Friday 10 December the complete hypocrisy of the government was exposed when the Authority calmly announced it was zoning 17,000 acres or 27 square miles to heavy industry and port installations. Consider this area — larger than the entire City of Altona, and almost the size of the City of Sunshine. There was only passing reference to French Island, although weeks earlier on 18 November the Minister for Local Government was quoted in the *Age* as saying, "The government believes there is a case for developing part of French Island as an industrial estate while preserving the remainder."

To my mind, those of us who pass through life with an active interest in natural history, occupy a privileged position. We are the custodians of our wildlife heritage. I consider this position of privilege carries a very real moral obligation to protect the creatures we profess to love. They cannot withstand the impact of man and his technology alone. They have few allies. It is up to us as naturalists to ensure if possible, that not one more species disappears from this earth. We must adjust our priorities accordingly. We must redefine progress in more humane terms and not in terms of gross national product. We must abolish as soon as possible, our bulldozer mentality of rapid exploitation of our environment for short term economic gain, at the expense of irreplaceable natural resources. It is indeed appalling to think on the crimes against the environment that are perpetrated in the convenient name of progress. Westernport may yet be one of them.

I should like to close by restating the position of the Save Westernport Coalition, and hopefully of all naturalists. We hereby call on the government to implement an immediate freeze on any further development at Westernport until the environmental study is complete, no matter how long this takes; and the results made public.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Nature Notes from the Gold Coast

by

A. N. Burns

The whole of July up to the 22nd has been fine, dry, and sunny, with nightly temperatures from 4 to 5 degrees below the normal average for the month. Despite these conditions, many plants and insects are already showing indications that spring is well on the way. Native epiphytal Orchids growing in the garden are showing flower spikes and even buds; this applies particularly to the Northern Rock Lily (*Dendrobium fusiforme*), the Golden Orchid (*Dendrobium undulatum*), and the large terrestrial Swamp Orchid which used to be under the name of *Phaius grandifolius*. Last year some of the flower spikes of the latter set seed capsules, and from these, in the last three or four weeks numerous small seedlings are appearing in the *Cymbidium* pots and boxes. These are situated from 25 to 40 feet away. Rock Lily Orchids (*Dendrobium speciosum*) both in the garden and in their natural haunts are showing flower spikes up to 3 inches in length. The coming season promises well for a show of wild flowers. At present, the Sarsaparilla (*Hardenbergia monophylla*) is in full flower making a fine display in some of the open forest areas; and several of the Bottle Brushes (*Callistemon* spp.) are in full bloom. To these flowers, and also to the orange-apricot flowers of the *Browallia* in gardens, are attracted at least two species of Honeyeaters. Currawongs are becoming active, and may be heard in the mornings and late afternoons as they congregate in the areas where they nest. Magpies and Butcher birds, too, are engaging in nesting activities. Each spring, in a group of large Box trees (*Tristania conferta*) growing in a gully at a bend of the road facing the Burleigh National Park, several pairs of Crows nest and produce young. The last week their raucous "carking" has been heard, so they will be round for some weeks to come. Is it usual for Crows to nest within 300 yards of the open ocean?

The last week has brought an abundance of Fireflies (small beetles belonging to the Coleopterous family *Lampyridae* in the rain forest areas. These beautiful little creatures fly only from actual dusk until about 8 p.m. A few specimens occur in the fringes of the rain forest, but as one penetrates to a depth of 50 feet or more, so the numbers increase, but only in localised patches. The production of light without heat is indeed interesting; the process involved, I believe, being due to the oxidation of a substance Luciferin to Luciferase. The light emitted by these beetles is flashed intermittently only, but in fairly regular rhythm. Adult short horned Grasshoppers (Acrididae-Orthoptera) are still present in gardens, but are far more numerous amongst the low bushland skirting the actual seashore. Nearing the end of July these insects are finished and the young nymphs do not normally appear in numbers until September. The common rain forest Jumper ant (*Promyrmecia nigrocincta*) is now enlarging the entrances to its nests and lowering the perimeters, a sure indication of the approach of warmer and drier weather. This week several freshly emerged specimens of the Green Awl Skipper Butterfly (*Hasora discolor mastusia* Fruhs.) have ap-

peared visiting the flowers of the Lantana and garden orange flowered Buddleyia. These large and pretty skippers are usually one of the first spring butterflies to appear. Their larvae feed on Match Box Bean, a rain forest climber which has pendulous rosettes of lemon coloured pea-shaped flowers: each rosette being suspended by a long thin stem.

Vale — William Giles

The death of William Giles, naturalist and orchardist of Springside, under the lea of Mt. Canobolas near Orange, N.S.W., has removed one of the most colourful and knowledgeable plant lovers of the central-west of N.S.W. from the scene of life. Right throughout his life "Bill" Giles, as he was universally known, showed keen interest in all forms of plant life, and the experiments he conducted at *Springside*, particularly with the genus *Eucalyptus* were of inestimable value to landowners and gardeners in the really cold areas of this State. His spirit of cooperation with fellow workers was well to the fore throughout his life. Although he published few notes on natural history, his methodical notes and records on the germination, growth and distribution of plants of the subalpine areas of this State, coloured and enriched the works of many writers throughout Australia.

I well remember his words of wisdom on the testing and growing of *Eucalyptus* spp. on the formerly bare and windswept hillside at Springside. He said ". . . unless a species is able to withstand conditions here without coddling, it is of little use to landowners of the cold and almost treeless farmlands of the State's highlands". That he was able to successfully test and acclimatise so many plants on his windy hillside was a tribute to his courage and the unerring plant sense that was inbuilt in his nature.

One of the early members and supporters of Burrendong Arboretum, his yearly donations of plants, cuttings and seeds will be sadly missed in the years ahead as well as his sage advice and comments on plans and layout of the giant scheme. Besides becoming somewhat of an authority of the genus *Eucalyptus* in the central-west, William Giles was keenly interested in the terrestial orchids of the area. He, ably assisted by his sister, Madge, and brother, Fred, was responsible for many new records for the areas stretching from Wellington to the Blue Mountains. He also first brought to my notice the presence of a *Prostanthera*, still unnamed, from Devil's Hole, Mt. Canobolas. It would be a fitting tribute to his work and life if, during the current revision of the genus this species was named in his honour.

William Giles was born at Springside on 19 July 1901 and died at his home there on 10 June 1972, just over a month short of his 71st birthday. For the last twenty years of his life, "Bill" Giles bore with great courage and fortitude an affiliction that would have written finish to the life of many a stronger man. Cremation took place on Tuesday 13 June at Orange Crematorium. The service was attended by relatives, friends and a wide circle of naturalists from the central-west and Blue Mountains of N.S.W. Many members of Bathurst Field Naturalists' Society made the journey to pay homage to one who had contributed so much to the Society of which he had been a member since its inception.

G. W. ALTHOFER,
Director, Burrendong Arboretum.

The Pollination of *Prasophyllum alpinum* R.Br.

by David L. Jones*

Prasophyllum alpinum, as its name suggests, is a highland orchid not occurring below 4500′ altitude. It is found in the grassy sub-alpine meadows of Tasmania, Victoria and south-eastern N.S.W., flowering from January to March and is often locally abundant. It is not an especially conspicuous species, growing as it does in grassy areas and having slender spikes of green to reddish flowers. Plants do, however, possess a very pleasant and easily distinguishable fragrance which readily diffuses into the air on a warm day.

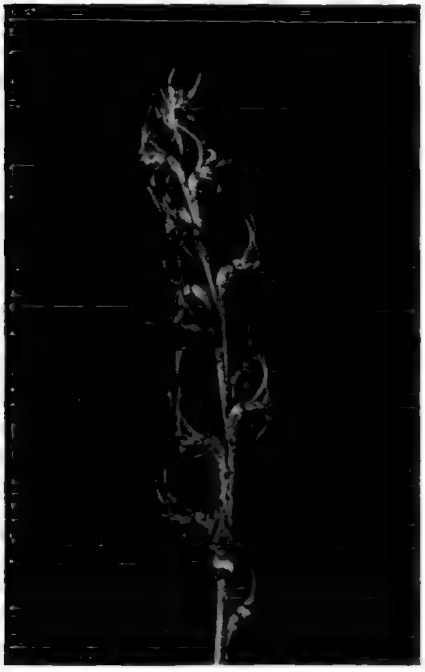


Plate 1
Prasophyllum alpinum from Rocky Plain.
Photo: E. R. Rotherham.

Nothing has so far been reported on the pollination of *Prasophyllum alpinum*, although its abundance plus the large number of swollen ovaries one sees after flowering testify to a very efficient mechanism. Insect attraction is by means of the perfume and rewards are provided in the form of copious nectar exuded from the callus plate of the labellum. Massing of flowers along the spike also contributes to the pollination process but only at close range.

I have extensively studied the species over a number of years in Victoria, in areas such as the Baw Baws, Bogong High Plains and alpine meadows to the west of Wulgulmerang. In the early stages the large number of swollen ovaries after anthesis led me to conclude that the species was self pollinating. My views were changed later, however, following further research on the Bogong High Plains which showed pollen on the stigmas of flowers with intact anthers. This pollen could only have been deposited by insect action; however it was not until recently that I was able to observe the pollination process in the field.

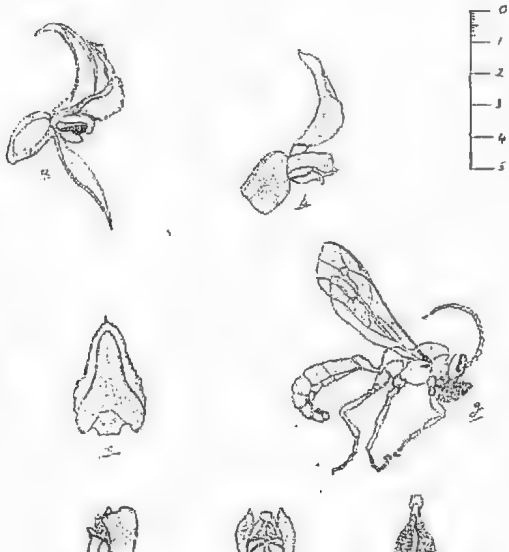
The venue was Rocky Plain near Wulgulmerang in late January 1972. The temperature was in the low 80's with little wind and the *Prasophyllums* were in abundance. In the company of John Fanning, I was checking the variability of the species when a large colourful Ichneumon wasp was observed working a spike of the orchid. Closer examination revealed a bunch of bright yellow pollinaria hanging

*2 Kathleen Close, Bayswater, Vic.

near the mouthparts. The insect was kept under observation for a while, but neatly avoided capture. Its appearance injected extra enthusiasm into the morning and the next two hours were spent actively studying all leek-orchids in the area. Six more specimens of the pollinator were seen, three of which were captured. As well, five other insects were seen feeding on the nectar of the flowers. These included a small brilliant green Chrysomelid Beetle (*Edusella tridens*), two Dipterans and a Honey Bee. None was considered to be of any importance in the pollination of *Prasophyllum alpinum*, although the Honey Bee was observed to pick up a pollinarium on the mouthparts. A surprising discovery was the presence of Black Jumper ants (*Myrmecia pilosula*) on the inflorescences of the orchid. These were quite common and fed avidly on the nectar secreted by the labellum. Pollinaria were picked up on the jaws but were wiped off on various parts of the plant. A second reddish species of ant about ¼" long was also observed to feed on the nectar.

All three specimens of the pollinator were identified by Dr E. F. Riek of CSIRO as males of the Ichneumon Wasp (*Pterocormus promissorius*), family Ichneumonidae, subfamily Ichneumoninae. This is a very common insect that is widespread throughout Australia. It is about ½" long and is black with handsome stripes of white and orange. The females parasitize the larva of Noctuid and other moths. It is a very hardy insect that may be abundant during summer in sub-alpine regions. Little is known of

Figure 1



(a) longitudinal section of flower 5x indicated scale
(b) column and labellum from side 7x indicated scale
(c) labellum from front 7x indicated scale
(d) column from side 10x indicated scale
(e) column from below 10x indicated scale
(f) pollinarium 10x indicated scale
(g) Pterocormus promissorius 4x indicated scale

the feeding habits but it would seem that the males at least are attracted to nectar secreted by flowers.

The insects' behaviour on the inflorescences was interesting and illustrated the method of attraction employed by the orchid. Flight to the flowers was into the wind as if following a perfume trail. The insect usually landed on the lowest flowers and worked up the spike in a spiral manner. Only a few flowers on each spike were examined in detail and it appears that these were at the most attractive stage. The insect worked the spike head uppermost and probed along the labellum to the base of the attractive flowers, spending quite a time in each. Pollinaria were picked up on the mouthparts and the underside of the head. When the orchids were growing in groups the wasp flew from spike to spike, working each systematically before flying to the next. No deposition of pollen was observed; however, this could not be easily seen because of the ventral siting of the pollinaria.

It was quite noticeable that the insects' activity increased during lulls in the breeze. In these quiet spells the temperature seemed to climb quite rapidly and the perfume of the orchids became very obvious.

Prasophyllum alpinum impresses me with its very efficient pollination mechanism; in fact, apart from autogamous species it is one of the most efficient Australian orchids studied. To gain a quantitative measure of this efficiency, 160 flowers, randomly sampled from Rocky Plain, were examined microscopically. Of these 8 per cent had the pollinarium removed from the anther sac, while 77 per cent had been pollinated. Comparable figures for many other species of *Prasophyllum* are less than 20 per cent.

The microscopic study also provided some valuable details about the mechanics of the orchids' pollination. Of the 120 flowers pollinated, only 15 per cent had a whole pollinarium deposited on the stigma. The remainder (some 85 per cent) had only a few grains adhering to the stigma indicating that a pollinarium had made contact with the stigma but had then been withdrawn by the insect, leaving some grains behind. This reveals the key to the insect's efficiency, for it is large relative to the flower and thus cannot penetrate to any depth, except with its mouthparts. While the insect is seeking nectar the pollinaria hang in a perfect position to brush the stigma of the flower being visited. Examination of pollinaria attached to the insect showed many to be in a state of disorder consistent with the above results.

The development of the ovary in this species is very interesting, and led me to believe for some time that the orchid was self pollinating. For a period after anthesis virtually every ovary swells and appears as if it will produce seed. About three weeks after flowering, however, it is noticeable that some ovaries are shiny, swollen, and turgid, while others are dull and not as swollen. The latter are flat when squeezed and are the ovaries of unfertilized flowers. The turgid ovaries are rigid and arise from flowers that have been pollinated. The early growth of the ovaries of infertile flowers is probably the result of hormonal levels within the plant. Growth of fertile ovaries is maintained by hormones produced as a result of the development of fertilized embryos and these outstrip the sterile ovaries after about two weeks.

An experiment was set up to verify the various findings and to test the relative efficiency of deposition of the whole pollinarium compared with a few grains. Flowers of potted plants

were variously treated to give all possible combinations. Treatments and results are presented in the accompanying Table. Without exception they verify and add to those obtained in the field. The experiment shows that flowers of *Prasophyllum alpinum* are self-fertile and will mature seeds if pollinated with their own pollen. Most significantly, ovaries of flowers pollinated by a whole pollinarium produced approximately twice the quantity of seed (as measured by weight) than ovaries of flowers pollinated by a few grains. This is probably an expected result, because it shows that more embryos are fertilized in each ovary if more pollen grains are available. It does indicate, however, that the orchid has not based its efficiency on whole pollinium deposition as have many other species, but rather has spread its resources widely. This reduces the effectiveness of each ovary, for it is not producing viable seeds at its maximum capacity; however, it does ensure a spread of the genetic resources of the pollen and may account for the amazing floral variation found in the species.

TABLE 1

Treatment	If ovary swollen in first 7 days	If swollen after 21 days	Average weight of seed produced
Anther intact, stigma unpollinated	+	—	nil
Pollinia removed, stigma unpollinated	+	—	nil
Pollinia removed, stigma pollinated:—			
by own pollen (i) whole pollinarium	+	+	6.4 mgm
by own pollen (ii) pollinarium brushed on	+	+	2.9 mgm
by other flowers pollen (i) whole pollinarium	+	+	5.7 mgm
by other flowers pollen (ii) pollinarium brushed on	+	+	3.1 mgm

Letter to "Durran Durra"

In the July issue of the *Victorian Naturalist*, an article appeared in "Overheard in the Bushes" under the nom-de-plume of Durran Durra. Among other things a question was posed, "Is it really true that the Entomology and Marine Biology Groups have not had a field survey for over one year?" The inference here is that at one time this Group held field surveys. This is incorrect. The Marine Biology and Entomology Group has never since its re-inception in the 1950's, conducted a field survey. Surely it is important that any article appearing in our Journal should be factually correct, and even more important if it is an article written by someone using a nom-de-plume.

J. STRONG,
Hon. Secretary,
Marine Biology and
Entomology Group.

Notice to Country Clubs

It is proposed that the names and addresses of the Presidents and Secretaries of all F.N.C.'s should appear in the *Victorian Naturalist*. It would therefore be appreciated if these could be lodged with the F.N.C.V. Secretary when convenient.

A Visit to East Sister Island, Tasmania

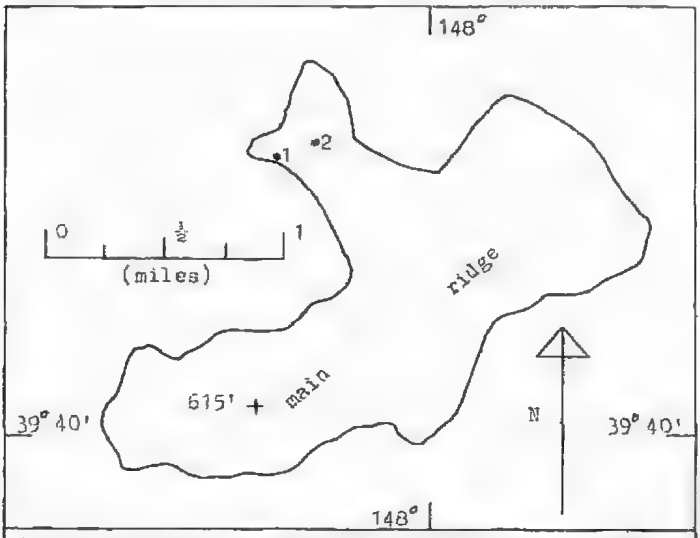
by J. S. WHINRAY†

The Furneaux Group is situated in the south eastern part of Bass Strait and East Sister is the northernmost island of the Group. It lies about five miles north east of the North Point of Flinders Island and is about 1,000 acres in area. The main part of East Sister is a high granite ridge which is two and a half miles long and has a summit 615 feet high. A sloping point juts out for about three-quarters of a mile from the north western side of the main ridge (see Figure 1). The landing place, sheepyards, shearing shed and hut are situated on this point. Only sheep are grazed on the island which is leased from the Tasmanian Lands Department. The pasture of the island is maintained by periodic burning. I saw most of the island before and just after the burn of February 1967 when about eighty per cent of the main ridge was burned black. The most recent firing was in the late Summer of 1972[1]. All my sightings and collections mentioned below were made during a visit on 7 December 1966.

PLANTS

I landed on the western side of the sloping point at the landing place near the yards and buildings (see Figure 1). Collecting started just in from high water level. The shrubs here were the coastal species White Correa *Correa alba*, Coast Everlasting *Helichrysum paralium*, Boobialla *Myoporum insulare*, Seaberry Saltbush *Rhagodia baccata* and Coast Beardheath *Leucopogon parviflorus*. Many native and

†Flinders Island, Tasmania, 7255.



1-Landing place, sheepyards and buildings. 2-Rise east north east of the landing place.

Figure 1

Locality plan of East Sister Island.

introduced herbs were found here amongst the fairly open scrub. Some of the native herbs were Prickly Speargrass *Stipa teretifolia*, Angled Lobelia *Lobelia alata*, Coast Colobanth *Colobanthus apetalus*, Knobby Clubrush *Scirpus nodosus* and Kidney Weed *Dichondra repens*. The introduced species included Buckshorn Plantain **Plantago coronopus*, and the grasses Soft Brome **Bromus mollis*, Giant Brome **Bromus diandrus* and Silvery Hairgrass **Aira caryophyllea*.

Three native herbs were then found in crevices of the coastal granite at the landing place. They were Sea Celery *Apium prostratum*, Beaded Glasswort *Salicornia quinqueflora* and Coast Goosefoot *Chenopodium glaucum* ssp. *ambiguum*. Three other native herbs grew in damp crevices a few yards in from the coast. They were Waterbuttons *Cotula coronopifolia*, Coast Cotula *Cotula vulgaris* var *australasica* and a Clubrush *Scirpus antarcticus*.

The plants noticed in the sheepyards just in from the landing place were mainly introduced weeds. They included Common Orache **Atriplex hastata*, New Zealand Spinach *Tetragonia tetragonoides*, Toad Rush *Juncus bufonius*, Scarlet Pimpernel **Anagallis arvensis*, Stiff Ryegrass **Lolium loliaceum* and Smallflower Mallow **Malva parviflora*.

From the sheepyards I walked through the pasture to the small rise east north east of the landing place (see Figure 1). Species noticed in the pasture were Climbing Lignum *Muehlenbeckia adpressa*, Jersey Cudweed *Gnaphalium luteo-album*, Hares Tail **Lagurus ovatus*, Rats-tail Fescue **Vulpia myuros* and Fireweed Groundsel *Senecio linearifolius*.

The granite outcrops at the summit of the small rise were surrounded by shrubs. Three of these were the same as those found earlier at the coast and were Coast Everlasting *Helichrysum paralium*, Boobialla *Myoporum insulare* and Coast Beardheath *Leucopogon parviflorus*. The other shrubs were Coast Teatree *Leptospermum laevigatum*, Dusty Daisybush *Olearia phlogopappa*, Sea Box *Alyxia buxifolia*, Dogwood *Pomaderris apetala*, Green Common Correa *Correa reflexa*, Spicy Everlasting *Helichrysum argophyllum* and the heath *Cyathodes juniperina* var. *oxycedrus*. Of the latter species the Spicy Everlasting does not occur further south in Tasmania than on the Bass Strait islands. It was flowering and my collection was the fifth or sixth locality record of this species for Tasmania. The herbs recorded in this scrub patch were Shorthair Plumegrass *Dichelachne crinita*, Coast Swordsedge *Lepidosperma gladiatum*, Tussock Grass *Poa labillardieri* and Scrub Nettle *Urtica incisa*.

From this rise I could see a large patch of Coast Daisybush *Olearia axillaris* on the southern side of the point near where it joined the main ridge. As well, all the north western side of the main ridge could be seen from here. Right along this side were patches of tall Drooping Sheoke *Casuarina stricta* surrounded by low scrub. Tussock Grass grew between the patches. The vegetation of south eastern side of the main ridge was quite different from this. When approaching the island I could see from the boat about two-thirds of the south eastern side. It had no shrubs or trees and seemed to carry Tussock Grass or some other low vegetation.

The walk back to the coast was through a different part of the pasture. Species noticed in it were Spear Grass *Stipa compacta*, Squirrel-tail Fescue **Vulpia bromoides*, Rats-tail Fescue **Vulpia myuros*, Winged Slender Thistle **Carduus tenuiflorus*, Spear

*An asterisk denotes introduced plant species.

Thistle **Cirsium vulgare* and Blown Grass *Agrostis avenacea*.

Finally a different part of the coast was visited a little south east of the landing place. Here were found Sea Box *Alyxia buxifolia*, Large Quaking-grass **Briza maxima* and, in a damp area, the small Swamp Cotula *Cotula reptans*.

Altogether sixty-seven plant species were recorded during my two hours on the island and a list is given as Appendix 1.

Fauna

The Red-bellied Pademelon or "Wallaby"† *Thylogale billardieri* was recorded for the island as early as 1928[2]. Two specimens of this species from East Sister were lodged at the Australian Museum, Sydney, in October 1929; They are AM M4782 and M4783 (skulls and skins)[3]. Two other specimens of this species from East Sister are held at the South Australian Museum, Adelaide. They are SAM M2870 (skull and skin) collected in October 1929 and M3553 (skull only) collected in January 1930[4]. These seem to be the only mammal specimens from East Sister in Museum collections. Pademelons were common on the island at the time of my visit.

Two smaller marsupial species were introduced to East Sister by the late Mr. George Blyth, a former leaseholder. The Brushtail Possum *Trichosurus vulpecula* was introduced from Flinders Island in the 1920's and the White-footed Sminthopsis or "Shrew Mouse" *Sminthopsis leucopus* was introduced from nearby West Sister Island in the 1920's or 1930's[1]. The present leaseholder, Mr. A. E. Blyth, noticed that both these introduced species were present still when he paid his last visit to the island in December 1966[1].

†Names in inverted commas are local common names.

The House Mouse *Mus musculus* and the Feral Cat *Felis catus* are common on the island[1]. Three spare cats were shipped out from Flinders Island and released during my visit.

Black Tiger Snakes or "Black Snakes" *Notechis ater* and Whitelipped or "Green" Snakes *Denisonia coronoides* occur on the island[1] but I saw none during my visit. However I collected a Bluetongue Lizard *Tiliqua nigrolutea* and lodged it at the National Museum of Victoria. As well, two White's Skinks *Egernia whitii* were seen in coastal scrub near the landing place. Other skink species should occur on the island, as five species have been collected on nearby West Sister Island[5].

There was no time for bird watching during my visit. However there are a number of small rookeries of the Short-tailed Shearwater or "Muttonbird" *Puffinus tenuirostris* on the island[1].

Acknowledgements

Miss M. A. Todd, National Herbarium of Victoria, determined nine East Sister plant specimens (the difficult ones). Mr. A. E. Blyth supplied much useful information about the island.

References

1. Information supplied by the present leaseholder, Mr. A. E. Blyth, Emita, Flinders Island, Tasmania. Mr. Blyth's brother, George, was the previous leaseholder of the island.
2. Scott, Thomas. *Account of the . . . Furneaux Islands . . . 1828*. Manuscript A606 held at the Mitchell Library, Sydney.
3. Information supplied by Mr. B. J. Marlow, Curator of Mammals, The Australian Museum, Sydney.
4. Information supplied by Mr. P. F. Aitken, Curator of Mammals, The South Australian Museum, Adelaide.
5. *Victorian Naturalist* 89: (1) pp. 8-9, January 1972.

Appendix 1

List of Plants of East Sister Island, 1966

An asterisk marks an introduced species. Species lodged at the University of Tasmania Herbarium are marked h and those lodged at the National Herbarium of Victoria are marked m.

Monocotyledons

POACEAE

h**Vulpia bromoides*
Squirrel-tail Fescue
h**Vulpia myuros*
Rats-tail Fescue
**Bromus diandrus*
Giant Brome
**Bromus mollis*
Soft Brome
**Briza maxima*
Large Quaking-grass
m**Koeleria phleoides*
Annual Cats-tail
hm *Poa labillardieri*
Tussock Grass
**Polypogon monspeliensis*
Annual Beard-grass
h *Agrostis avenacea*
Blown Grass
**Lagurus ovatus*
Hares Tail
h *Dichelachne crinita*
Short-hair Plume-grass
m *Stipa compacta*
Spear Grass
Stipa teretifolia
Prickly Spear-grass
**Aira caryophyllea*
Silvery Hair-grass
m**Lolium loliaceum*
Stiff Rye-grass
h**Hordeum leporinum*
Barley-grass

CYPERACEAE

hm *Scirpus antarcticus*
Clubrush
Scirpus nodosus
Knobby Clubrush
Lepidosperma gladiatum
Coast swordsedge

JUNCACEAE

h *Juncus bufonius*
Toad Rush

Dicotyledons

CASUARINACEAE

Casuarina stricta
Drooping Sheoke

URTICACEAE

Urtica incisa
Scrub Nettle

POLYGONACEAE

Muehlenbeckia adpressa
Climbing Lignum
h *Rumex brownii*
Swamp Dock

CHENOPODIACEAE

h**Atriplex hastata*
Common Orache
Rhagodia baccata
Seaberry Saltbush
h *Chenopodium glaucum* ssp. *ambiguum*
Coast Goose-foot
Salicornia quinqueflora
Beaded Glasswort

AIZOACEAE

Carpobrotus rossii
Karkalla

TETRAGONIACEAE

Tetragonia tetragonoides
New Zealand Spinach

CARYOPHYLLACEAE

Colobanthus apetalus
Coast Colobanth

ROSACEAE

Acaena anserinifolia
Bidgee Widgee

FABACEAE

h**Melilotus indica*
King Island Melilot

GERANIACEAE

m**Geranium rotundifolium*
Roundleaf Cranes-bill

OXALIDACEAE

Oxalis corniculata
Creeping Wood-sorrel

RUTACEAE

Correa alba
White Correa
h *Correa reflexa*
Green Common Correa

RHAMNACEAE

hm *Pomaderris apetala*
Dogwood

MALVACEAE

m**Malva parviflora*
Smallflower Mallow

MYRTACEAE

Leptospermum laevigatum
Coast Teatree

APIACEAE

h *Daucus glochidiatus*
Austral Carrot
Apium prostratum
Sea Celery

EPACRIDACEAE

Leucopogon parviflorus
Coast Beardheath
Cyathodes juniperina var. *oxycedrus*

PRIMULACEAE

**Anagallis arvensis*
Scarlet Pimpernel

GENTIANACEAE

h**Centaurim ?pulchellum*
Centaury

APOCYNACEAE

Alyxia buxifolia
Sea Box

CONVOLVULACEAE

Dichondra repens
Kidney Weed

MYOPORACEAE

Myoporum insulare
Boobialla

PLANTAGINACEAE

Plantago varia
Variable Plantain
**Plantago coronopus*
Buckshorn Plantain

LOBELIACEAE

Lobelia alata
Angled Lobelia

ASTERACEAE

Olearia phlogopappa
Dusty Daisy-bush
Olearia axillaris
Coast Daisy-bush
h *Gnaphalium luteo-album*
Jersey Cudweed
**Gnaphalium candidissimum*
Silver Cudweed
hm *Gnaphalium purpureum*
Purple Cudweed
hm *Helichrysum argophyllum*
Spicy Everlasting
Helichrysum paralium
Coast Everlasting
Cotula coronopifolia
Waterbuttons
h *Cotula reptans*
Swamp Cotula
h *Cotula vulgaris* var. *australasica*
Coast Cotula
Senecio linearifolius
Fireweed Groundsel
h**Cirsium vulgare*
Spear Thistle
h**Carduus tenuiflorus*
Winged Slender Thistle
hm**Hypochaeris glabra*
Smooth Cats-ear
**Sonchus oleraceus*
Common Sow-thistle

Field Naturalists Club of Victoria

General Meeting, 14 August, 1972

The President, Mr. Tom Sault, opened the meeting, and then handed over the chair to Vice-President Mr. Barry Cooper, who is to leave shortly for five years' study at Ohio State University, U.S.A. Mr. Sault said that the Club, and in particular the Hawthorn Junior Group, would miss Barry's energy and enthusiasm, and wished him well on his new venture.

Dr. Alan Parkin was the speaker for the evening; his topic was "The Trees of Northern Australia". Dr. Parkin spoke from first-hand experience of work and extensive travel in the north, and showed an interesting series of his own slides. A vote of thanks was moved by Mr. Ros Garnet.

The presentation of a certificate of Honorary Life Membership was made to Mr. Peter Kelly by the President, in recognition of his long term of service as Club Librarian. In reply, Mr. Kelly said he looked forward to enjoying continuing participation in club activities.

The need for protection for native reptiles in Victoria was raised in General Business, and a motion was passed that the Club make representation to the Chief Secretary, urging the introduction of the necessary legislation to bring this about.

Preparations for this year's Nature Show, to be held in the Camberwell Civic Centre, are well under way, and most Club groups will have exhibits. An appeal was made for helpers to attend during the hours the show is open, and also for setting up and cleaning up afterwards. Show dates this year were to be Sunday 1 to Tuesday 3 September.

The Secretary spoke briefly about activities of the Steering Committee advising on the formation of a naturalists' Statewide co-ordinating body. He announced that a further full meeting of delegates and a social gathering would be held in Balmsdale on 30 September.

Mr. Ros Garnet reported on the work being done in the new Organ Pipes National Park near Sydenham. The Management Committee and volunteers are attempting weed eradication and hope eventually to replant the area with indigenous species. Extra helpers would be very welcome at the week-end working bees. Mr. Garnet also announced that drainage of the Edithvale Swamp had commenced, in spite of reassurances that the area would be preserved as a valuable habitat for swamp birds.

The notice area at the back of the hall was again well filled. A full list of Club correspondence, copies of notices and letters and Council Minutes were on display. The bookstall was also open.

Among member's exhibits on display were fossils from the Bacchus Marsh area, as well as several specimens of garden grown native plants, including a number of *Acacias*.

Day Group Report

July

A sunny morning offset by chilly winds was the weather pattern as nineteen members and one visitor assembled in the drive of the Burnley Horticultural College. Two student guides, Linda and Sue, both good "Field Nats" led us to a classroom that had been placed at our disposal. Large fruits of the North American Osage Orange, *Maclura pomifera*, and some good examples of "bottle gardening" soon became points of interest. After our group meeting and lunch, the Chairman introduced Mr. William Nicholls from the College staff.

Mr. Nicholls took charge from this point. His talk to members covered the history of the College, the scope of the courses, practical work of students both within the College grounds and at research stations at Tatura and Mildura, including work on fruit blocks in these areas. Excellent slides accompanied the talk. The last shown illustrated the magnitude of the cut flower industry and were centred on carnation growing. Mr Nicholls then showed members through the glasshouse displays and propagating rooms. Our Chairman thanked Mr. Nicholls for his informative talk and interesting tour

From then on we were free to inspect the 12 acres of well kept ornamental gardens including fairly recent plantings of Australian native plants. These gardens are open to the public at all times and the Day Group recommend them to other members of our Club. Stop 18 on Tram Route No. 70.

Marine Biology and Entomology Group, 3 July, 1972

The meeting was chaired by Mr. Condon, sixteen members being in attendance. In Mr. J. Strong's absence the minutes were taken by Mrs Zillah Lee. Mr. Peter Kelly reported finding a small sapling of wild cherry that appeared as though chopped through by an axe, but which had actually been the work of a longicorn beetle. Mr. P. Kelly also advised the meeting of his resignation from the position of F.N.C.V. Librarian. Mr. Condon thanked Mr. Kelly on behalf

of the Group for his past services in this office.

The speaker for the meeting was Dr. Brian Smith, who delivered an interesting address on his observations of Westernport Bay; much of which consisted of aerial views from a plane chartered for this purpose. He explained the tide actually observed by the use of float cards showing that polluted water could build up in the northern area as a result of poor ebb flow.

His pictures showed extensive growth of Zostera (eel grass), which would be endangered by pollution, thereby resulting in ecological upset to the bay, as Zostera was important in providing necessary oxygen. Dr. Smith also expressed concern for the mangrove zone which was showing marked decline. Mr. Condron thanked Dr. Smith for this interesting address.

Exhibits: Mr. D. McInnes had two microscopes on the table; under one a sponge showing spicules, and the second showing how spicules build up the wall parts of a sponge. He explained that identification of a sponge is by the kind of spicules, and not the shape of the sponge as silicous and calcarious spicules can be found in sponges of similar shapes.

Mr. B. Condron — an Australian Admiral butterfly larvae, *Vanessa itea*. This was on an introduced stinging nettle.

Marine Biology and Entomology Group,

7 August, 1972

Fifteen members were in attendance at this meeting which was chaired by Mr. Condron. Mr. Leigh Winsor gave a report on the forthcoming Nature Show, and distributed notices giving the times that the show would open and close. A short discussion took place re an article in the July *Naturalist* under the nom-de-plume — "Durran Durrah". The Secretary pointed out that a reference to this group contained, by inference, an incorrect statement. The Secretary was to write to the Editor correcting this. Speaker for the evening was Mr. H. B. Wilson, Senior Entomologist, Plant Research Institute, his subject being Pheromones. He outlined the history of the discovery of these hormonal secretions which were first written about in 1949. Glands were discovered in female Gipsy moths. Thousands of these moths were collected, and an extract made from the glands. This extract was used to attract males who would pick up the scent from half a mile away. Mr. Wilson went on to say that pheromones are found in a wide range of insects, e.g., trail pheromones are given out by ants, so that they can follow one another. A great deal more work is still to be done on this chemical. At the conclusion of this most interesting talk, a vote of thanks was moved by Mr. Peter Kelly

Exhibits: Mr. R. Condron — a caterpillar given to him by Mr. McInnes was parasitized *Diptera* sp. emerging from it. The moth of the larva was of the family Anthelidae.

Mr. McInnes showed, from a sycamore tree, a mass of black insect eggs on an old stocking. Mr. Wilson said that these were probably eggs of a species of fly which was probably harmless.

Mr. Winsor — a parasitic beetle *Myotyphlus jansoni*, Fam. Staphylinidae, the head of which he showed under his microscope. He explained that the tribe Amblyopinini includes beetles that are parasitic on mammals in South America and Australia. *Myotyphlus jansoni* is the only Australian species and has been found in the fur of native *Rattus* sp. in Tasmania and Victoria.

Mr. J. Strong — a wasp Fam. Helovidae. Genus *Monomachus*, taken at Murrumbeena, Vic., in March. He explained that there was not much known about this family. Apparently the specific name of this one was as yet to be decided. This insect has a very long thin gaster, and does not look like a typical wasp. It is parasitic on a fly Fam. Stratiomyidae — Genus *Boreoides*. The adult wasps emerge from the fully grown larvae of the fly.

Mammal Survey Group

The camp at Siberia, by the Murrindindi River, over the week-end of July 29-30 was attended by 18 members of the group. A total of 10 species of wild mammals were trapped or sighted in the area. Trapping captured 22 animals of three native species, while five were seen by spotlight, and two others were seen in

daylight. Eight of the 10 species found during this camp were native mammals —the two introduced species were rabbits, and ferral cats. Strangely a large number of rabbits were spotlighted. Though common enough in farming country it is rare for the group to see them when spotlighting in the bush.

A report on the Siberia camp was given at the monthly meeting of the group at the Rylah Research Centre on Thursday, 3 August, by its chairman, Mr. H. Janssen. As there were several visitors among the 21 people present he also gave a brief outline of the group's working methods in the field. Nine members presented chance sighting reports. Maps were handed out to those who said they would attend the camp at Cape Liptrap on August 26-27. There was discussion on means of cleaning skeletal material collected in the field. The secretary, Mr. G. F. Douglas, gave a brief talk on the statistical information derived from the first three camps at which standard measurements had been taken of all captured animals. Only two species of animals have so far been caught in sufficient numbers to be of any statistical significance. These are the bush rat, *Rattus fuscipes*, and *Antechinus stuartii*. Statistical data has, however, already been collected on a total of 12 species, and is steadily growing in quantity.

Camp sites for September and October will be on the Acheron Way and the Bellerine Peninsula respectively.

Day Group Outing Report

August—

Lovely sunshine enticed 22 members to attend Cheltenham Park. After a short meeting lunch was partaken of and our guide, Mr. Fairhall, with members, strolled through the Park, which is a Nature Reserve. The Park is looking beautiful at this time of the year and many native plants are flowering. To name a few: *Acacia spectabilis* and *A. normallis* excelling, several species of *Grevillea* with *G. rosmarinifolia* and *G. dallachiana* most frequent. Payne's Thryptomene grows in profusion near the War Memorials. Various *Callistemons*, *Banksias*, *Hakeas*, and a big range of *Correas* were inspected.

A few birds, such as Striated Thornbills, Wattle-birds, Tree-creepers were also noted.

Members left the Park about 3.30 p.m. after enjoying a pleasant and interesting afternoon.

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 Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Mammal Survey: Mr. G. F. DOUGLAS, "Knotanoll", Riddell's Creek 3431 (054-285191)

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 1972.

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

GENERAL MEETINGS

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

Subject for evening — "The Natural History of the Murray River tract between Mildura and Renmark": Edmund D. Gill.

New Members:

Ordinary:

Mrs. Esme W. Dunnell, 36 Bronte Ave., Burwood, 3125.
Mr. Arnold Ian Dunlop, 222 Patterson Road, Moorabbin, 3189.
Mr. Richard Forse, 44 Dunloe Ave., Box Hill North, 3129.
Miss Margaret Griffiths, 94 Doncaster Road, North Balwyn, 3104.
Mr. Mart Hogel, 5 Buxton Road, Mitcham, 3132
Mrs. Margaret Huiskamp, 236 Old Eltham Road, Lower Plenty, 3093.
Miss Lynne King-Smith, 26 Manoon Road, Clayton, 3169.
Miss Margaret A. MacEwan, 9 Stanhope Grove, Camberwell, 3124.
Miss J. I. Webb, 2/551 Toorak Road, Toorak, 3142.

Joint:

Dr. and Mrs. R. B. Johns, 19 Kawarren Street, North Balwyn, 3104.
Mr. and Mrs. D. Moynihan, 25 Hume Street, Briar Hill, 3088.

Junior:

Adrian Kelly, 9 Foden Street, West Brunswick, 3055.

Country:

Mr. Barry J. Cooper, Nhill High School, Nhill, 3418.
Mr. John R. Curr, P.O. Box 471, Robinvale

GROUP MEETINGS

(To be held in National Herbarium at 8 p.m. unless otherwise stated.)

Thursday, 12 October — Botany Group: Dr. Gretna West: "The Invasion of Victorian forests by *Phytophthora cinnamomi*."

Thursday, 19 October — Day Group: Warringal Park, Heidelberg. Meet at 11.30 a.m. on east side of Heidelberg Station. Bring lunch. Members of Warringal Conservation Group will join us.

Thursday, 26 October — Field Survey Group meeting at 8 p.m. in Conference Room, Nat. Mus. Vict.

Wednesday, 1 November — Geology Group meeting.

Thursday, 2 November — M.S.G. (F.N.C.V.) meeting in Arthur Rylah Inst., 123 Brown St., Heidelberg, at 8.00 p.m.

Monday, 6 November — Marine Biology and Entomology Group meeting.

Thursday, 9 November — Botany Group meeting: Members' Night, featuring King Island.

Wednesday, 15 November — Microscopical Group meeting.

JUNIOR MEETINGS

Friday, 27 October — Hawthorn Town Hall at 8 p.m.

Friday, 3 November — Preston Rechabite Hall, 281 High St., at 8 p.m.

Friday, 10 November — Montmorency and District, Scout Hall, Petrie Park at 8 p.m.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 10 — 4 October, 1972

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reptiles of victoria—7

by HANS BESTE

Plate 13

Cryptoblepharus boutoni — Wall Lizard.

A small skink with several sub-species in Australia, also found overseas.

Length: to 4 inches.

Depressed head. No movable eyelids. Distinct ear-opening. Five fingers and five toes. Black above, with a pair of pale dorso-lateral stripes from above the eye to the tail. A pale, less conspicuous stripe along vertabral line. Small spots between stripes and on sides. Underside — pale grey.

Habitat — Among leaf litter, on walls, fences and on tree trunks — a good climber.

Best distinguishing features — immovable eyelids, dorso-lateral stripes, climbing habits.

Plate 14

Gehyra variegata — House Gecko, Dtella.

A common gecko — widespread throughout Australia.

Length: to 4 inches.

Spade-shaped head. Distinct ear-opening. Five fingers and five toes. Colour — variable, depending on background. Basically creamy-buff with chequered pattern of brown-grey lines and blotches on back and sides. Two distinct dark lines running through eye. Under creamish. Tail long, tapering to a point.

Habitat — in houses, under debris, under bark and not too far from water.

Best distinguishing features — characteristic toe structure. Claw and enlarged sheath free and rising from distal pad.

Plate 13

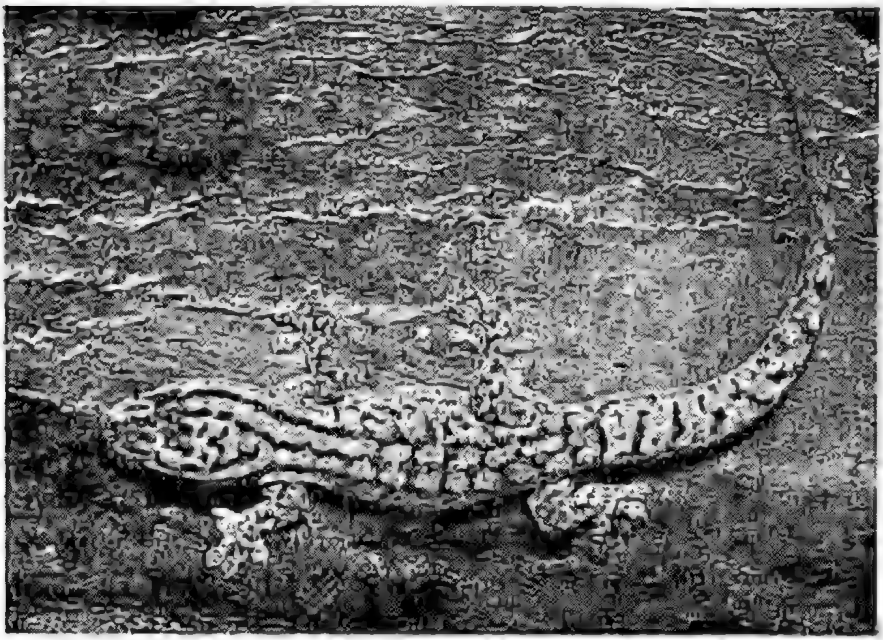

Plate 14

Victorian Non-Marine Molluscs – No. 10

by

RHYLLIS J. PLANT*

Genus Limax

The two species representing this genus in Victoria were originally introduced from Europe, and are our largest slugs. However, unlike most of the other species of introduced slugs these should not be considered as pests but could be called beneficial. This is because they feed on decaying animal and vegetable matter, rather than on living plant material.

Apart from their large size, the species can readily be separated from all other slugs by a keeled top to the tail.

Limax flavus, Linne 1758.

Commonly called the yellow slug, this species is a uniform yellowish-green in colour and produces a sticky yellow mucus. It grows up to 6 inches (150 mm) in length and is found closely associated with man, being usually located on damp rotting refuse or decaying animal matter and sometimes in houses. It is confined to very damp situations and is mainly found active on cool, wet nights.

Limax maximus, Linne 1758.

This species is called the great grey slug, and is dark grey in colour with black and white mottles on its body. It grows to a length of 6-7 inches (150-180 mm) and, unlike *L. flavus*, the mucus is clear and not as sticky. *L. maximus* also lives in damp areas but usually away from man in open areas of pasture or large gardens.

These animals appear to breed in late summer and autumn by laying clutches of 10-15 large transparent jelly-like eggs buried in the soil. The species appears to overwinter either as eggs or juvenile individuals.

Both these species are successful world travellers, and have been recorded from all the eastern States of Australia, including Tasmania. They have also been recorded as introductions into North and South America, South Africa and New Zealand.

*Assistant in Invertebrates, National Museum of Victoria.

Fig. 1: *Limax maximus*.
(Drawing by the author)

Back Copies of the "Naturalist"

(a) Miss Lorna Banfield has a complete set of the "Naturalist" for the last forty years, and would like to know of a library or other body which could make use of them.

(b) Mr. Keith Hately, of Kiata, would like a copy of Volume 4, No. 68, of the "Naturalist". For further information please contact the Secretary.

Trees equal Birds

by Victor Jacobs

The carolling of magpies filters persistently through dreamy thoughts, and heavy eyelids open in order to peer at the luminous figures of the bedside clock. Only 3 o'clock!

Was I dreaming of magpies? No. There they were again. The silvery landscape that excited Walter de la Mare often activates the magpies into playing daytime.

It is somewhat too early for me to rise, so I turn over.

At the dimmest of light a "Quilp", "Quilp" indicates that the White-eared Honeyeaters are about, and then at full dawn the cawing of a flock of Ravens reminds me that the bird table has no pudding on it, and what is more it will not have until those persistent callers forget their feast of a week ago. Have you ever made a bird pudding? If you care to try, here is a recipe.

Render some mutton fat to liquid state and while still hot add scraps of bread, cake, titbits of dried fruit, spare bird seed, cast-off honey, bacon rind, and mix well. Turn into a hemispherical bowl and compress the mixture by applying pressure to a plate on the top. When firm, turn out in one piece and either hang in a string bag or fix firmly on your bird post.

We made them especially for the Grey Thrushes, and they continued to enjoy the delicacies even when the argumentative Starlings, gangster-like Mynahs and impudent House Sparrows joined in. But when the Ravens came along, they had it all to themselves. If you wish to feed the smaller birds by this method and keep the larger ones away as a local dentist did; you can make "mini bird puds". Festoon them along a rope away from other perching points. However, this morning there is no feed laid on and after a cursory glance, the Ravens departed.

It was now quite light, and from the Sallow Wattle which overhangs a gravelled path, a small flock of Yellow-tailed Thornbills dropped mechanically to seek out tiny titbits among the gravel. Their relations the Brown Thornbills and the Striated Thornbills, kept to the thick foliage of the eucalypts or sped directly across open spaces to regain the next sheltered spot. These two species are not usually here so early.

Halfway down the block, beside the banks of the tiny dam, two Spotted Turtledoves kept a close attachment. They were originally attracted to the aviary next door by spilt seed, but often used the open spaces to work or rest as a pair. When they found the crumbs of bird pudding scattered by the vigorous attacks of Starlings and Mynahs, they awaited the manna from heaven, but soon learned in the absence of the distributors of this heavenly largesse, to ascend to the land from whence it came.

Back at the orchard, a large bird was trying to wrest free a piece of "Bird-scare". Rather late in the season, I thought. It is a Red Wattlebird which earlier had been "Hockhocking" as it fed from the Golden Banksia and Bushy Yate.

Two Kookaburras laugh from a Mahogany Gum on the margin. They are frequent visitors but not pets. We

noticed, during the barbecue season, that they were more frequent in their visits and no doubt could have been tamed.

The garage at the south and higher end was being investigated by a pair of Welcome Swallows. This occurrence is a yearly event but as they cannot solve the problem of entry with the door shut they nest elsewhere.

Breakfast time was here. From the study I could hear the squeaky call of a Grey Fantail. Its gyrations and antics were watched until it settled in the green gloom hard against a window. Behind it, a much bolder combination of colours appeared as an Eastern Shrike-tit worked its way along the branches, hunting as it shredded the bark.

Halfway down the block a drainage ditch bisects the area, and long rank grass domes the narrow confines. A tremor of the vegetation was investigated, and a brown, whirring rocket of a Stubble Quail shot away.

In the little wood a pair of Scarlet Robins sat in the same tree. They are often seen here in the cool seasons, although usually are perched on the fences. Flame Robins are common on the next open hillside but they haven't yet been seen on the acre. This wood also holds a Golden Whistler whose black, white and yellow are vivid in the morning sun. He seems to prefer the obscurity of the wood, while his mate, that demure female with the chestnut wing-patch moves alone throughout the block and even up against the house windows. The north fence backs this little wood, and a Jacky Winter uses it as a base from which to make forays into the open paddock. Here, too, a Bushy Sugar Gum in full flower holds a vociferous flock of Noisy Miners.

Bird watching here, not always a full time job, is often incidental to garden chores. While delegating some gazanias to a new compost heap the "whit-e-chu" of a Striated Pardalote was noted. It was most likely using the nature strip trees as part of his roadside highway. Another more penetrating pardalote call impinged on the ear as a Spotted Pardalote moved down the block. We had been aware of the latter's proximity for some weeks.

The Grevilleas magnetize the honeyeaters. Heavy bodied Noisy Miners and Red Wattle-birds sag the slender branches and make off. There is al-

Plate 1.

Third generation magpie at food table.

Photo. Author.

ways at least one of these plants in flower. *Grevilleas* var. Poorinda Constance and Porinda Beauty, themselves usually carry the annual banner. White-plumed Honeyeaters next replace the larger birds. Strangely enough the next sighting — a rarity for this area — was the Tawny-crowned Honeyeater! It was not on a grevillea, but on *Cotyledon umbilicus*. The piping call of a slender bird added yet another of this family, the Eastern Spinebill. A few moments later, the White-eared Honeyeater, not heard since dawn, showed his bold colours. Our little favourites, the Brown-headed Honeyeaters had not been seen for some time. A few months ago they visited the garden frequently each day. Did they come out of the wood and return to it, or were they on a longer circuit which included our grevilleas? When their absence extended through September and October to November we presumed that they were family raising and then in January, made the same assumption because of extended rains. The dry season delayed the usual heavy autumn flowering of their favourite plants.

As I strolled along, a flurry resolved itself as an Australian Ground Thrush, seen more commonly in the wood, and as yet but rarely in this garden. The chicken wire impeded progress, and while it struggled and finally found a gap I had a clear view of its half-moon patterns.

Nearby, in the orchard a Bronze Cuckoo called and appeared momentarily from a Bushy Yate to snaffle a large, hairy caterpillar from the fruiting trees. A couple of swings of its beak rendered the prey immobile and digestible. The trilled note, which cuts across the mournful downward note of this caterpillar eater, comes from the Fantail Cuckoo which prefers to scan its area from the post at the front of the block. We are lucky this day, as a third cuckoo is heard. This, the largest of the three, is the Pallid Cuckoo, and by moving from tree cover to tree cover it is possible to watch it also feeding on hairy caterpillars, and returning to the wire fence midway down the block.

On going in to lunch, I heard a wren-like trilling amongst the *Cassias* and *Grevilleas*. A tiny brown wren with slender blue quill-like tail dashed to the shelter of a *Callistemon*, sprang to the bird table, picked up a minute crumb, and fled back to cover. The Superb Blue Wren has not bred here yet, nor is it particularly frequent or constant in its visits.

A flock of Galahs heading up the Bailey Road valley changed direction at the bottom of Longmeadow and flew over our more wooded area, using it as a sort of open tunnel. Our neighbour has a pet of this species about four years old whose wings, once shortened, have regrown. His usual flight is a centrifugal one, making an erratic circle with the Jones' chimney as its centre, and the love of food and company the restraining radius. As the wild birds approached, the tame one took off and had performed one hysterical circle when the other six joined in, and raucously went round and round till, tired of their fun, they made off leaving "cocky" in the lurch and perched on the garage roof.

Glimpsing a shadow I looked up to see a Brown Hawk fly downhill and pass under a Nankeen Kestrel which hung, wings slightly quivering, over the little pond.

A Grey Butcher-bird which has adopted us, and has even been seen at the bird pudding, sat patiently on a post of the deck tennis court till he espied food in the grass and swiftly trapped it there. His carols make him a welcome visitor.

The tall Silver Wattle which projects from the little wood had a bird

atop its swaying branches. A Black-faced Cuckoo-shrike sat quietly there. I had seen them flying over this area, but never perched in the trees until they had reached a height of about 20 feet.

Approaching the newly-dug fern trench, I heard the Spotted Pardalote again; and saw him clearly as he sat in the bare willow. When he called, the whole body moved from the relaxed horizontal position to a taut 45 degrees, and the head feathers formed a distinct crest. A rustle in the canopy of the trench itself announced the female. She generally resembles her partner, but her throat is creamy instead of a brilliant yellow. Almost certainly they have found the steep sides of the fern trench suitable for their nesting tunnel.

A swarm of dots high in the sky, swished down and spent considerable time over the area. They were Spine-tailed Swifts. Diving in pursuit of food, extremely fast, sometimes below the level of the trees, the rush of air over their wings is clearly audible. They quite ignored a Black-shouldered Kite which floated leisurely by. This latter species has been common in the locality recently.

A flock of Silvereyes were feeding on a laden Cotoneaster. Their slender bills pecked tiny portions of the flesh until they were able to swallow the diminished bulk of the berry. The smaller birds moved away in haste as a dozen Crimson Rosellas noisily swooped in to join the party. Hastily they scooped off a clawsful of ripe fruit, dropping as much as they cram into their beaks. They were restless and soon moved off.

Two larger birds, sparrow-sized and heavily beaked, seemed familiar yet out of context. A look in the text-books identified them as Greenfinches; a new record for Longmeadow and my first sighting. Their close relative, the Goldfinch, appear on the block as soon as seeds are available. A stroll towards the little wood proved the point, as a small flock of them flew from the dried grasses beside the drainage ditch, and the flashes of red and gold enlivened their more sober plumage. As I turned up the slope, a

Plate 2

Ground-feeding Turtle Dove.

Photo: Author.

rustle of wings behind me indicated that the finches had settled again to feed. In a tangle of grass beside an unexpected fuchsia, a pair of Yellow-faced Honeyeaters were busy, but there was no indication of a nest.

On the pergola beside the little dam, a black and white Mudlark used its wings like a pump to produce a warning call, and as if in answer, a large grey bird rose from the brimming dam. A White-faced Heron moved on, leaving but three of our newly acquired dozen goldfish.

Light is fading now, but the gleam of a Yellow-winged Honeyeater in the Bushy Yate is easily discerned.

The Noisy Miners in those same Bushy Sugar Gums appeared to have been there all day. Their previously sharp cries seemed to have a "hic" like quality, as if the nectar imbibed had fermented and produced an alcoholic slur.

In the dusk, the Blackbirds were restless, and quit one roosting place for another, no better. Their lovely calls from the static position became raucous, as the alarm call replaced them.

Just after dark, the beam of the lantern traced a foggy path to the upper branches of a Mahogany Gum. The light illuminated a pair of Eastern Rosellas, which are newcomers as far as roosting is concerned. During the fruit season they hid in the little wood and made raiding sallies into the orchard; but dispersed at night. They had been roosting there about a month.

The "day"* was nigh done, and bedtime was near. Bird activity was nearly at zero, but hour after hour a pair of Willy Wagtails called back and forward across the block in the moonlight.

*The day referred to has been over a period beginning 9 years ago, when the area was a bare grazing paddock. Now, with the growth of trees, birds are numerous — Hence the title "Trees equal Birds."

Readers' Nature Notes and Queries

Cyclone Prelude

From our constant contributor from Charters Towers, Mr. Alfred Fellows, comes this note.

Herewith a little incident which may interest you regarding the recent cyclone that passed nearly over us here after its devastating visit to Townsville. Five days previously, a number of the giant cactus blossoms which so accurately foretell our weather-changes here*, had opened one evening after a day of arid temperature, 97 degrees on the dry bulb and 73 degrees on the wet bulb and no moisture promised for the next day.

At 11 a.m. next day we received word that two inches of rain had fallen overnight just outside of our immediate area. Later that day I examined the now shrivelled blooms in case any more were due to open. Then an entirely new phenomenon showed up. A second number of buds had rapidly developed and were due to open very shortly before the plant had even discarded the older flowers. This was unprecedented to say the least. Very soon some buds showed their creamy-coloured interiors before sundown. Unusual again and as if the flowers were desperate to open as quickly as possible. Meanwhile a light misty shower to the north-east of this locality had persisted for four hours with a weak rainbow visible until nearly sunset. A setting sun just peeped out between two clouds, the upper one with golden edges and the lower one with a bright red edge to the horizon. After a quick snapshot of the ominous and strange contrast I once again looked to the north-east.

*See *Victorian Naturalist* 86 (3) p. 79.

The last rays of the setting sun had now cleared the clouds in the west and intensified the rainbow in the easterly direction, the secondary bow being equally prominent. The sun having been so low caused the bow-arches to rise very high. One strange thing presented itself.

Neither end of the bows "contacted" the country-side as if some contrary conditions existed near ground level. Within the arches the bright whitish vapour was extremely prominent but outside of the bows was nearly black in comparison, the contrast between interior and exterior being much greater than is usual. Clear as the bows were, our view for over twenty miles in that direction was unimpaired and no rain was closer than that. Unknowingly we were looking straight into the approaching front of the cyclone still far away but with an atmosphere already in violent turmoil.

Whereas the air had been arid a short time before, it now suddenly became very humid and by 9 p.m. only six degrees were indicated as the difference between dry and wet bulbs. At this hour a quick look at the cactus flowers showed seven wide open. Others opened soon afterwards. A gentle breeze soon became a strong wind, and by morning the blossoms were wilting wrecks. After many hours of violence a quick look at the cactus plant showed some more flowers to soon open. That night the heaviest rain of the period fell, and now no more buds remain to give indications, but the shrivelled blooms remain to denote what came and went at such short notice.

So what at first seemed contradictory by its signs proved correct, and only one's inability to read all of the signs and all of the time is the dubious factor.

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.

Norman Arthur Wakefield

(An Appreciation)

The sudden death of Norman Wakefield is a tragic loss. In the field of popular nature writing, he was perhaps the most worthy successor to the late Crosbie Morrison. His widely read weekly articles in the daily press showed but one facet of his abundant knowledge.

His scientific papers, with which most members will be familiar, have been paramount; particularly in regard to mammals and fossiliferous bone deposits.

He was inspired by nature — and his nature, was to inspire. Time and again as Editor, I had been guided and enlightened by him; his gentle yet forthright manner leaving me with no doubt.

The typescripts of his many articles which it has been my privilege to publish, were so meticulously arranged, that any editing on my part was barely necessary.

There is no doubt that future issues of the *Victorian Naturalist* will be affected by his death. The thought of the many potential papers which undoubtedly would have come from him is saddening. Indeed, this tragedy has left a gap in the ranks of naturalists which shall never be quite closed.

On behalf of the members of F.N.C.V. and its Council, I extend my sincerest sympathy to his wife, family and friends.

G. M. WARD.

Nature Notes from the Gold Coast

by

A. N. BURNS

The past month has provided a wonderful display of epiphytal orchid blooms; the most abundant and noteworthy being the Rock Lily (*Dendrobium speciosum*) and the Ironbark Orchid (*Dendrobium aemulum*). Other natives which have flowered in the garden are the fragrant Pencil Orchid (*Dendrobium teretefolium*) and the North Queensland Golden Orchid (*Dendrobium undulatum*). Two very large plants of the well-known Indian Orchid (*Dendrobium nobile*) which are growing on a large horizontal branch of a gum tree in the garden have over 300 blooms, and another plant in a wooden box attached to a steel fence post has no less than 186 blooms, a truly beautiful sight.

The scarlet flowered Bottle Brush (*Callistemon viminalis*) is now at its best, and on a tree at the bottom of the garden a daily attraction is the presence of several Spine-billed Honeyeaters and small flocks of Silver Eyes. To my surprise a few days ago a male Mistletoe Bird was visiting the flower brushes, apparently getting nectar from them. At the last bend in the road opposite the National Park, Crows and Currawongs are busy nesting; and in the rain forest in the Park, Scrub Turkeys are now laying eggs in the nesting mounds. One such mound

under observation has one male turkey, and up to seven females associated with it.

A local observer told me that he had watched a Goanna (these reptiles are very fond of eggs) in the vicinity of a Turkeys' mound, being pecked on the tail by a male Turkey.

Koalas are now active in the white barked *Eucalypts* along the road bordering the Park. For the past week, a female with a small young one clinging to its back, has frequented two trees across the road; and two more, fully grown, have also been observed in the same trees. As the weather has been, and is still, very dry, diggings and the turning over of rocks and large stones by *Echidnas* is a common sight. These interesting animals may sometimes be seen ambling along the edges of the road in the late afternoon. Any place where there is a little moisture is explored.

Insect activity is rapidly increasing, especially among the butterflies, but individuals are not as plentiful as usual because of the very dry weather conditions. Several species of Skipper butterflies (*Hesperidae*) have been noted; also a few examples of the Blue Triangle Papilio (*Graphium sarpedon choredon* [Feld.]), the Large Greasy (*Cressida cressida cressida* [Fab.]). Several species of small *Lycaeinidae* and *Satyrinae* are also about. A good fall of rain would increase the insect population many times within a week.

The Wild Duck population at the Currumbin Bird Sanctuary lagoon at Flat Rock Creek has increased greatly in the past month, and in addition to these, the Ibises have trebled in number, with numerous other water birds appearing. Egrets, Spoonbills, Herons, and Water Hens are among these, and on the adjacent flats, are numbers of Curlews.

Today (16 September) a visit was made to Springbrook and Purlingbrook, each between 2,500 and 3,500 feet above sea level; and twenty-six and twenty-three miles respectively by road from Burleigh Heads. This area has always appealed to the writer as a likely spot to find the "Cyril's Brown Butterfly" (*Argynnina hobartia cyrila* W. & L.) but over the years it had not appeared. This day however two fine female specimens were noted, which were unusually large, as also are specimens from near Sydney. This record is probably new as far as the northern distribution of this butterfly is concerned. It had been recorded from Cunningham's Gap which is not many miles south-west from Purlingbrook.

On the rocky cliff faces of the gorges in this mountainous area many fine clumps of the dainty pink Rock Lily Orchid (*Dendrobium kingianum*) were noted in full flower. These plants are rigidly protected, and fortunately, most of them were growing on parts of the cliff face remote from would-be collectors.

F.N.C.V. CAR STICKERS

F.N.C.V. Car Stickers are now available from Mrs. Strong, Book Sales Officer, at a cost of 25c each.

Car owners travelling in the country or interstate can identify other members quickly in this way.

It also helps to advertise the Club.

Plant List, for King Island, Bass Strait

The following list contains the names of 430 species of vascular plants, of which 55 are introduced species. Many plants not previously known to exist on King Island have been found since 1956 by members of the King Island Field Naturalists Club. Identifications have been made by Dr. Winifred Curtis, University of Tasmania, the National Herbarium, South Yarra, and our guide, philosopher and friend, Jim Willis.

A previous list of plants was published in the *Victorian Naturalist*, Vol. IV, No. 9, Jan., 1888, following the expedition of the F.N.C.V. to King Island in November, 1887. It is interesting to note that at that date, the total number of species recorded was 231, of which 16 were introduced "weeds". The discovery and rediscovery of so many species despite the ravages of fire between 1890 and 1950 is a tribute to the strength of the forces for survival.

PTERIDOPHYTA (Ferns, Club Mosses)

Ophioglossaceae

Ophioglossum coriaceum — Austral Adder's Tongue. Yarra Ck.: uncommon.

Osmundaceae

Todea barbara — Austral King Fern. Ettrick R.

Schizaeaceae

Schizaea fistulosa — Narrow Comb Fern. Forestry Reserve, Pegarah: uncommon.

S. asperula — Rough Comb Fern.—Uncommon.

Gleicheniaceae

Gleichenia microphylla — Scrambling Coral Fern. Fairly common

Sticherus tener — Silky Fan Fern. Forestry Reserve, Pegarah.

Cyatheaceae

Cyathea australis — Rough Tree Fern. Fairly common.

Dicksoniaceae

Dicksonia antarctica — Soft Tree Fern. Fairly common.

Dennstaediaceae

Hypolepis rugosula — Ruddy Ground Fern.

H. australis — Austral Ground Fern.

H. punctata — Downy Ground Fern.

H. muelleri — Harsh Ground Fern.

Peteridium esculentum — Austral Bracken.—Very common.

Histiopteris incisa — Batswing Fern.—Common.

Athyrium australe — Austral Lady Fern.

Lindsayaceae

Lindsaya linearis — Screw Fern. Heath lands: Common.

Adiantaceae

Adiantum aethiopicum — Common Maidenhair Fern. Seal River.

Pteris tremula — Tender Brake.—Grassy.

Pteris comans — Netted Brake. Grimes Ck.

Pellaea falcata — Sickle Fern. East coast between Grimes and Cumberland Cks. in grove of *Melaleuca ericifolia*.

Grammitidaceae

Ctenopteris heterophylla — Gypsy Fern. Rocky creek banks, Tynans and Seal River.

Polypodiaceae

Microsorium diversifolium — Kangaroo Fern. Seal River.

Aspleneaceae

Asplenium obtusatum — Shore Spleen-wort. Bold Head, New Year Is.
A. flabbelifolium — Necklace Fern. Yarra Ck.
A. bulbiferum — Mother Spleen-wort.

Athyriaceae

Athyrium australe — Austral Lady-fern. East coast.

Aspidiaceae

Lastriopsis shepherdii — Shiny Shield Fern. Yarra Ck.
Rumohra adiantiformis — Shield Hare's-foot Fern. Cumberland Ck.
Polystichum proliferum — Mother Shield Fern. — Common.

Thelypteridaceae

Cyclosorus pennigerus — Lime Fern. Ettrick River, near limy springs.

Blechnaceae

Blechnum nudum — Fishbone Waterfern. Widespread — rivers, creeks, swamps.
B. minus — Soft Waterfern. Widespread — rivers, creeks, swamps.
B. procerum — Hard Waterfern. Hillsides.
B. lanceolatum — Lance Waterfern. Ettrick River.
B. patersonii — Strap Waterfern. East coast, small creek between Grimes and Cumberland.

Hymenophyllaceae

Hymenophyllum cupressiforme — Common Filmy Fern. Little Grassy River, City of Melbourne Bay Rd.
Mecodium australe — Austral Filmy Fern. Jim Hall's Gully.
M. flabellatum — Grassy River.

Lycopodiaceae

Lycopodium deuterodensum — Bushy Club-moss. In tall scrub, Forestry Reserve, and elsewhere.
L. laterale — Slender Club-moss. Penny Lagoon, Fraser Rd.
L. carolinianum — Bog Club-moss. Penny Lagoon: very rare.
Phylloglossum drummondii — Pigmy Club-moss.

Selaginellaceae

Selaginella uliginosa — Swamp Selaginella. Banks of creeks; poor heath lands.

Psilotaceae

Tmesipteris parva — Small Fork-fern. Grassy River.

Azollaceae

Azolla filiculoides — Pacific Azolla. — Widespread.

Potamogetonaceae

Potamogeton pectinatus.
P. tricarinatus — Floating Pondweed.

Zannichelliaceae

Cymodocea antarctica — Sea Nymph.
Lepilaena preissii — Slender Water-mat. Margin of Big Lake.

Juncaginaceae

Triglochin striata — Streaked Arrow-grass. Creek flowing into Big Lake from N., and in Sea Elephant River.
T. procera — Water Ribbons.

Hydrocharitaceae

Halophila ovalis — Sea Wrack.

Gramineae

**Briza minor* — Lesser Quaking Grass.
Microlaena stipoides — Weeping Grass.
**Dactylis glomerata* — Cocksfoot.
**Catapodium rigidum* — Fern Grass, Hard Poa.
Distichlis distichophylla — Australian Salt Grass. Sea Elephant River flats (subject to tidal flooding), and on Fraser Rd.
Poa australis — Tussock Grass.—Grassy.
**Sclerochloa dura* — Hard Meadow Grass.
Festuca littoralis — Coast Fescue.
**F. arundinaceae* — Tall Fescue. Ettrick River.
Poa poiformis — Blue Tussock Grass.
**P. pratensis* — Kentucky Blue Grass.
**Vulpia bromoides* — Squirrel-tail Fescue.
**V. megalura* — Fox-tail Fescue.
**Lolium perenne* — Perennial Rye Grass.
**Bromus diandrus* — Great Brome.
**Cynosurus echinatus* — Rough Dogs-tail.
**C. cristatus* — Crested Dogs-tail.
**Hordeum leporinum* — Barley Grass.
**Aira caryophyllea* — Silvery Hair-grass.
**Holcus lanatus* — Yorkshire Fog.
**Anthoxanthum odoratum* — Sweet Vernal Grass.
**Ammophila arenaria* — Marram Grass.
**Bromus unioloides* — Prairie Grass.
Dichelachne crinita — Long-hair Plume Grass.
Agrostis rudis — Bent. Ettrick River.
**A. stolonifera* — Creeping Bent. Ettrick River mouth.
**A. tenuis* — Brown-top Bent.
A. billardieri — Blown Grass.
A. avenacea — Blown Grass.
**Polypogon monspeliensis* — Annual Beard Grass. Big Lake.
**Lagurus ovatus* — Hare's Tail. Grassy Golf Links.
Echinopogon ovatus — Hedgehog-grass.

Zoisia macrantha — Prickly Couch.
Agrostis venusta — Bent.
Danthonia setacea — Bristly Wallaby Grass.
D. pennicillata — Slender Wallaby Grass.
Stipa teretifolia — Prickly Spear Grass.
S. elatior — Spear Grass.
S. ? flavescens.
**Pennisetum clandestinum* — Kikuyu Grass.
**Stenotaphrum secundatum* — Buffalo Grass.
Spinifex hirsutus — Hairy Spinifex.
**Oryzopsis miliacea* — Rice Millet.

Cyperaceae
Scirpus nodosus — Knobby Club Rush. Ettrick River.
S. validus — River Club Rush. Big Lake.
S. cernuus — Nodding Club Rush. Collyer Swamp.
S. inundatus — Swamp Club Rush.
S. merrillii — Salaisoi (Phillipines).
Eleocharis acuta — Common Spike Rush. Pearshape Lagoon, Yarra Ck.
Schoenus nitens — Shiny Bog Rush.
S. maschalinus — Leafy Bog Rush. Collyer Swamp.
Cladium junceum — Bare Twig Rush.
Gahnia psittacorum — Grassy.
G. trifida — Coast Saw-sedge. Ettrick River.
Lepidosperma gladiatum — Coast Saw-sedge.
Carex appressa — Tall Sedge.—Grassy.
**C. divisa* — Divided Sedge.
C. fascicularis — Tassel Sedge. Collyer Swamp.
C. pumila — Strand Sedge.

Lemnaceae
Lemna trisulca — Ivy-leaf Duck-weed.
L. minor — Common Duck-weed.

Restionaceae
Lepyrodia tasmanica — Branching Scale Rush.
Restio tetraphyllus — Tassel Cord Rush. Near Ettrick River.
R. monocephalus — Tas. only.
Salorophus lateriflorus — Spreading Rope Rush. Off Fraser Rd.

Centrolepidaceae
Centrolepis strigosa — Hairy Centrolepis.
C. fascicularis — Tufted Centrolepis. Upper part Ettrick River.

Xyridaceae
Xyris operculata — Tall Yellow-eye. Plains on Grassy Rd.

Juncaceae
Luzula campestris — Field Wood-rush. Yarra Ck.
Juncus maratimus — Sea-rush.
J. pauciflorus — Loose-flower Rush.
J. pallidus — Pale Rush.
J. planifolius — Broad-leaf Rush.—Grassy.

J. caespiticius — Grassy Rush.
J. bufonius — Toad Rush.
J. articulatus — Jointed Rush.
**J. acutiflorus* — Sharp-flower Rush. Pearshape Lagoon.
J. filicavlis — Thread Rush. Yarra Ck.
J. australis.

Liliaceae
Dianella laevis — Pale Flax-lily.
D. caerulea — Paroo Lily.
Drymophila cyanocarpa — Turquoise Berry. Lake Martha Lavinia.
D. revoluta.

Iridaceae
Patersonia fragilis — Short Purple-flag.
**Sisyrinchium iridifolium* — Striped Rush-leaf. Graham Rd., Grassy River.

Orchidaceae
Thelymitra aristata — Scented Sun-orchid.
T. ixioides var. *truncata* — Dotted Sun-orchid.
T. flexuosa — Twisted Sun-orchid.
T. venosa — Veined Sun-orchid.
T. grandiflora — Great Sun-orchid.
T. retecta — Sun-orchid.
T. media — Tall Sun-orchid.
T. rubra — Salmon Sun-orchid.
T. carnea — Pink Sun-orchid.
Calochilus robertsonii — Purplish Beard-orchid.
C. campestris — Copper Beard-orchid.
C. paludosus — Red Beard-orchid.
C. saprophiticus — Leafless Beard-orchid.
Diuris pedunculata — Golden Moths.
D. longifolia — Wallflower Orchid.
Microtis unifolia — Common Onion-orchid.
Prasophyllum nigricans — Midge-orchid.
P. archeri — Variable Midge-orchid.
P. australe — Austral Leek-orchid.
Chiloglottis cornuta — Green Bird-orchid.
C. gunnii — Common Bird-orchid.
C. reflexa — Autumn Bird-orchid.
Acianthus reniformis — Gnat Orchid.
A. caudatus — Mayfly Orchid.
A. exsertus — Mosquito Orchid.
Eriochilus cucullatus — Parson's Bands.
Lyperanthus nigricans — Red Beaks. El Dorado Ck.
Burnettia cuneata — Burnettia.
Caladenia menziesii — Hare Orchid.
C. latifolia — Pink Fairies.
C. carnea — Pink Fingers. Yarra Ck., Ettrick River.
C. dilatata — Green-comb Spider-orchid. Lake M. Lavinia.
Glossodia major — Wax-lip Orchid.
Corybas dilatatus — Veined Helmet-orchid.

C. unguiculatus — Small Helmet-orchid.
Cryptostylis subulata — Large Tongue-orchid.—Grassy.
Pterostylis barbata — Bearded Greenhood.
P. cucullata — Leafy Greenhood.
P. pedunculata — Maroon-hood. Yarra Ck., Mt. Stanley.
P. nutans — Nodding-Green-hood.—Grassy, Yarra Ck.
P. longifolia — Tall Green-hood. Yarra Ck.
P. vittata — Banded Green-hood.
P. foliata — Slender Green-hood. Tynans, Mt. Stanley.
P. nana — Dwarf Green-hood.
Gastrodia sesamoides — Cinnamon Bells.
Sarcochilus australis — Gunn's Orchid.
Orthoceras strictus — Horned Orchid.

Casuarinaceae

Casuarina monilifera. Formerly *C. distyla*: common.

Urticaceae

Urtica incisa — Scrub Nettle.—Grassy.
Australina pusilla — Smooth Nettle. Ettrick River.
Parietaria debilis.

Proteaceae

Persoonia juniperina — Prickly Geebung. Mt. Stanley.
Banksia marginata — Silver Banksia.—Common
B. integrifolia — Coast Banksia.—? extinct.

Polygonaceae

Muehlenbeckia adpressa — Climbing Lignum.
Polygonum hydropiper. Sea Elephant River at bridge, Fraser Rd.

Chenopodiaceae

Atriplex billardieri — Glistening Salt-bush.
A. cinerea — Coast Salt-bush. Near mouth Ettrick River.
**A. hastata* — Orache. Rough pasture, Pearshape — (Coastal Salt-bush, Tas.).
Rhagodia baccata — Seaberry Salt-bush. Common on dunes, South Road (Climbing Salt-bush, Tas).
Chenopodium glaucum — Pale Goosefoot. Whistler Point.
Salicornia quinqueflora — Beaded Glasswort.
Arthrocnemum arbusculum. Salt March — Sea Elephant River.

Ficoideae

Carpobrotus rossi — Angular Pigface. Common on dunes.
Disphyma australe — Rounded Pigface. On dunes and among rocks.
Tetragona implexicoma — Bower Spinach. Common on dunes.

Caryophyllaceae

**Cerastium glomeratum* — Chick-weed. Councellor Is.
Colobanthus apetalus — Tufted Colobanth.
**Polycarpon tetraphyllum* — Four-leaved. All Seed.
Sagina apetala — Small Pearlwort.
S. procumbens — Spreading Pearlwort. Yarra Ck.
**Silene gallica* — Small-flowered Catchfly. ? City of Melbourne Bay.
Scleranthus biflorus.
Stellaria pungens — Prickly Star-wort.

S. multiflora — Many-flowered Star-wort.
**S. media* — Chick-weed. Counsellor Is.

Ranunculaceae
Clematis aristata — Clematis.—Grassy.
C. microphylla — Small-leaved Clematis. Yellow Rock River.
Ranunculus sessiflorus var *pumilio*.
**R. muricatus* — Sharp Crowfoot.
R. rivularis. River Buttercup. Grassy River.

Monimiaceae
Atherosperma moschatum — Southern Sassafras. Fraser River in Dolmans' Farm, Pegarah.
Hedycarya angustifolia — Austral Mulberry.—Grassy.

Winteraceae
Drimys lanceolata — Mountain Pepper. Dolmans' Farm, Pegarah.

Lauraceae
Cassytha pubescens — Downy Dodder Laurel. On *M. encifolia* — Fraser Rd.

Papaveraceae
**Papaver aculeatum* — Field Poppy.

Fumariaceae
**Fumaria officinalis* — Fumitory.

Cruciferae
Cardamine heterophylla.
Cakile edentula — Grassy beach.
C. maratima — Sea Rocket. Grassy beach.
**Capsella bursa-pastoris*.
**Brassica ? rapa*.
Hymenolobus procumbens — Oval Shepherd's Purse.
Lepidium foliosum — Leafy Peppercress.
L. praetervisum — Peppercress.
Rorippa islandica — Yellow Water-cress. Yarra Ck.

Droseraceae
Drosera binata — Forked Sundew. Little Grassy Ck.
D. pygmaea — Tiny Sundew. Off Grassy Rd.
D. auriculata — Tall Sundew.—Grassy.
D. peltata.

Baueraceae
Bauera rubioides — Wiry Bauera.—Grassy.

Crassluaceae
Crassula helmsii — Swamp Stonecrop. Big Lake.
C. macrantha — Rufous Stonecrop.
C. sieberiana — Austral Stonecrop.

Pittosporaceae
Billardiera longiflora — Purple Appleberry. Lymwood.
Pittosporum bicolour — Banyalla (Vic.). The Nook, Dolmans', Pegarah.
Bursaria spinosa — Sweet Bursaria. Little Grassy River.
Marianthus procumbens — White Marianth. On rocky Seal Rocks beach.

Rosaceae

Acaena ovina — Sheep's Burr.
A. anserinifolia — Bidgee Widgee. Grassy: common.
Acaena anserinifolia — Bidgee Widgee. Grassy: common.

Leguminosae

Acacia melanoxylon — Blackwood.—Common.
A. verniciflua.
A. longifolia var. *sophorae* — Coast Wattle. East coast near Cable Station.
A. mucronata.—Common.
A. oxycedrus — Spike Acacia.
A. verticillata — Prickly Moses.—Common.
A. suavolens — Sweet Acacia. R. 2 m. from Fraser Rd. to Sea Elephant Rd.
**Albizzia distachya* — Cape Wattle. Native in W.A. — hedges and ornamental trees.
Pultenaea juniperina — Prickly Bush-pea. Ettrick River, Lymwood (Prickly Beauty, Tas.).
P. dentata — Clustered Bush-pea (Button Pea, Tas.).
Aotus villosa. Fraser Rd. (Golden Pea, Tas.).
Dillwynia glaberrima — Heathy Parrot-pea.
Daviesia ulicifolia — Gorse Bitter Pea. Bold Head.
Gompholobium huegetti — Pale Wedge-pea. Lake M. Lavinia Ck. — near Big Lake.
Goodia lotifolia — Golden Tip.
Kennedia prostrata — Running Postman.— Not found.
**Melilotus indica* — Sweet Melilot.
Sphaerolobium vimineum — Leafless Globe-pea. Road to Sea Elephant River.
Swainsonia lessertifolia — Purple Swainson-pea. Grassy: common.
**Vicia sativa* var. *angustifolia* — Vetch.
Trifolium campestre — Hop Clover.
T. repens — White Clover.
T. glomeratum.
T. subterraneum.
T. fragiferum.
**T. arvense* — Hare's-foot Clover.—Grassy.
**Lotus uliginosus.*
**L. corniculatus.*—Grassy.

Geraniaceae

Geranium pilosum. Sand hills, Grassy.
G. solanderi — Cut-leaf Cranesbill. Ettrick River.
G. potentilloides.
Pelargonium australe — Austral Storksbill.—Widespread.

Oxalidaceae

Oxalis corniculata — Yellow Wood-sorrel. Ettrick River, Red Hut Headland.

Linaceae

Linum marginale — Wild Flax.—Grassy.

Rutaceae

Correa alba — White Correa.—Not found.
C. backhousiana. East coast.

Zieria smithii — Sandfly Zieria. Grassy, Yarra Ck.
Boronia variabilis. East coast.
B. parviflora — Swamp Boronia. Tin Mine Rd.
Phebalium squameum — Lance Wood.—Grassy.

Polygalaceae
Comesperma volubile — Love Creeper. Fraser Rd.
C. calymega — Blue-spike Milk-wort. Lake M. Lavinia.
C. retusum. El Dorado Ck.

Euphorbiaceae
Phyllanthus gunnii — Shrubby Spurge. Ettrick River.
Amperea xiphoclada — Broom Spurge. Lake M. Lavinia.
Beyeria leschenaultii. Currie, coast sand-hills.

Stackhousiaceae
Stackhousia monogyna — Candles. East coast.
S. spathulata — Coast Stackhousia.

Sapindaceae
Dodonaea viscosa.—? synonymous.

Rhamnaceae
Pomaderris apetala. Common in fern gullies.
P. ? elliptica.—Not found.
P. oraria.—Not found.

Elaeocarpaceae
Elaeocarpus reticulatus — Blue Oliveberry.—Grassy.
Aristotelia peduncularis — Heart Berry. Mt. Stanley.

Dillenaceae
Hibbertia fasciculata — Bundled Guinea-fl.
H. asterotricha — Trailing Guinea-fl.
H. procumbens — Spreading Guinea-fl.

Hypericaceae
Hypericum japonicum — Matted St. John's Wort. The Nook.

Violaceae
Viola hederacea — Ivy-leaf Violet.

Thymelaeaceae
Pimelea drupacea — Cherry Rice-flower. Forestry Reserve, Pegarah.
P. curviflora.
P. ligustrina — Tall Rice-flower.
P. linifolia — Slender Rice-flower. Forestry Reserve, Pegarah.
P. serpyllifolia — Thyme-leaf Rice-flower. Yellow Rock River, Ettrick River: common.
P. axiflora — Tough Rice-flower. Mt. Stanley.

Lythraceae
Lythrum hyssopifolia — Small Loosestrife.

Myrtaceae
Eucalyptus globulus — Blue Gum.—Common.
E. viminalis — Manna or Ribbony Gum.—Common.
E. ovata — Swamp Gum. Lymwood.

Leptospermum laevigatum — Coast Tea-tree. Common — Currie, south-west, east coast.
L. scoparium — Manuka.—Common.
L. lanigerum — Woolly Tea-tree. Ettrick River, Pass River.
Melaleuca ericifolia — Swamp Paperbark.—Common.
M. squarrosa — Scented Paperback.—Common swamps.
M. squamea.—Not found.
Calytrix tetragona — Common Fringe-myrtle. Coastal sand-hills N.E. of Grassy, Seal Rocks.

Onagraceae

Epilobium billardierianum — Willowherb. Red Hut Headland.
E. junceum — Hairy Willowherb. Stokes Point

Haloragaceae

Haloragis teucrioides.—Grassy.
Myriophyllum amphibium — Broad-leaf Water-milfoil. Tin Creek.
M. propinquum — Water Milfoil. Collyer Swamp, Grassy Rd.

Umbelliferae

Hydrocotyle sibthorpioides.
H. muscosa.
H. hirta — Hairy Penny-wort.
Daucus glochidiatus — Austral Carrot.
Apium prostratum — Sea Celery, Sea Parsley. Grassy beach.

Epacridaceae

Epacris impressa — Common Heath. Fraser Rd.
E. lanuginosa — Woolly-heath.
E. obtusifolia — Blunt-leaf Heath. Lake M. Lavinia.
Sprengelia incarnata — Pink Swamp-heath. Fraser Rd.
Styphelia australis — Spike Beard-heath. Common — Grassy.
S. parviflora — Coast Beard-heath.—Common.
S. ericoides — Pink Beard-heath.
S. oxycedrus.—Formerly *Cyathodes*.
S. lanceolata. Not positive — S.W. of Grassy.
Monotoca elliptica — Tree Broom-heath.—Grassy, Naracoopa.

Primulaceae

**Anagallis arvensis* — Pimpernel. Ettrick River.
Samolus repens — Creeping Brookweed. Sand-hills, near Petrif forest.

Loganiaceae

Mitrasacme pilosa — Hairy Mitrewort. Ettrick Plain, S. of Grassy Rd.

Oleaceae

Notelaea ligustrina — Privet Mock-olive. Grassy Fern Gully, Seal Rocks.

Gentianaceae

Sebaea ovata.
Centaurium australe — Austral Centaury. Coast N. of Grassy: common.

Apocynaceae

Alyxia buxifolia — Sea Box. Seal Rocks.
Parsonsia brownii — Twining Silk-pod. Ridges Rd.

Convolvulaceae

Wilsonia ? backhousii.

Boraginaceae

Cynoglossum australe — Austral Houndstongue. Seal River.

C. latifolium — Forest Houndstongue. Seal River.

Myosotis australis.

**M. scorpioides* — Forget-me-not. Garden escape, Kentford Rd.

**Lithospermum arvense.*

Labiatae

Ajuga australis — Austral Bugle. — Common.

Westringia brevifolia — Creeping Mint.

**Mentha pulegium* — Pennyroyal. Red Hut Headland.

M. diemenica var. *serpyllifolia* — Creeping Mint. The Nook, edge of swamp.

Prunella vulgaris — Selfheal. Kentford Rd.

Solanaceae

Solanum laciniatum.

S. nigrum — Black Nightshade.

S. vescum. — Grassy.

**Lycium ferocissimum* — African Boxthorn. West coast: widespread in hedges.

Scrophulariaceae

Glossostigma elatinoides.

Limosella aquatica.

Mimulus repens — Creeping Monkey-flower. Sea Elephant River mouth.

Mazus pumilio — Swamp Mazus. Lake M. Lavinia, The Nook.

Veronica calycina — Cup Speedwell.

Euphrasia collina — Purple Eyebright.

**Parentucellia latifolia.* Root parasite, Grassy.

Lentibulariaceae

Utricularia lateriflora — Tiny Bladderwort. Alf. Buttons.

Myoporaceae

Myoporum insulare — Boobialla. Common on coast.

Plantaginaceae

Plantago varia — Variable Plantain.

Rubiaceae

Galium australe — Tangled Bedstraw. Ettrick River, Yarra Ck.

Coprosma quadrifida — Prickly Currant-bush. — Grassy.

Caprifoliaceae

Sambucus gaudichaudiana — White Elderberry. Ayton's Farm; Grassy.

Campanulaceae

Wahlenbergia gracilenta.

W. consimilis — Bluebell.

W. quadrifida. Yarra Ck.

Lobelia alata — Angled Lobelia. Sand-hills, Ettrick River.

Pratia puberula — Alpine Pratia. Garden, Grassy.

Goodeniaceae

Selliera radicans — Swampweed. Penny Lagoon.
Scaevola microcarpa.
S. calendulacea.

Stylidiaceae

Stylidium brachyphyllum. Tin Mine.
S. graminifolium — Grass Triggerplant. Lake M. Lavinia.

Compositae

Bellis perenne — Perennial Daisy.—Grassy.
Brachicome diversifolia var. *humilis* — Tall Daisy.
Calocephalus brownii — Cushion-bush. Coast, south-west.
Centipeda cunninghamii — Sneezeweed. Sea Elephant River (2 miles inland).
C. australis.
Craspedia uniflora — Billybuttons.
**Achillea millefolium* — Yarrow.—Grassy.
**Aster subulatus*. Big Lake.
Gnaphalium indutum.
G. japonicum — Common Cudweed.
G. purpureum — Purple Cudweed.
G. candidissimum — White Cudweed.—Grassy.
G. luteo-album — Jersey Cudweed. Kentford Rd.
G. involucratum — Cottony Cudweed. Sand-hills on Ettrick River. ? Syn. *japonicum*.
Helychrysum dendroideum — Tree Everlasting.—Common.
H. apiculatum — Common Everlasting.
H. paralium — Coast Everlasting.—Common.
Hypochoeris glabra — Smooth Cat's-ear.
Lagenophora stipitata — Blue Bottle Daisy. The Nook.
Omatticaria matricaroides — Rounded Camomile. Lymwood.
Microseris scapigera — Yam.—Not found.
Nablonium calyceroides. Big Lake; The Nook. Limy seepages.
Olearia argophylla — Musk Daisy-bush.—Grassy.
O. phlogopappa — Otway Daisy-bush.—Grassy.
O. lirata — Snow Daisy-bush. Off Fraser Rd.
O. ramulosa — Twiggy Daisy-bush. Red Hut Rd.
O. lepidophylla. Common, exposed coastal hills.
O. glutinosa — Sticky Daisy-bush. Naracoopa. Common other coastal sites.
O. axillaris — Coast Daisy-bush.
**Picris hieracoides* — Hawkweed Picris.
Podosperma angustifolium — Sticky Long-heads.
Senecio lautus — Groundsel.—Common.
S. linearifolius — Fireweed Groundsel.—Grassy.
**S. elegans* — Purple Groundsel. Yellow Rock Beach; sand-hills, Currie.
S. minimus — Shrubby Groundsel. Yarra Ck. mouth, City of Melb. Bay.
S. spathulatus — Spoon Groundsel.
S. odoratus — Scented Groundsel.
S. quadridentatus — Cotton Fireweed.
S. glomeratus — Rough Fireweed.
S. hispidulus — Stiff Fireweed.

S. jacobaea — Ragwort.
**Sonchus oleraceus* — Sow-thistle. Counsellor Is.
**Taraxicum ? spectabile* — Dandelion.
Senecio ? orarius. — Grassy.

* Denotes introduced species.

Check-List of the Bryophytes of King Island

(Compiled from collections and records of I. Cameron, P. Barnett, A. Gardiner, J. H. Willis and a few earlier investigators—most identifications confirmed by Willis).

Mosses

Alphabetically arranged by genera —

Acrocladium auriculatum
(S. of Yarra Ck.)
Acanthocladium extenuatum
Amphidium cyathicarpum
Barbula torquata
Bryum billardieri
sp. *(Ettrick R.)*
Camptochaete gracilis (Ettrick R.)
ramulosa (S. of Yarra Ck.)
Campylopus bicolor
introflexus
torquatus
Catagonium politum
Ceratodon purpureus
Cratoneuropsis relaxa
Dicranoloma billardieri
Distichophyllum microcarpum
Ditrichum flexifolium
Eriopus apiculatus
Fissidens asplenioides
leptocladus
rigidulus (Grassy R. tributary)
Funaria
hygrometrica
Grimmia apocarpa
pulvinata
Gymnostomum calcareum
Hypnodendron "arcuatum" (sens. lat.)
Hypnum cupressiforme
Hypopterygium rotulatum
Lembophyllum clandestinum
Lopidium concinnum
Macromitrium eucalyptorum
Philonotis tenuis
Plagiothecium denticulatum
Polytrichum juniperinum
Ptychomnion aciculare
Rhacopilum convolutaceum
Rhizogonium distichum
Rhynchostegium laxatum
taxatum
tenuifolium

Hepatics

Sematophyllum homomallum
Sphagnum australe
Thuidium furfurosum
Tortella calycina
Tortula muralis
papillosa
princeps
Weissia controversa
Zygodon
menziesii
Balantiopsis convexiuscula
Cuspidatula monodon
Hymenophytum flabellatum
Kurzia hippuroides
Lepidozia sp.
Lophocolea semiteres
Marchantia berteroana
Plagiochila fasciculata
Riccardia sp.
Riccia fluitans
Symphyogyna obovata
Trichocolea mollissima

Field Naturalists Club of Victoria

General Meeting

11 September

About seventy-five members and friends were welcomed to the September meeting by the President, Mr. Tom Sault.

Mr. Ros Garnet paid a tribute to the life and work of Miss Winifred Waddell who died in August, and members observed a moment of silence in her memory. Mr. Garnet also reported on a recent meeting in Maryborough with Mr. Alec Chisholm who sent a message of kind regards and remembrance to club members.

The guest speaker for the evening was Mr. A. J. Reid, and his topic was "An Introduction to Ecology and Ecological Methods". Mr. Reid is the Education Officer of the Australian Conservation Foundation, and a lecturer at the Burwood Teachers' College. At the conclusion of his address Mr. Reid made an offer to help any group wishing to undertake practical work in ecology, stating that requests should be made to him through the A.C.F. A vote of thanks by the president was carried with acclamation.

Mr. Roger Riordan, Club Secretary, was again responsible for a large display on the notice table at the back of the hall. Minutes of Council and General Meetings were on display, also a full list of correspondence, including several notices of meetings and seminars organised by kindred associations. Particular attention was drawn to the seminar, "The Challenge of Westernport", to be held at Monash University on October 14th. Mr. Riordan was nominated to represent the Club in a deputation to the Minister for Forests to press for the preservation of "Terrible Hollow", near Wannangatta, as a wilderness area.

The President welcomed and introduced to members Mr. Jon Martindale, the new Club Librarian. The appointment of Mr. Leigh Winsor as Vice-President in place of Mr. Barry Cooper, now overseas, was announced, and Dr. Brian Smith of the National Museum was welcomed as a new Council member. Mr. Sault called for nominations to fill the last remaining vacancy on Council.

Mr. McInnes spoke about the forthcoming meeting of Naturalists' Clubs to be held in Bairnsdale on 30th September. He urged city members to give the gathering their fullest support, and to make sure that metropolitan groups were well represented. The Secretary read the programme for the week-end, which promises to be an interesting one and includes a talk on the threatened Glenaladale National Park. There will also be a guided tour to the Park on Sunday, 1st October. Delegates to the business meeting will again discuss a proposal for State-wide co-ordination of Naturalists' Clubs.

Mr. Garnet expressed concern over the most recent proposals for quarrying the Lysterfield hills; he urged members to keep watch on these proposals, and to be ready to make informed criticism and protest.

Among exhibits displayed at the meeting were garden grown native plants from several members and a collection of shells of the New Zealand Canaan Snail (genus Paryphanta) contributed by Mrs. M. North.

Botany Group

11 May

Mr. Karl Kleinecke presided as usual, and the speaker was the club president, Mr. Tom Sault, who spoke on "Seaweeds". In the short time he has been studying these algae, he has acquired a good knowledge of the Port Phillip species, as well as many from the outer coast of the Mornington Peninsula. About 60 pressed specimens were on exhibit, and drawings of plant parts of many genera — the Greens (*Chlorophyceae*), Browns (*Phaeophyceae*) and Reds (*Rhodophyceae*) all being represented.

8 June

Mr. Bruce Fuhrer spoke on "Fungi". He first referred to nitrogen-fixing bacteria, and rhizomorphs (fungi supplying nutrients to particular plants), then to the antibiotic functions of certain fungi such as *Penicillium*. He reviewed the range of these flowerless plants from macrofungi down to lower fungi such as moulds, then dealt successively with the gilled fungi, polypores, coral fungi, Gasteromycetes (puffballs and earth-stars) and Ascomycetes. His excellent slides of fungi were varied occasionally by fine shots of flowering plants as "visual interludes".

Montmorency Junior Field Naturalists' Club

Annual Report for 1971

At the Annual Meeting, the following Office-bearers were elected:—

President:
Mr. R. DeGruchy.

Vice-President:
Mr. J. Pittard.

Hon. Secretary:
Mrs. L. Cookson.

Hon. Treasurer:
Mrs. J. Howard.

Minute Secretary:
Mrs. D. D'Alton.

Committee:
Mr. D. Clark, Mesdames B. Pittard, B. Woodburn and M. North.

Junior President:
Laurie Cookson.

Junior Committee:
Margaret Howard, Judith Pryor, Gail D'Alton, Julie Cookson, Robert Callander and Peter Gillard.

Auditor:
Mr. T. North.

The inaugural president of the Club, Mr. Ray Wilton, was elected as a Life Member.

During the year, attendances of 60-70 were maintained at monthly meetings.

Speakers and their subjects were:—

February — Mr. I. MORRISON — "Nature Walkabout".
March — Mr. W. DAVIS — "Film on Birds".
April — Mr. N. SHAW — "Fossils of the Melbourne Area"
May — Mr. P. KELLY — "Micro Fungi".
June — Mrs. L. DeCOSTA — "Birds of Prey".
July — Mr. P. RAWLINSON — "Reptiles".
August — Mr. W. DAVIS — "Glenburn Dam".
September — Mr. E. ALLEN — "Sounds and Slides of Victorian Birds".
October — Miss M. LESTER — "Gum Trees and Their Near Relations".
November — The BENNETT Family (all five) — Their "Round Australia" Excursion.
December — Members' Night.

At each meeting there has been quite a good showing of exhibits by the members, and it is noticeable that even the very young exhibitors are now willing to talk freely about their exhibits. All exhibits tabled at a meeting are listed in the next month's issue of our "Club Notes", and as well, every member gets a copy of the excellent "Nature Notes — Ringwood Inspectorate".

Considerable interest was shown in the various specimens set up each month under our two microscopes, and many of our young Naturalists have purchased books from the book table.

Parties averaging about 55 members, took part in excursions arranged for:—

March — "Water Birds" at Healesville Sanctuary, led by Mrs. Van Rompaey.
June — Zoological Gardens: Mrs. DeCosta and Mr. Atkinson.
September — 19th — Glenburn Dam: Mr. Alan Reid and Mr. W. Davis.
October — Maranoa Gardens: Mrs. Fisch and Mrs. W. Batchelor.

At the Montmorency Horticultural Society's Flower Show on the 27 and 28 March, our Club staged a Naturalist Exhibtion in one of the smaller rooms of the Petrie Park Hall.

Our Junior Club also provided an exhibit at the "Wildflower and Nature Show" conducted by the F.N.C.V. and S.G.A.P. in the Lower Melbourne Town Hall, late in September.

Maryborough Club Wants Box-ironbark Reservation

"Submission Requesting Appropriate Permanent Reservation of Maryborough's Box-Ironbark State Forest."

(Price $1.30 posted, from Secretary, Mrs. L. Courtney, Carrick Street, Maryborough, 3465.)

This is an attractive presentation of Maryborough Club's Submission to the Forests Commission and the Land Conservation Council for the permanent reservation of about 25,000 acres of the local Box-Ironbark State Forest. It has a printed cover and frontispiece showing a typical bush landscape; two pages of printed nature photographs; a locality map; a census of 200 birds and 148 plant species, 11 local trees; plus spiders, reptiles and mammals listed to date. Two appendices cover the Maryborough Goldfields story and Maryborough's splendid example of Aboriginal Rock Water Wells.

The Submission has been supported by the City of Maryborough and the Shires of Tullaroop and Talbot-Clunes (in whose areas the 25,000 acres lie), as well as by many local organizations and several prominent naturalists.

Originally a sheep and cattle run, then a goldfields town, Maryborough is now an industrial city with the unusual distinction of having a higher percentage of its population engaged in industrial employment than Melbourne. It is probably unique, for its size, in still having State Forest along nearly three-quarters of its perimeter.

The Submission presents the following points as the basis of the case for reservation—

(1) It is an area of ecological and historical significance.

(2) It is a first-class example of a dry sclerophyll box-ironbark forest with a characteristic woodland formation of medium height eucalypts and an undercover of acacias, various small shrubs and many wildflowers. Much of the soil is marginal for agricultural purposes.

(3) No substantial permanent reservation of this type of country exists in Victoria, and because it is so characteristic of Victoria's northern goldfields, and consequently so interwoven with the State's early history, it is vital that this lack should be remedied.

(4) The first gold rush in Victoria occurred in this area (at Amherst—originally called Daisy Hill—nine miles south-west of Maryborough) in 1848, three years before the first "official" discovery of gold in Victoria at Clunes. This spot will, no doubt, be recognised in future years as a place of considerable historical importance.

(5) There is a strong scientific need to preserve native flora in its native habitat to provide reservoirs of material for plant breeding. Plant breeding with our native flora has scarcely begun. New or improved plants for fodder, food, drugs or gardening necessitate the bringing together by scientists of species from different areas. Without a substantial reservation of goldfields flora for this purpose, the needs of science for plants from every type of plant community cannot be met.

(6) The area of 25,000 acres proposed in this Submission is regarded as the minimum required to conserve the greatest variety of Victorian goldfields flora and fauna and to provide an adequate buffer zone between cultivated areas and roads for all wildlife and vegetation within it.

(7) Quote from "Nature Conservation in Victoria", by Judith Frankenberg, M.Sc. (V.N.P.A.).

"Western Highlands Between Bendigo and Stawell

The major plant communities of this area urgently need conservation.

These hills are distinct from the Grampians in the west and Mt. Macedon Range in the east, and reserves representative of the area are almost non-existent. Large areas of at least 20,000 to 30,000 acres are needed to represent this distinct environment adequately.

Historical features common in this area are the remnants of goldfields, once a centre of population in Victoria. A reserve including an old

goldfield of note would be a great interest to tourists and, at the same time, could preserve some of the characteristic vegetation."

The area which is the subject of this Submission includes—

(a) the site of the first (unofficial) gold rush in Victoria in 1848, and

(b) the only known Aboriginal rock water wells in Victoria, made by man.

These, in addition to the features listed in Appendix No. 1 (Maryborough Goldfields Story and Historical Tourist Attractions) could provide a unique basis on which to build a reservation of the type envisaged above.

F.N.C.V. EXCURSIONS

Sunday, 8 October — Geology excursion to Sydenham "Organ Pipes". Leader: R. Dodds. Meet opposite C.T.A. Building, Flinders St., at 9.30 a.m.

14-15 October — F.S.G. Camp at Mt. Disappointment. (Return Camp.)

Sunday, 15 October — Dromana-Red Hill area. Leader: Mr. T. Sault. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.70 — bring two meals.

Tuesday, 7 November — President's Picnic. Rushworth area. The coach will leave Batman Avenue at 8.30 a.m. Fare $2.40 — bring two meals. Note earlier time of departure.

11-12 November — F.S.G. Camp at Stony Rises with M.S.G. members.

Tuesday, 26 December-Monday, 1 January — Leongatha.

Saturday, 6 January-Saturday, 27 January — New Zealand. The balance of payment for this excursion should be paid by Monday, 13 November; on numbers booked at present the total cost will be $557.00, and this amount, less the deposit already paid should be forwarded to the Excursion Secretary — all cheques to be made out to Excursion Trust. Itineraries are being prepared and the party will be accompanied by Mrs. J. Monahan who is now living in New Zealand. Any members who want to stay a few extra days in New Zealand after the tour ends should notify the Excursion Secretary as soon as possible. We have a group concession on the plane which allows a maximum period of 28 days in New Zealand, including the excursion, and anyone staying on the extra days must pay for the additional accommodation in advance and return from Christchurch.

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 Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1971-1972.

President:

Mr. T. SAULT

Vice-President: Mr. B. COOPER

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 Road, East Malvern, 3145

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

Hon. Librarian: Mr. P. KELLY, c/o National Herbarium. The Domain, South Yarra 3141.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161. (52 2749).

Magazine Sales Officer: Mr. B. FUHRER, 25 Sunhill Av., North Ringwood, 3134.

Group Secretaries:

Botany: Mr. J. A. BAINES, 45 Eastgate Street, Oakleigh 3166 (57 6206).

Day Group: Mrs. J. STRONG, 1160 Dandenong Road, Murrrumbeena. (56 2271)

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

Field Survey: Mr. D. BARHAM, 14 Finnigans Rd., Research 3095. (437 1791).

Geology: Mr. T. SAULT.

Mammal Survey: Mr. G. F. DOUGLAS, "Knotanoll", Riddell's Creek 3431 (054-285191)

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 1972.

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members (under 18 years)	$2.00
Junior Members receiving Vict. Nat.	$4.00
Subscribers to Vict. Nat. (Aust. only)	$5.00
Overseas Subscribers	$6.00
Affiliated Societies	$7.00
Supporting Members	$10.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the Vict. Nat. will be 45 cents ($2 cents — overseas requests).

Full-time Students between 18 and 21 years pay at Junior Member rates.

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

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

GENERAL MEETINGS

Monday, 13 November — At National Herbarium, The Domain, South Yarra, commencing 8 p.m.

Subject for evening — "Conservation Education": Mr. A. A. Strom, Natural History Medallionist for 1972.

The presentation of the Medallion will be made by the Hon. W. A. Borthwick, Minister for Conservation.

The list of New Members for this month will be given in the December issue.

GROUP MEETINGS

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

Wednesday, 15 November — Microscopical Group.

Thursday, 16 November — Day Group outing: Ferry trip on Yarra. Meet at 11.15 a.m. at foot of steps at Princes Bridge. Ferry leaves 11.30 a.m.; bring lunch. Fare $1.50.

There will be no meetings of the Group in December, or January 1973.

Thursday, 23 November — Field Survey Group meeting in Conference Room, National Museum, at 8 p.m.

Monday, 4 December — Marine Biology and Entomology Group meeting at 8 p.m. in Conference Room, National Museum.

Wednesday, 6 December — Geology Group.

Thursday, 7 December — Mammal Survey Group (F.N.C.V.) meeting in Arthur Rylah Institute, 123 Brown Street, Heidelberg, at 8 p.m.

Thursday, 14 December — Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 19 November — Phillip Island. Marine Biology and General. The coach will leave Batman Avenue at 9.30 a.m.; fare $2.40. Bring two meals.

Sunday, 10 December — Corranderrk, Healesville. The club has been asked to help in a survey of this area and this excursion, led by Mr. P. Kelly will be on Entomology and General. The coach will leave Batman Avenue at 9.30 a.m.; fare $1.80. Bring two meals.

Tuesday, 26 December-Monday, 1 January — Leongatha. Few bookings have been received for this excursion so it has been decided to run this as a private car trip and those already booked should pay the excursion secretary $4.00 for accommodation deposit.

Saturday, 6 January-Saturday, 27 January — New Zealand. Members are reminded that the balance of payment ($557.00 less deposit already paid) is due by Monday, 13 November, and should be paid to the excursion secretary, all cheques being made out to Excursion Trust. Anyone planning to extend their stay should notify the excursion secretary by the same date.

JUNIOR MEETINGS

Friday, 24 November — Hawthorn Town Hall at 8 p.m.

Friday, 1 December — Preston Rechabite Hall, 281 High Street, at 8 p.m.

Friday, 8 December — Montmorency and District, Scout Hall, Petrie Park at 8 p.m.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

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CONTENTS

Front Cover:

The photograph shows one of the Mason Wasps (**Abispa ephippium?**), constructing the entrance tube to one of the many cells contained in the fist-sized red clay nest. Paralysed caterpillars are placed and sealed in each cell, an egg having first been deposited by the wasp.

Photo by Graham Pizzey.

Dung Beetles on the Move

Grateful acknowledgement is made to the CSIRO for permission to reproduce the following, which appeared in "Rural Research in CSIRO" for March 1972.

Since 1967 the CSIRO Division of Entomology has been releasing dung beetles in Northern Australia, and several species have become well established. One, *Onthophagus gazella*, has spread spectacularly, and already it has apparently begun to control that menace to cattlemen in the north — the buffalo fly. The beetles should improve soil fertility too. The Division has now begun liberating new species in the southern half of the continent that should help to reduce the bushfly nuisance.

Dr. G. F. Bornemissza of the CSIRO Division of Entomology first put forward the idea of introducing dung beetles into Australia in a scientific paper published in 1960 (see *Rural Research* 34), and in 1963 the present programme began under his leadership. He pointed out that in most of the warmer countries of the world dung beetles carry out the very important task of clearing away the droppings of native animals. They achieve this by burying them in the ground while still fresh for use as food for themselves and their offspring. Here in Australia indigenous beetles do the same with the pellet-like droppings of the native marsupials, but they cannot cope with the large wet dung pats of domestic stock introduced by European Man.

Cattle and their close relatives evolved in Asia and Africa, and with them evolved beetles that can use their dung. The CSIRO programme involves introducing the best of these into Australia, and the Organization believes that they will have three beneficial effects. At least during the warmer months, they will:

free pastures from dung accumulation,
fertilize the soil,
control pests.

Cow pats often last for months or even years in Australia, so they cover considerable areas of ground and prevent pasture growth. Termites have a major effect in removing dung, but they take months to do so. Australia's 20 million-odd cattle each produce about 10 pats a day, so many hundreds of thousands of acres of pasture must be lost annually for this reason. Dung beetles could prevent this loss.

As everyone knows, most Australian soils lack fertility. Fresh dung contains nitrogen, which is lost into the atmosphere when the dung lies on the surface of the ground. In one experiment, Dr. Bornemissza, with Dr. C. H. Williams of the CSIRO Division of Plant Industry, showed that — by burying the droppings of stock—dung beetles could considerably increase soil fertility.

Two major Australian pests breed in cattle dung — the bushfly and the buffalo fly (see *Rural Research* 65). Dung beetles cannot always prevent these insects from laying eggs in the fresh droppings, but if they bury these droppings before the flies have completed their development then they will effect control.

Dung also contains eggs of parasitic worms, and rapid burial of pats would reduce the number of infective larvae reaching grass blades and hence the gut of stock.

Such are the expected results of the dung beetle introduction programme. It has already achieved some progress towards these goals.

Releases in the tropics

In April 1967, Dr. Bornemissza and his group began releasing four species of dung beetles at selected sites, mainly in tropical Australia. They had selected the species from African and Asian beetles previously introduced into Hawaii to control horn fly (a close relative of the buffalo fly). In the three ensuing summers they liberated about 275,000 beetles, and one species, *Onthophagus gazella*, has made spectacular progress. Within two years it had colonized 400 kilometres of the northern Queensland coast around Townsville and penetrated 80 km inland — closing the 80-km gaps between release sites in the process. During the first year it proved its ability to make long-distance flights by crossing 7 km of water to colonize Magnetic Island, near Townsville (see *Rural Research* 70). A year later it reached Palm Island — a distance of 30 km across the sea.

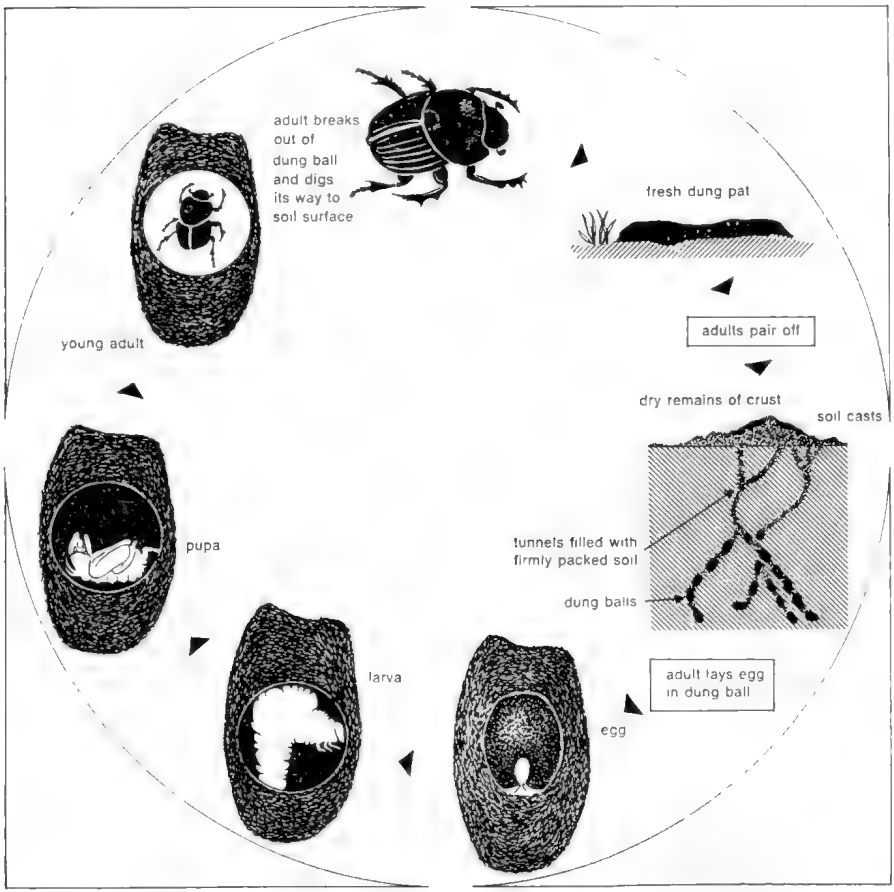


Figure 1. The dung-burying process — why the beetles do it.

Other species have not done so well, but fewer beetles were released and they do not reproduce as fast as *O. gazella*. They certainly have not yet failed.

As a back-up measure, the entomologists also introduced three dung-inhabiting histerid beetles from Hawaii and Fiji, and these again had African or Asian origins. Two have become established. Instead of burying the dung, these histerids attack the developing larvae of flies within it. Thus they should reduce fly populations where the dung beetles do not bury the dung fast enough.

Since their release in 1967, the introduced beetles have survived and flourished during periods of both exceptionally heavy rain and severe drought. Obviously therefore they can adapt most effectively to the climate of northern Australia.

Less buffalo fly

Already the Division of Entomology considers that at least some of the objects of the programme have been achieved in the colonized area surrounding Townsville. Dung disposal has proved much more rapid during the wet summer period, and between December and March the buffalo fly nuisance does appear to have abated. The numbers of other dung-breeding flies also appear much reduced. Beetle activity slows down markedly in the dry, cool season between April and October, and so there still remains a dung disposal problem at this time. Mercifully, buffalo fly numbers too are much reduced just then.

Observations over several seasons show that, with the present beetles, buffalo fly numbers may reach troublesome levels at two periods:

in spring, when temperature and rainfall conditions have become suitable for fly reproduction, but the beetles have not yet become active enough to dispose of all dung,

in autumn, when temperatures have fallen low enough to inhibit beetle activity more than buffalo fly reproduction

It is hoped that it will be possible to find species to fill these gaps and Dr Bornemissza is now in Africa searching for them.

In the meantime the Division of Entomology would encourage any efforts by interested people to help spread the beetles. They can be easily trapped — using a bucketful of sand with a cowpat on top, which is sunk so that the top of the bucket is flush with the soil surface — and transferred from one property to another. Any farmer knowing another on whose property beetles have already become established, and who wishes to introduce them on to his own, can obtain further information from the Division of Entomology, CSIRO, P.O. Box 109, Canberra City, A.C.T., 2601

Beetles for southern Australia

Phase one of the programme — introducing the first dung beetles into tropical Australia — has been completed. Phase two — introducing them into the southern half — began early this summer. At Pretoria in South Africa Dr. Bornemissza has set up a laboratory, which he is using as a base to search for suitable beetles. Australia needs species for all its cattle-raising areas, and these cover such a wide range of climates, soils, and pasture types that a hundred or more different beetles may be required. Fortunately, there are some 1,800 known species south of the Sahara to choose from.

After one season's investigation Dr. Bornemissza had already sent back eight dung beetles and two histerids (predatory on fly larvae) — now being bred up in large numbers in Canberra — and some were released earlier this summer. These should prove suitable

for a variety of climates, with annual rainfalls varying between 10 and 40 in. in temperate areas and 15 and 35 in. in the tropics. One species of histerid suitable for the very wet tropical areas was released around Daintree and Tully in 1968, but this has not thrived and possibly a more suitable species for this area will crop up later.

Any introduction programme of this type will raise fears about introducing diseases and about the effects of beetles on other endemic fauna. They must, of course, breed rapidly and respond well to handling, but they must also breed only in dung. The beetles go through a rigorous quarantine procedure so that they cannot carry any disease in with them, and this procedure is described in some detail here since it illustrates well the complicated precautions that must be taken before insects can be released in Australia.

Beetles of the selected species having been paired, the resulting eggs are extracted from the brood balls and surface-sterilized in 3% formaldehyde solution. They are then packed in specially designed containers (sent from Australia) and air-freighted to Canberra, where Mr. P. Ferrar and his helpers wash them and place them in hand-made dung balls of "clean" Australian dung — a lengthy procedure since up to 1,500 eggs may arrive in a single batch. The team rear the eggs through to adults that never leave quarantine. They then collect the eggs of this generation, cleanse and surface-sterilize them, and place them in turn in "clean", hand-made dung balls. The adults that emerge from these eggs are then used for mass breeding for field release. Thus the beetles must pass through one complete generation in quarantine before release for mass breeding.

Slow starters

A word of warning — once released in the field the beetles appear to be slow starters. During the first year or so, even when they are breeding well, little sign of the beetles may be visible at the release sites. After a year or two, however, destruction of dung pats gradually becomes apparent, and so lack of any sign of the beetles does not mean that they have failed to become established. Almost inevitably those released in the south will take longer to produce results than the very successful *O. gazella*, since temperate species breed more slowly.

No risk

What risk is there that the beetles themselves may become pests? Dr. Bornemissza and his colleagues are confident that this cannot happen. The adults feed exclusively by sucking fluids from fresh dung — they cannot chew anything. They will not reduce reseeding within the pastures by burying the seeds, since they remove all irregularities from the dung and leave them on the surface. While burying the dung the beetles should in fact help reseeding by creating loose, well-fertilized seed-beds. The larvae do have chewing jaws for feeding on the fibrous dung balls, but they die very quickly if these balls are opened and so they cannot break out and feed on other materials.

Further reading

Could dung-eating insects improve our pastures? G. F. Bornemissza, *Journal of the Australian Institute of Agricultural Science*, 1960, **26**, 54-6.

An effect of dung beetle activity on plant yield. G. F. Bornemissza and C. H. Williams. *Pedobiologia*, 1970, **10**, 1-7.

Dung beetles. *CSIRO Division of Entomology Annual Report*, 1970/71, 80-2.

Termites (Isoptera) associated with dung in Australia. P. Ferrar and J. A. L. Watson. *Journal of the Australian Entomological Society*, 1970, **9**, 100-02.

Insectary studies on the control of dung breeding flies by the activity of the dung beetle, *Onthophagus gazella* F. (Coleoptera: Scarabaeidae). G. F. Bornemissza, *Journal of the Australian Entomological Society*, 1970, **9**, 31-41.

National Seminar*

Aboriginal Antiquities in Australia

Existing Legislation and its Implementation – Victoria May 1972

by Alan L. West

An Act entitled the "Archaeological and Aboriginal Relics Preservation Act, 1972" was quite recently passed by the Victorian Parliament and was given Royal assent earlier this month (May 1972). It has yet to be proclaimed but we expect that this will happen very soon. The responsible Minister will be the Chief Secretary. Arrangements are in hand for the establishment of an Archaeological Relics Advisory Committee, for the drafting of regulations, and for the provision of staff and finance. We are hopeful that the legislation will be operating by the end of this year.

Implementation

The Act will be implemented by the National Museum and the Director, from time to time, of the Museum will be the Protector of Relics. The Director in his capacity as Protector will be the Chairman of the Advisory Committee and will be required to discharge a number of functions as set out in Section 10.

1. He will, through the appointed staff, keep a register of restricted areas (called 'archaeological areas'), of relics, and of persons holding private collections. Relics are broadly defined as Victorian objects 'pertaining to the past occupation of the Aboriginal people . . . whether or not the relic existed prior to . . . occupation . . . by people of European descent'. Handiwork made for the purpose of sale is excluded by definition as are human skeletal remains buried after the year 1834.
2. The Protector shall seek for relics, arrange for their preservation and conduct research in respect of them. He may also enter into arrangements with the Minister and certain other persons regarding the general oversight and administration of restricted archaeological areas.
3. A final and important obligation on the Protector shall be the development of a positive education programme to make available 'to the public facts and information pertaining to relics and archaeological areas'. Such publishing of information will not necessarily mean the disclosure of the location of relics.

A further instrument having a part in the implementation will be the Archaeological Relics Advisory Committee consisting of ten honorary members. The Director of the National Museum and a Museum archaeologist or anthropologist will take two places and there will be one representative each from the Anthropological Society of Victoria and the State section of the National Trust of Australia. Of the remainder one shall be an Aboriginal nominated by the Minister of Aboriginal Affairs, one shall be a member of the Institute of Aboriginal Studies and there will be one member each from the following government departments: Lands, Aboriginal Affairs, National Parks and the Forests Commission.

*Held in Canberra, May, 1972.

The Committee, as the name suggests, has advisory functions only but as well as considering matters referred to it by the Minister it may advise the Minister on all matters it thinks necessary in relation to archaeological relics and their preservation.

A third vital administrative function will be vested in honorary wardens. These will be private individuals who have shown or are likely to show a keen interest in the protection of relics. The functioning of these people in scattered areas of the State where they live will undoubtedly be one of the chief strengths of the legislation. Wardens will be local guardians of relics. They will have power, when they suspect a breach of the Act, to impound relics; they will be able to demand names and addresses in certain circumstances; they can require vandals or suspected vandals and unauthorised persons to leave gazetted archaeological areas and they are encouraged by the Act to seek out the location of newly reported or unreported relics.

Main Provisions

Legal Protection of All Relics

The Act gives legal protection to all Aboriginal relics whether they stand on private or Crown Land or are held in private collections. A person who wilfully or negligently defaces or damages a relic shall be guilty of an offence against the Act.

Related provisions state that it is not an offence for a person to possess portable relics, or other relics which he possessed legally before the commencement of the Act, but no relics of any category shall be bought or sold without the permission of the Protector.

Anyone who collects a portable relic defined as "a relic which because of its weight and size is capable of being lifted and removed by hand" shall identify and safeguard it and shall report the find, in writing, to the Protector.

Archaeological Areas

The Act provides for the proclamation of special archaeological areas in which all relics shall be the property of and under the protection of the Crown. No one may enter such an area without authority. I expect that only a few sites where there are relics of more than ordinary scientific and/or historical importance will be declared to be archaeological areas.

Certain consents are required before land can be so proclaimed. In respect of Crown Land the consent of the responsible Minister must be obtained and in the case of private land that of the owner or occupier. Should a private person withold consent when the preservation of a unique or irreplaceable relic is involved, the Minister may compulsorily acquire land and compensate the landholder. I anticipate that action under this section will rarely, if ever, be necessary; a person served with a compulsory acquisition notice has a right of appeal.

Temporary Archaeological Areas

Temporary archaeological areas can be created at short notice if this is necessary to protect a relic. The simple publishing of an Order in Council in the Government Gazette will bring this situation about. Within six months these temporary areas must be proclaimed as Archaeological Areas otherwise they revert to their original status.

Excavations

An important clause places a complete prohibition on all archaeological excavation unless the consent of the Minister is first obtained. In granting excavation permits the Minister may impose whatever conditions he thinks are appropriate. Details of this permit system have yet to be spelled-out in the

regulations, but suitably qualified persons with a scientific interest in archaeology will, I am sure, experience no great inconvenience in following their professional interests. The casual digging into and plundering of archaeological sites by unqualified people we hope will cease as a result of the education programme which will follow implementation of the Act.

Miscellaneous

The Act empowers the Minister to purchase land on which immovable relics are located and he may also purchase relics in order to preserve them.

A person who discovers a relic has an obligation under the Act to report the find to the Protector or a Warden unless he has reasonable cause to believe that it has already been reported.

Should a relic be discovered in the course of any construction or excavation, the person in charge must forthwith report the find to the Protector who shall take whatever steps are necessary should he consider the relic worthy of preservation.

Victorian Non-Marine Molluscs – No. 11

by

BRIAN J. SMITH*

The commonest and most widespread freshwater bivalve, known as the Little Basket Shell, belongs to the family Corbiculidae.

Corbiculina angasi (Prime, 1864)

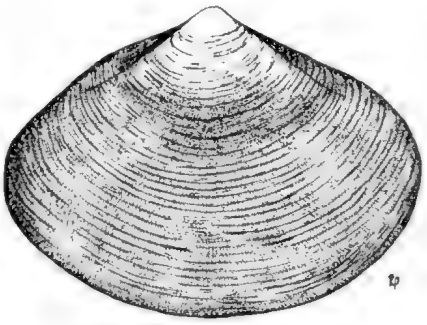
This is a small, solid shell with umbos almost central and deep, regular concentric striae. It is very variable in colour and pattern both internally and externally. Many specimens are pink to deep purple inside and vary from purple to a pale yellowy brown externally. Shells are usually covered by a straw-coloured epidermis. In many areas shells are frequently found covered with an earthy deposit. Average size is 20-25 mm long.

Like all freshwater bivalves the species feeds by creating currents of water across its gills and filtering out the small food particles out of the stream. Its method of reproduction is not known, but this is currently under study at a local university.

These molluscs are usually found buried close to the surface of sandy mud in slow flowing rivers or creeks. However they have been found in dams and lakes. They have also been found in main water reticulation pipes where they have caused trouble to authorities by blocking meters.

This species has been recorded from all over Victoria and southern South Australia and New South Wales. Closely related species occur in most of the flowing freshwater in the eastern part of Australia and in many of the rivers of Northern Australia.

*Curator of Invertebrates, National Museum of Victoria.



(Drawing by Miss Rhyllis Plant)

Emerged Marine Shell Beds near Geelong, Victoria, Australia, with Marine Shells Bored into Freshwater Limestone.

by Edmund D. Gill*

No better evidence of change in the relationship of land and sea can be provided than marine boring shells in place in fossil burrows that penetrate freshwater limestone. Such occur on Hovell Creek, 14.5 km (9 mi) north of Geelong, Victoria.

When the Princes Highway between Melbourne and Geelong was being duplicated to provide a divided highway between these cities in 1959, a new bridge was built over Hovell Creek. Dr. R. W. T. Wilkins, then my assistant, drew attention to the occurrence of these strata. We examined the site, which is shown in Figure 1. Information was obtained from the excavation for the bridge, and from a pipeline excavation a little further upstream between the bridge and an old ford. Jutson (1931) noted that on the creek banks there "are some recent marine deposits, which possibly have been uplifted. If so, they are older than those of the marshy belt. The question of uplift is left open pending further examination."

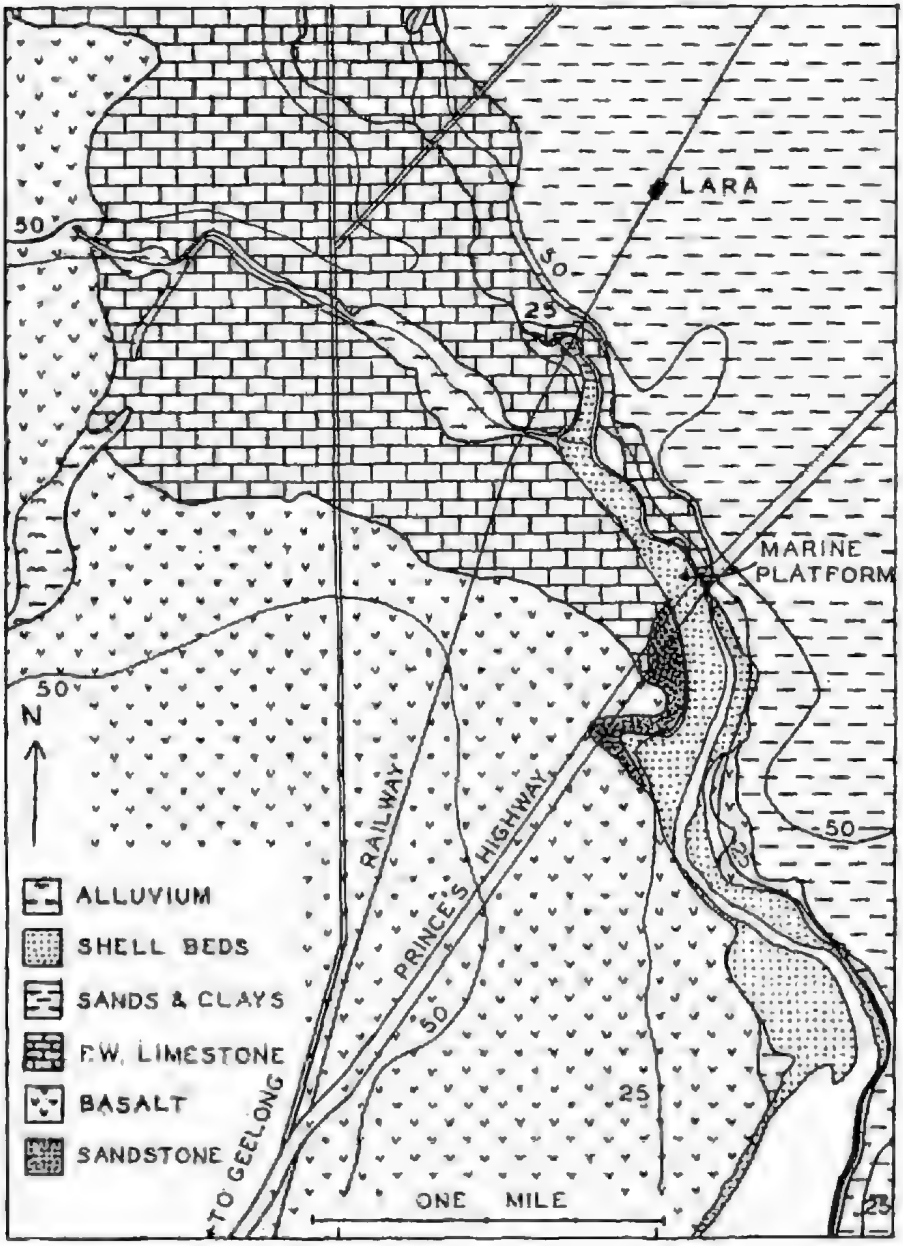
Stratigraphy

The relationship of the beds is shown in Figure 2. The Lara Limestone underlies all this area as is shown in the Quarter Sheet of the Geological Survey of Victoria (1863), and in the more recent map (1963) published by that organization. Hovell Creek has cut a shallow valley in this formation, which is completely freshwater. It is discussed by Gill (1964) and Wilkinson (1971). Thus, the marine beds are emplaced on freshwater limestone in a valley cut by a freshwater stream. The creek flows into Corio Bay which is a branch of Port Phillip Bay. At the mouth of Corio Bay there is a bar of basalt, while Port Phillip Bay is almost closed by an aeolianite bay bar. There is therefore a high impedance to seawater entering Corio Bay, and high tide at Geelong is 3 hours 10 minutes later than at Port Phillip Heads (Bradley 1949). A relatively higher sea level is therefore necessary for the sea to reach the Hovell Creek site.

The top of the Lara Limestone is somewhat leached, and in it were discovered burrows of the boring mollusc *Venerupis* with paired shells still in place in the burrows. In the banks of the creek are outcrops of hard recrystallized limestone.

At the site examined, the Lara Limestone was overlain by (1) a shell bed a little over a foot (0.3 m) thick containing mixed facies of estuarine and swamp shells, the latter apparently washed in from the nearby marshland. The matrix was brownish-grey fine sand and silt, with a small amount of coarse sand and gravel. Above this bed was (2) another shell bed about 4.5 feet (1.37 m) thick containing innumerable *Velacumantus australis* shells and little else. An occasional *Ostrea sinuata, Macoma deltoidalis* or *Anadara trapezia* was found. Above this bed was (3) a stratum with a dozen or more species of estuarine shells, including *Mytilus planulatus, Notospisula*, and *Katelysia rhytiphora*. The top of this bed was disturbed by human activities, so it was not possible to determine its original upper limit of

*National Museum of Victoria


LARA
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RAILWAY
PRINCE'S HIGHWAY
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ALLUVIUM
SHELL BEDS
SANDS & CLAYS
F.W. LIMESTONE
BASALT
SANDSTONE
TO GEELONG
ONE MILE

Figure 1

deposition. This site was recorded in 1961 (Gill et al.), and the radiocarbon date in 1966 (Gill et al.).

Degree of Emergence

The construction authority provided a bench mark which had been surveyed from a railway datum at the Little River Railway Station (coping at Melbourne end of platform). Surveys made from the bench mark determined the elevations listed below which are based on low water mark at Melbourne. Study of the cotidal lines (Bradley 1949) suggests that low water mark in Hobsons Bay would not be appreciably different from that in Corio Bay.

	Feet	Metres
Top of water in creek ..	2.6	0.79
Top of Lara Limestone	4.1	1.27
Top of mixed facies shell bed	5.2	1.57
Top of *Velacumantus* shell bed	9.7	2.97

Age of Deposition

At the time of study, it was inferred that the deposit was Holocene in age because of lack of compaction and lack of oxidization. Furthermore, the beds were comparable with others that had been dated mid-Holocene. Dr. T. A. Rafter of the Institute of Nuclear Science in New Zealand carried out a radiocarbon assay of marine shells from Hovell Creek, which gave an age of 5,620 ± 90 yr. B.P. (NZ-279). The sample was from the *Velacumantus* horizon. In age the bed is comparable with numerous others recorded along the coast of Victoria across a number of tectonic blocks of varying direction of movement (Gill and Hopley 1972).

Interpretation

There is no evidence of presently measurable movement since 5,600 years ago. As any tectonic movement must be a very small component, and as similar emerged beds are found on all the horsts and basins along the coast of Victoria, these beds are best interpreted as a function chiefly of eustatic change of sea level.

Many authors have described the tectonics of this area and the movements that have taken place in Upper Pliocene and Lower Pleistocene time (e.g. Bowler 1963). Movements were never rapid in the sense that they are in New Guinea and in parts of New Zealand, but in the Upper Pleistocene and since, they have been very slow.

FORAMINIFERAL FAUNA

Mr. A. C. Collins has kindly examined these microfossils (N.M.V. P21369), and reports as follows:

"Sample 1. Upper bed (shell bed with varied fauna, above *Velacumantus* bed). Washings mostly angular quartz sand, poorly sorted. Some shell fragments and small mollusca. Foraminifera few, *Ammonia* sp. predominating, with rare specimens of two species of *Elphidium*.

Sample 2. Middle bed (*Velacumantus* bed). Washings mostly quartz sand, poorly sorted. Shell fragments and small mollusca. Foraminifera more plentiful, *Ammonia* sp. predominating, more than 99% of specimens. Rare specimens of two species of *Elphidium* and *Trichohyalus* aff. *tropicus* Collins were also found.

Sample 3. Lower bed (mixed facies, above Lara Limestone and below *Velacumantus* bed). Washings mostly quartz sand with shell fragments and small mollusca, also three species of ostracoda. Foraminifera much more numerous, *Ammonia* still dominant, but *Quinqueloculina*, *Millonella*, one species of *Elphidium* and *Trichohyalus* present in some numbers.

The ecological indication is estuarine conditions throughout, with salinity decreasing upward, as shown by decrease in numbers of both specimens and species, and increasing dominance of *Ammonia* from lower to upper beds. No indication of climatic conditions other than those existing at present.

Species Present

Quinqueloculina poeyana (d'Orbigny). This elongate and striate species is common in the western and southern areas of Port Phillip. Specimens compare well with others from the Caribbean, from whence it was described.

Milionella labiosa (d'Orbigny). A common Victorian shallow-water species.

Ammonia aoteanus (Finlay) is the species commonly found in both estuarine and fully marine conditions in Victoria. When present in dominant numbers it indicates brackish-water conditions. It corresponds well with published figures of the New Zealand species.

Elphidium crispum (Linné) and other species of this genus common in shallow water in Corio Bay.

Trichohyalus tropicus (Collins) was described from mangrove pools on the Barrier Reef, and later recorded by Albani from Port Hacking, N.S.W. The present form differs in some respects from the species as described, and may represent a cool-water modification. It has been found in recent shore sand from Altona Bay, Victoria, all records so far being from shallow and sheltered waters where considerable variations in temperature and salinity can occur."

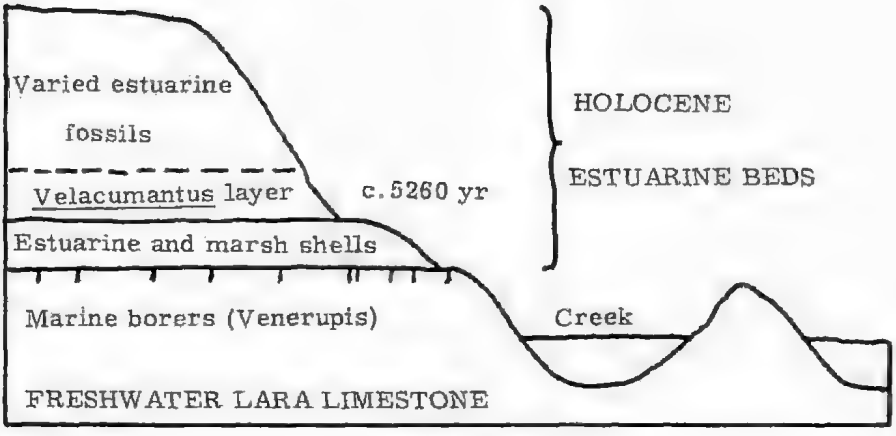

Figure 2.

A more protected site can hardly be imagined, viz. a small valley running into an inner bay (Corio), fenced in by a basalt bar from an outer bay (Port Phillip), which in turn is protected from the open ocean by a bay bar (Nepean Peninsula). Protection is confirmed by the sediments in the valley, which are of stillwater type. The fossils tell the same story, being of estuarine type. So the shell beds cannot owe their supratidal position to a storm surge, or other high dynamics event. Anyway, if they did, they would have a different structure. The Hovell Creek deposits are the normal sediments of a quiet estuary, emplaced over a period of time yet to be determined.

To ascribe the emergence of the shell beds to 3 m of uplift in the past 5,600 years is out of character with the very mild movements of the area. The major factor is believed to be glacio-eustatic change of sea level. Moreover, such an interpretation fits the pattern of emerged shell beds found all along the coast of Victoria.

In adjacent Port Phillip Bay at Altona, there is clear stratigraphic evidence (Gill 1972 pp. 22-23) of advance of the sea followed by retreat at about this same time. If the beds were due to uplift, then there would be evidence of retreat only. My interpretation is that during mid-Holocene times, the sea transgressed the valley of Hovell Creek, stripping the superficial sediments from the limestone, and establishing a platform into which *Venerupis* bored. The sea then retreated, as is shown by evidence of decreasing salinity through the beds (Collins report), and the emergence of the marine strata.

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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.

Ecology of Some Eucalypts of the Gippsland Lakes District

100 years after Dr. Howitt

by L. A. Fell

Dr. Howitt finished his long life as explorer, geologist, anthropologist and botanist, at Metung on the Gippsland Lakes. He had come to the province in 1860 and to the end of his life in 1907 he roamed widely, making a worthwhile contribution to its botanical knowledge especially in the difficult Eucalyptus. In October 1890 Dr. Howitt lectured to the Royal Society of Victoria on the "Eucalypts of Gippsland". Any discussion of the present status of those Eucalypts is complicated by taxonomic changes and lack of basic ecological information.

In the more than 100 years since Howitt came first to East Gippsland *four* complete ecosystems have been destroyed there, leaving almost no trace. The first consisted of the subtropical vegetation gullies formerly fringing the northern shores of the Lakes. These, the continuation of the warm east coast flora from further north, have been destroyed in the writer's lifetime. Secondly the open woodland area east of the Mitchell River formerly carrying *E. tereticornis* and *E. bosistoana*, of which, except in the skeletons of trees rung nearly 100 years ago, not a trace remains. Thirdly that of the three alluvial systems on the Mitchell, Tambo, and Snowy river flats where again accurate record seems never to have been kept of the flora. Finally the 100-mile stretch of plains, east of Traralgon, on which *E. tereticornis* was the dominant eucalypt, does not contain even *one* adequate reserve characteristic of the system.

Before they too disappear without a trace it is proposed to discuss in some detail the past and present ecology of the principal eucalypts in the locality between the Lakes shores and the Prince's Highway to the north. This district gets from 23 ins. rain on the western edge, to about 28 ins. at Lakes Entrance, but there are long harsh dry spells every few years. Geologically it is described as Tertiary with lowland soils on clay sediments. Winters are usually mild but heavy frosts occur in the valleys. Howitt was of the opinion that elevation, rainfall and aspect have more to do with distribution than geological formations. Patton (1930) says "each individual (eucalypt) is present because of some particular set of conditions" and continues "the habitat is the sum of a large number of factors and all of these may not be known."

In the case under notice, rainfall, elevation and temperature are constants so that soil texture and fertility are the deciding factors in local distribution in the absence of biological controls. This woodland, rich in eucalypts, fulfils the dictum of Pryor and Johnson (1971) that "although Australia has been subject to vast changes . . . it still has as remnants, enough of the original eucalypt population to enable one to discern with some confidence what the original stands were like and to see clearly the patterns of variation associated with the range of habitats". In the designated locality there are still a few pre-settlement trees from 200 to possibly 1,000 years old, but they are failing rapidly and time is short to delimit their original range. Aids to this acti-

vity are the memories of old men, records of pioneers and old photos. Prior (1960) pointed out that "the majority of stands of eucalypts with a rainfall of more than 25 ins. do not contain only one species, but are frequently an intimate mixture on any one circumscribed site often no more than a few acres in extent. There are grounds for supposing . . . that such mixtures which are often repeated, frequently are *not* co-incidental . . . that they are an ecological pattern which results because there is biological benefit to the partners." Here in this unique ecosystem is an illustration supporting Pryor. Nowhere else in Australia do *E. sideroxylon, E. tereticornis, E. botryoides, E. pseudo globulus, E. cypellocarpa, E. bosistoana, E. bauerana, E. polyanthemos* and *E. melliodora* come together in a limited area *right on the coast.*

The varieties listed above are treated in some detail in the descriptions following:

Eucalyptus tereticornis

In most of the literature this eucalypt is recorded vaguely as occurring east of Traralgon with no reference to its easterly extension limit. Ewart records it as growing on a wide variety of soils including sandy loam, gravel and alluvial soils, avoiding acid soils. In the writer's experience it is *never* found on poor or deep sands nor does it favour hillsides. Anderson (1956) suggests that in New South Wales it favours moderately rich and heavy soils which are often dry and subject to droughts. For some distance east of Traralgon the varieties *camaldulensis/ tereticornis* mix together and Ewart further states that seed of either tree sown in forest plantations may yield a mixture of both forms. In the area under discussion *E. tereticornis* is found usually as a tall open topped tree growing on clay, clay-gravel or good alluvial sites.

This tree is mis-named the "forest" red gum. Over its range in East Gipps-

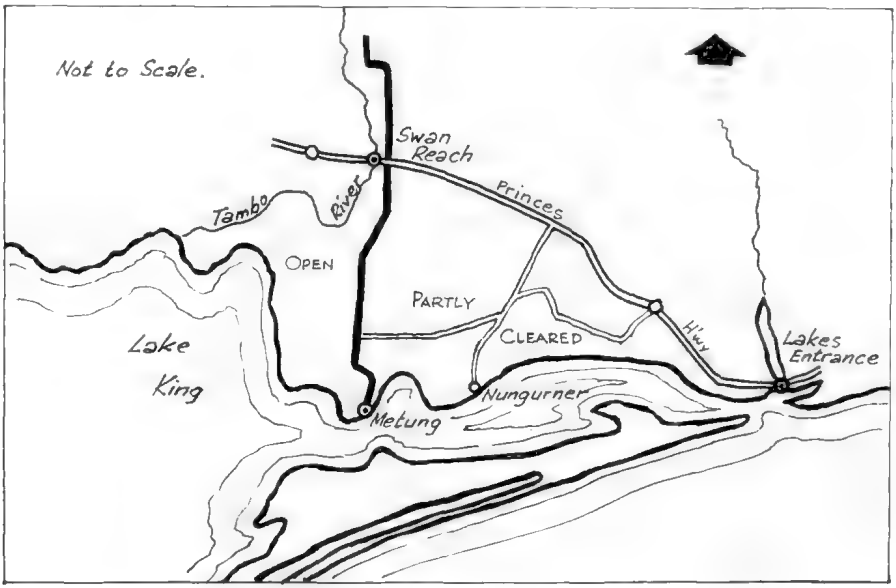

Figure 1

land it conforms to the description in the Natural Occurrence of the Eucalypt, 1953, "as a distinctive tree of particular topographic localities, not appearing in closed forest formations." On the plains country it adopts the typical open twisted appearance of *E. camaldulensis* as seen on the western plains. General vagueness as to the eastern limits of this tree is found even on the spot, as conversations on its boundaries with Forestry Officers at Bruthen and Nowa Nowa were indecisive. It extends to the rises on the north-east corner of the Tambo River flats above Bruthen. Whether it was dominant pre-settlement of the alluvial flats seems now to be unknown. It certainly was on the Mitchell River flats. It extends to the mouth of the Tambo and where ever there is an area of heavy soil on the hills towards Lakes Entrance.

To the north of Metung are some pre-settlement trees possibly up to 1,000 years old (Jacobs), but further along the coast it disappears just west of Lakes Entrance, not to reappear for more than 100 miles away in southern New South Wales. The tree thus avoids the more heavily forested stretch of East Gippsland. Few signs of fire are seen on the remaining pre-settlement trees although Howitt says "the annual crop of grass . . . was more or less burnt off by the Aborigines annually". Many of the dead *tereticornis* towards the mouth of the Tambo River had been used by the Aboriginals for canoes, and apparently no other eucalypt in this area was so used. Its powers of regeneration are extremely high, even in grass, so it will never die out. In view of what Pryor and Johnson (1971) describe as "clinical variation" or "geographic races", the varying descriptions by botanists of varietal differences and its variability in the field this writer doubts its validity as a species.

Plate 1

E. tereticornis (The furthest east tree of this species along the lakes-post settlement).

Photo: Author

Eucalyptus bosistoana

With *E. tereticornis*, once covered as an open forest some 40,000 acres round and east of Bairnsdale. In 1930 Ewart described this tree as in rapid process of extinction and this is now virtually true of this locality. Odd trees are still alive at Bruthen, but all that remains towards the Tambo River mouth, where it was once numerous, are the trunks of long dead trees rung in pioneering days. It grows also in association with *E. polyanthemos*, but is such a poor regenerator it is doomed.

Eucalyptus polyanthemos

Found as individual trees or in small groups throughout this woodland. Penfold and Willis say that it is found on poor dry stony and gravelly soils and poor class heavy soils. This is not so here, where it often occupies good loamy damp soils on gully hillsides. It was never found on the heavy loams and clays along the Tambo River. Pryor and Johnson believe it merges with *E. bauerana* as they approach the coast. This is absolutely *not* the case here. The wood of *polyanthemos* is almost dark red, that of *bauerana* a dull yellow; they grow on different sites and their habit of growth is not alike. A very valuable wood, but in short supply, while it is a poor regenerator. It grows in association with *E. melliodora*, *E. Bosistoana* and probably *E. globoidea*.

Eucalyptus bauerana

A medium sized umbrageous tree said by Ewart to grow on river flats and loamy soils. This tree grows with *E. tereticornis* on river bottom lands but it also grows on deep sands along the Lake verges in that district, where it associates with *Pittosporum undulatum*. In leaf shape is closely resembles *E. polyanthemos*, but is easily distinguished by a competent observer in the field. A poor seeder and regenerator with a papery brittle inflorescence shedding its seed in the year it matures.

Plate 2

E. bauerana at Metung, the age of which is unknown.

Photo: Author.

Eucalyptus melliodora

Found in groups and scattered trees over the district where the soils are heavy, hard and dry. It *never* grows on poor sands and seldom on river loams where its place was formerly taken by *E. bosistoana*. North of Nungurner it grows as an almost pure stand but the trees are post-settlement. A decorative smallish tree needing plenty of room to spread.

The "Blue Gum Complex"

According to Willis (pers. comm.) *E. pseudo-globulus* (Blakely No. 353) is the common blue gum of coastal and near coastal East Gippsland, not *E. maideni* or *E. st. johnii*. Metung is its western limit, as it is the present western limit of *E. botryoides*. At the head of Chinaman's Creek near Metung *E. pseudo-globulus* is mixed with *E. botryoides* on the shore and on the hilltop above with *E. sideroxylon*. Further east it grows on ridges with *E. globoidea*.

Eucalyptus cypellocarpa

Grows just east of Metung in damp gullies or on loamy hillsides. Visually it is extremely difficult to differentiate it from *E. pseudo-globulus*, but the buds and capsules are very different.

Eucalyptus sideroxylon

Apart from Airey's Inlet west of Geelong the only place in Victoria where this tree grows to the water's edge is between Metung and Nungurner. It is not now reproducing itself.

Eucalyptus botryoides

A coastal eucalypt except on a few rich loams such as at Orbost. On the mainland does not now extend westerly beyond Metung. It associates with *E. pseudo-globulus* and *E. viminalis/racemosa* type, but is not reproducing in the given area and will die out. It will grow on poor deep sands but must be within reach of the water table.

Plate 3

E. melliodora, post settlement at Metung.

Photo: Author.

Hybrids

Among the species quoted several hybrids have been recorded (Blakely 177, 260, etc.) but most botanical determinations vary as to the parents. The original trees are now probably dead and it is unlikely they will recur.

In the locality discussed no mention has been made of the Stringy bark group, nor the peppermints, nor the forms of *E. viminalis*. Nor has a rich diversity of sub-shrubs been yet commented on although these make an integral part of the ecology. Before this ecosystem is destroyed like the others, it might be possible at a later date to record it further.

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Plate 4

E. pseudoglobulus; a young tree near Nyerimelang.

Photo: Author.

Allen Axel Strom

Australian Natural History

Medallionist for 1972

After considering dossiers of 23 nominees, the Award Committee has named Allen Strom as winner of the Australian Natural History Medallion. Mr. Strom was nominated by the David G. Stead Memorial Wildlife Research Foundation of Australia, Sydney (of which he is president) and supported by the Victorian National Parks Association, the National Trust of Australia (New South Wales), the Federation of Victorian Walking Clubs, Goulburn Field Naturalist Society (N.S.W.), and Katoomba and District Wildlife Conservation Society.

He had previously been nominated in 1968 by Illawarra Natural History Society and by Oatley Flora and Fauna Conservation Society, and back in 1959 by The Rangers' League of New South Wales. This widespread support indicates the broad scope of Allen Strom's activities and recognition of his sterling work for extension of knowledge of our Australian environment and its conservation for all to enjoy — for ourselves and posterity.

He is vice-president of the National Parks Association of New South Wales (was its foundation secretary), and has been a leading advocate of and tireless worker for the acquisition of national parks and nature reserves: secretary of the Nature Conservation Council of N.S.W., adviser in conservation to the N.S.W. Department of Education; chairman of the Education Committee of the Australian Conservation Foundation: editor of the journal of the Gould League of N.S.W., and chairman of the Field Studies Centre Advisory Committee, Sydney. For many years he was chief guardian of Fauna and chairman of the Fauna Protection Panel. He was secretary of the Wildlife Preservation Society, and a council member of the Men of the Land Society, and of the National Trust of Australia (N.S.W.). He represented the Sydney Bushwalkers on the Federation of N.S.W. Bushwalking Clubs.

Allen Strom's major interests were originally in geology and geomorphology, then he became intensely interested in the ecological relationships of flora and fauna. He has given innumerable lectures to a wide variety of organizations, illustrated by his own photographs, and has written widely (often anonymously) in the furtherance of his aims. A diplomate in general science at Sydney Technical College (1943), he was a teacher in primary and secondary schools for 25 years, and a lecturer at Sydney Teachers' College for 15 years. Until very recently he lived at Gymea Bay, his present address being Scenic Road, Kilcare Heights, via Hardy's Bay, N.S.W. 2256. The medallion will be presented at the F.N.C.V. meeting on 13 November, when Mr. Strom will give a talk on "Conservation Education".

J. A. BAINES,
Secretary, General Committee,
Australian Natural History Medallion.

Readers' Nature Notes and Queries

A Bird Note

This note about Currumbin, Queensland comes from Alex N. Burns of Burleigh Heads.

The big lagoon at the new development area of the famous Currumbin Bird Sanctuary, has to me, always been a constant source of interest with regard to the behaviour of some of its feathered inhabitants. These are many, in the main being several species of Wild Duck, some Muscovies (and hybrids!), Ibises, Water Hens, Herons, Egrets, and for a couple of years, one Jabiru. For the past two or three years there has been one Goose, and the master of them all, a male Black Swan. My almost daily observations centre largely on this Swan, which, at morning and afternoon feeding time is "first in", and drives off all other birds who come too close to him.

Two years ago we had some 60 Muscovy ducklings being cared for by two mother ducks, each in a coop and yard with its complement of little ones. At feeding time one morning, from out of the blue appeared a small gawky greyish creature, a gosling, apparently without any parents looking after it. It was therefore placed in one of the Muscovy coops and was accepted by the mother and ducklings. Very soon it grew to about three-quarters the size of its foster mother who, by that time had become tired of her clutch, so she was returned to the lagoon area. The ducklings were not dismayed and clustered round the gosling who seemed very happy with them all. In due course all were "liberated" in the 52 acre area with the lagoon. Immediately the black swan took a dislike to the gosling who was chased and bitten many times. This dislike has persisted to the present day, and the gosling, now a fully grown goose is still chased (sometimes on the wing) by the swan. Conversely, the swan has had, over the past three years, a constant friend and companion in the being of a male Wood-duck. These two are always together, either on land or in the water. A year ago a female black swan was introduced to the lagoon, and was accepted only half-heartedly at first; but its presence completely changed the temperament of the male black swan.

He attacked everything, man and animal, who ventured within 30 or 40 yards of the lagoon; if he was at the distant end and one approached the other end to feed the birds, he would swim rapidly down, come ashore, and attack even those who had fed him twice daily for almost three years

This year he and his mate nested amongst some vegetation at the edge of the lagoon; eggs were laid, but one night nine inches of rain fell, and nest and eggs were washed away. Not to be deterred, another nest and eggs soon appeared, only to meet a similar fate after a night of torrential rain. Again another nesting site was selected, and more eggs were laid. Good fortune prevailed and five cygnets were hatched. Within the first week two of these had perished, but the other three are well and growing fast. Unfortunately one of these had a foot bitten by one of the large eels that inhabit the lagoon. On account of this, the swans and cygnets were placed in a netted area enclosing part of the lagoon. Throughout all these ordeals the little Wood-duck has stuck to its much larger companion. Today, two black swans, three cygnets, and a little Wood-duck form one happy bird-family

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Back Copies of the "Naturalist"

(a) Miss Lorna Banfield has a complete set of the "Naturalist" for the last forty years, and would like to know of a library or other body which could make use of them.

(b) Mr. Keith Hately, of Kiata, would like a copy of Volume 4, No. 68, of the "Naturalist". For further information please contact the Secretary.

A Tribute to the late H. C. E. Stewart

On the evening of 24 October 1972, Mr. Hugh Charles Euro Stewart died after a long illness. Older members will remember him as a very active member of the Club. He joined the Field Naturalists' Club of Victoria in January 1931. He was the first Secretary of the Botany Group, and was President (1944-1945). His interests were many; and although Botany was his subject, he found two insects new to science, both of which were named after him. A primitive native bee, (*Paracolletes stewartii* Raym.) described by Tarlton Rayment, and an Australian Opilionid, or Harvestman (*Spinicrus stewartii*) described by R. R. Forster, Director, Otago Museum, New Zealand.

Hugh became an authority on Mt. Buffalo National Park. He spent his holidays there every year. The booklet, "Flower and Feather at Mt. Buffalo National Park", was written by him, published and issued by the Public Relations and Betterment Board, through direction of the Railway Commissioners. About two million copies were distributed.

Hugh Stewart was almost a foundation member of the Anthropological Society of Victoria, becoming elected at the second meeting; Professor Wood Jones was the founder, with Mr. H. R. Balfour, Mr. Stanley R. Mitchell, Dr. R. Wishart and others. Hugh was a member of the Historical Society and had a wide knowledge of Gippsland. He was born in Sale, over eighty-three years ago. Members may be surprised to know that he was a good actor, performing in plays and play readings with the Playlovers' Society, of which he was the honorary treasurer.

LYNETTE YOUNG.

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book review

Wilsons Promontory

by J. ROS GARNET

Illustrated by Ronald Brooks.

Price: 55 cents from F.N.C.V. Bookstall, or 65 cents from bookshops

The Promontory, a huge granite headland of 160 square miles; 80 miles of coastline; and 150 miles south-east of Melbourne.

As the second largest National Park in Victoria, it's a gem; and in this book, in a smooth and flowing style, Ros Garnet tells us so.

Lively illustrated with black and white sketches that bear the charm of half-forgotten yesterday, it covers the history since the Promontory was first discovered by Bass.

Who were the three F.N.C.V. members who in 1884 trecked for 120 miles through sand wastes and along bridle tracks to the lighthouse; and who persuaded the Club and others to campaign for the area to be proclaimed as a National Park — what of the Boon-cor-ong tribe of Wamoom and their Dreamtime spirit, Loo-em, who lived on the mountain — and what is pudding granite?

These and other questions are answered in this very fine publication.

DAVID J. LEE.

Field Naturalists Club of Victoria

General Meeting

9 October

There was a large gathering at the October general meeting. The President, Mr. Tom Sault, welcomed some new members and visitors, including Miss Ellen Kniep, Assistant Secretary of the Field Naturalists' Club of Western Australia.

Mr. Ros Garnet paid a tribute to the life and work of the late Norman Wakefield, Club member for many years, and one time Editor of *The Naturalist*. Members stood while the Secretary read a letter from Mrs. Wakefield and then observed a moment of silence.

The speaker for the evening was Mr Edmund Gill, Deputy Director of the National Museum, whose talk was entitled, "The Natural History of the Murray River tract between Mildura and Renmark". His interesting series of slides were mainly taken during the Museum's research expeditions to the site of the proposed Chowilla Dam

The list of the Club's correspondence, notices, and a copy of Council Minutes were on display as usual. The Secretary reported on the recent Conference of Field Naturalists' Clubs at Bairnsdale, at which it had been decided to form a "Victorian Field Naturalists' Clubs Association". It is proposed that this body will hold a convention in Shepparton on Labour Day, 1973.

Mr Taylor spoke about Lake Pedder, reminding members that although the water is now ten feet above the normal winter level, it is not too late to drain it and save the lake and its surroundings.

The Land Conservation Council's publication on South-West Victoria was on display, and Mr. Garnet reminded members that anyone was entitled to make submissions for the use of Crown Land in the study area. Mr. Sault said that Council was preparing a recommendation and would welcome help from anyone having particular knowledge of the area.

Field Survey Group Reports

August

Cape Liptrap Grid: Using Bear Gully camping reserve as a base, 10 members and friends divided into three groups and surveyed coastline, farm and forest localities, all representative of habitat types within this grid. Few non-marine molluscs were found, even in the areas in which limestone occurred. On the Sunday, some members of the Botany group joined us and assisted with the identification of plant specimens. A new species of fern was recorded for the area.

The group was greatly assisted by information supplied by Mrs. E. Lyndon of Leongatha, and we seek such valuable co-operation from other members in country areas.

September

Gembrook Grid: This camp was attended by 12 members and friends who surveyed fourteen localities in the southern half of the Gembrook grid. A feature of the camp was the use of botanical survey techniques advocated by Dr Alan Bridgewater, Botany Department, Monash University. Invertebrate specimens collected included freshwater mussels and *Peripatus leuckartii*.

October

Mr. Disappointment Grid: The second survey camp in this grid was attended by 11 members and friends. Emphasis was placed on farm land localities, as the State forest had been previously surveyed. Many invertebrate specimens were collected, including freshwater molluscs, leeches, flatworms and spiders. Information on species of insects collected will be forwarded to Entomological Society of Victoria for inclusion in their grid survey data.

Various members of the group are specialising on spiders (D. Barham), scorpions (A. Burns), freshwater crustacea (R. St. Clair), terrestial flatworms (L. Winsor), frogs (A. Brooks), and non-marine molluscs (Dr. B. Smith, N.M.V.). It is hoped to begin special botanical projects soon.

Day Group Report

October

Twenty-one members met at the Heidelberg station on a warm, pleasant day. Members of the Warringal Conservation Society joined us and after holding our meeting and partaking of lunch, the project was explained to us. The area is part of the Banyule River flats and the Yarra River flood plain. It has been developed over a period of 12 months by a study group of the Society, following concern over the possible destruction of this

unique wetlands complex by recreational ovals.

A plan has been evolved for the preservation and conservational development of the Banyule River flats. Mrs. Holywell, a member of the Society, took members to her lovely home, refreshed them with cool drinks and showed them the area from her lounge and kitchen windows. Discussion took place with other members of the Society and F.N.C.V. members who had previously visited a swamp in the area.

The swamp has been built up, and it is hoped to plant aquatic and native trees to provide an adequate breeding and feeding place for the number of birds in the area.

A list of 150 birds has been made over a period in the area. Among those sighted by members were ibis, spoonbills, cattle egrets, white-faced herons, and swamp-hens in the short time allotted us.

Space does not permit a full coverage of the project in hand, and Mr. Fairhall assured the Society members that the F.N.C.V. will give all help possible to assist in the wonderful project. It is hoped eventually to establish a nature reserve or sanctuary, and to have a landscaped area with native trees and shrubs with botanical, educational, and reference value to all nature lovers.

Botany Group

13 July

Mr. John Robin spoke on "Sherbrooke", detailing the methods and results of a group study of an area on a transect south-west of "Burnham Beeches". He dealt with variations of soil, altitude, rainfall, temperature, light intensity and aspect, then proceeded to describe the ecology of the study area, showing slides of many species familiar to members on their various excursions to the Dandenongs. The study extended over a full year, so seasonal changes were regularly observed.

10 August

This was a members' night. First, Mr. J. Baines spoke on his exhibit of 150 wildflower cards — reproductions by the South Australian Museum of paintings in many parts of Australia by Miss Alison Ashby. These are published from time to time in sets of six, often with a theme (such as alpine plants, cushion plants, Tasmanian endemics, and many unusual species from Western Australia). References were also made to other wildflower painters such as Mrs. Fanny Charsley, Mrs. Ellis Rowan and Miss Margaret Stones. Mr. Alan Morrison showed and commented on slides from Northern Australia (Alligator River, Arnhem Land and the Gulf of Carpentaria). Mr. T. Sault showed slides of a trip to the summit of Mt. Torbreck (where a ski run has been proposed). One notable photograph showed acres of Royal Grevilleas (*G. victoriae*) in flower. He knows this area ("back of Eildon") well, having spent his boyhood there.

14 September

Mr. Ian Cameron, a New Zealander from the South Island, who managed gold mines in Western Australia and, for 16 years, the scheelite mine on King Island, spoke on the flora of his native country, using charts and a wide sample of slides, many of which were taken by Professor John Salmon, author of "New Zealand Flowers and Plants in Colour". Of the 4,000 species known, no fewer than about 2,500 are endemic to New Zealand. There are no eucalypts (except plantations of Australian bluegums) and no acacias, banksias, hakeas, grevilleas, melaleucas or innumerable other genera common in Australia. But there are 79 species of *Hebe* (formerly *Veronica*), 58 species of *Celmisia*, 50 of *Epilobium*, 45 of *Coprosma*, 43 of Ranunculus, 39 of *Aciphylla* and 38 of *Carmichaelia*. There are about 800 species of mosses, including the King Moss (*Dawsonia superba*), which grows to a height of two feet! There are 170 ferns and clubmosses (including the unique Kidney Fern and the national emblem, Silver Treefern or Ponga (*Cyathea dealbata*). The national floral emblem, Yellow Kowhai (*Sophera microphylla*, syn. *Edwardsia tetraptera*) was among the slides shown. Three types of N.Z. forests were depicted: Podocarps, beeches (*Nothofagus* spp., in high rainfall habitats) and kauri (*Agathis* spp.).

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

the victorian naturalist

Vol. 89, No. 12 DECEMBER, 1972

F.N.C.V.

FIELD NATURALISTS CLUB OF VICTORIA

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

GENERAL MEETINGS

Monday, 11 December — At National Herbarium, The Domain, South Yarra, commencing 8 p.m.

Subject for evening — Movie Films.

New Members:

Ordinary:

Miss Patricia Bingham, 224 Leicester St., Carlton, 3053. Botany and Marine.
Mr. Peter Cox, 486 Lower Plenty Rd., Rosanna, 3084. Botany.
Aita Haller, 70 Barry St., Reservoir, 3073.
Miss Sylvia Shaw, 12 Jolimont Terrace, Jolimont, 3002.
Mrs. W. I. Thompson, 39 Allison Rd., Box Hill North, 3129. Mammals and Fungi.
Mr. E. A. Chesterfield, 59 Longview Rd., North Balwyn, 3104.
Mr. B. M. Beattie, 57 Mills St., Hampton, 3188.
Mr. Brian H. Groom, 631 Orrong Rd., Toorak, 3142. Botany.
Miss Audrey Morwick, Flat 4, 312A Orrong Rd., North Caulfield, 3161. Mammal Survey and Botany.
Miss Patricia A. Weeks, 4/31 312A Orrong Rd., North Caulfield, 3161. Botany and Geology.

Junior:

M. Satterly, 36 Holyrood Drive, Vermont, 3133.

Country:

Mrs. Audrey I. Wakefield, P.O. Box 37, Ferntree Gully, 3156.

GROUP MEETINGS

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

Thursday, 14 December — Botany Group. Speaker Mr. Rex Filson. As this will be the final meeting for the year the evening will conclude with supper.

Wednesday, 17 January—Microscopical Group.

Monday, 5 February Marine Biology and Entomology Group, 8 p.m., at National Museum, Library Conference Room.

Wednesday, 7 February—Geology Group.

Thursday, 8 February—Botany Group.

F.N.C.V. Excursions

Tuesday, 26 December-Monday, 1 January — Leongatha. This will be a private car excursion and seats in cars have been arranged for members who have already booked; any additional members going must make their own arrangements. It is suggested car parties meet at the Dandenong Comfort Station at 10.15 a.m. and travel together, possibly meeting some of the L.T.F.N.C. members en route. Take a picnic lunch. Members are staying at the Leongatha Motel, but anyone who would like to camp should contact Mrs. Brewster, "Nerrena", R.S.D., via Leongatha, as there is a good camping site on their property. A deposit of $3.00 has been paid to the motel for those already booked and anyone who has not paid this amount to the excursion secretary should do so.

Saturday, 6 January-Saturday, 27 January — New Zealand. Those going will receive full details. At time of writing a vacancy due to a cancellation exists. Anyone interested should contact excursion secretary immediately.

There will not be a club day excursion in January.

Saturday, 10 March-Monday, 12 March—Labour Day Week-end. There will be a combined excursion to Shepparton with other clubs. A bus has been chartered and accommodation booked for the week-end. The cost for the coach and bed and breakfast at the motel will be $24.00 per person. Further details next month.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: G. Douglas

Vol. 89, No. 12 — 5 December, 1972

CONTENTS

Front Cover:

Densey Clyne photographed the colourful and dramatic show produced by the male of the Mountain Grasshopper.

Early Naturalist's Writings – 1

With the writings of earlier naturalists becoming rare, and because of this, libraries restricting them to the reference shelves; it would be appropriate to devote space in the *Victorian Naturalist* to some of these early works.

It is proposed to publish these from time to time, in the hope that both the nostalgic feeling of older members, and the effect of partial denial of the past to younger members may be eased and satisfied respectively.

It seems appropriate to begin with an extraction from the *Victorian Naturalist*, which covers the report by J. A. Kershaw in 1915, of an excursion to Wilson's Promontory.

An Excursion to Wilson's Promontory

On two previous occasions the Club has undertaken extended excursions to the National Park, the first during Christmas, 1905, before the whole of the Promontory had been permanently reserved, when the western coast as far south as Oberon Bay was visited; and the second during Christmas, 1912, when the Vereker Range and the adjacent country was explored.

On the present occasion, while necessarily covering much of the ground traversed on these earlier trips, some new localities which have been recently opened up by the Committee of Management of the Park were visited. Our party of twelve consisted of the following:—Messrs. E. Allman, F. G. A. Barnard, J. Barr, W. Kernot, L. N. Kershaw, L. K. M'Nab, J. G. O'Donoghue, O. W. Rosenhain, J. Shephard, B. L. Stanton, H. Whitmore, and J. A. Kershaw (leader).

Leaving Melbourne by the 6.30 a.m. train on Saturday, 26th December, we reached Foster (110 miles), where lunch had been provided, shortly after mid-day. Bennison, three miles further on, completed our railway journey, and here we were joined by some members of the Committee of Management, who were also visiting the Park on their annual inspection. Among the latter were two of our members—viz., Prof. A. J. Ewart, who represents the Club on the Committee of Management, and Dr. T. S. Hall, representing the Royal Society. Continuing our journey by horse tram for another mile and a half, we reached Port Franklin, a small fishing village on the Franklin River, where we found our motor-boat awaiting us. Transferring our baggage to the boat, we proceeded down the river. We were fortunately able to leave on a rising tide, the extensive mud-flats bordering the river to its mouth being still uncovered, and, as usual, swarming with countless numbers of the small Mangrove Crab, *Heloecius cordiformis*. Here and there groups of birds, including Curlews, Blue Cranes, Hooded Dottrels, together with Pacific and Silver Gulls, wandered over the mud, while on the sand-banks at the mouth of the river were seen numbers of Black Swans, Pelicans, and Cormorants. The river, more especially on the western side, is margined with a thick growth of the Spurious Mangrove, *Avicenaria officinalis*, whose green foliage is a pleasing contrast to the bare, muddy banks. Leaving the mouth of the river, we steered a course for Doughboy Island, where we landed and spent an hour or so waiting for the incoming tide to rise sufficiently to enable us to cross the shallow sand-banks between the chan-

nels. Our trip across had been a rather wet one, as, besides some slight showers, we had been running against wind and tide, causing the spray to occasionally break over our boat. On the island, however, this was soon forgotten, and we spent the time at our disposal on the short, sandy beach, or examining the features of the island. During a previous visit no less than 50 species of plants were noted, and we were unable to add to these on this trip. Among the thick growth of bracken on the sheltered (or eastern) side of the island is a fairly large Mutton-bird rookery, which is now being carefully preserved. Here we saw several of the parent birds running quickly through the ferns or in their burrows.

Continuing our journey, we reached the jetty at the south-west corner of the Inlet about 7 o'clock, and were soon busily occupied removing our baggage to the rest-house close by. While some assisted in preparing our evening meal, others erected one of the tents, and, generally, made everything comfortable for the night.

On Sunday morning we were early astir, and, while our camp assistant prepared breakfast, we re-packed our belongings for removal to the Darby by pack-horses. One of the first discoveries was a Koala perched in a gum-tree in front of the rest-house, close to which a Boobook Owl was observed the previous evening quietly surveying the unusual bustle. Our pack-horses arrived at 8 o'clock, as arranged, and then began the work of loading them with our bulky baggage. It is useless for an inexperienced person to attempt to load a pack-horse. If he does he will soon find the packs dropping off one after another, or the saddle working round under the horse. We were, however, very fortunate in having an energetic and experienced worker in our secretary, Mr O'Donoghue. With the help of our camp assistant, Mr. O'Donoghue superintended the packing, while we all assisted as far as possible. Our third horse had just been packed, and the straps tightened up, when he became restless. All attempts to quieten him proved useless, and he finally brought matters to a head by an exhibition of buckjumping that, while being creditable to him, was rather disastrous to us. When he had quite finished there was a circle of swags and packages all round him, while the pack-saddle was where the girth ought to have been. It was finally decided that he was not suitable, and we transferred the packs to a spare riding horse.

From the rest-house at the Vereker landing to the Darby (6¼ miles) is a well-defined track, winding for the first mile or so through the excellent banksia forest already described in the accounts of previous trips. Birds were numerous, among those seen being the black and Sulphur-crested Cockatoos, King Parrot, Crimson Parrot, Black-faced Cuckoo-Shrike, Grey Bell-Magpie, Wattle-bird, and Bronze-wing Pigeon. The common Black-tailed Wallaby, *Macropus ualabatus*, is plentiful here, and occasional Koalas are met with in the eucalypts. Passing through the gate in the boundary fence, the track passes outside the Park boundary, and crosses an expansive heathy flat, devoid of timber, but from which excellent views of the ranges to the east and south can usually be obtained. Unfortunately for us, a misty rain had been falling all the morning, and heavy mountain mists obscured the tops of the hills, altogether spoiling our view; but still we could make out Mount Vereker in the east and Mount Leonard and the Darby Saddle to the south. On our right were seen a row of rather picturesque low sand-hills,

once bare, but now covered with grass and short scrub. Earlier in the season this flat is bright with red, pink, and white Epacris and flowering shrubs of various kinds. Quail are common, and occasionally the rare Ground-Parrot, *Pezoporus formosus*, has been flushed here. About three miles from the Darby we entered what was once a thickly-timbered eucalyptus forest, where, only a few years ago, native bears (Koalas), wallaby, and occasional introduced deer might be seen, but which is now only a mass of dead and bleached trees. Passing again into the Park, where the green trees throw a pleasant shade, and traversing the northern edge of the Darby swamp, we were joined by one of the Park emus—a full-grown bird, which, together with its mate and four half-grown young birds, frequent this portion of the Park. This bird came close to our party, occasionally uttering its deep drumming note and spreading out its long neck feathers, and accompanied us towards the Darby. A very fine view of the extensive Darby flat is obtained here, showing the ranger's and committee's cottages and the rest-house, clearly backed by the steep scrub-covered sand-hills which separate the flat from the ocean beach, while the river is seen winding through the impenetrable tea-tree towards the foot of Mount Vereker. The track leading southwards towards the lighthouse is seen winding round the steep hills on the western slope of Mount Leonard.

Crossing the Darby River at its only bridge, which really forms the entrance to the National Park, and from which can be seen Shellback Island standing out clearly opposite the mouth of the river, a well-formed track winds along the southern bank of the river to the Darby flat, where the second rest-house is situated. On the river Black Swans, Black Duck, Water-hens, Grebes, Cormorants, Nankeen Herons, and Blue Cranes make their home. The Black Duck, Water-hen, and Grebe breed here, and in the season may be seen with their young brood on the water, while in the river are numerous eels, *Anguilla australis*(?), Tupong, *Pseudaphritis urvillei*, and minnows, or so-called Mountain Trout, *Galaxias attenuatus*.

During the process of unpacking, several of the party refreshed themselves by a swim in the river or the ocean, and, after a good lunch, it was decided to put in the rest of the day here and camp for the night, instead of pushing on to the Tidal River, as originally intended. While some of the party elected to explore the immediate vicinity of the river, the remainder visited Tongue Point, a narrow, scrub-covered point jutting into the sea about three miles below the Darby mouth. A well-defined track leads over the high hill separating the Darby flat from the ocean, and winds in and out among low scrub, stunted eucalypts, and sheltered belts of sheoaks. All along this track were to be seen the recent tracks of emus, kangaroos, wallabies, and wombats—conclusive evidence that these animals, introduced into the Park by the Committee, are well established. On the journey an occasional wallaby was seen, and many native birds, including the small Emu-wren, were noted.

The excellent view usually obtained from Tongue Point, a favourite spot for tourists, was again marred to a great extent by the mists, but still good views of the numerous islands, such as the Glennie and Anser Groups, Norman and Shellback Islands, were obtained. This point is well worth the walk if only to see the enormous weather-worn granite boulders, of all shapes and sizes, which are scattered about in great, confused

masses all along the shore-line. Near the end of the point, at the base, as it were, of the tongue, the sea has almost cut its way through and made an island of it. In the great fissure thus formed are stupendous granite boulders which have slipped down from the steep sides of the hill opposite, while other similar masses are apparently ready to slip down at any moment. The point itself is thickly covered with short shrubs of various kinds, many of which were in flower, and duly noted by our botanists. The trip was greatly enjoyed, and camp was again reached about 7.30 p.m., where, after a refreshing tea and the usual enjoyable camp chat, all turned in to enjoy a well-earned rest.

Monday, 28th December. — An early start was made to re-pack our horses, which our previous experience enabled us to accomplish more readily, and we were again on the track. Passing through the gate of the Park, we came upon a fine group of five or six emus, so tame that they would hardly move out of our way. The track led through a fine grove of banksias, *B. serrata*, thence over and around the slopes of some scrub-clad hills to the timbered slopes of Mount Leonard, which towered up on our left to 1,860 feet. Here we met with our second Koala, and from now on these animals, together with the Black-tailed Wallaby, were constantly being seen. The track, winding in and out along the hill-sides, was in places so steep as to cause those leading our pack-horses some concern; but from the tops of these hills extensive and beautiful views of the coast-line and adjacent islands were obtained, and well repaid our exertions. The track crosses here and there small gullies, in some of which are numerous ferns, the King Fern, *Todea*, being common.

After crossing Whisky Creek, a very steep pinch, and an adjacent gully, we ascended a steep hill, from the summit of which was obtained an excellent view of the surrounding country. In front is Mount Oberon (1,968 feet) and the Bad Saddle between it and the high peak overlooking Norman Point. On our left is Bishop Rock, an exceedingly steep granite point overlooking the undulating hummocky country between it and the sea, while on our right is a pretty view of Leonard and Norman Bays, with Norman Island, the Glennies and Anser Groups standing off the mainland. One track leads off to the right on to the beach at Norman Bay, the other to the left over the undulating, scrub-covered sand-hills to the crossing over the Tidal River at the foothills. We followed the latter, and, crossing the Tidal River, not without occasional stoppages to readjust our packs, we traversed an extensive marsh to the foot of the northern slope of Mount Oberon. Turning eastward we followed the telegraph line into a well-timbered and sheltered valley. Here the telegraph line ascends steeply over another bad saddle on the eastern slope of Mount Oberon and descends into the marshy country behind Oberon Bay. Leaving the telegraph line, we entered the valley between the Wilson and Ramsay Ranges, and reached our camp, situated close by a beautifully clear, fern-bordered creek.

The camp consisted of two large sleeping tents and a dining tent large enough to accommodate the whole party. Our surroundings were made as comfortable as many willing hands could make them, and we settled down to enjoy our stay. The clear running stream close by provided us with good water, both for consumption and bathing, the latter being specially enjoyed, notwithstanding the presence of numerous leeches and oc-

casional scrub-ticks. After fixing up the camp, the remainder of the day was devoted to exploring our immediate surroundings.

Tuesday.—Early rising is the rule with our Club camps, and 5 o'clock a.m. was not considered too early to start our day's operations. A morning dip, then breakfast and away, was our programme. This morning an early start was made for Sealers' Cove, on the eastern coast. The track commenced not far from our camp, where it followed up the very steep northern slope of the Oberon Range to what is known as the Bad Saddle. It is here that the telegraph line, which connects Foster on the mainland with the lighthouse on the extreme southernmost point of the Promontory, crosses this range. The Sealers' Cove track proper commences near this saddle, and winds about along and near the top of the Wilson Range to a saddle connecting Mounts Ramsay and Wilson, from where it descends in a gradual and easy grade along the slopes of the hills into Sealers' Cove. This track was formed under the supervision of the Public Works Department for the Committee of Management, and covers a distance of about seven miles. It is about 4 feet broad, and is constructed for riding or walking. It opens up some magnificent fern gullies, both on the western and eastern slopes, some of the large Slender-stemmed Tree-ferns, *Cyathea Cunninghami*, in the eastern gullies towering fully 50 feet high. The scenery along this track is all that can be desired. On the western side of the saddle it commands extensive views over the Tidal River valley and adjacent hills and the ocean beyond, with the islands standing out clearly, while from the eastern slopes are obtained beautiful views of the Wilson Range opposite, and Sealers' Cove, with the Cliffy Island group, in the distance. Numerous small streamlets cross the track, and well-sheltered camping places have been formed for those desiring to pass the night among the hills. In places the track passes among and under great tree-ferns, blackwoods, and lilly-pillies, where the Lyre-birds, recently introduced, have already established themselves; or through dense growths of tall hazel, musk, and blanket-wood scrub, and along the old deserted tramway track; finally opening upon the broad sandy beach, immediately opposite a long jetty running into deep water, on the southern side of which the Sealers' Creek empties itself.

The jetty, originally erected for the purpose of loading timber cut by a saw-mill then situated near the beach, has long been neglected and fallen into decay, but it is understood this is now to be put into good repair. It will then be possible for parties to land here from the small coastal steamers, and walk or ride through the Park to the mainland. Although, as a rule, the dense growth of the timber and undergrowth on the steep slopes of the hills on either side of the track would not permit of any divergence for collecting purposes, there were opportunities on the track itself for a certain amount of collecting and observation. Bird and plant life was observed as we passed along, while fallen timber, etc., was turned over in search of ground-frequenting animals. Birds were fairly numerous, but often difficult to recognize. Among those noted were the Coachwhip-bird, *Psophodes crepitans*, Thickhead, *Pachycephala olivacea*, White-eared Honey-eater, *Ptilotis leucotis*, Rufous Fantail, *Rhipidura rufifrons*, White-shafted Fantail, *R. albiscapa*, Striated Tit, *Acanthiza lineata*, Yellow-rumped Tit, *A. chrysorrhoa*, White-eye, *Zosterops coerulescens*,

Black Cockatoo, *Calyptorhynchus funereus*, Sulphur-crested Cockatoo, *Cacatua galerita*, and Gang-Gang Cockatoo, *Callocephalon galeatum*. All along the track the common lizards *Hinulia quoyi* and *H. whitei* were exceedingly numerous, and several Blue-tongued Lizards, *Cyclodus*, were seen.

The trip occupied the whole day, and was full of interest, and, notwithstanding the rather long walk, none regretted the undertaking.

Wednesday.—It was arranged to devote today to a visit to Oberon Bay *via* the western Bad Saddle. Unfortunately, shortly after our early start a fine rain came on, and continued at intervals throughout the morning. The first part of our journey followed along the northern foot of Mount Oberon, where, at one time, a narrow cattle track could be followed. This had, however, become quite overgrown, and we had to make a track for ourselves, in some places through tangled masses of scrub and sword-grass reaching over our heads. The wet scrub and the falling rain soon saturated our clothes, while the heavy mists quite obscured the mountain tops. We, however, pushed on, and soon found the track leading up the steep mountain side to the Bad Saddle. The long, steep climb was rather trying for some of the party, but, had the day been clear, the fine view to be obtained would have quite repaid the exertion. Descending the mountain on the Oberon Bay side was much more easily accomplished, and we had a good view over the bay and of Mount Norgate (1,390 feet) while winding round the hillsides to the beach. Crossing Growler's Creek at its mouth, we traversed the broad, clean, sandy beach to a small creek at its southern end. Following this up for a short distance, we entered upon the well-known grassy flat behind the sand-hills, the home of scores of Koalas, to Fraser's Creek, where we lunched on the exact spot where the Club's first party camped in December, 1905. A light lunch and a hot cup of tea soon restored our spirits, notwithstanding the occasional light showers and our wet clothes. Numbers of Koalas were seen, and numerous photographs taken. Attention was drawn to the numbers of dead or dying gum-trees in the flat, nearly all of which had been quite or partially depleted of their foliage within the last few years by the Koalas which frequent this sheltered locality.

Owing to the state of the weather, it was decided to make an early start back to camp. As we reached the steep slopes of Oberon again the weather cleared considerably, so that a good view of the surrounding country and islands was obtained. Descending the mountain, we varied our course by following along Norman Bay to the Tidal River, thence across country to camp.

Thursday.—Today seven members of the party visited Lilly-pilly Gully, situated among the hills near the head of the Tidal River; two others explored the Bad Saddle and part of the Sealers' Cove track; while three elected to return to the Darby, and so save a long walk on the following day.

Lilly-pilly Gully, so named from the presence of numerous Lilly-pillies, *Eugenia Smithii*, was only recently explored by the Committee of Management, with the result that a short bridle-track has been formed into it. This has made accessible what proves to be the most beautiful of the fern-gullies in the National Park. The growth of the ferns of various kinds is wonderful, the Polypodium covering the ground and tree-trunks, while

enormous lilly-pillies and blackwoods are plentiful. The Slender-stemmed Tree-fern, *Cyathea Cunninghami*, is common, growing to a height of 20 or 30 feet. The gully should be of particular interest to the botanist, and is deserving of a more careful survey than we were able to give to it. It is in its wild state, and, so far, untouched by bushfires. An enjoyable and interesting day was spent here, and we returned to camp well satisfied with the trip.

Friday.—We broke up camp at an early hour, and, packing our horses, returned to the Darby in time for mid-day lunch. After a rest here we continued our journey to the Vereker rest-house, which was reached about 6 o'clock. Our evening meal, as on a previous visit, was prolonged by a few speeches in which members took the opportunity to express their appreciation of the valuable work done by the Committee of Management in opening up and stocking the Park, and the facilities afforded tourists for seeing its beauties. To show their appreciation in a practical manner, the members unanimously decided to subscribe five shillings each towards providing additional conveniences in the rest-houses.

Saturday.—After an early breakfast, our belongings were packed up and taken aboard the motor-boat awaiting us, and a pleasant trip across the inlet terminated an enjoyable eight days' camp in the National Park. From a collector's view, I am afraid that this trip will add little to our knowledge of the fauna and flora of the Park. In zoology, nothing deserving of special mention was obtained beyond what has already been recorded in the *Naturalist*.

I am indebted to Mr. Barnard for the following notes on the botanical features of the trip. He says:—"Entering the Park at the Vereker landing, one could not help being struck by the unique effect created by the numerous fine banksia trees, *Banksia serrata*, which at a little distance have the appearance of a well-tended orchard. Their flowering spikes in many cases were from nine to twelve inches long and proportionately thick. When the seeds are ripe they form a favourite article of diet of the Black Cockatoos. Here and there were fine spikes of the Pink Spotted Orchid, *Dipodium punctatum*. At the Darby River we found a nice fringe of shrubs and plants along the bank, comprising many species, among which *Swainsona lessertifolia* was conspicuous by its dark purple flowers. The plants of the Promontory have been so well listed by the two previous Club excursions and the three special collecting trips organized by the National Herbarium, the results of which have appeared in the *Naturalist*, that there is no necessity to again refer to the several species in detail. During the walk to Tongue Point several novelties to the newcomer were seen, such as *Thomasia petalocalyx*, a shrub with pretty pink flowers, belonging to the natural order Sterculiaceæ; the red-flowered variety of *Correa speciosa*, *Correa alba*, and *Alyxia buxifolia*. *Kunzea corifolia* had been making a fine show, but was just over. During the walk to Tidal River the Wedding-bush, *Ricinocarpus pinifolius*, was found in fruit, and the reason for its generic name easily seen, for they resembled in miniature those of the well-known castor-oil tree. Large patches of Coral Fern were seen near the Tidal River, while in the moister parts the delicate purple flowers of the Bladderwort, *Utricularia dichotoma*, were fairly common. It had been anticipated that some plants or shrubs would have oc-

curred in sufficient abundance to have given colour to the landscape, but at the time of our visit half an acre or so of *Hakea pugioniformis*, with creamy white flowers, was the only decided patch we came across. Earlier in the season *Pultenaea daphnoides* and *P. Muelleri*, which occurred in abundance near the site of our camp, must have given a tinge of colour to that locality. During the trip to Sealers' Cove, knowing that the list of ferns recorded could probably be augmented, I devoted some attention to those plants, and added *Lomaria fluviatilis* to the list. It is quite probable other species will yet be found here, but our time was too limited to allow us to leave the track. Many shady fern-glades were passed which one would have liked to have stopped and explored, but they had to be rapidly passed by. Many of the tree-ferns were clothed with *Asplenium flaccidum*, a somewhat rare fern in the gullies nearer Melbourne. A search was made for seedlings of *Cyathea Cunninghami*, a tree-fern which most of us saw for the first time in a state of nature; and, though full-grown specimens twenty to forty feet high were fairly abundant, and thousands of seedlings of Dicksonias and Alsophilas, the other two tree-ferns, could be seen alongside the track, only a solitary specimen which appeared to be a Cyathea was detected. Was it want of experience, or is the Cyathea a relic of past times, for no Cyatheas were seen under fifteen to twenty feet high. The absence of the Silver Wattle along the track, and, in fact, the few acacias recorded for the National Park, is one of its striking features to one used to the mountain-sides nearer Melbourne. During the trip to Oberon Bay the Common Heath, *Epacris impressa*, was flowering freely, but nearly always stunted, and almost smothered by the adjacent vegetation. Trailing on the sand-hills along the coast, *Lotus australis*, with its pretty pink pea-shaped flowers was conspicuous in several places. The final day of our stay was devoted to the upper Tidal River, where a track had recently been opened into a fern gully, which proved to be one of Nature's fairy-lands. Though we were unable to get very far up the gully, some five-and-twenty species of ferns were noted, the feature of the gully being the wonderful growth of a Polypodium which seems to agree with *P. scandens*, but as that species and *P. pustulatum* are so closely allied, and, in fact, seem to run into one another, it can only be provisionally recorded as new for the Park. However, *Aspidium decompositum* was found here, which has not yet been recorded for the Park, and another record is the variety *bipinnatifida* of *Lomaria discolor*, of which many fine plants were seen. The Polypodium not only grew on the tree-trunks up to twenty feet above the ground, but covered large areas of the ground to the exclusion of other species. These additions bring the fern flora of the Park up to thirty-six species, or just half the Victorian list; but no doubt other species could be added if more time were available."

The total cost of our eight days' trip, which includes railway fare, hire of pack horses, tents, provisions, etc., and camp assistant, amounted to £2 18s. 4d. per member, or at the rate of 7s. 3¼d. per day.

In conclusion, I desire to express my thanks and those of the party to Mr. J. G. O'Donoghue, whose assistance and advice throughout the trip was greatly appreciated, and to Messrs. J. Shephard, J. Barr, J. G. O'Donoghue, O. W. Rosenhain, and B. L. Stanton for the loan of most of the photographs used to illustrate this report.—Jas. A. Kershaw.

A New *Sarcochilus* species from Northern Queensland

by David L. Jones

SARCOCHILUS SERRULATUS, D. L. Jones spec. nov.

Planta epiphytica, staturae parvae vel mediae, foliis flaccidis tenuibus, ex affinitate *S. olivacei* a quo differt sic: marginibus foliorum distincte undulatis serrulatisque (haud integris); racemis clavatis floribus congestis; segmentis perianthii usque ad late spathulatis; lobis lateralibus labelli oblongis latisque; calcare prope basin fortiter dilatato, deinde apicem versus multo contracto; callo ciliato, callis lateralibus quam uno centrali paene altioribus; pede columnae curvato.

Holotype: East Evelyn Tableland, North Queensland, at 980 metres — D. L. Jones, B. Gray & R. Collins, 31 July 1972 (MEL). Isotypes at MEL, BRIS.

A small to medium sized pendulous epiphyte with a stem 1-2 cm long.

Roots not numerous, slender about 1.5 mm in diameter.

Leaves 3-6, 2.5-10 x 0.8-2.0 cm, ± oblong, ovate, falcate, flaccid, deep green; the margins undulate and distinctly serrulate; the tips unequally emarginate.

Racemes 2-4 cm long, clavate; the peduncle either shorter or longer than the rhachis.

Pedicels 4-5 mm long, straight or curved, subtended by a broad, obtuse bract ± 1 mm long.

Flowers 2-10, 12-15 mm in diameter, brown with white and yellow markings.

Dorsal sepal 5-6 x 5-6 mm orbicular with a broadly acute apex, brown with a white base.

Lateral sepals 5-7 x 3-4 mm, broadly and unequally spathulate with an acute to cuspidate tip, brown with a white base.

Petals 5-6 x 2-3 mm, obovate, brown with a white base.

Labellum ± 4 mm long white with brown and yellowish markings; lateral lobes about 4 x 2 mm, oblong, slightly curved forward in the upper half; midlobe 1.0 x 1.5 mm, erect, oblong, emarginate, thick and fleshy; spur about 3 mm long, ± triangular, dilated at base, linear-obtuse in the distal half, callus at the proximal part grooved, ciliate, inclined backward, broader than tall; side calli not much higher than central one.

Column 2.0 x 1.5 mm, fleshy; column foot 2.5 x 1.5 mm curved, fleshy.

Stigma 0.9-1.0 x 1.0-1.2 mm rhomboidal, concave.

Rostellum prominent, obtuse.

Anther ± 1.2 mm long, ridged, with a pointed rostrum.

Pollinia 0.5 x 0.75 mm, orbicular.

Stipe 0.75 mm long dilated towards apex. Retinaculum about 0.5 mm, obovate.

Flowering Period:

Usually August to October, but plants from very high elevations may flower as late as January.

Distribution:

Confined to North Queensland, in the ranges surrounding and including the Atherton and Evelyn Tablelands and the ranges at the headwaters of the Mossman River, extending at least as far south as the Cardwell Ranges.

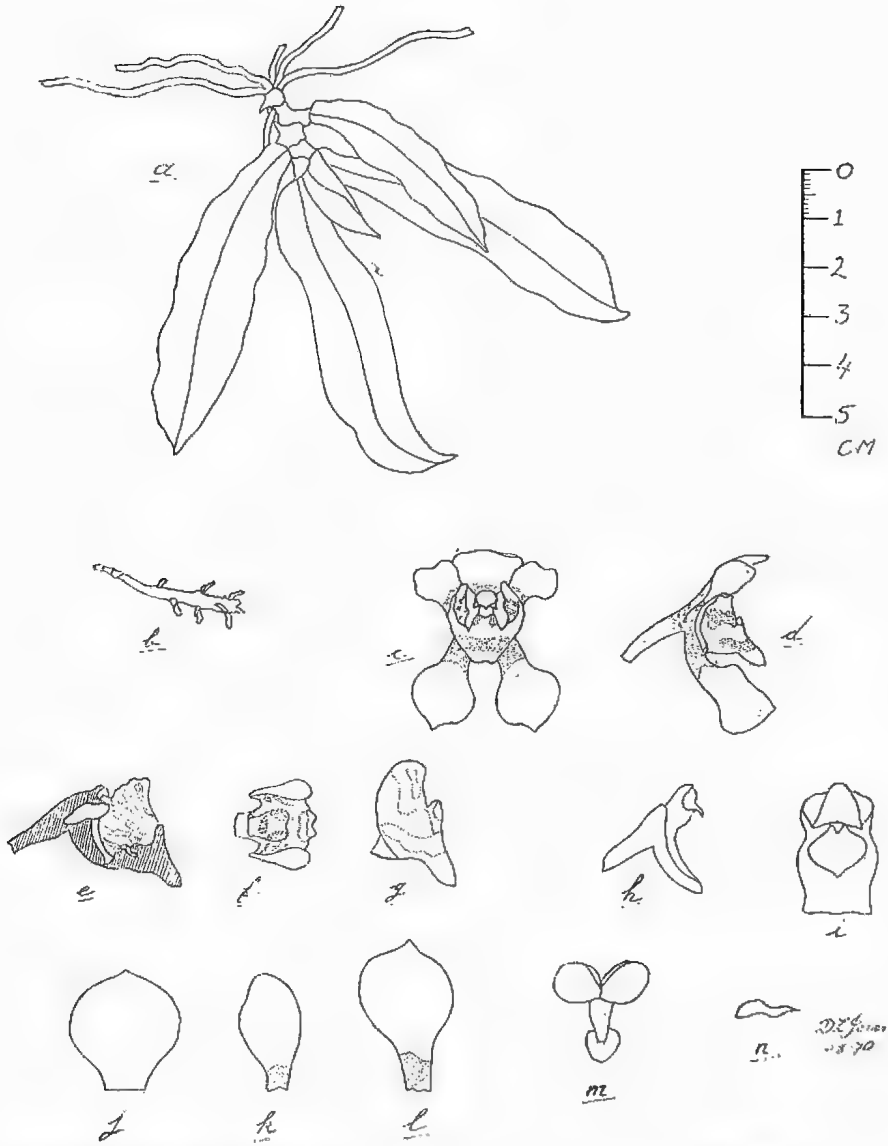

Figure 1

(a) Plant — to indicated scale.
(b) Peduncle with flowers removed — to indicated scale.
(c) Flower from front — to scale x 3.
(d) Flower from side — to scale x 3.
(e) Median — longitudinal section of column and labellum — to scale x 4.
(f) Labellum from above — to scale x 4.
(g) Labellum from side — to scale x 5.
(h) Column from side — to scale x 5.
(i) Column from front — to scale x 10.
(j) Dorsal sepal flattened out — to scale x 4.
(k) Lateral petal flattened out — to scale x 4.
(l) Lateral sepal flattened out — to scale x 4.
(m) Pollinarium — to scale x 15.
(n) Anther cap from side — to scale x 10.

Discussion:

The correct identity of this species has in the past been confused with *Sarochilus olivaceus* Ldl. var. *borealis*, W. H. Nicholls. The wide disparity between the two species was first noticed by B. Gray of Atherton. This very observant and enthusiastic collector has been familiar with the new species for a number of years and brought the problem to my attention following a careful study of the drawing accompanying the original description of *Sarochilus olivaceus* var. *borealis*.[1] Upon checking the Holotype of the latter, which is situated at Melbourne Herbarium, I found that it was merely the North Queensland form of *S. olivaceus*. This form has been well illustrated by Dockrill.[2] Apart from their often smaller stature, plants of *S. olivaceus* from the tropics are identical with southern forms and it is doubtful if the maintainance of var. *borealis* can be justified.

Sarcochilus olivaceus and *S. serrulatus* have a large number of differences as shown in Table 1. *S. serrulatus* can readily be recognized by its brown flowers, with broad perianth segments, that are fairly crowded on the clavate peduncle. When not in flower it can be distinguished by its thin flaccid leaves that have serrulate margins. The flowers of *S. olivaceus* may be brown or green with narrow segments, and are scattered along a slender peduncle. Its leaves are thicker and have entire margins. *S. falcatus* R.Br. is the only other Australian species to have serrulate leaf margins, but its leaves are stiffly erect and much thicker than *S. serrulatus*.

In the field *S. serrulatus* is confined to the ranges and Tablelands, and does not seem to grow at less than 762 metres (2,500 ft) altitude. It seems to prefer densely shaded humid areas around small watercourses and may grow with *S. olivaceus*.

Acknowledgements

The author wishes to express his gratitude to B. Gray of Atherton for friendly hospitality and the supply of information and specimens; also to J. H. Willis for preparation of the latin description.

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TABLE 1

Contrasting characters

S. olivaceus	*S. serrulatus*
Leaf margins slightly undulate, entire	Leaf margins markedly undulate, serrulate
Peduncle slender, the flowers evenly spaced	Peduncle clavate, the flowers crowded
Perianth segments linear spathulate	Perianth segments orbicular, broadly spathulate or obovate
Lateral lobes of labellum triangular and narrow	Lateral lobes of labellum oblong and broad
Spur slightly dilated near base, only shortly narrow towards apex	Spur dilated near base narrowing considerably towards apex
Callus glabrous, the side calli almost twice as high as the central one	Callus ciliate, the side calli not much higher than the central one
Column foot straight	Column foot curved

Nature Notes from the Gold Coast

by

ALEX. N. BURNS.

During the month of October I had to be absent from the Gold Coast from the middle almost to the end of the month, therefore my notes will cover observations for the latter part of September, and for 26 until 31 October.

The first Richmond Birdwing (*Ornithoptera priamus richmondius*), a female, was observed on 25 September; this specimen frequented the garden for two days when it was joined by another female. The next day both were gone. Apparently the spring brood of this fine butterfly was poor; because normally, nearing the middle of August until early October, both males and females are seen almost daily. Other butterflies, usually plentiful, have also been quite scarce; this applies particularly to the Meadow Argus (*Precis villida calybe* [Godt.]) and the Australian Painted Lady (*Vanessa cardui kershawi* [McCoy]) both of which normally appear in large numbers during the early part of October. So far only odd specimens of each species have been noted.

Up to the time I left the Gold Coast (14 October) the big lagoon at Currumbin was teeming with bird life; a conservative estimate of wild ducks of several species would be 500, the Ibis population grew to about 100, and many other interesting birds such as Spoonbills, Coots, and Herons would make up another 100 or more individuals.

Two days after my return the weather broke and torrential rain which delivered 2662 points (from the gauge at the Sanctuary) in 48 hours completely changed the entire natural history set up of the area, as well as some small parts of the area itself. The level of the big lagoon rose many feet covering a long stretch of the Pacific Highway, and many acres of adjacent land with up to 6 feet of water. Almost immediately following the cessation of this rain, even as the waters subsided, the bird life practically disappeared. Two days later, the wild duck population was down to about 30, all the Ibises had gone, and of the other birds all that remained were less than a dozen Coots. The two Black Swans with the cygnets also remained together with less than a dozen domestic Ducks.

Although the other smaller Water Lily lagoons had been completely inundated during the floods, very soon after the waters had subsided, the Water Lilies (mostly the blue *Nymphaea stellata*) burst into flower, many hundreds of flowers appearing almost at once. The Lotus Lilies also appeared to have received a "boost", in fact, this applied to all the different types of native, exotic and hybrid Water Lilies.

Whilst the rains were "on", the Scrub Turkeys, Rock Wallabies, and Koalas in the Burleigh National Park apparently wisely, sought shelter; only one or two bedraggled and water-soaked turkeys turned up at the usual feeding spot. A couple of days fine weather soon brought about a return to normal, and the usual numbers appeared at feeding time. Even the Frilled Lizards appeared again in their usual "basking" spots amongst the rocks. The male scrub turkey who has no less than seven females at the nesting mound has taken over complete control at feeding time; the

females are driven off in all directions and slices of bread are even snatched from the wallabies. This behaviour is certainly not due to any shortage of food.

The last couple of days has brought a return of specimens of the beautiful Regent Skipper Butterfly (*Euschemon rafflesia rafflesia* [Macl.]), and just after sunset numerous Hawk Moths (*Sphingidae-Heterocera*) appear at garden flowers. Amongst the latter are examples of the pretty Brush Tail species (*Macroglossum* spp.?). Another fine moth that has also appeared is the beautiful day flying Agaristid, *Agarista agricola*. Specimens of the beautiful insect have been noted at Burleigh and Currumbin.

Victorian Non-Marine Molluscs – No. 12

by

BRIAN J. SMITH*

GENUS Helicarion

This is a group of slug-like snails, belonging to the family Helicarionidae, which occur fairly commonly in all the eastern States of Australia. The genus is characterised by a relatively small, thin, fragile, almost transparent shell, associated with a large animal that, in some species, is too big to completely retract into the shell. The shell is composed entirely of a horny material, conchin, and it is thought by many that the group is well on the evolutionary way towards loss of the shell in favour of greater mobility and flexibility. When crawling, the animal has two lateral folds of skin which are drawn up over the shell. The animal has a long tail which is flattened laterally into a sharply keeled structure and terminated by a prominent mucus gland. The species are all fairly similar and there appears to be quite a deal of individual variation in colour but there are probably only two species in Victoria.

Helicarion cuvieri, Ferussav, 1823

Shell nearly twice as long as wide and a yellowy-green in colour. Animal grey to buff with large mantle flaps. The animal appears to be fairly slow and sluggish in its movements.

This species is fairly rare and seems to be confined to East Gippsland and southern N.S.W. and Tasmania. It may also occur on Wilson's Promontory. Average length of shell is 12-15 mm.

Helicarion niger (Quoy & Gaimard, 1832)

This is a smaller, darker and more active and widespread species than the previous one. The shell is almost as broad as long and varies from a dark yellowy red to a deep rufus brown and in some specimens is extremely shiny. The animal grades from a mid grey to black. Average length of shell is 8-12 mm. This species is widespread over the forest and coastal scrub areas of eastern Victoria and also occurs in southern N.S.W. and Tasmania.

*Curator of Invertebrates, National Museum of Victoria.

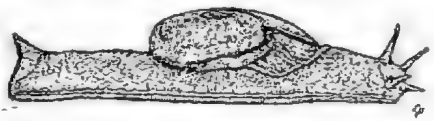

Fig. 1: *Helicarion cuvieri*.
(Drawing by Miss Rhyllis Plant)

Ancient Soils at Diamond Bay, Victoria

by

E. C. F. Bird*

ABSTRACT

Ancient soils (termed palaeosols) are present at several levels within the calcareous dunes and aeolian calcarenites of the Nepean Peninsula. The lowest (i.e. oldest) palaeosol in the upper, unconsolidated dune sands contains carbonaceous material which gave a radiocarbon date of 5350 ± 110 years B.P. This indicates a Holocene age for these unconsolidated dune sands, as distinct from the underlying aeolian calcarenites, which date from the Pleistocene.

The Nepean Peninsula, extending from Cape Schanck westwards to the entrance to Port Phillip Bay (Fig. 1), consists of a number of superimposed calcareous dune formations. At the surface the dune sands are unconsolidated, partly stabilised by a cover of scrub vegetation and partly active, especially along the southern or ocean coast, where blowouts have developed and the prevailing westerly winds are driving sand inland. Near Sorrento the crests of these dunes rise more than 200 feet above sea level. Beneath the modern dune topography, older dune formations have been lithified by secondary carbonate deposition to form aeolian calcarenites, and on the ocean coast these have been exposed and cut back by marine erosion to form rugged cliffs at the back of broad shore platforms exposed at low tide.

Aeolian calcarenites

Cliff sections show much variation in rock type within the aeolian calcarenites. There are outcrops of coherent sandstone (typically 50 to 90 percent carbonate, the remainder mainly quartz) showing bedding characteristic of the internal structure of dunes. There are intervening layers of white or brown calcrete, a sandy limestone formed by carbonate precipitation at or near the surface of dune topography (typically over 80 per cent carbonate, the brown coloration being due to iron oxide staining). Often the calcrete layers are overlain by ancient soils (termed palaeosols) containing relics of a former plant cover, chiefly root systems preserved in cylindrical calcrete (termed rhizoconcretions). Palaeosols associated with aeolian calcarenite are generally 1 to 2 feet thick, and red, brown or yellow in colour due to the presence of iron oxides; they vary in texture from sandy silts to silty clays, and show little profile development. Frequently their contact with the underlying calcrete is irregular, with downward protrusions known as soil pipes. These have been described, and their geomorphological consequences discussed, in a previous paper (Bird 1970).

These soils, now interbedded with dune sands, must have formed on land surfaces during phases of topographic stability, when the dunes were colonised and fixed by a vegetation cover. The underlying calcrete is the result of subsoil precipitation of carbonates dissolved and leached from the soil by percolating rainwater, corrosive because of its dissolved atmospheric carbon dioxide, and further acidified by organic acids derived from plant humus produced under the vegetation cover. Upward movement of ground water containing dissolved carbonates

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derived from the underlying calcarenite may also have contributed to calcrete formation, but this implies a phase of arid climate, which is difficult to reconcile with the evidence of a considerable vegetation cover on the ancient dunes.

The presence of silt and clay in the palaeosols raises a problem, for the soils have developed on calcareous dunes, the nature of which can be deduced from the underlying dune sandstones. These are usually well-sorted fine to medium quartz and carbonate sands, with very little silt and clay. In a discussion of this problem, Nevile (1970) concluded that the silt and clay fraction in the palaeosols was of extraneous origin, probably in the form of wind-borne accessions to soils developing on a vegetated and topographically stable dune landscape. Possible sources included volcanic ash generated by eruptions in western Victoria, or similar material winnowed from the weathered surface of the basalt plains, and delivered to this area by westerly winds.

Typical features of aeolian calcarenite are shown in Plate 1, a section in the cliffs on the shore of Diamond Bay. Near the base of the cliff is a massive calcrete layer (C), relatively resistant and protruding as a structural ledge. Immediately above this is a red-brown sandy clay palaeosol (P), some five feet thick, and showing layering suggestive of slow vertical accretion. Evidence of contemporary vegetation is present in the form of calcareous rhizoconcretions. Underlying dune sandstone is exposed in the adjacent cliff, where the calcrete and palaeosol horizons rise to a higher level, and it is clear that these horizons developed on the surface of an ancient dune: they commemorate an interval of topographic stability when the dune landscape was fixed by a vegetation cover for a sufficient period for soil formation (pedogenesis) to occur. Thereafter, a younger dune (D) developed, its advance from left to right being marked by successive frontal laminae, preserved as lightly-cemented layers of 'biscuit-rock'; it buried the pre-existing vegetation, and the phase of pedogenesis came to an end (cf. Fig. 2 in Bird 1970). In turn the younger dune became stabilised, for there is another palaeosol, with rhizoconcretions, at the top of the cliff.

This, too, is overlain by unconsolidated dune sands (Plate 2).

There are many such sections on the ocean coast of the Nepean Peninsula, and it is evident that there has been a long history of dune accretion, interrupted by phases of topographic stability marked by the palaeosols, the rhizoconcretions, and the calcrete layers. The sequence is one of great complexity. In cliff sections the calcrete and palaeosol horizons rise and fall, delineating ancient dune topography; they vary in thickness, are truncated, and sometimes bifurcate in a manner that indicates local

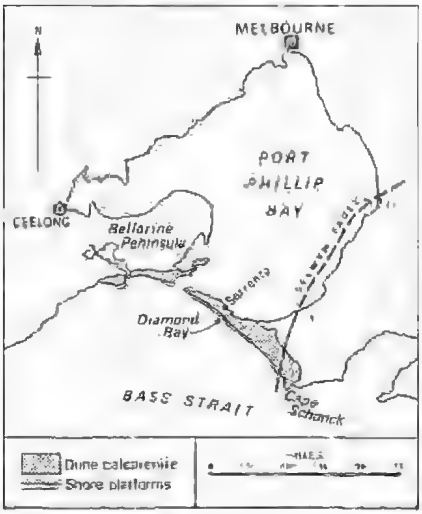

Figure 1

and temporary development of blowouts and sand spills during periods of general topographic stability.

The onset of widespread instability, marked by the advance of wind-blown sand over previously stabilised dune topography, could be related either to a weakening of the vegetation cover by increasing aridity, or to a change of sea level. A falling sea level would lay bare unconsolidated sands on the emerging sea floor, and if the climate were then arid these could become a source of new dunes. However, the relationship of successive waves of transgressive dunes to the lee of existing shorelines is better explained as a consequence of dune initiation during episodes of sea level rise, when blowouts developed on sandy coastal terrain cut back by wave attack. Dune stabilisation, conversely, is favoured where a humid climate permits the luxuriant growth of vegetation over dunes, and is more likely to occur when sea level is stable or falling than during episodes of marine transgression.

The aeolian carcarenite exposed above present sea level, rising locally more than 100 feet, is only a part of the sequence developed on the Nepean

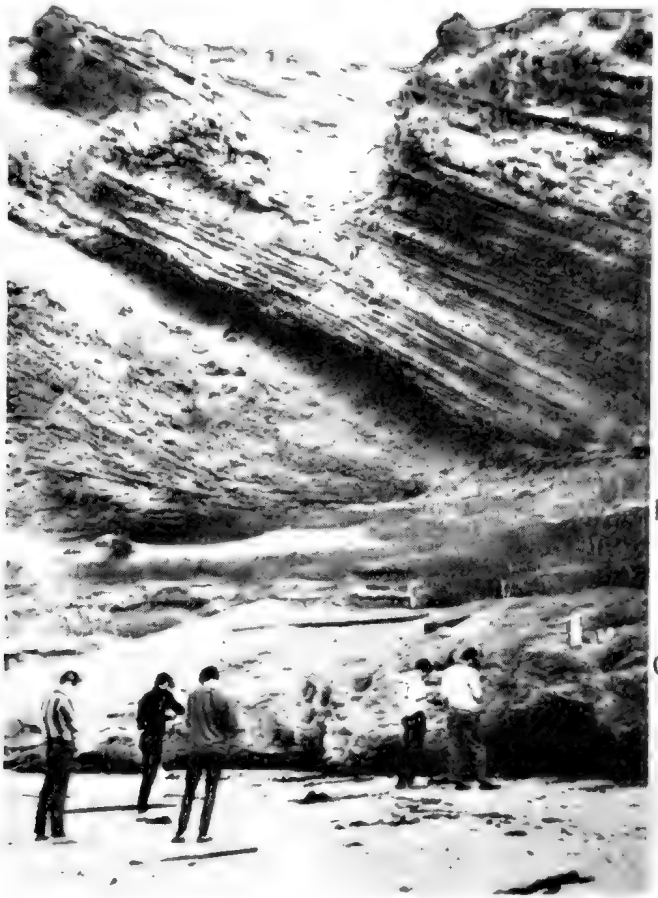

Plate 1.

Peninsula. In the Sorrento bore, dune sandstones were encountered to a depth of 428 feet below sea level, in formations interspersed with layers of marine sand, clay, and limestone (Chapman, 1928). Deposition of this thick sequence probably spanned much of the Quaternary time. The dunes now below sea level may have formed during the episodes of world-wide ocean lowering that accompanied the colder phases of the Pleistocene, but they may also owe their position, at least in part, to the tectonic subsidence that has occurred on the downthrown (western) side of Selwyn Fault (Keble, 1950).

Fossil remains of an extinct giant kangaroo species in aeolian calcarenite near present sea level at Sorrento have been taken as evidence of a Pleistocene age for these rocks (Gregory, 1901), and it is assumed that the overlying unconsolidated dune sands (including still-active dunes) include deposits of Recent (i.e. Holocene) age. Evidence in support of this assumption is adduced below.

Unconsolidated sands

Sections on the sides of blowouts in the dunes which cap calcarenite cliffs at Diamond Bay show at least three dark grey to black soil horizons, each containing carbonaceous material derived from a former plant cover. These, too, are palaeosols, though they differ from those in the aeolian calcarenites in their colour and texture, and in the absence of underlying calcrete layers. Carbonate precipitation has occurred locally around plant roots, but the processes which form calcrete layers have not yet been effective here. The sharp contrast in degree of lithification of the unconsolidated sands and the subjacent aeolian calcarenites betokens a definite break in sedimentation, the palaeosol at the top of the calcarenites indicating a prolonged phase of topographic stability.

The dark palaeosols in the unconsolidated sands mark phases of temporary stability, separated by the accretion of dunes of varying thickness. Carbonaceous material extracted from the lowest of these palaeosols in the cliff-top dunes at Diamond Bay (Plate 2) gave a radiocarbon date of 5350 ± 110 years B.P. (GaK-3820), indicating a Holocene age for this soil. The overlying dunes, some 50 feet thick, thus represent about five thousand years of sand accretion. Palaeosols at higher levels are penetrated by modern roots, but these were not present in the sampled soil horizon.

Charcoal from a similar dark soil horizon in dune sands behind Armstrong Bay, between Warrnambool and Port Fairy, yielded a comparable radiocarbon date, 5120 ± 120 years B.P. (Gill, 1967). This was also of interest in that it post-dated the final eruption of nearby Tower Hill volcano, some 7000 years ago (Gill, 1972). By the time soils were forming on unconsolidated dunes at Diamond Bay, the airborne accessions thought to have influenced the texture, thickness, and development of palaeosols associated with the aeolian calcarenites may no longer have been available.

Evidence from Diamond Bay may be taken to indicate that the aeolian calcarenites here are of Pleistocene age, the overlying dune sands being a Holocene addition. The intervening phase of topographic stability marked by the palaeosol which caps the aeolian calcarenites may have coincided with the low sea level episode that occurred late in Pleistocene times. If so, the development of modern, transgressive coastal dunes is related to the rise of sea level during the past 20,000 years (the Holocene

marine transgression), the dunes being initiated on a receding shoreline when previously stabilised sandy terrain was cut back by wave attack to expose sand to the action of onshore winds. The first phase of topographic stability in the unconsolidated sands at Diamond Bay thus occurred after the sea attained its present level some 6000 years ago.

Subsequent instability has been engendered partly by continuing cliff recession, and partly by the impact of man. Cliff-top kitchen-middens contain charcoal, indicating the use of fire by the Aborigines. It is likely that weakening of dune vegetation by fires set by the Aborigines led to renewed blowout formation. Since the beginning of the 19th century there has been the more severe impact of grazing and trampling by European settlers and their introduced animals, notably rabbits; an impact compounded in recent years by the arrival of such devices as beach buggies and trail bikes. Dune erosion has become extensive in a phase when, under natural environmental conditions, there would probably have been prevailing topographic stability.

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Plate 2

The cliffs at Diamond Bay, showing aeolian calcarenites (left) overlain by unconsolidated sands, partly scrub-covered, marks the palaeosol, exposed in a blowout, from which a sample was taken for radiocarbon dating.

"Wilson's Promontory", written by J. Ros Garnet, would be an excellent publication to take on an excursion to this part of Victoria. Price 65c; or 55c from F.N.C.V. bookstall.

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The Hatching of Huntsman Spiderlings

by

LEIGH WINSOR

Huntsman spiderlings are released from the egg case by their mother. The female spider cuts perforations in the egg case and tears along these to form a hole through which the spiderlings emerge.

An account of this hatching behaviour (McKeown 1952) does not record the making of perforations.

A female Huntsman spider (*Delena cancerides*) with her egg case, was found beneath eucalypt bark near Healesville, 40 miles East of Melbourne. They were taken to Melbourne and housed in a large jar containing bark and twigs. Water on a cotton pellet and live flies were provided. The female secured the egg case to the wall of the jar. She remained inactive, covering the egg case with her body, except when feeding.

In the evening, six days following capture, the female spider, using her fangs, began perforating the egg case. The perforations were 0.5cm from the periphery on the upper surface. During this operation the egg case was steadied by the six fore legs, the spider balancing on the two rear legs. She rhythmically pushed with her fangs, resting frequently, until 2 hours later, a 2 cm. semicircular incision had been made. On close examination this incision was not a continuous cut, but a row of pin-point holes (Fig 1).

The female spider then concentrated on the apical region of the perforate incision until a hole 0.5 cm. x 0.3 cm. had been enlarged (Fig 2). During this procedure the palps were introduced into the hole and used to retract the flap by pressing outwards. Only one or two millimetres of case tore at a time, requiring considerable effort.

Perforating the dry, tough, parchment-like egg case produced a loud noise which had originallly directed my attention to the hatching process. Whilst working, the female spider salivated freely, probably to soften the tough silk and aid penetration. On several occasions the egg case had to be resecured to the sides of the jar because it was dislodged during pulling at the flap.

Two and a half hours since beginning, the hole had been enlarged and a spiderling emerged remaining close to the mother (Fig 3). Work on the hole continued and more spiderlings emerged, only to be pushed back inside the egg case by the mother's palps.

Fig. 1

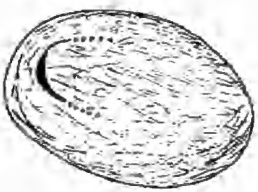

Fig. 2

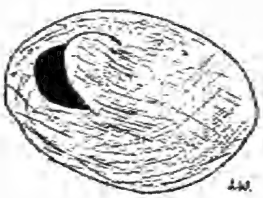

Fig. 3

The following morning the spiderlings were covering the egg case, protected by the female straddling them with her body. The spiderlings, 0.4 cm. long, had translucent pale green abdomens with brown cephalothorax and dark eye cluster. Their legs were brown, translucent, with darker brown concentric rings along their length.

These observations indicate the significance of perforations made by the female, in constructing an exit for spiderlings in the egg case of a Huntsman spider.

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Winifred Waddell, M.B.E., M.Sc.

Founder Native Plants Preservation Society

Teacher and tutor in mathematics, artist, lover of native plants, indomitable and single-minded in her work to preserve them through the society she founded, and all other means; warm-hearted friend, winner of the Aust. Natural History Medallion in 1964 (in which year she was also awarded the M.B.E. for outstanding services to natural history) — all that is true of Winifred Waddell, yet it is the barest outline of the woman known to her friends for her almost fierce devotion to the preservation of native plants.

Those of us who knew her well will always remember her welcoming "Come in m'dear. Nice to see you", her sympathy and understanding in sorrow or illness, and her enthusiasm as she pointed out some wildflower in her garden, saying with affectionate pride, "The dear little fellow is doing his stuff".

Nothing was too good for her friends, but they were unworthy of notice if she thought they fell short of her ideal of service to "Pres." — her usual abbreviation of Native Plants Preservation Society, although they were taken back into favour with warmth and an unreserved apology if she found she had been mistaken.

Her friends were glad to work with her — even to the point of exhaustion sometimes — in helping to create or protect wildflower sanctuaries, and her appreciation was generous.

For this writer memory brings back many things from a friendship of over thirty years, and any good that has come from the book, *Wildflowers of Victoria*, is due to her. It was her conception; her insistence that caused it to be written, and her determination and energy that resulted in its publication.

A memorial is planned for her, and donations toward it can be sent to Mr. D. Dunn, 3 Allfrey Street, East Brighton 3187.

There are already memorials in the society she founded, and the N.P.P.S. wildflower sanctuaries scattered through Victoria — for so long as we can preserve them. Even more enduring will be the love of native plants in the lives of many who learned it from her, through friendship, through her work with children, and especially through the many wildflower sanctuaries established and maintained in schoolgrounds, but it is felt that the Native Plants Preservation Society should establish a more tangible memorial though its form has not yet been decided.

Field Naturalists Club of Victoria

General Meeting

13 November

A larger than usual gathering was present for the annual Natural History Medallion award meeting. The President, Mr. Tom Sault, was in the chair, and after welcoming members and visitors he announced the death of Mr. Hugh Stewart. Miss Young spoke briefly and a minute's silence was observed in tribute to Mr. Stewart's life and work.

The presentation of the 1972 Natural History Medallion to Mr. Alan Axel Strom was made by the Hon. W. A. Borthwick, Minister for Conservation. Mr. Borthwick expressed his pleasure at being asked to present the award. He said that he regarded it as very important that this year's award had gone to a teacher, and that Mr. Strom was one of those responsible for developing sensitivity and new value judgments in the rising generation.

In reply Mr. Strom commended the Club's nation-wide approach to the Medallion award; he said he hoped that this was indicative of the development of a national attitude towards conservation. Mr. Strom later delivered the address for the evening, entitled "Conservation Education". A vote of thanks was moved by Mr. Ros Garnet, a previous Medallion winner. Another holder of the Medallion, Miss Jean Galbraith, was also present.

Lists of correspondence, newspaper clippings and copies of some letters were on display, and also a copy of the Act to establish the Victorian Ministry of Conservation, which the Secretary recommended members to study. He also commented on a letter from the Dandenong Valley Authority, inviting the Club to make suggestions for improvements to the Edithvale Swamp.

The President appealed for nominations for the remaining vacancy on Council, and announced that Council was considering a memorial to Norman Wakefield. Suggestions as to the form this should take would be welcome.

The Secretary invited members to a barbecue at his home on 16 December. Tickets would be $1 each and proceeds would go to the Wakefield memorial. Mr. Riordan also said that Miss Lorna Banfield's offer to donate a large set of the "Naturalist" had been answered by several large organisations, including University and C.S.I.R.O. libraries. He suggested that there may be other members willing to donate sets of the "Naturalist".

Botany Group

12 October

Dr. Gretna Weste, of the Botany School, University of Melbourne, spoke on "The Invasion of Victorian Forests by *Phytophthora cinnamomi*. This root-rot fungus causes ink disease of chestnuts and other deciduous trees in Britain and little-leaf disease of pines in Europe, but in Australia is best known as the cause of "dieback" in eucalypts. It has caused terrible devastation since 1926 in jarrah forests of Western Australia, where it was studied intensively by Frank Podger, who, when on a 1969 visit to Victoria, identified it as the cause of the yellowing and browning-off of grass-trees (*Xanthorrhoea australis*) in the Brisbane Ranges. Very troublesome in Queensland and New South Wales, it reached Victoria through coastal East Gippsland, where dieback in Silvertop forests (*Eucalyptus sieberi*) has been severe. Unfortunately it has reached Wilson's Promontory, and obviously it is a major threat to the future of all our national parks and forest reserves. Dr. Weste mentioned a number of methods being tried to prevent its spread, one drastic way being the clearing of all trees and shrubs in a restricted area, decontamination of soil, and sowing to grass, which is immune to attack, leaving the grassland for three years before reafforestation. For a full account of this menace, see Dr. Weste's article in *Victoria's Resources*, Vol. 14, No. 3, pp. 27-30: *A Sinister Invader*.

Reports were given on the group's second excursion to the Coranderrk bushland adjoining the Sir Colin MacKenzie Sanctuary at Healesville.

9 November

This was a members' night, in which four contributors showed colour slides and gave a commentary on them. First, Mr. Ian Cameron recalled pictorially some of the highlights of the F.N.C.V. Easter excursion to King Island, and in-

cluded some photographs he took on a visit to a penguin rookery after the main party had flown back to Melbourne. He then took us visually to South Africa, to enjoy the colourful glories of the Kirstenbosch Botanic Gardens, and on to Harvard University (Cambridge, Massachusetts) to see remarkable glass-blown "plants" by an Austrian craftsman. Next, Mr. Ian Morrison continued the King Island theme, not confining his slides to botany — for example, a close-up of the beautiful green White-lipped Snake (photographed while being held by King Island botanist, Mr. Paul Barnett, whose fine native garden the F.N.C.V. party visited later in their stay). Mr. Jim Baines dealt with Tasmanian flora, most of those shown being endemic species, among them Tasmanian Waratah (*Telopea truncata*), first seen by the January 1965 F.N.C.V. excursionists when accompanied to the summit of Mount Wellington by Dr. Winifred Curtis, author of the three-volume "Student's Flora of Tasmania", Mountain Rocket (*Bellendena montana*), Tasmanian Laurel (*Anopterus glandulosus*), Horizontal (the notorious scrub hazard) (*Anodopetalum biglandulosum*), seen on the way to the west coast, Mersey Lily or Christmas Bells (*Blandfordia marginata*), and various species of *Richea*, including the huge heath, Pandani (*R. pandanifolia*), Deciduous Beech (*Nothofagus gunnii*) and King Billy Pine (*Athrotaxis selaginoides*), as well as several endemic eucalypts. This excursion, recalled by some as the best of the interstate trips, was unfortunately never published in the *Victorian Naturalist*. Miss Marie Allender's slides of King Island completed a most varied, interesting evening.

Day Group Report

As it was the last outing for the year the committee arranged a very relaxing outing. Despite a train strike, 17 members joined us at Princes Bridge and boarded "The Jolly Roger" for a trip on the Yarra. Before lunch we travelled down towards the Victoria Docks and the proprietor, Mr. Dyson, pointed out items of interest. We returned for lunch and held our meeting on the ferry. After lunch we proceeded towards South Yarra. The embankments are looking lovely despite the lack of rain, and a lot of work has gone into keeping them in excellent order. We returned about 3.30 and members went their various ways. All agreed that it had been a very pleasant day and look forward to many more happy outings next year.

Field Survey Group Camp

November; Colac Area

The November camp was combined with F.N.C.V. Mammal Survey Group in surveying the Stoney Rises area. On the Friday night, some members travelled to Colac and L. Winsor spoke to the Colac F.N.C. on work being done by the group. Liaison with the Colac F.N.C. will continue with exchange of specimens and data. It is hoped that similar liaison can be established with other country clubs.

On Saturday seven members visited five localities in the Stoney Rises. The terrain made collecting difficult, as the many inaccessible crevices provided ideal hiding places for the animals sought. Night surveying would probably have produced better results than day collecting. Bad weather limited night surveying in the area, and Sunday was mainly spent drying out.

Despite the scarcity of specimens, valuable data on frog distribution was obtained by Arthur Brooks, two interesting species of flatworm, some spiders and non-marine molluscs recorded, and Barbara Hooke collected some interesting sedges. The small number of members attending this camp was due to many members studying for exams. The group is very grateful for the help and hospitality of Mr. Tom Underwood, on whose property we camped, and to the Colac F.N.C. for their assistance in organising the camp, and the opportunity of telling them something of the field survey group.
