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THE VICTORIAN NATURALIST

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FIELD NATURALISTS CLUB OF VICTORIA

in which is incorporated
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Pygmy Glider or Feathertail, *Acrobates pygmaeus.*

Photo: *W. H. King*

This animal is the smallest gliding possum and is immediately distinguished by its distinct gliding membranes and feather-like tail. The gliding habit really consists of a series of agile leaps which are prolonged by a parachute effect of the gliding membranes.

Feathertails are usually found in small colonies and their "nests" of shredded bark and gum leaves are built in knot-holes or small hollows up to sixty feet above the ground.

There is only one mainland species of *Acrobates* and this is widely distributed through the eucalypt forests of Eastern Australia, and although apparently quite common, the animal is rarely observed because of its smallness and nocturnal habit.

R. H. J. McQ.

Vol. 82, No. 1

F.N.C.V.

May 6, 1965

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Front Cover:

The photograph of a young lyrebird chick, *Menura novae-hollandiae* is by Mr. J. Cooper of the Fisheries and Wildlife Department of Victoria.

The First Victorian Record of the Spiny Gurnard *Paratrigla papilio* (Cuv. and Val.) (Pisces).

By T. B. Gorman*

Two specimens of Spiny Gurnard *Paratrigla papilio* (Cuv. and Val., 1829), Australia's smallest representative of the Gurnard family (*Triglidae*), were captured in Port Phillip Bay in February 1964.

They were taken by Fisheries and Wildlife Department officers using an otter trawl in 4½ to 5 fathoms of water.

According to Scott (1962) this species has been recorded in every

Fig. 1. The Spiny Gurnard *Paratrigla papilio* (Cuv. and Val.)

Australian State except Victoria, therefore this record fills a rather important gap in its known range.

It is believed that this species is much more common than the literature implies, but because of its small size (7 inches) it is rarely recognized.

The following description of the species is given by Scott.

Fin formula:

D.ix; 13-14. P.11 + 3. A.13-14. V.i, 5. L. lat. 55.

Head large and rugose, but without any strong spines. Three small, weak spines above the anterior part of the eye. Interorbital space deeply concave. Two dorsal fins, situated very close together, their bases almost continuous. A row of 22 spiny bucklers on each side, along the bases of both dorsal fins. Humeral bone oval, without a

* Fisheries and Wildlife Department, Melbourne.

spine, not as rough as the head bones. The lateral line is armed with enlarged scales bearing strong spines.

Colour of body bright red on back and sides, lighter below. An orange band across the throat and chest. Inner surface of pectoral fin green at the base, grading to blue at the margin. Length 7 in.

The two captured specimens (Fig. 1) agree closely with the above description, their morphometric measurements and scale formulae are given in Table 1. However, the dorsal fin possesses a black spot similar to that found on *P. vanessa* (Richardson), the Butterfly Gurnard, which is another small member of the gurnard family, and which occurs over a similar range.

The specimens have been lodged in the fish collection of the National Museum of Victoria and have been given the number A.236.

TABLE 1

Species *Paratrigla papilio* (Cuv. & Val., 1829), Spiny Gurnard

Date 28/2/64. Examined by T. B. Gorman. Locality Port Phillip 4·5-5 fathoms

	Morphometric Measurements	
	Specimen 1	Specimen 2
Weight	52·0 gms	59·0 gms
Fork length	15·7 cms	17·3 cms
Head length	3·8 cms	4·25 cms
Snout to insertion of 1st Dorsal	4·1 cms	4·55 cms
Snout to insertion of 2nd Dorsal	6·9 cms	7·3 cms
Snout at insertion of Anal	6·5 cms	6·7 cms
Snout to insertion of Ventral	6·7 cms	7·7 cms
Insertion of Ventral to anterior edge of Ventral	3·2 cms	3·7 cms
Greatest depth at 5th Dorsal (No. of dorsal spines)	3·1 cms	3·5 cms
Length Pectoral	3·5 cms	4·5 cms
Height of 3rd Dorsal (longest)	2·2 cms	3·5 cms (4th Dorsal)
Height Anal (max.)	1·8 cms	2·15 cms
Diameter Iris	1·0 cms	1·0 cms
No. Gill Rakers (left side only)		
Fin Ray Count:		
	D.ix; 14	D.ix; 14
	P.11 + 3	P.10 + 3
	A.14	A.14
	V.1; 5	V.1; 5
Scales and Spines:		
	L. lat. 59	L. lat. 58
	D. Spines	D. Spines
	L.21 R.22	L.21 R.22

Notes:

How captured: Otter trawl.
Sex: Not determined.
Colour: Brick red on back and sides. Lighter below. A black spot on dorsal fin.

REFERENCE

Scott, Trevor D., 1962. *The Marine and Freshwater Fishes of South Australia.* W. L. Hawes, Government Printer, Adelaide.

Brumby Point on the Nunniong Tableland

By Keith C. Rogers

In the *Victorian Naturalist* of May and June 1960, there was an article by Mr N. A. Wakefield entitled "Forlorn Hope and the Reedy River". The focal point of interest concerned the great chasm through which the Reedy flows.

It has now been discovered that another unique place occurs within a couple of miles or so of the Reedy Gorge, and almost immediately above it on the western side.

Mr S. A. Hodge, of Gelantipy, had long since told me of a particularly barren ridge called Brumby Point, which juts out from the northern escarpment of the Nunniong Plateau. He had known this ridge years earlier, when mustering cattle from the hut at Digger's Holes. It was also learnt that a Forests Commission jeep-track had more recently made access to Brumby Point possible for a vehicle.

With a view to exploring the area, Mr Hodge and I set off from Gelantipy by Land Rover on January 30, 1964.

The track crosses the divide between the Snowy and Buchan Rivers at Mt. Statham at an altitude of nearly 4,000 feet, then descends steeply to cross the Buchan River at 1,600 feet above sea level, only to climb again to an altitude of 4,400 feet on the Nunniong Tableland. There the tall forest gives way to more open timber around Digger's Holes, which lies at the foot of the gently sloping 5,000 ft. Mt. Nunniong.

In that locality there is a considerable area of the rather rare Dargo Gum, or Spinning Gum (*E. perriniana*). Its almost round and opposite juvenile leaves, fused together at the base, form, in effect, one circular leaf that, on drying, will often spin round on the stem.

From Digger's Holes, which is about 20 miles west of Gelantipy, we followed another Forests Commission track for 4 miles in a northerly direction to Brumby Point. This track led through the usual type of more or less open sub-alpine forest, the dominating eucalypts being Kindling Gum (*E. dalrympleana*) and Snow Gum (*E. pauciflora*).

Exactly where the ridge called Brumby Point leaves the plateau there is a most spectacular change in the landscape and the normal growth of trees ceases abruptly along a definite line. The ridge runs eastwards for nearly two miles, forming the watershed between the Reedy River and its tributary the Little Reedy, and is at an average elevation of 4,100 feet, rising to 4,300 feet at one point. It is composed of slates and a whitish, fine grained quartzite, which is the same formation as at the chasm some 2,000 feet below. The bedding of this sedimentary rock is almost vertical, causing all the outcrops of rock in the area to be extremely jagged.

The shallow soil along the crest of the ridge is apparently so poor that it can support only a stunted flora, comprising belts of mallee eucalypts alternating with bands or patches of heathland. These strips run chiefly north and south across the ridge for almost the whole of its length, and extend

Brumby Point.
Clumps of mallee and *Banksia* "mounds".

Photo: *C. Bowden*

further down on the northern slope than on the colder south side. The peculiar striped appearance thus formed can be seen from places many miles to the north.

A remarkable feature is that the belts of densely growing mallee all along Brumby Point have quite definite margins, with only a very odd eucalypt growing in one or two of the open spaces. The reason for this is a complete mystery, as the bulldozed track shows a uniform few inches of whitish, stony soil throughout.

There are four eucalypts that form the belts of mallee, the most plentiful being Kybean Mallee Ash (*E. kybeanensis*), a true high altitude mallee with many slender, greenish stems. It is fairly widespread in that area. Growing with it is the taller mallee, Tingiringi Gum (*E. glaucesens*). It might be mentioned here that this eucalypt, although normally a mallee, does grow into a forest tree in some localities and that such is the case on the south side of this ridge. There, it occurs as a tree with Alpine Ash (*E. delegatensis*). The other two eucalypts that go to make up the belts of mallee are Snow Gum and Black Sallee (*E. stellulata*), neither of which adopt a true mallee form elsewhere in the district.

In the open heathland spaces the most conspicuous shrubs are a species of *Banksia* that grows in dense, cushion-like "mounds" to an average height of two to four feet. This is the unnamed species with large silvery cones that occurs on rocky hillsides in many parts of East Gippsland. It was formerly included in the species *B. marginata*. Here it adopts a particularly dense and low form.

On our leaving the vehicle in one of the open spaces, a low-growing heath immediately attracted our attention. It is in profusion all along the ridge, as a trailing plant up to one foot high, amongst masses of Alpine Boronia (*B. algida*), Mountain Shaggy Pea (*Oxylobium alpestre*), Alpine Bossiaea (*Bossiaea foliosa*) and Gorse Bitter-pea (*Daviesia ulicifolia*). On sending a sample of this heath to Mr. J. H. Willis for identification, he found it was an entirely new species of Broom-heath (*Monotoca*). As far as present observation goes, it appears to be endemic to that one locality, and was then just starting to flower.

Acacia lucasii—flowers.

Photo: *C. Bowden*

Other heaths that occur along the crest of the ridge are Prickly Broom-heath (*Monotoca scoparia*), Daphne Heath (*Brachyloma daphnoides*) and the alpine Beard-heath (*Leucopogon gelidus*). Of 25 species of plants noticed along the crest of the ridge, some others not previously mentioned are a Tea-tree (*Leptospermum sericatum*), Alpine Mountain Pepper (*Drimys* sp.), Rough Coprosma (*C. hirtella*), *Platysace lanceolata*, Digger's Speedwell (*Veronica perfoliata*), Purple Daisy-bush (*Olearia iodochroa*) and the creeping Geebung (*Persoonia chamaepeuce*). Grasses were found to be almost absent along most of the ridge, and in places the *Bossiaea*, with a ground cover of lichens, is all that grows.

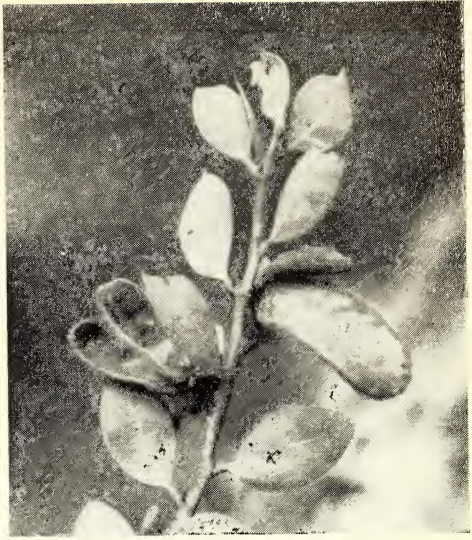
On making another trip to Brumby Point on March 10, 1964, to collect more of the new *Monotoca* for the Herbarium, it was decided to explore the south side of the ridge. Not so far down the steep slope, the mallees were found to be replaced by trees of normal growth, particularly Alpine Ash, and in places, as mentioned earlier, the tree form of Tingiringi Gum.

Amongst the Alpine Ash was a Tree-everlasting (*Helichrysum* sp.) in full flower, and a very showy shrub indeed, and quite unknown to us. On material from this find being forwarded to the Herbarium, Mr Willis was able to state that this shrub is only known in one other place, on the Otway Peninsula, and has not been named. It is of upright growth, with dark leaves at right angles to the stem, and reaches a height of six or eight feet.

On a third trip to this interesting spot, on April 18, 1964, the ridge was followed about half-a-mile further east than the termination of the jeep track. Here the ridge falls away to a low saddle, where at 3,700 ft. elevation, a remarkable and rare wattle was found. It is entirely woolly, both phyllodes and stems, and the remains of the previous season's empty seed pods were still retained. These were covered with a tan felt. It is a shapely small tree or shrub, attaining a height of five to eight feet, but occasionally taller. These wattles are scattered amongst a quarter mile or so of rocks and cliffs, chiefly on the sunny side of a high outcrop.

Again on information kindly supplied by Mr Willis, this interesting wattle turns out to be a new record for Victoria. It is *Acacia lucasii*, and is found in two places about 100 miles away on the Southern Tablelands of New South Wales. The buds on this wattle indicated a spring flowering, but it took two more trips before it was actually seen in bloom. One visit was made with my son, John, when on a piece of new road, we were well bogged, and on reaching the wattle it was still only in bud.

Next trip, on October 11, 1964, with Mr C. Bowden and Rodney, was made through Buchan, twice the distance, but no delays, though snow and heavy rain on the return made travelling unpleasant. This time we were rewarded by finding *A. lucasii* just starting to bloom. The flowers are in large, bright yellow heads. Also with it is an abundance of *Boronia anemonifolia* with its highly scented leaves and nearby is another attractive wattle *A. kybeanensis*.



Acacia lucasii—pods. Photo: *C. Bowden*

It is felt that these trips to Brumby Point, with its unique stunted flora and the discovery of three such rare plants, have been well rewarded.

The Grinding Rocks at Boisdale

By Aldo Massola

This paper records the first aboriginal antiquity found in Gippsland. This statement does not mean that traces of the aborigines have not been found before in this region. I am well aware of the existence of long lines of coastal middens, which extend not only along the dunes facing the sea, but also around the lakes. Many trees bearing scars from which the aborigines removed bark for their mia-mias or for their canoes are to be seen; one such canoe-tree, a magnificent example, is in Howitt Park at Bairnsdale. There are many relics of their material culture in our public and private collections; we have a number of their myths and legends, and some skeletal remains have been found. At Lake Tyers and elsewhere many of their descendants, amongst whom are a few pure-blooded blacks, live out their existence. However, all these are mortal and destructible remains. The present find is in a different class, inasmuch as, by its very nature, it is permanent and indestructible.

In its pristine state Gippsland can be described as a rugged, densely timbered country, abounding in rivercourses and lakes, with here and

there, in the river valleys, timberless, or at least thinly timbered plains.

The natives lived mainly on the lakes and along the sea-shore, where it was easier to obtain plentiful supplies of food. Occasionally, however, they would make incursions towards the mountains, and, because of the impenetrable bush, they had to follow the rivers. Their inland camps, therefore, must have been situated close to the rivers, and preferably in the vicinity of open tracks of land.

These occasional excursions were doubtless dictated by important reasons, one of which we have known for a long time; it was in order to wage war on their enemies, the Omeo tribe to the north, and the Western Port or Coast tribe to the west. One other reason is now known to us from the present find of the Boisdale sandstone outcrops. Since they are situated not far from the inexhaustible supply of well-shaped water-worn stones, obtainable from the pebbly bed of the Avon River, they would have been a good reason for visiting the locality. Doubtless other such places exist in Gippsland, places which ordered the movements of the tribes, and would have supplied additional reasons for these inland excursions.

Gippsland was destined to be explored from the north, and the Avon River valley to become an important link in the route to the south. McKillop and McFarlane, by reaching Omeo from the Manero district of New South Wales in 1835, set the stage for the eventual penetration of Gippsland by the white man. Shortly after this McFarlane took up a station there, and this station became the jumping off place for both the Gippsland explorers, Angus McMillan and Count Strzelecki; but while McMillan became "a son of the soil", the Count, after following closely on the former's tracks down the Tambo River and as far as Lake Victoria, struck off in a westerly direction across the centre of Gippsland, and, after traversing some of Australia's most beautiful and most rugged country, disappeared from Victoria's history.

Starting off in September 1839, Angus McMillan, in the employ of Lachlan Macalister, followed the course of the Tambo River south from Omeo, and established a station at Numbla-Munji, close to where the present town of Ensay stands. Leaving some men in charge, he continued south and then west, and after much travelling discovered and named the Avon River, which, he wrote, "flowed through beautiful rich open plains, intersected by occasional belts of timber".

At this river, at a place called Nuntin, or Stratford, he formed another station on behalf of his employer, and left some of his men in charge, but they were attacked by the natives, and so resolute and fierce were the attacks, that they had to leave all their possesions behind and escape back to Numbla-Munji. In December 1840, McMillan again took possession of the Nuntin station, and despite more aboriginal attacks was able to hold it. It will be remembered that he, himself, eventually settled on these plains, at a place called by the natives "Kutbuntaura", and by himself "Bushy Park".

The Gippsland natives, the Kurnai, had been very troublesome, and in the early years of settlement had made great depredations amongst the white men's cattle and property. Gradually, however, they made friends with the white man, and directed their warlike activities against their hereditary enemies from Omeo and the High Plains. As late as January 27, 1855, the Omeo tribe, to avenge an earlier spearing of four of their men, attacked the Kurnai encamped on the present reserve at Lake Guthridge, in

Boisdale Rock No. 1.

Sale. Despite the fact that the Police Station (in York Street) adjoined this reserve, and that the Sale natives sought refuge in it, as well as in other nearby European houses, several were killed and wounded. Later the same year the northern blacks attacked the Kurnai camped at The Heart, and killed one man.

The Kurnai retaliated by raiding a camp of Omeo blacks on the Snowy River, killing six and wounding others. This was followed by upwards of 100 men from the Upper Tambo coming to Sale, on September 7, 1855, to avenge the Snowy defeat. They remained orderly, but named five local natives whom they wished to kill. These men ran off to Tarraville, and although followed, were not caught.

McMillan was a great influence in quietening the natives, who regarded him as a just man, and their friend. He, in fact, became local Protector of Aborigines, and did all in his power to ameliorate their condition.

It is ironical that the last battle fought by the natives in Gippsland took place within sight of McMillan's house at Bushy Park, some six hundred yards from the right bank of the Avon. This battle was fought in two separate engagements, the first at the end of 1856. It not being conclusive, a second engagement took place on the same spot at the beginning of 1857, when both sides brought in all their available men. The victory went to the Kurnai. After one of the Omeo blacks was speared, the rest turned and fled, and several were either speared or shot in the ensuing running fight.

In 1858 the Reverend F. A. Hagenauer formed the Mission Station at Ramayuk, 15 miles from Sale, on the north-east bend of the Avon River, near Clydebank. From this time the natives were brought under control.

It can be seen that the plains about the Avon River were the central points of activity. It is, therefore, interesting that the newly-found Boisdale grinding rocks should also occur in this locality. They are situated about half a mile south of the stables of Boisdale homestead, which has been the home of the Foster family since May 1850, when Mr John Foster purchased this

Boisdale Rock No. 2.

property, the Boisdale Estate, then consisting of 57,000 acres, from Lachlan Macalister.

Boisdale Homestead is situated about two miles south of Boisdale township, on the road to Maffra, on a low chain of hills. These are the only hills in the vicinity, and, though low, are a very noticeable feature in this otherwise extensive plain, which remains unbroken till the foot-hills of the Barry Mountains are reached. Because of its commanding position as a look-out, this chain of hills would have been the obvious choice for an aboriginal camping place. Perhaps this was also the reason that made John Foster build his home there.

To the south of the house one more rise is noticed before the ground falls away. This feature is known as Reservoir Hill, because, on its summit, the Fosters have built a half-million gallon reservoir. A few hundred yards to the west of this reservoir the hill falls into a natural drain, or wide culvert, inclining in a southerly direction, and terminating, some 300 yards further, in a waterhole, or soak, which is probably in much the same condition now as when the natives knew it. This waterhole has never been known to dry up, and was undoubtedly the source of water for the natives camped in the vicinity.

On both sides of this drain there are several small outcrops of coarse-grained ferruginous sandstone. Most of these outcrops take the form of low rocks, but here and there are also seen what appear to be slabs, but are the tops of larger rocks, barely protruding above the surface of the soil. Two of these slabs, one on the east and the other on the west side of the culvert, bear grooves caused by the grinding on them of the pebbles which the natives made into axes. As already stated, the pebbles were obtained by them from the nearby Avon River.

The eastern slab, which we may call Rock No. 1, is only 4 feet by 3 feet in size. It bears 6 grooves, ranging from 6 to 14 inches in length by 2 to 2½ inches in width, and all ¾ of an inch deep.

The example to the west of the culvert, which we may call Rock No. 2, measures 11 feet by 6 feet, and has 14 grooves upon it. These vary from 8 inches to 15 inches in length, but all are 2½ inches wide and ¾ inch deep.

Although of small size, these two rocks are of extreme importance. In spite of the fact that great numbers of ground axes have been, and still

are, found, grinding rocks are very rare in Victoria. Only two others are known: one at Gellibrand, in the Otway Ranges, the other at Earlston, in the Central Plains. It is difficult to account for this paucity, unless, of course, many unreported examples exist. They are important enough, for the reconstruction of Victoria's prehistory, to warrant a systematic search for them.

My grateful thanks are due to Mr N. M. Elliott, of Bairnsdale, for giving me the information which enabled me to locate these rocks.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Wattle-bird/Heron Duet

The following observations were made during last spring by Mr C. T. Barbour of Murrayville.

Following a record rainfall during September, the Murrayville area of the Mallee had a further 125 points of rain in the first week of October 1964.

One bird which found the district worth visiting was a White-fronted Heron, which was observed perched on the roof of the local Consolidated School. Herons do not usually frequent this area, and I would have assumed the bird to have moved out of the district but for hearing its voice under very interesting circumstances two mornings later. Early on this morning a Red Wattle-bird gave its characteristic gruff call several times at intervals. At the end of each call it seemed to be answered from perhaps two hundred yards away by the equally gruff and distinctive calls of a heron. This continued for several minutes.

The most interesting point about this performance was that, ten years ago, at Barongarook, six miles south of Colac in the Otway Forest, my wife and I were regularly entertained for several weeks by exactly the same combination of bird voices.

On these occasions, the heron roosted in a Monterey Pine within about fifty yards from where the wattle-bird would send forth his three or four raucous notes at intervals. Instantly at the end of each bracket of notes there would come in reply a similar bracket—a little lower in tone, but otherwise matching perfectly the call of the wattle-bird.

The wattle-bird, busily feeding, may not have been aware of his part in the duet, but the heron seemed to deliberately wait for the wattle-bird call and then to chime in.

This part-singing between birds of different species I originally thought of as a freak occurrence, but now it has occurred again in a different locality. I think that in each instance the heron did not have a mate and the certain amount of similarity in the calls caused a type of conditioned response in those birds.

A Cave-Dwelling Land-Snail

These notes were forwarded by Mr E. Hamilton-Smith of Montmorency and refer to the invertebrate fauna of a Gippsland cave.

Although many countries have molluscs which live exclusively in caves, such species do not appear to occur in Australia. However, it may be of interest to record a population of one of our Gastropoda living in a cave.

A population of *Elsothera funerea* Cox has become firmly established on the floor of the main chamber in Wilson's Cave, East Buchan. The number of individuals present apparently ranges from approximately 30 to over 200, as estimated on a number of visits since 1961. However,

on a recent visit none were in evidence as the cave had recently been flushed out by especially heavy rains, and it will be of interest to see if the colony is re-established.

The floor of the cave in the area concerned consists of fine mud with a considerable amount of vegetable debris and small amounts of bat guano on the surface. The snails are confined to an area kept permanently damp by dripping water from the roof. Many other invertebrates occur within this cave, including Millepedes, a Tineid moth, beetles of the families Carabidae, Trichopterygidae, and Staphylinidae, Ichneumon wasps, Cave-wetas, Spiders, Harvestmen, Springtails, Mites, and Flies.

I acknowledge with thanks the help of Miss Hope MacPherson who identified the specimens concerned.

Brisbane Ranges

This note has been sent in by Miss Marie Argo and refers to an F.N.C.V. excursion to the Brisbane Ranges on November 3, 1964.

The Club excursion to the Brisbane Ranges last Cup Day was memorable for me as I was fortunate enough to collect a specimen which, on identification by Mr B. Muir at the National Herbarium, proved to be a new record for the area—the Rough Burr-daisy *Calotis scabiosifolia*.

It was interesting to see wide expanses of the Snow Mint-bush, *Prostanthera nivea*, in full flower. In contrast, on December 13 at Powelltown, this species was only just coming into bloom.

Orchids observed in the Brisbane Ranges region included Pink Fairies (*Caladenia carnea*), Musky Caladenia (*C. angustata*), Fringed Spider Orchid (*C. dilatata*), Tiger Orchid (*Diuris sulphurea*), and Leopard Orchid (*D. maculata*).

Mallee Bird-Notes

This short collection of separate encounters with Mallee birds has been sent in by Mr. C. T. Barbour of Murrayville. Mr. Barbour has only resided a short time in the north-west of Victoria, but has already accumulated a wealth of observations on the birds of the area.

Last August 25, we observed a Sacred Kingfisher in mallee bushland. We assumed that the bird was migrating southwards, but if so, it would seem to be unusually early. Over past years in the Goulburn Valley we have recorded the dates on which these kingfishers have returned to their summer habitat. In each of three years the return was during the first two weeks of October.

White-browed babblers are present in this locality. Their nests are easily found in the mallee scrub, but there are very few young birds to be seen with the adults. Boys on bird-nesting ventures are responsible for some of the loss in numbers this year and as well, clearing of building lots disturbed many families of babblers which then tried to make new homes in introduced trees such as pepper-trees and athel. I have later found these abandoned. One nest in the small branches on a lower limb of a pepper-tree was built during four days in the school holidays. There were joyous chortlings as the birds lived there for about a week, then to find that it apparently would not do.

A very vigorous colony of Grey-crowned Babblers existed in the natural vegetation of White Cypress-pine and Yellow-box on a low hill between Katunga and Muckatah in the Murray Valley. Four years ago the hill was cleared for lucerne crops. The Grey-crowned Babblers responded the same way as their White-browed cousins in that they tried to build in pepper-trees and other introduced species, but were unable to re-establish themselves. After revisiting the locality recently, I found that they are either seriously depleted in numbers, or have completely gone.

A pair of Grey Shrike-thrushes are presently most engaging visitors to our bird-table. These birds prefer little bits of cheese and meat. Apparently the cheese is considered suitable food for the nestlings as the smaller bird of the pair picked up several small pieces and carried them away in the beak. Small pieces of mutton fat have also been carried back to the nest.

We have found that the bluest of the wrens is not the Superb Wren, but rather the Black-backed Wren. This bird can be seen in good numbers when moving quietly through the mallee scrub. We had four of these brilliant little birds feeding and singing very close to our feet during a walk through Murray Pines in September. Also seen, but less frequently, was the brightly-hued Purple-backed Wren.

F.N.C.V. Excursion to Western Australia, August 31 — September 22, 1963

With special reference to botanical impressions and gleanings

By J. H. Willis

(*Continued from Vol. 81 page 337*)

Sand-plain flora begins

In travelling south toward Esperance, through Kumarl, Salmon Gums, Circle Valley and Grass Patch, one experiences a kind of floristic acceleration: more and more fascinating and colourful species of plants crowd the roadsides, until near Grass Patch, on the southern sand-plains, there are as many kinds of wildflowers to be seen at once as were observed along the whole preceding 1000 miles of our journey. Again and often the bus echoed to impassioned cries of "Oh, look at *that*—we *must* stop here"! A short stop about 2 miles north of Salmon Gums enabled several eucalypt-fanciers to examine and collect seed from the curiously distorted, 6-foot-high and very thick-leaved Phillips River Gum, *Eucalyptus grossa;* the triads of its greenish flowers are deflexed on broad strap-like peduncles. Lanky wands of the unusual emu-bush *Eremophila calorhabdos* were noted at Circle Valley; but their torch-like spikes of rosy flowers had not yet expanded.

Lunch-time break was made just short of Grass Patch, in a particularly good area of roadside mallee scrub. Here was a spate of leguminous flowers—species of *Chorizema, Sphaerolobium, Daviesia, Dillwynia* and *Bossiaea.* Among several acacias were fine examples of a locally endemic and as yet undescribed species—low, cushion-like, with small clavate phyllodes and ablaze with golden blossom. There were *Verticordia* species in several colours, *Calytrix brachyphylla* of deepest violet, five different boronias (including *B. baeckeacea* and *B. tetranda*), *Goodenia strophiolata, G. phylicoides, Dampiera lavandulacea, Lysinema ciliatum, Hakea cinerea, H. pandanicarpa* and others too numerous for listing. A further halt 5 miles south from Grass Patch introduced us to the gorgeous *Leschenaultia formosa,* in every conceivable shade from orange-salmon to deep blood-red; some plants were blooming heavily when scarcely more than 2 ins. high or wide. The little square-fruited Fuchsia Gum (*Eucalyptus forrestiana*) flourished nearby, and spindly *Acacia gonophylla* was noteworthy for its almost white flower-heads. Between Grass Patch and Esperance vast areas of sand-plain are yearly being brought under cultivation, and almost the only survivals of native vegetation now are along the railway and road-edges where their existence is jeopardized by a continuing influx of agricultural weeds. It will be deplorable if this astonishing and beautiful flora is allowed to vanish forever. Nearer to the sea, dominant bushes or small spreading trees of the sand-plain are silvery *Eucalyptus tetragona* and long-leaved *Banksia speciosa.*

Esperance and Neighbourhood

On the outskirts of Esperance our bus was flagged down by two male members of the Daniell family, formerly of Montrose in the Dandenongs but now on a newly established farm at Condingup (some 65 miles east of Esperance). They had heard of our approach from Norseman by pedal radio, and were willing to take a small party out to see their property the following morning. Thus, on Saturday afternoon, Sept. 7th, after a full week's travelling, we reached the lovely ocean port of Esperance. For a very modest camping fee, tents were soon erected on the beach reserve at the southern extremity of the township. After their exciting day, most campers were early to bed, lulled by the murmur of wavelets only 100 yards away; but a few very tired ladies indulged in the comparative luxury of meals, bed and bathing facilities at the local hotel. Latest to retire, as usual, was Alan Morrison who busied himself with flower-photography by flashlight in a communal cooking pavilion.

Next morning was very dewy and cold, but that did not deter one brave camper (Mollie Elder) from taking a swim before breakfast. The beach sand on this part of Esperance Bay is now almost completely buried under extensive piles of driftweed (chiefly *Posidonia*). This sad deterioration of a scenic spot may be linked, as a side effect, with the new breakwater built from Dempster Head out into the Bay. During Sunday our party broke into small groups to explore the neighbourhood at leisure. Dempster Head, with impressive sea cliffs and coves to the west, became the principal objective. Vast slabs of granite on the northern (i.e. townward) slope of this lofty headland have been walled around with cement to provide a catchment where rainwater gravitates to a sizeable reservoir—the town supply for many years past.

At the summit one is arrested by a truly magnificent panorama: rocky islets of the Recherche Archipelago dot the ocean from west to east where they are lost behind the mountainous profile of Cape le Grand (a large permanent reserve). The scene recalls a rich pageant of history. Bruni d'Entrecasteaux's two vessels, *La Recherche* and *L'Espérance,* lay at anchor below this hill in December 1792. His botanists, Riche and Labillardière, made large collections of plants in the vicinity; most of them became the types of new species, including the first eucalypts to be diagnosed from Western Australia. Despite the inroads of civilization, now much accelerated, numbers of the plants described by Labillardière are still to be seen about Dempster Head, e.g.: *Adenanthos cuneata, Olax phyllanthi* (ghost plant), *Acacia saligna* (wreath wattle), *Phyllanthus calycinus, Spyridium globulosum, Pimelea ferruginea, Agonis marginata, Platysace compressa* (tapeworm plant) and *Anthocercis littorea. Anthocercis viscosa* (white flowers 2-3 ins. wide), scarlet *Templetonia retusa,* purple-headed *Melaleuca subtrigona* and *Hakea nitida* are also frequent shrubs of the rocky hill.

On 9 January 1802 Captain Matthew Flinders steered his *Investigator* among the islands of Esperance Bay, remarking that, because D'Entrecasteaux had "mostly skirted round the archipelago", it was "a sufficient reason for me to attempt passing through the middle". This he did, bypassing the present site of Esperance but reaping a great harvest of botanical specimens at Lucky Bay, about 25 miles to the south-east.

The Dempster brothers made a reconnaissance of the Bay in August 1863 and established their sheep station (four runs totalling 304,000 acres) at Esperance early in 1864. They were the first permanent settlers in this delightful region, and their old house still stands in Dempster Street. Sir John Forrest and party, with his faithful native Tommy Windich, arrived here on 24 April 1870 and spent a fortnight with the Dempsters, while riding horses from Perth to Adelaide—an epic achievement. A reminder of Forrest's association with this district is given by the epitaph on Tommy Windich's grave, where Dempster Head rises above the narrowing beach. Tommy died here in February 1876; and it was acutely disgusting to see the results of quite recent desecration at this lonely burial place, pieces chipped from the headstone, scribbles over its inscription, broken bottles littered in and around the damaged railing. What sort of people *are* Australians that such vandalism is possible, and are we *ever* going to grow up?

True to promise, Mr Pat Daniell was at the camp early on Sunday morning. He took five lucky people (including the writer) on a day's tour of the new selections out east at Condingup and adjoining Duke of Orleans Bay. We marvelled at the transformation when passing Art Linkletter's model farm—from hungry scrub to rolling green pastures and sleek cattle in a few seasons! The only traces left of the original flora were scattered and picturesque Christmas Trees (*Nuytsia floribunda*) standing in many of the paddocks. Were they retained as little shelter-trees for stock? "Not really," said Mr Daniell, "but, once you cut them down, they sucker so persistently that it's less trouble to leave the trees there and so avoid the crops of sucker-shoots." *Buyi Billanak* (meaning "rock outcrops") is the aboriginal name the Daniells have chosen for their attractive property, and they have wisely set aside as a wildflower reserve about 20 acres surrounding mossy granite pavements near the house.

This piece of sand-plain abounds in orchids (we saw a dozen different kinds), lilies, aroids, gay proteads, boronias, trigger-plants and such very showy myrtaceous bushes as *Calothamnus quadrifidus, Melaleuca suberosa, M. steedmanii, Thryptomene, Darwinia* and *Baeckea* species. Along the flowing but quite salty Mungliginup Creek, 3 miles north of Daniells' house and near their northern boundary, we were entranced by the groves of chalk-white and bizarre old paperbarks (*Melaleuca preissiana*), the hillslopes covered with tall cycads (*Macrozamia riedlei*), *Acacia saligna*, a kangaroo apple (*Solanum symonii*) and other brilliant flowers too diversified even to mention.

We arrived back in Esperance after dark, and camp was struck early next day to put us all on the road for Ravensthorpe by 8 a.m. A brief stop at Six-mile Hill afforded a last pleasing view of Esperance Bay and its numerous islands. Tall salmon-flowered bushes of *Lambertia inermis* (a honey-flower) were conspicuous around the hill, as were pale yellow *Dryandra floribunda* and the curious *Hakea trifurcata* with its dimorphic foliage—round flat leaves and needle leaves on the same branches.

Interphase at a Borden Woolshed

An incredibly tiny, one-roomed school of galvanized iron was noted at Munglinup (between the Oldfield and Young Rivers). Recently cleared paddocks nearby were red with a massed display of "running-postman"

(*Kennedya coccinea*), but so very much of this wonderful wildflower country has been utterly destroyed, to the very road-edges. Then, after another 63 miles we drove into Ravensthorpe—a typical mining township that has seen better days, but is currently enjoying somewhat of a revival in its copper mines. Lunch time coincided with our arrival at the pretty, rock-paved Phillips River (still very salt) where a few interesting plants were photographed: viz. *Santalum spicatum* (Southern Sandalwood), *Eucalyptus platypus* (Round-leaved Moort), *Acacia acuminata* (Jamwood) and a remarkable bitter-pea with bluish, inflated, cylindrical, spine-tipped leaves (*Daviesia pachyphylla*).

It had been intended to push on and camp for two nights at Chester Pass in the Stirling Range; but ominous rain-clouds rolled up from the west. Near Borden lived the Tozer family, friends of Len Fell (our companion from Gippsland Lakes), and they generously offered us the use of their capacious woolshed about 5 miles E.S.E. of Borden. This was an unexpected god-send, affording complete shelter for sleeping and eating. In general, women slept on one side of the shed and men on the other; but there was little real privacy, and most inhibitions quickly dissolved in mutual mirth.

The unforgettable Stirling Range

Next day (Sept. 10th) broke fine and our objective was Bluff Knoll (3640 ft.), the highest peak of the Stirling Range which beckoned irresistibly some 20 miles to the south. For some of us, this was to prove the highlight of the whole excursion. Before Chester Pass is reached, a well formed road leads off the Borden-Albany highway for several miles eastward, ending at a turntable on one of the high western foothills of Bluff Knoll. Here our bus waited from 10 a.m. to 4 p.m., which allowed ample time for ascending the peak should any of the more agile wish to do so. The majority were content to browse in leasurely fashion on the lower heathy slopes and gullies which had endless delights to offer.

Among such a galaxy of colourful blooms, it is hard to single out individual species for comment, but one feels compelled to mention the following: golden-headed *Dryandra formosa,* rose-pink *Isopogon formosus,* the ginkgo-leaved *Hakea baxteri, Franklandia fucifolia* (a protead with yellow starry flowers on remarkably long tubes, and seeds like thistledown), rosy-purple *Burtonia villosa,* the blue wax-flower *Eriostemon nodiflorus,* deeper blue *Platytheca verticillata* (a close relative of the pink to magenta *Tetratheca* species), nodding pink bells of *Darwinia leiostylis,* rose *Hypocalymma speciosum* with trim round leaves, rather procumbent *Beaufortia heterophylla* bearing bottle-brush flowers of deepest red, the white Southern Cross (*Xanthosia rotundifolia*), citrine *Pimelea suaveolens,* various heaths and orchids.

Four mountaineers were successful in making the top of Bluff Knoll. Magnificent views in every direction rewarded them; and the bus, far below, looked like a tiny ant where the white ribbon of road terminated abruptly. Quite the choicest flower up there was *Darwinia collina,* with nodding lemon-yellow globes; it is endemic on this particular summit, but not rare. Two other shrubs of the higher altitudes were *Banksia brownii* (large golden flower-spikes set among finely cut, ferny leaves) and *Andersonia echinocephala,* a mountain heath with large, coarse, prickly leaves that give it the aspect of a miniature Monkey-puzzle Tree, 2-4 ft. high. At the edges of the

Actinodium cunninghamii—a daisy-like myrtle from the Stirling Range.
Photo: *the late H. T. Reeves*

escarpment a strong wind was constantly blowing, and at one very narrow deep gulch on the northern side the up-draught caused columns of vapour to swirl high in the air—a veritable geyser or "witches' cauldron", fascinating to behold.

It was something of an anticlimax to leave this entrancing spot and return to sup and sleep in the Borden woolshed for a second night. Again, the botanical collectors and photographers were up until a late hour dealing with their large "bag" of trophies. Short stops were made next day at Chester Pass and at several places along the road to the Porongorups—our objective for lunchtime. Near the Pass, one proud lady found a most unusual rose-pink form of Tinsel Lily (*Calectasia cyanea*). Others were intrigued by a couple of entirely prostrate *Banksia* species (*B. prostrata* and *B. petiolaris*); their foliage and erect brown fuzzy cones appear to spring directly out of the sand, but are in reality attached to horizontally spreading subterranean branches. Near the junction of the Albany and Mt. Barker roads (of which we followed the latter) were many vivid wayside flowers: Primrose Orchid (*Caladenia flava*), the smaller Red-and-green Kangaroo Paw (*Anigozanthos bicolor*), the blue heath *Andersonia cærulea*, magenta-spiked *Comesperma nudiusculum*, and lovely Snake Bush (*Hemiandra pungens*) with dotted rosy flowers reminiscent of an emu-bush.

Porongorups and Albany

The reservoir at the northern foot of Nancy's Peak is an idyllic picnic place among towering white Karri eucalypts (*E. diversicolor*) in the heart of the Porongorups. This granitic range enjoys a rainfall of about 39 in. per annum and marks the most easterly occurrence of Karri forest. Leguminous plants are conspicuous as an understorey, notably: *Acacia urophylla* (Karri Wattle), *A. hastulata, Bossiæa aquifolium* (Water Bush), rosy-flowered *Mirbelia dilatata* with prickly foliage, royal blue *Hovea elliptica*

(Karri Bluebush) and climbing *Hardenbergia comptoniana* (Wild Wisteria). Another striking plant is *Leucopogon verticillatus* (Tassel-shrub), with whorled leaves that are the longest in its large genus—up to 6 in.

During the two hours available, several of our party climbed to the boulder-strewn summit of Nancy's Peak (at 2150 ft.) whence a superb panorama stretches from the serrated Stirling Range, 20 miles northerly, to the southern coast around King George's Sound. Surrounding the higher parts are thickets of a curious green-flowered *Melaleuca* that is either a divaricate form of *M. microphylla* or an underscribed species. A few old spectacular "blackboys" (*Xanthorrhoea preissii*) also crown this peak, while mosses and lichens abound everywhere among the granite slabs and ledges—James Drummond wrote enthusiastically of them as long ago as 1848:

> The Perongarup are clothed with mosses and *Jungermannia* and lichens, as rank and luxuriant as I have ever seen them in the moist, rich valleys in the south of Ireland.

A quick trip through Mt. Barker, and the rich farmlands to the south, brought us to Albany in ample time to do some shopping and settle into camp before dark on the evening of 11th September. Our "home" for the ensuing 40 hours was to be "The Forts", just over the brow of Mt. Clarence and within easy distance of the town. Here, for a small fee, we were allotted fairly comfortable bungalows, each containing bed linen, tables and chairs, an electric jug and rather temperamental wood-fire stove. It was certainly much more convenient than camping out.

Albany is sited on one of the deepest, most well-protected and attractive ocean harbours in Australia; there are fine beaches, impressive granite headlands and offshore islands, while the citizens have wisely preserved many of their old historic buildings, some of these dating from the 1840's. Thursday we spent in local sight-seeing—the nearby clumps of Scarlet Banksia (*B. coccinea*), *Callistemon speciosus, Kingia australis* and other beauties of Mt. Clarence, the south coast of King George's Sound near Peak Head, the whaling station (revoltingly malodorous!) and last, but not least, the Elizabeth Farm Golf Course near the lower King River Bridge. The caretaker of this golf links escorted us to a swamp where Pitcher Plants (*Cephalotus follicularis*) grew abundantly among slender *Cosmelia rubra* (red-belled heath) and various sedges—a breath-catching sight. He even had a large sod of "pitchers" lifted for us to take away; and, when we remonstrated at such ruthless destruction of a unique and highly interesting endemic plant, the only retort was "that's nothing; the golfers will soon be trampling all over them!" A solitary specimen of the amazing Hammer Orchid (*Drakæa glyptodon*) was also collected here.

On toward Pemberton

Westward again early next morning, so as to reach Pemberton by nightfall. About 8 miles beyond Denmark we detoured south for the purpose of inspecting William Bay and the adjoining "Petrified Forest". Along this section of coast rugged cliffs on the west meet high extensive dunes to the east of the Bay, the latter being clothed with a colourful heathland in which rosy *Pimelea ferruginea*, yellow *Anthocercis littorea* and a low purple-headed *Melaleuca* were conspicuous, not to mention some noble spider-orchids.

As this petrified forest proved to be almost a mile from where the bus had parked, only a handful of smart

walkers persisted in reaching it across the heavy sand, but their effort was amply repaid. Here was a live karri forest in the act of being submerged under encroaching dunes from the sea, and, where the sand from earlier encroachments had again blown away, white calcified trunks and roots of trees were exposed forlornly on a kind of wind-desert—fascinatingly weird and surely one of the most astonishing scenes in the State. It rained soon after we clambered into the bus, and a deviation to view the Valley of the Giants (tall Tingle trees, *Eucalyptus jacksonii* and *E. guilfoylei*) near Nornalup was disappointing to hopeful photographers. After lunch-break at the Deep River bridge (between the Walpole and Weld Rivers), the only other stop for the day was at Shannon where we hoped for a glimpse of Brown Boronia on the swampy tracts, but in vain. Some other attractive blooms, e.g. graceful *Crowea dentata* and *Clematis pubescens*, were some compensation.

Out among the big timber

At last we entered Pemberton, a wet milling settlement in the very heart of the Karri country. As the weather showed no sign of improvement, it seemed imperative to secure lodgings of some kind for our two nights at the village. Negotiations were soon in hand with the sawmill authorities who alowed us to occupy a row of empty workers' cottages at the western end of Pemberton. A little preliminary sweeping and coaxing of uncooperative chimneys (which smoked abominably) made these homes habitable enough; but they lacked electric power, so there was a keen demand for tallow candles at the local store. The morning of 14th September was reserved for a visit to the famous "Gloucester Tree", on a high hill about 2 miles eastward. This giant karri has been

Cephalotus follicularis (West Australian Pitcher Plant)—swamps near Albany.
Photo: *the late W. H. Nicholls, Oct. 1946*

beheaded at 200 ft. from ground-level and a cabin built at the top for fire lookout purposes—also as an observation point for any tourist willing to climb the stairway of wire-braced wooden pikes that spirals round its massive trunk several times. Two of our number braved the dizzy climb and waved cheerily from the cabin windows; Flora MacDonald earned a special ovation, as the only lady to go aloft.

With a rainfall of 50-60 in. and its forest of tall timber, Pemberton district approaches nearer to the conditions prevailing in our Otway or Upper Yarra Ranges than any other tract in Western Australia. There are smaller, second-canopy trees of *Casuarina decussata* (its mossy trunk sometimes a host to the epiphytic fern, *Asplenium adiantoides*), *Agonis flexuosa, A. juniperina* and *A. linearifolia.* A dense undergrowth soon occupies all clearings and burnt areas, the chief taller shrubs being *Trymalium floribundum* (analogous to Hazel Pomaderris in Victoria), *Persoonia longifolia, Leucopogon verticillatus, Bossiæa aquifolium, Albizia lophantha* and such karri forest wattles as

Acacia pulchella, A. pentadenia and *A. urophylla*. Mosses, foliaceous lichens and fungi are conspicuous, but, except for the ubiquitous bracken (*Pteridium esculentum*), ferns are neither varied nor frequent.

During an abortive attempt in the afternoon to reach Warren River National Park by means of a steep dirt road, that proved too slippery for our bus, drivers Ken and Bill were applauded heartily as they inched backwards downhill over a very narrow bridge. We then followed the safer Mannup road to Beedelup National Park, about 12 miles west of Pemberton. Attractive sights by the wayside were *Hakea amplexicaulis*, heavy with white blossom, and a vivid rosy-magenta form of *Hypocalymma robustum* (Swan River Myrtle), also several bracket-fungi (*Coriolus* and *Stereum* species fringing burnt logs). A few energetic spirits headed down the 2-mile track to Beedelup Falls (little more than a series of shallow cascades) where, apart from half a dozen ferns, the principal subject of interest was a tall, narrow-lipped form of the Mosquito Orchid (*Acianthus reniformis*).

Coastal plain between Busselton and Perth

After further rain that night, it was deemed advisable to take a longer road to Busselton (via Manjimup and Bridgetown) instead of the direct route through Mannup. Thus, we were charmed by many glimpses of the Blackwood River and surrounding farmlands, bowers of blue *Hardenbergia comptoniana* by the roadside, and on one steep rocky hill an unforgettable blaze of the native yellow flag, *Patersonia xanthina*. The outskirts of Busselton afforded another surprising spectacle—acre upon acre of introduced white Calla Lilies (*Zantedeschia æthiopica*), spreading like shoots of snow among the eucalypts on damp flat country. A stroll along the shores of Geographe Bay brought little to light in the way of sea-shells, but lagoons near the mouth of Vasse River did provide two new botanical records for the West, viz. *Carex divisa* and *Myriophyllum elatinoides*—both introduced. Busselton has a number of old historic buildings that certainly merit preservation: our party photographed the original home of the Bunbury family (now in process of restoration), St. Mary's Anglican Church, and the old locomotive in a park opposite. One of the most delightful wayside gardens encountered on our tour was near Capel railway siding, about 18 miles N.E. of Busselton. Here we saw for the first time the floral emblem of Western Australia, large Red-and-green Kangaroo Paw (*Anigozanthos manglesii*). Other showy subjects were: *Sowerbæa multiflora, Conospermum flexuosum* (like a cushion-bush), *Synaphæa polymorpha*, seemingly leafless *Acacia extensa*, the highly floriferous *Hibbertia hypericoides* and *Conostephium pendulum*. Along the road hereabouts grew some fine tall examples of Tuart (*Eucalyptus gomphocephala*), beyond which we passed a limonite (iron ore) excavation. Cleared land became more frequent on the Swan River north from Bunbury. Beyond Pinjarra we kept to the coast road leading toward the suburban sprawl of Perth; and before long, on the Sunday evening of 15th September, we were disembarking at the Derward Hotel—luxury after a fortnight's makeshift accommodation.

Around and north of Perth

Two full days in the metropolis afforded time for shopping, sightseeing, visits to King's Park, the local Field Naturalists' show in Perth Town Hall and the Yanchep Caves reserve

about 20 miles to the north. The floodlit caves were exciting enough, but their environs have been developed as a sizeable wildflower garden in which such treasures as the various kangaroo paws, feather-myrtles, waxflowers, leschenaultias and many orchids can be seen blooming at one place. Meanwhile two excursionists (Daisy Wood and the writer) were fortunate enough to spend a couple of days at Bolgart with Mrs Rica Erickson, a noted naturalist and authoress of two beautiful illustrated books—*Orchids of the West* (1951) and *Triggerplants* (1958). Mrs Erickson drove her Victorian friends via the Red Hill Road, resting for lunch at the popular Noble Falls (20 miles N.N.E. of Perth). Beyond that pretty spot they passed almost pure colonies of tall blackboy (*Xanthorrhaea preissii*) clothing the hillslopes, while at St. Fergus's turn-off an unspoiled swamp carried the blue smokebush, *Conospermum amoenum* and many sundews. On the eleven-mile hill, south of Toodyay, blue Leschenaultia (*L. biloba*) made banks of heavenly colour, and at five miles south were seen the tall, large-headed but very localized *Dryandra nobilis*. Toodyay itself proved to be fascinating, especially the old gaol that has been lately turned into a folk museum (largely through the enthusiasm of Mrs Erickson) and the historical home "Hawthornden" of the Drummond family about 2 miles north from the village.

Undoubtedly the highlight of this side-excursion was a trip to Wongan Hills on 17th September. It was here that John Gilbert had first studied the habits of Mallee Fowl 120 years ago, and the bird still survives in the district, despite a sadly reduced habitat. The main range consists of granite slopes on the west, but abrupt "edges" of overlying ironstone to the east. Mallee eucalypts of great diversity

Forest of Karri trees (*Eucalyptus diversicolor*) near Pemberton.

abound, e.g. *Eucalytus pyriformis, E. drummondii, E. erythronema,* and *E. flocktoniæ*; so do trigger-flowers of which were noted *S. affine, S. leptophyllum, S. miniatum, S. zeicolor* and a very exciting undescribed species having relatively large cream flowers arranged in a corona. The orchid genus *Caladenia* was conspicuous, its representatives including *C. roei*, rare insectiform *C. multiclavia*, blue *C. gemmata*, and pure white *C. saccharata* with a highly musky scent. Ironstone escarpments were often shared by a shrubbery of *Callitris roei* and

the superb *Grevillea petrophiloides*—its dense, cylindrical flower-spikes shot with green and purple hues. By contrast, granite slabs were almost bare, save for occasional distorted, "bonsai"-like bushes of crimson *Kunzea sericea*. Adjoining sand patches carried many acacias, a particularly handsome and floriferous species being the golden-spicate *Acacia lasiocalyx* with silvered branchlets and long narrow phyllodia. It was on damp mossy ground at the edge of granite outcrops that a very unusual hornwort was collected, viz. *Phæoceros tuberosus*. The quaint little lizard *Moloch horridus*, so-called "mountain devil", was observed sunning itself among rocks on the Wongan Hills.

Eastward across yellow sand-plains to Kalgoorlie

Next morning Mr and Mrs Erickson drove the small Bolgart party to Northam, where they linked up again with their fellow-excursionists. A promising piece of yellow sand-plain on the roadside at Walgoolah (20 miles east of Merredin) yielded many botanical treasures, notably: *Eucalyptus burracoppinensis* quite near its type area (discovered by Mrs Keith Parkin), *Bæckea grandiflora*, with large waxy rose-and-white blooms, *Philotheca hassellii, Pityrodia axillaris* ("Woolly foxglove"), spectacular golden *Grevillea excelsior* to 15 ft., crimson *G. paradoxa*, lemon *G. integrifolia* and almost black *G. apiciloba*, blue pincushion-like *Dampiera wellsiana* in utmost profusion, not to mention brilliantly coloured species of *Calytrix, Cyanostegia, Thomasia* and *Keraudrenia*. It was indeed hard to wrench oneself away from such a glorious garden of nature. The night's stopping place was an old hotel at Southern Cross, where the last gold-mine had ceased operation only within the previous fortnight. After breakfast (19th September) several energetic walkers marched ahead of the bus and got more than a mile along the Great Eastern Highway before being picked up—with "pituri" (*Duboisia hopwoodii*), fruiting *Templetonia sulcata* and several showy emu-bushes in their "bag".

The 116-mile stretch between Southern Cross and Coolgardie offers one of the best possible hunting-grounds for Western wildflowers, and our five stopping places on this last memorable field day seemed all too few. One would need at least a week to plumb its floral wonders adequately. The arresting sight of *Acacia rossei* in bloom, about 12 miles east of Southern Cross, was sufficient signal for a general exodus from our bus. This widely spreading bush (to 10 ft. high) is very localized on the highway. Its elongated, wand-like and highly resinous branches terminate in circular clusters of large golden flower-balls that have inspired the apt name "Coronet Wattle". Smaller legumes growing nearby included yellow *Mirbelia spinosa* and *Pultenæa dasyphylla* (the flowers in dense terminal knobs among silky-hairy foliage). The gigantic-fruited *Hakea platysperma*, dainty pink *H. falcata*, caramel-scented *Grevillea integrifolia* with yellow spikes, and pale greyish-mauve *Conospermum stœchadis* (an attractive smoke-bush) were all conspicuous among the various proteads. However, special rejoicing attended the discovery of a much humbler plant—the thyme-like, procumbent Native Pomegranate (*Balaustion pulcherrimum*), with scarlet bell-flowers an inch long, extraordinarily like those of a true pomegranate.

Within 8 miles we had stopped again, near Yellowdine where another wildflower garden beckoned enticingly. Here grew *Thryptomene kochii* and *T. racemulosa*, leafless *Psammo-*

moya choretroides (in the family *Celastraceæ*), also such curious members of *Restionaceæ* as *Ecdeicolea monostachya* and *Lepidobolus preissianus*. Just west of Karalee, a third spell by the roadside gave opportunities to admire (and photograph) *Hakea multilineata*, rosy *Phebalium canaliculatum* (that was discussed in *Vict. Nat.*, May 1958, p. 169), deep violet *Wehlia thryptomenoides*, mauve *Verticordia picta*, shell-pink *V. roei* with flowers like miniature powder-puffs, and members of other myrtaceous genera.

An extensive area of granite, at 45 miles west from Coolgardie, was a very propitious lunch-place. Rain-water pools on the great rock surfaces yielded a tiny quillwort (*Isoetes humilior*), while on moist sand around the edges flourished several orchids (notably *Prasophyllum macrostachyum*, blue and yellow *Thelymitra* species), elfish *Levenhookia leptantha* and other ephemerals. A white-flowered form of *Kunzea sericea* shared rock-crevices with occasional quandongs (*Santalum acuminatum*), some bushes of which were hung with lustrous, cherry-red fruits. An interesting western pigface (*Sarcozona* sp.) occurred here and there in large succulent clumps. At about 10 miles west of Coolgardie we paused again to photograph a floral carpet beside the railway line: sheets of yellow *Goodenia*, white *Helipterum*, red *Haloragis* and mauve *Ptilotus*. The Lamb-tails (*Ptilotus exaltatus*) stood as thick and impressive as *P. nobilis* which featured on the cover of *Vict. Nat.* for June 1962.

The collectors of everlastings for dried floral art had a busy time outside Coolgardie Cemetery, where most of us paid homage at the monument to explorer Ernest Giles who died in this district on 13 Nov. 1897. White *Helipterum floribundum*, *Cephalipterum drummondii* and rosy *Pterigeron liatroides* were particularly abundant hereabouts. Signs of former opulence are not wanting in Coolgardie, and, while some of our party lingered to photograph the fine old town hall, post office and other buildings in the main street, others did good business at a local stone shop purchasing attractive samples of wood opal, agates, crystal quartz, azurite and other such minerals. With one further halt along the road to examine the burnished Gimlet Gums (*Eucalyptus salubris*), we reached Kalgoorlie with time to settle in at the Railway Hotel and have a stroll about town before tea. What a day it had been! That same evening we also attended a wildflower display at the Kalgoorlie Town Hall; Mr Alec George of Perth Herbarium was there, assisting in the accurate naming of exhibits, and he was able to resolve some of our immediate botanical problems. One of our plantsmen had had such a heavy day's collecting that, by the time he changed papers on all his specimens and roughly labelled them, he did not tumble into bed until after 2 a.m.

Home by the "Overland"

Next morning, 20th September, most of us boarded the transcontinental train leaving at 8 o'clock, and thus began the final—if least interesting—phase of our 3-weeks' journey across Australia. A few had remained in Perth (one lady unfortunately in hospital there), and others dropped out at Kalgoorlie to spend a little longer in the West. The "Overland" express certainly proved a pleasant and comfortable means of travelling, with excellent meals and service. During the midnight stop at Cook (on the Nullarbor Plain) passengers were permitted to alight and stretch their legs for ten minutes. A few plant specimens were snatched at random from

the station precincts, by torchlight; these included a small saltbush (*Atriplex eardleyae*), the drought-resisting weeds *Carrichtera annua* and *Cryophytum aitonis*, also several widespread grasses. The remainder of the trip home through South Australia and Victoria (at night time) was uneventful.

All voted the experience a huge success, thanks to Marie Allender's competent planning, and during the following 12 months two reunions have been held where photographic enthusiasts could show a selection of their best pictures. The syllabus item of the Club for the December meeting in 1963 was also a symposium of colour slides (with running commentary) on this very wonderful excursion. And the results botanically? Melbourne Herbarium has benefitted by specimens of at least 320 species (including 15 fungi, also mosses and lichens), though at least as many more were noted and admired in the field. A couple of excursionists, who are also keen growers of native plants, have had good results from the seed of eucalypts, hakeas and other shrubs that they collected while in the West.

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Willis, J. H., 1959. Notes on the Vegetation of Eucla District. *Muelleria* **1**: 92-96.

Anon., 1963. *Westward* (a humorous journal, mimeographed for the special edification of participants in the 1963 "Fieldnatz" W.A. Excursion).

Glossodia major, Large Wax-lip Orchid

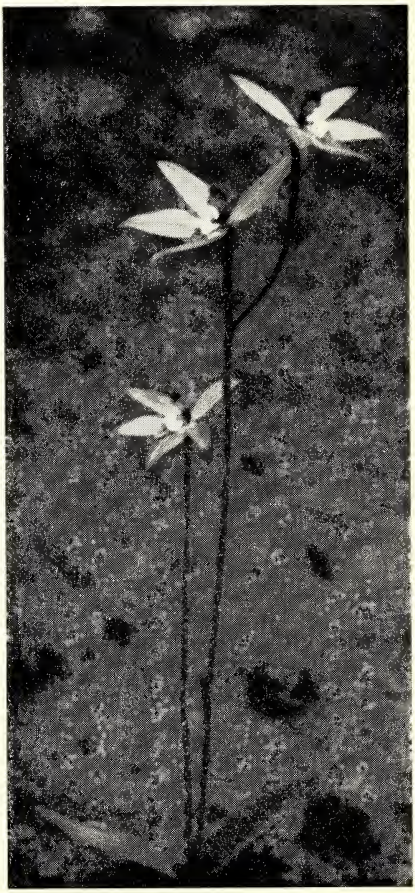
By J. M. AND W. H. KING

The genus *Glossodia* is limited to Australia and, of the five known species, two are found in Victoria. The more common of these is the Large Wax-lip Orchid, *G. major.*

This plant has a slender light-green stem ranging from six inches to over one foot in height and a solitary basal leaf covered with fine hairs. During the latter part of winter it is not unusual to see large areas of *Glossodia* leaves, a promise of many beautiful blooms in early Spring.

The flower is commonly single, although double-headed forms (as illustrated) may be found. The petals and sepals are approximately the same size and purple-blue in colour. Odd specimens may range from mauve or pink to white. The labellum is shorter than the sepals and has two relatively large white protuberances above which is a small hood, yellow at its base.

Distribution of this orchid is almost State-wide. It can be found growing in large numbers quite close to Melbourne along the Mornington Peninsula, in the Brisbane Ranges and in the foothills of the nearer ranges.



Glossodia major. Photo: *J. M. King*

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for May-December 1965 were due for renewal by May 1. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

Field Naturalists Club of Victoria

General Meeting—April 12, 1965

About 120 Members and friends were present when the President, Mr. M. K. Houghton, opened the meeting.

After confirmation of the Minutes, the Hon. Secretary, Mr. E. H. Coghill, made a number of announcements. He asked once again for the names of anyone going to the ANZAAS meeting in Hobart who would be prepared to represent the Club. He mentioned that nominations had been called for the Natural History Medallion for 1965. He reported that Mr. Swarbreck had compiled a supplementary list of Members and those present expressed their thanks to him for undertaking this task.

The President referred to the coming election for office-bearers and members of Council and said that nominations must be handed to Mr. Zirkler that evening after the meeting.

The Subject for the Evening was "Selective effects of bushfires on vegetation" and the speaker, Mr. Ross Cochrane, from New Zealand. He described the main elements that influenced the nature of a bushfire, including the different types of vegetation, variations in climatic conditions and the relief of the land surface. Using a blackboard and slides, he showed different species of eucalypt with their associated low-growing plants and shrubs. The slides illustrated different stages of regrowth and the effects in some areas of clearing, cultivation and the introduction of plants. Such climatic conditions as a very dry season and high temperatures increased the risk from bushfires. The steep slopes of a gully favoured rapid development of a fire. Other slides included diagrams of trees and vegetation and the effect of an increase and a decrease of sunlight on the undergrowth.

Many questions were asked and answered by Mr. Cochrane. The President thanked the speaker for his most interesting talk and the audience showed its appreciation by applause.

The new members listed on page 343 of the April *Naturalist* were elected.

Mr. Coghill tabled a brochure giving details of a series of lectures on "The Australian Scene" arranged by the Fabian Society. A request was made for anyone knowing where a copy of Ewart's *Flora of Victoria* could be obtained to inform the President. The Botany Department of Monash University had no copy and Professor Canny was naturally very anxious to obtain one. Mr. Quirk spoke on the wombat and moved that a letter be sent to Mr. Balfour, Minister for Lands, requesting that the bounty payable for this native animal be abolished and that the animal be placed under the control of the Fisheries and Wildlife Department. The motion was seconded by Mr. Fuhrer and carried by the Meeting.

Mr. McInnes spoke on a snake and a crab from the Point Henry area and asked for confirmation of identification. He also mentioned the progress of the microscope project. Mr. Jeffs mentioned the reported sighting of a thylacine on the Birdsville Track! Mr. Swaby referred to his exhibits, the bark of a common Hemp Bush from which the aborigines made string, the outer covering of an introduced wasp's nest and a *Casuarina* log with medullary rays harder than the rest of the wood. Mr. Coghill spoke to his exhibit of a saw-fly, *Perga bella* (Fam. Pergidae of the Order Hymenoptera), found at Taggerty. Mr. Strong mentioned the stalk-barnacles and the red algae *Corralina* that he had brought from Torquay.

Other exhibits were a rock-section under polarized light, Mr. Woollard; gum leaves infested with leaf-miner larvae, Mrs. Pinches; a large female Wattle-Goat Moth, *Xyleutes durvillei,* Mrs. North; many different kinds of seaweed from Torquay, Miss M. Lester; and fossil bone found in an Upper Eocene cliff at Torquay, Mr. McInnes.

Microscopical Group—January 20, 1965

Twenty-two members and visitors attended this meeting which was the first for the year. It was chaired by Mr. E. Le Maistre.

After the minutes had been read and confirmed, a letter from the Middletons, now residing in England, was read to those present. As no talk had been arranged for the evening, the programme consisted of a series of reports.

Mr. J. Strong related how, while on vacation recently with his wife, he had attended a meeting of the Queckett Microscopical Society in England, and had been made most welcome. Mr. McInnes reported that Mr. Hope was still seriously ill in hospital, and all present expressed their regret. Mr. E. Le Maistre, who has recently visited the National University at Canberra, described how exceedingly fine and accurate micropipettes are produced there.

Mr. W. Woollard displayed a number of parts for a binocular microscope, based on the scissors principle, which he is in the process of constructing. Mr. D. McInnes described his experiences, some humorous and some exasperating, in purchasing eye-pieces for the members; he also mentioned that he considered the book "The Microscope made Easy", by Wells, was excellent for beginners.

One member complained that a stereo microscope, which he had recently bought for £50, was useless to him because the minimum eye-distance adjustment obtainable on the instrument, was far too wide for him. As a result, it was impossible for him to get the stereoscopic effect with it. Unfortunately the firm who sold him the microscope refused to take it back! Members were all advised that before purchasing any very expensive equipment, especially that produced by relatively unknown firms, they should seek expert advice.

Mr. W. Evans exhibited an enlarger he had made from odds and ends and demonstrated how he uses his lightmeter to calculate exposures.

Mr. W. Genery showed some live brine shrimps, some of which he had collected from brine vats and others which he had reared from the commercial strain of eggs, produced and sold as food for tropical fish. He also displayed the remarkable larva of the insect "Ephydra".

Mr. H. Barratt displayed a type slide which he had made and which contained 40 types of the diatom *Lacodiscus*.

The evening ended with an examination of various slides under the microscopes on display.

Geology Group—March 3, 1965

Twenty-four members and 3 visitors were present and Mr. Angior was in the Chair.

Members expressed pleasure in learning that the popular Group Secretary, Mr. Dodds, was making good progress towards recovery from his recent serious illness.

Various reports on recent excursions and proposed excursions were discussed, including a week-end visit to the Colac Club early in April.

For the syllabus, the Acting Secretary, Mr. R. Davidson, gave a talk on the "Geology of the Tertiary". The talk covered the Tertiary and Quaternary periods of the Cainozoic Era and dealt, in a broad way, with the sequence of geological events from the Eocene to Recent epochs in both the northern hemisphere and Australia.

Exhibits:

Mr. Davidson, Fossils of various geological ages: Mr. McInnes, Metamorphic rock showing Andalusite crystals, from Moorooduc: Mr. McCay, Quartz crystals from Talangalook: Mr. Angior, calcite nodules, Castlemaine; Feldspar crystals (Turkey); Bituminous marl (Turkey); Marble (Greece): Mr. Whatnough, Tertiary limestone with fossils from Morgan, S.A., and photographs: Mr. Sault, Pisoliths from Cape Schanck: Mr. Collyer, Stibnite from Yarra Junction.

Botany Group—March 11, 1965

The subject for the evening was Flora of Western and Central Australia: the speaker was Mr. Alan Morrison. Mr. and Mrs. Morrison recently travelled over 8,000 miles in these areas and he talked about this trip and the many beautiful wildflowers that had been seen. Mr. Morrison is a particularly good photographer and the pictures shown were enjoyed by members.

Excursions were arranged to the swamp at Burke Road, the subject being water plants and the leader Miss Helen Ashton, and to Cape Schanck on Sunday, 4th April, the subject being seaweeds and the leader Mr. Bruce Fuhrer.

AFFILIATED CLUBS

Colac Field Naturalists Club

The Annual Report has just been received.

This Club continues on its way, with meetings, excursions and Group activities. They have as President our old friend Mrs. Denney, of Glen Aire, and Mr. Robert Missen is now Secretary.

Among their activities may be mentioned the banding of Straw-necked Ibis and Mutton-birds. Also efforts to preserve the pelican and ibis rookeries on Lake Corangamite.

Bendigo Field Naturalists Club

The syllabus for 1965 lists the meetings and excursions for the year and shows once again how active this Club is, particularly in the fields of botany and birds. The idea of arranging the programme for the year in advance is greatly to be commended.

The President is Mr. C. H. Bubb and the Hon. Secretary Mr. J. C. Ipsen, 15 Smith Street, Bendigo. Meetings are held at 7.30 p.m. at the Bendigo Technical College on the second Wednesday in each month.

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

GENERAL MEETINGS

Monday, May 10—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Members' Night, Tasmania.
3. Election of Members.

(a) *Ordinary*:
Mrs. M. R. Craig, 62 Sims Street, Sandringham.
Mr. H. Dacy, 7 Bolton Street, Box Hill, E.11 (Interests: Microscopy, Geology, Fauna. Introduced by Mr. McInnes).
Mrs. M. F. Flattely, 15 Warne Street, Heidelberg, N.22.
Dr. and Mrs. J. W. F. Hampton, 64 Durham Street, Heidelberg, N.22 (Interest: Fauna. Introduced by Mr. Ros Garnet).
Mrs. M. McGavin, 187 Collins Street, Melbourne (Interests: Eucalypts, Grasses. Introduced by Mr. and Mrs. Strong.
Mrs. S. Spargo, 5 Bridge Street, Hampton, S.7.
Mrs. D. I. Stock, 13 Lockhart Street, Camberwell, E.6 (Introduced by Miss Sutherland and Mrs. Swaby).

(b) *Country*:
Mr. P. S. Lang, "Titanga", Lismore, Victoria.

(c) *Junior*:
Andrew Lang, "Titanga", Lismore, Victoria.

4. Discussion on change of financial year.
5. General Business.
6. Nature Notes and Exhibits.

Monday, June 14—Annual General Meeting.

NOTICE

In order to comply with the Articles of Association notice is given that at the Annual General Meeting in June the motion will be submitted that "from January 1966 the financial year be changed to January 1-December 31 and consequential amendments be made in the Articles".

GROUP MEETINGS

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

Thursday, May 13—Botany Group—Mr. J. H. Willis, "Fungi around Victoria".

Friday, May 14—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just N. of Bell Street), at 8 p.m. Dr. L. Beadnell, "The Stars".

Wednesday, May 19—Microscopical Group.

Friday, May 28—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Mr. Len Robinson—"Parrots".

Wednesday, June 2—Geology Group. Mr. Julian D. Hollis—"Geology of the Nullarbor".

Thursday, June 3—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.

Monday, June 7—Entomology and Marine Biology Group—at Mr. Strong's rooms, Parliament House. Enter through private entrance at S. end of House, 8 p.m.

Thursday, June 10—Botany Group—Miss P. Carolan, "Coastal Vegetation of Wilson's Promontory and Other Areas".

Friday, June 11—Preston Junior Club—at the Rechabite Hall.

F.N.C.V. EXCURSIONS

Sunday, May 16—Korweigaboora Springs, Moorabool Reservoir, Tipperary Hill and other Ballarat Reservoirs. Leader Mr. R. Hemmy. Bus will leave Batman Avenue at 9 a.m. Cars may join the party in Bacchus Marsh at 10 a.m. Lunch at Moorabool Reservoir. Bring two meals. Fare 18/-.

PRELIMINARY NOTICE

Friday Evening, August 27, to Sunday, September 5—Red Cliffs district. The party will leave Melbourne by coach Friday evening, stop overnight at Bendigo and complete journey to Red Cliffs on Saturday where it will remain for a week making daily excursions organized by the Red Cliffs F.N.C. The party will leave on Saturday, Sept. 4, but will probably stop overnight before reaching Melbourne on Sunday, Sept. 5. Accommodation has been booked at Bendigo and Red Cliffs for coach party. Bus fare, including day trips, £10. A deposit of £4 should be paid when booking.

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, 1964

President:

Mr. M. K. Houghton
20 Trevascus Street, Caulfield (58 1937)

Vice-Presidents: Mr. E. Byrne, Mr. A. Fairhall

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. Hudson, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mr. F. Zirkler, 134 Kangaroo Road, Oakleigh, S.E. 12 (56 4337).

Geology: Mr. R. R. Dodds, 5 Banchory Street, Essendon (379 4309).

Microscopical: Mr. P. Genery, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: Mr. R. H. J. McQueen, 262 Nepean Street, Greensborough (43 4439)

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 81 of the *Victorian Naturalist* is from May 1965 to December 1965.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1

The Victorian Naturalist

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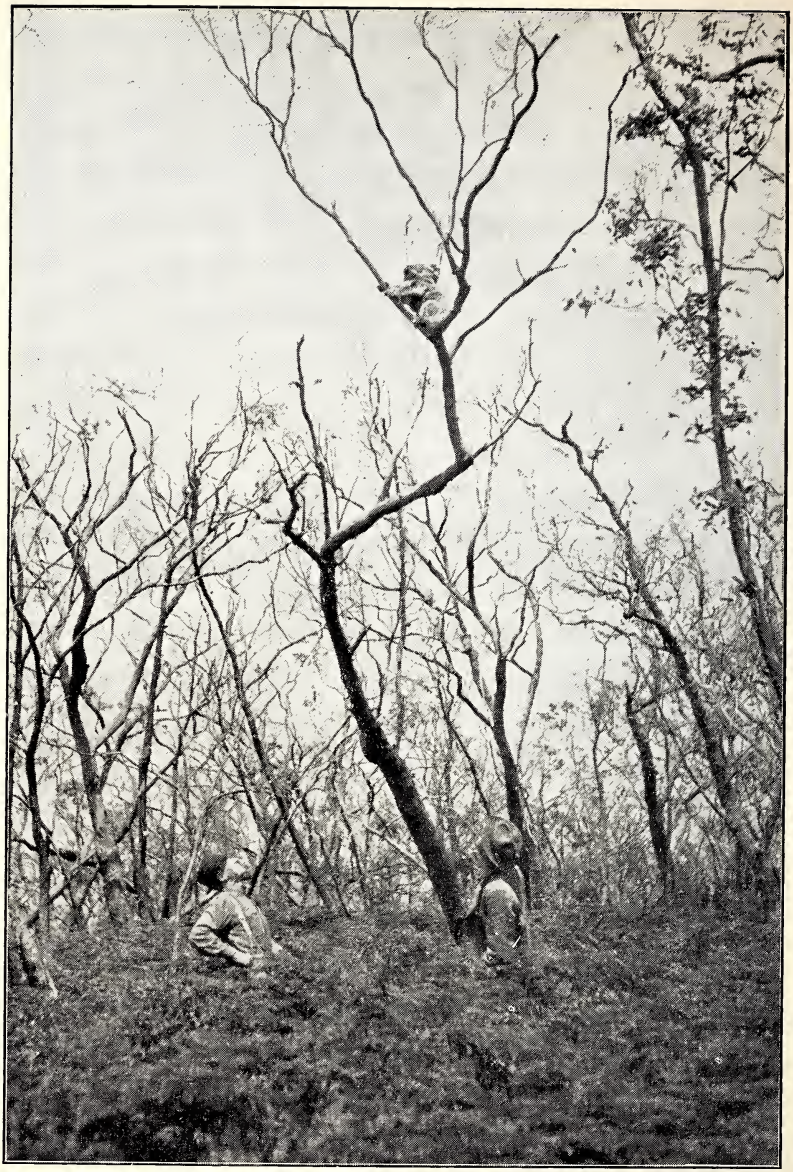

This photograph of a koala in the fork of a sapling eucalypt by Mr. Fred Lewis is reproduced from volume 51 of the *Vict. Nat.*

Vol. 82, No. 2 June 10, 1965

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

We are indebted to Mr. J. Cooper of the Fisheries and Wildlife Department of Victoria for this photograph of the Smokey Mouse, *Gyomys fumeus,* a native rodent.

Flight Patterns of some Eastern Australian Bats

By P. D. Dwyer*

Introduction

A knowledge of specific flight patterns in bats may throw light upon feeding specializations and, in this way, provide some insight into the ecological diversity shown by the species found in a particular area. In addition, this information can provide useful clues for field identification. With these aims in mind certain morphological flight attributes were measured for most of the microchiropteran species known from New South Wales and Victoria. The megachiropteran, *Pteropus scapulatus,* has been included for comparison. Where possible, correlation between deduced flight pattern and behaviour in the field or laboratory has been recorded. The field observations were made in north-eastern New South Wales.

Nomenclature used in this report is based on the recommendations of Tate (1952 and references therein), with the exception that the molossid species is named *Tadarida* rather than *Nyctinomus* (see Hill, 1961).

Methods

The morphological criteria used here are aspect ratio (with and without uropatagium), wing loading, uropatagial loading, and the ratio wing area/uropatagial area. Aspect ratio is taken as span^2/area where span is from wing tip to wing tip and area is of the relevant membranes only. Load is in pounds/sq. ft. of wing area. By analogy with birds and other bats, short broad wings (low aspect ratio) are considered to suggest slower and more manoeuverable flight than long narrow wings (high aspect ratio). Struhsaker (1961) and Vaughan (1959) have demonstrated this for several North American bats. In addition high aspect ratio may be considered an indication of sustained flight and high speed. Similarly, low and high loading may be accepted as indicative of increased or decreased manoeuverability (Vaughan, *loc. cit.*). The uropatagium is probably significant in lift, braking, and turning, and consequently low values for the ratio wing area/uropatagial area may again suggest increased manoeuverability. Thus for all the morphological criteria used here high manoeuverability may be expected from low values, and vice versa.

I am grateful to Mr. B. Marlow, Australian Museum, for the loan of material.

* Zoology Department, University of New England, Armidale, N.S.W.

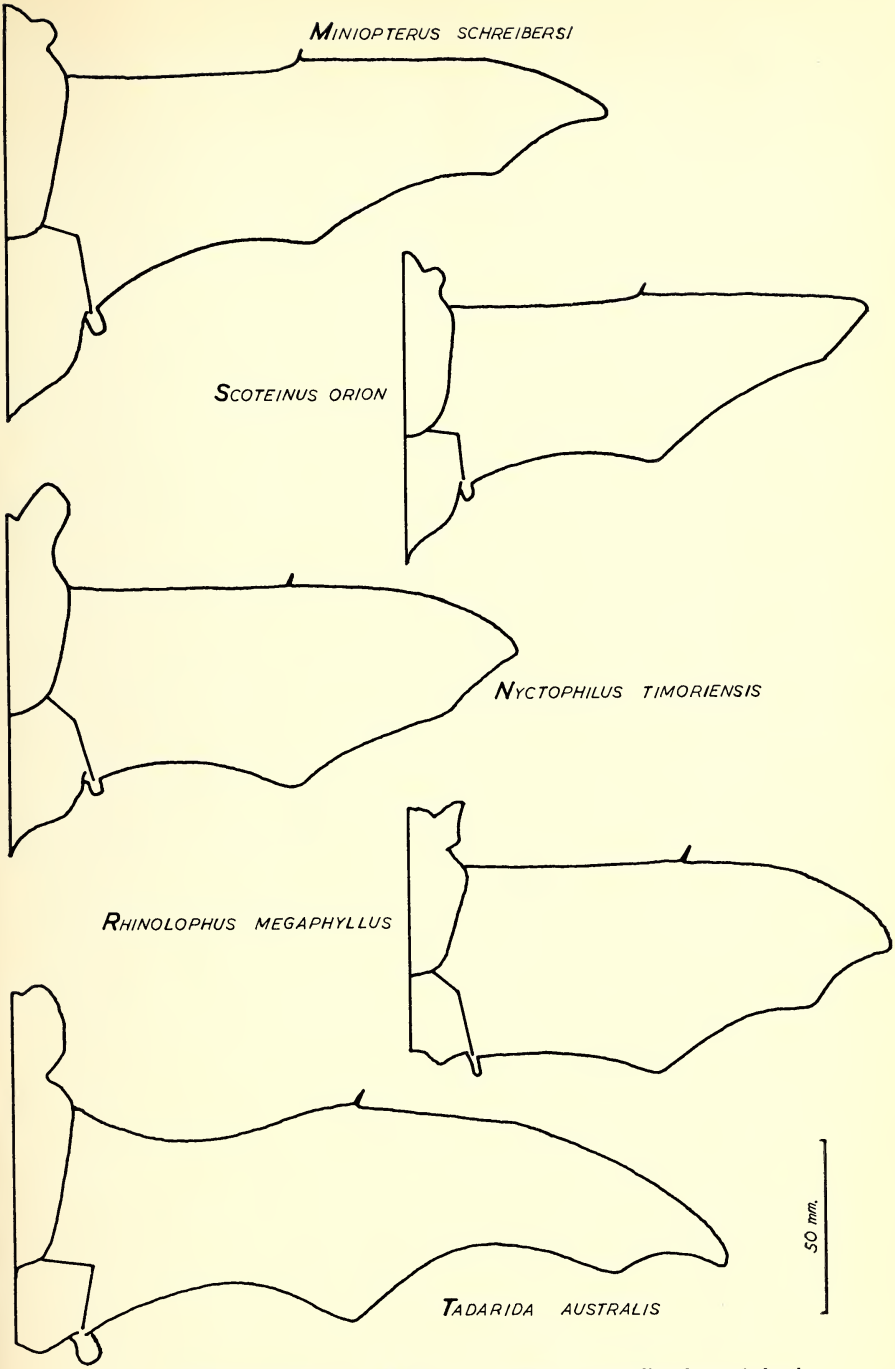

Fig. 1. Outlines of flight membranes for five eastern Australian bats. Only the right hand side is drawn.

Results

Values obtained for the selected morphological criteria are given, for 17 species, in Table 1. Wing outlines for selected species are shown in Fig. 1 to illustrate the most striking differences observed. The 17 species can be placed in eight groups on the basis of expected flight patterns deduced from the table.

(1) *Pteropus scapulatus* (Fam. Pteropidae) stands apart from all others in having extremely high values for loading and for the ratio wing area/uropatagial area. Moderate speed and very little manoeuverability would be expected. The well known helplessness of "flying foxes" on the ground, and their crash-landings in trees, correlate well with high loading. Flight of these bats is direct and at moderate speed.

(2) *Rhinolophus megaphyllus* (Fam. Rhinolophidae) has a very high wing/uropatagial ratio, but the limiting effects of this upon manoeuverability could be countered by the combination of moderately low wing loading and very low aspect ratio. Frequent field observations of this species have established that it regularly flies low, within a few feet of the ground, and is able to manoeuvre successfully amongst the branches and foliage of dense shrub areas. It may also ascend into the canopy of larger trees. Speed is slow and flight appears fluttery. The ability to hover has often been noted. Harrison-Matthews (1952) describes low and fluttery flight for *R. hipposideros* and *R. ferrumequinum* in Britain, and the habit of this latter species of frequently taking prey to a roost for eating is shared by *R. megaphyllus* in New South Wales. Insect wings dropped below feeding stations

TABLE 1—Flight Characteristics of Some Australian Bats.

Species	Number examined	Area wing / Area uro.	Aspect Ratio Without uro.	Aspect Ratio With uro.	Load Uro.	Load Wing.
Pteropus scapulatus	1	43·1	8·2	8·0	33·2	0·77
Rhinolophus megaphyllus	2	17·2	6·7	6·4	3·1	0·18
Tadarida australis	1	15·6	12·4	11·6	7·4	0·48
**Taphozous flaviventris*	1	12·1	9·7	9·0	4·4	0·36
Scoteinus orion	1	9·7	8·3	7·6	2·8	0·28
Scoteinus rueppelli	1	9·4	8·1	7·3	3·1	0·33
Chalinolobus sp.	2	8·7	7·8	7·0	1·4	0·17
Nyctophilus timoriensis	3	8·5	7·2	6·5	1·5	0·17
Nyctophilus geoffroyi	5	8·2	7·5	6·5	1·5	0·17
**Scoteinus greyi*	1	7·9	7·6	6·7	1·6	0·15
**Myotis adversus*	2	8·8	8·4	7·5	1·7	0·19
Miniopterus australis	3	8·2	8·4	7·5	1·3	0·16
**Pipistrellus tasmaniensis*	1	7·7	10·1	8·9	2·3	0·30
Miniopterus schreibersi	3	7·4	9·5	8·3	2·0	0·27
Eptesicus pumilus	1	7·1	9·1	8·0	1·5	0·19
Chalinolobus gouldi	4	7·1	8·7	7·6	1·7	0·22
**Chalinolobus morio*	1	6·2	8·3	7·2	0·9	0·14

Weights used to calculate loading are live weights except where the species is marked with an asterisk. For these latter the weight used was taken as 80% of preserved weight, this figure being derived from 10 bats, of known live weight, which were preserved similarly. Where more than one individual of a species was measured the figures given are averages. Vertical spacing is used to separate the 8 flight groups discussed.

suggest that large, and relatively ponderous, insects are important in the diet.

(3) *Tadarida australis* (Fam. Molossidae) and *Taphozous flaviventris* (Emballonuridae) are characterized by a combination of small uropatagium, high aspect ratio, and high wing loading. *T. australis,* in particular, should stand apart as a fast-flying, relatively unmanoeuverable, bat that is probably capable of sustained flight for considerable periods. Van Deusen and Petersen (1958) have noted the swift direct flight of *Tadarida* in Australia and Vaughan (1959) has referred to similar characteristics in another molossid species. Some molossids cannot fly from the ground but *T. australis* is able to launch itself, with some difficulty, from rough horizontal surfaces. A captive individual could not maintain flight in a room 25 x 15 ft. *T. flaviventris* shows considerably less extreme values than *T. australis* for aspect ratio and loading. Slower and more manoeuverable flight could be expected.

The other species examined (species of the family Vespertilionidae) do not show the extremes of aspect ratio or the very high values for loading indicated above. In comparison with other families, the vespertilionids have well developed uropatagia (i.e. high values for wing area/uropatagial area) and reduced loading. The 13 species considered can, however, be classed in five groups.

(4) *Scoteinus rueppelli* and *Scoteinus orion* (Sub-fam. Vespertilioninae) have relatively small uropatagial membranes, quite high wing loading, and intermediate aspect ratio. Flight would be expected to be at moderate speed and to show little manoeuverability. Calaby (pers. comm.) has observed such characteristics for *S. rueppelli* and described this species as flying repeatedly up and down a line of trees at about 30-60 ft. Identification was established by shooting specimens in flight. I have observed similar behaviour, in which only slight deviations were made from the flight path to chase insects, but without identification of the bat. Relatively large (1 inch), and slow flying beetles are known to form part of the diet of these *Scoteinus* species.

(5) *Scoteinus greyi* and *Chalinolobus* sp.* (Sub-fam. Vespertilioninae), and the two species of *Nyctophilus* (Sub-fam. Nyctophilinae) have only moderately large uropatagial membranes relative to wing area, but may obtain extremely high manoeuverability by combining low loading with low aspect ratio. *N. geoffroyi* is apparently the commonest town bat of the Northern Tablelands (N.S.W.) It forages by flying at about 20-30 ft. and dropping vertically upon insects. The "drops" are extremely rapid and may be to within inches of the ground. After each drop the bat then resumes, approximately, its former height. Relatively small feeding areas seem to be established, and to be revisited on successive nights, and within these flight is haphazard. Dew (pers. comm.) has observed *N. geoffroyi* alight on the ground to capture insects, while McKean and Hall (1964) record the habit of taking food (moths and beetles) to a roost for eating.

Chalinolobus sp., when liberated outside their roost, flew relatively slowly, with little amplitude to the wing beat, and with considerable manoeuverability. Flight was not very erratic. The bats characteristically flew at about mid-canopy level some 20-30 ft. above the ground.

* This species of *Chalinolobus* from the Northwestern Slopes of New South Wales is closely related to *C. picatus* (Ryan, pers. comm.).

(6) *Myotis adversus* (Sub-fam. Vespertilioninae) and *Miniopterus australis* (Sub-fam. Miniopterinae) are treated as a separate group for they have aspect ratios and loading intermediate between the bats of groups 5 and 7. Such separation thereby gives emphasis to the differences between these groups. *M. australis* usually flies quite rapidly and with considerable manoeuverability, between shrub and canopy layers of densely wooded areas. *M. adversus* has the smaller uropatagium and greater loading and could be expected to be less manoeuverable.

(7) *Eptesicus pumilus, Chalinolobus gouldi,* and *Pipistrellus tasmaniensis* (Sub-fam. Vespertilioninae), and *Miniopterus schreibersi* (Sub-fam. Miniopterinae) have relatively high aspect ratios and intermediate wing loading. The low values for wing area/uropatagial area suggest that manoeuverability in these species is primarily the concern of the uropatagium. In forested areas *M. schreibersi* flies high, from just above the canopy to many times canopy height, but in more open areas such as grasslands flight may be within 20 ft. of the ground. Flight is very fast and typically relatively level and swift shallow dives, rather than erratic tumbling, are the rule. In addition, however, flight can be extremely erratic within the same horizontal plane much after the fashion of snipe (*Gallinago* spp.) and these deviations are presumably to catch insect food. Nothing is known about the diet of this bat other than it is predominantly lepidopterous in content, for moth remnants are extremely abundant in guano deposits. It is considered possible that some of the high flying hepialids and noctuids may be of importance. The extensive accumulations of moth wings reported from the Lake Gillear Guano Cave (Warrnambool, Vict.) by McKean and Hall (1964) suggest that they must have been dropped by *M. schreibersi* returning with food to the roost for no other bats are known from this cave. My observations show that these wings (noctuids) are well distributed through the cave but are especially concentrated at a few points in the large entrance chamber. If they are indeed the work of *M. schreibersi* the record is remarkable for nothing similar has been noted elsewhere in the south-eastern Australian range, and I am satisfied for north-eastern New South Wales that food is consumed away from the roosts. Overnight recoveries of several marked females of this species have demonstrated that distances up to 40 miles may be covered in a single night. Constant and Cannonge (1957) have estimated flight speeds of 31 m.p.h. for *M. schreibersi* used in homing experiments.

C. gouldi is considerably slower than *M. schreibersi* and appears to forage below canopy level in relatively open woodland areas. Flight of *E. pumilus* is characterized by moderate speed, manoeuverability, and by frequent landings in foliage. The bats characteristically fly within woodland areas, from about 5 ft. to near canopy level. Flight path is typically well clear of foliage and it is possible that observed landings were for eating, rather than hunting, purposes. *P. tasmaniensis* has the smallest uropatagium and highest wing loading of this group of bats and should, therefore, be the least manoeuverable.

(8) *Chalinolobus morio* (Sub-fam. Vespertilioninae) is considered on its own. Intermediate values for aspect ratio are combined with low loading and a very large uropatagium. The development of the tail membrane includes even the postcalcaneal lobes

which are especially enlarged in this species. Moderate speeds and considerable manoeuverability were observed when a captive individual flew in a small room. These observations support aerodynamic expectation.

Discussion

The correlation between expected flight characteristics, based on aerodynamic properties, and observed patterns is striking for *M. schreibersi, N. geoffroyi,* and *S. rueppelli,* and applies to a lesser extent for *R. megaphyllus* and *E. pumilus.* It is probable, therefore, that characteristics deduced for other species are meaningful and it follows that a wide range of flight patterns has been shown to exist amongst south-eastern Australian Microchiroptera. The most striking differences in behaviour tend to reflect family divisions. Thus, *R. megaphyllus* has apparently achieved great manoeuverability by reduction of aspect ratio whereas in the verspertilionids manoeuverability results primarily from increase in uropatagial area and decrease in loading. The conspicuous separation of the three species of *Chalinolobus* on the basis of flight characteristics is noteworthy, for these species are not obviously separated in terms of spatial or habitat distribution.

It is certain that specific flight patterns reflect specific feeding habits and that future work is required to refine the generalization that these bats are "insectivorous".

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Notes on Two Eucalypts from Arnhem Land

By E. Colline Muir

Following Miss Jean Galbraith's interesting article on *Eucalyptus miniata* (*Vict. Nat.* Feb. 1965) perhaps one or two general observations may be of interest.

Where I saw it in Southern Arnhem Land, *E. miniata* was a handsome and beautiful tree, which grew on the dissected sandstone plateau country. It shared this habitat with a closely allied and, in that area, much more common tree, *E. phoenicea,* these two species comprising the series *Miniatae.*

Eucalyptus phoenicea was, in this area, the smaller of the two, and seldom grew upright, preferring to arch its trunk and send up more vertical branches from it, the whole forming a rounded crown, while *E. miniata* grew very straight, up to fifty feet or more, with a girth of perhaps two and a half feet or more at the base. Miss Galbraith tells me that the specimens collected by Miss Walker near Darwin came from a tree that was low and shrubby. Both species have a curious fibrous-scaly bark, often with a decided "crimp", and contain straight, hard fibres that pierce the skin, and may be found in all parts

of a person luckless enough to climb one of these trees.

The upper branches are smooth, and in the case of *E. miniata* pure white, but both the rough and smooth bark of *E. phoenicea* has a decided yellow cast.

The flowers of *E. miniata* were more scarlet, those of *E. phoenicea* more orange, although the colour of both is apparently extremely variable. The white "bloom" mentioned by Miss Galbraith was not present on *E. phoenicea,* which was very prone to attack by some unidentified gall-insect, and one or more ovaries in each umbel may be affected, swelling to a large size. For what reason we could not decide, there were no mature fruits on any tree we examined, and even a search amongst the litter beneath, produced only a few, and these well weathered. It was hard to reconcile this with the fact that the tree was extremely common, and formed pure stands over large areas. Since our visit, sharp-eyed aboriginal stockmen at Mainoru Station and Roper River Mission, as well as a school-teacher at the mission, have been searching for ripe fruits for me, but so far none have been found.

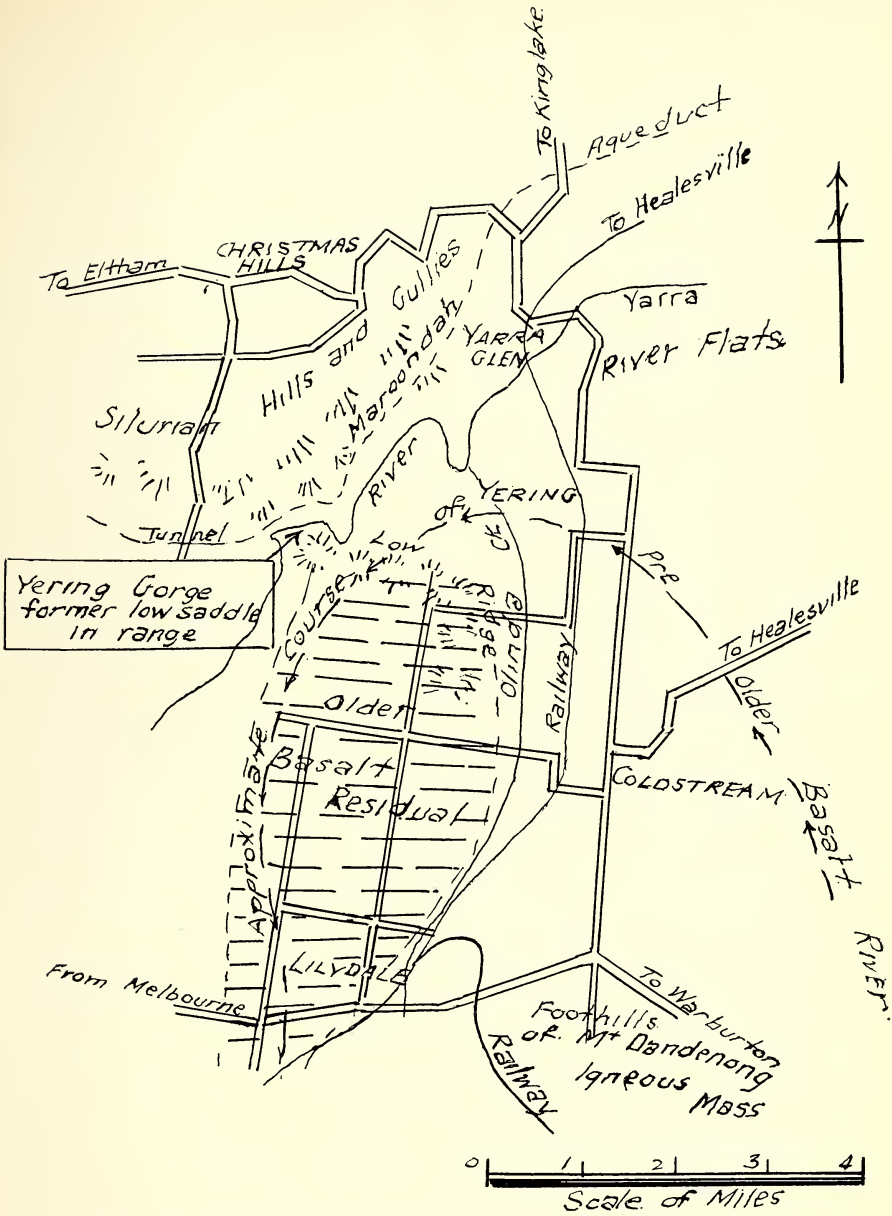
The opercula of *E. miniata* collected in Arnhem Land show a curious oblique tilt, the point being in a straight line with the axis of the bud, but one side of the operculum is longer than the other. Miss Galbraith explains that this is due to the buds being pressed together and flattened within the fused bracts. The shape of the fruits of the Arnhem Land specimens also differs from the Darwin examples, in that they are strongly ribbed and have more parallel sides, are not constricted at the neck, and are similar to those illustrated by Maiden, but shorter.

Here again no mature fruits were found on the trees in 1963, and it was left to one expedition member the following year to find fruits containing ripe seeds. (To obtain these involved a strenuous climb of some 60 feet). Thirty-three of these seeds subsequently germinated, but a number damped off and at the time of writing there are sixteen healthy seedlings left, some with their first leaves, some still with only their large squarish cotyledons. May Melbourne's climate treat them kindly, and allow this handsome tree to decorate its gardens.

The River Yarra

By R. G. Hemmy

It is my considered opinion that Melbourne people have an inferiority complex in respect to their river, the Yarra. So many remarks are made to its detriment by interstate visitors that we take it for granted that it has nothing in its favour. Such is definitely a mistaken view. Almost all of our capital cities are situated on tidal waters. It is the sea rather than the river which maintains their depth and size. Only the Yarra, the Derwent and the Brisbane have any depth of water beyond their tidal limits. The Yarra is a long stream of 153 miles, it supplies with pure drinking water a population of over two million people and, once the confines of the Port are left, there is much beauty whether it be up in its mountain reaches or in its



Map showing present and former course of River Yarra north of Lilydale.

many bends not far from the City. To come in along Alexandra Avenue on a sunny winter's morning and see the buildings and bridges reflected in its glassy waters is to see something of which any city may be proud, recalling Wordsworth's famous lines on the River Thames "Earth has not anything to show more fair".

Scarcely three miles from the City

where the Yarra forms the boundary between Richmond and Collingwood on the west and Kew and Hawthorn on the east is a patch of lovely parkland which repays detailed study. Alighting from the North Kew bus after it crosses the river one finds oneself in high country affording a panoramic view of the Fire Station, St. Patrick's Cathedral, the I.C.I. building and the Exhibition Dome on the skyline from which the land slopes gently down to the river immediately below.

On our side of the river there is a quick rise from the water to form a narrow spur with almost precipitous sides. The slopes are wooded with wattle and gum which continue well upstream. This high country is the Silurian bedrock of Melbourne highly contorted and folded to form an escarpment over 100 feet above sea level.

Between us and the City is a long tongue of basalt, a beginning of the huge lava plain which stretches far to the west and north of Melbourne right over to the South Australian border and almost to Bendigo. The high Silurian ridge prevented it extending to the east. Geologically speaking, this lava flow is not very old. Before it came the Yarra occupied a bed further to the west, but this older valley was filled with the molten rock which, when it hardened, forced the river to find a new path along the edge of the flow. So the stream is jammed against the rising eastern bank with the gently sloping volcanic plain on the west.

The basalt had a checking or damming effect. Whilst the river flow was checked, huge deposits of gravel and sand were laid upstream from Fairfield to form the flats below Heidelberg and Ivanhoe reaching back right up to Templestowe.

There is another stretch of the Yarra well upstream where a similar happening has contributed to its present nature. The basalt flow of the west of Victoria which terminates at the Yarra near Kew is generally known as the Newer Basalt. Earlier than this again, but still geologically recent, is the Older Basalt flow. This flow intruded into the valleys to the east of Melbourne reaching a level of about 600 feet above sea level, but as it advanced south-westerly rapidly dropped to what is now below sea level in Bass Strait and Port Phillip Bay. It was contained by the deep broken valleys between the spurs filling these valleys to reach in them its maximum depth. The lava residuals of today were the valleys of the past pre-basaltic streams.

This present Middle Yarra did not come down from Yering and Yarra Glen through the Warrandyte Gorge to Templestowe and Heidelberg. Somewhere near Lilydale it flowed round the nose of the Dandenong Ranges into what now approximates the Dandenong Creek valley and reached the sea, if the sea was there then, near where Frankston is now. It is more than likely that Port Phillip Bay had not then been formed and it continued down what is now the South Channel to beyond the Heads linking up with the channels from Western Port somewhere in the middle of the present Bass Strait.

A big mass of lava filled this valley at Lilydale stretching over from the Dandenongs to the spurs running down from the Great Dividing Range. This formed a barrier which could well have turned the area to the east into a huge lake or, at least, caused a liberal deposit of silt and sand to fill and create the Yarra Flats between Lilydale and Healesville.

Raised in level by this damming effect the Yarra finally found a gap in a low saddle on one of the Silurian spurs running from the Divide. This

former saddle became a gorge a mile or so long, well tucked away to the north of the flats and from it the country rises quickly and steeply to the Christmas Hills above Yarra Glen.

On the south, the wall rises up to a sandstone knoll, about 150 feet above the river, which links with the end of a spur winding eastward and southward to the foothills of the Dandenong ranges. This is an Older Basalt residual.

The gorge takes the name, Yering Gorge, from the parish. It can be reached from a road which turns south off the Kangaroo Ground-Yarra Glen road at Christmas Hills post office. About three miles along this is a track leading down to the east through a gate in a fence bordered by large pines. This is the property of the Melbourne Board of Works for they too have used the self-same gap as the river to bring an aqueduct from the Maroondah Weir to the city to supply the service reservoirs. The Board do not like people intruding on their water-supply areas, but glimpses can be gathered from the higher part of the track of the aqueduct and river and its depth, length and topographic significance appreciated.

Upstream from this point the old bed of the river which has been named the Wurrunjerri River by investigating geologists to distinguish it from the present stream, probably came in from the south or south-east, but has been buried by the basalts of Wandin and Seville.

The Yarra is not the only stream affected by these Older Basalt flows. The Olinda Creek follows a line between the basalt and the older Mt. Dandenong lavas as it comes down into Lilydale. The Woori Yallock Creek carved out a similar course against the residuals which filled its former valley. The Diamond and Watsons Creeks also flank a similar mass of Older Basalt at Kangaroo Ground. These residuals are generally marked by their fertile and green appearance. The rock has decayed into a rich red or chocolate soil frequently used for cultivating potatoes and green pastures.

Watsons Creek enters the Yarra not so far down from the Yering Gorge. It could well be that the deflection of the bed of the creek caused it or its tributaries to link up with the Yarra deflected through the gorge, thus forming and fixing the present course of the stream. It is perhaps headward erosion, the back scour of a steeply graded stream, which causes it to widen and lengthen towards the back from its headwaters, that achieved the link. This is hard to analyse in its precise details.

The section through Warrandyte is a deep gorge for several miles. It is remote from basalt flow and is probably a very old river. As a young stream eroding or degrading its bed, it enlarged its bends so developing a sinuous channel with huge meanders or loops. It kept its course over the centuries gradually deepening and cutting in more and more even as the country gradually rose. The result is a stream of infinite interest somewhat remote from roads and only accessible on foot. He who explores it will be well rewarded, although "Trespassers Prosecuted" notices are frequent.

This is a geographical feature close to Melbourne that is well worth exploring and research: this is not the whole story. There are several other writers who have put up a different tale. Their views may be rejected, but they are all interesting. In the list of references below I would draw special attention to the late Professor J. W. Gregory's work, *The Geography of Victoria,* and T. S. Hall's *Victoria Hill*

and Dale. It was through reading these two books that my interest in these areas was stimulated.

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The Vegetation of Wyperfeld National Park

The vascular flora of Wyperfeld, Victoria's biggest National Park, is the subject of a booklet by Mr. J. Ros Garnet which is about to be published by the F.N.C.V.

Within the 218 square miles of this Park grows an astonishingly varied and abundant flora. More than 400 species have been recorded and listed in the booklet and over one quarter of the native species has been illustrated, one hundred of them by line drawings executed with the care and accuracy which is to be expected of the author, and many others by photographs. One, reproduced with fidelity from a colour transparency, is used as a frontispiece and depicts the lovely deep pink-flowered Wyperfeld form of *Calytrix tetragona,* the Common Fringe-myrtle. Another feature is a map of the Park prepared specially for the booklet by Mr. Ian Maroske. It is the most up-to-date and accurate map of the Park yet published. It shows clearly all the tracks and important physiographic features that the visitors to the Park would wish to see.

Mr. Garnet, as a member of the committee of management of the Park has had opportunities of examining much more of its flora than most visitors but, as the booklet indicates, his own observations have been amply supplemented by those of many others who have a deep interest in the native plants of Victoria. The Vegetation of Wyperfeld is, as Mr. J. H. Willis says in his introduction, "a first"; the first time the natural history of any of our National Parks has been dealt with in a comprehensive and authoritative way. The booklet is an experiment and it remains to be seen how successful the experiment will be. For field naturalists, especially those who propose to visit the Park, the booklet will be a "must". It is being printed in a limited edition and the low price suggests that those who want a copy should order it without delay. The retail price will be 15/- plus postage (8d.) but members of the Field Naturalists Club may obtain it at a special concession price of 12/6d. plus postage from the Hon. Sales Officer or from the National Parks Association.

Wanted—Ewart's Flora of Victoria

The newly-established Botany Department at Monash University urgently needs to buy copies of Ewart's Flora for research and teaching. If you own or know of an idle or little-used copy, please communicate with Professor M. J. P. Canny, P.O. Box 92, Clayton, or telephone 544 0611, ext. 2820.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Fruit Bats

During the past several months, many reports of "Flying-foxes" or Fruit-bats have been made throughout Victoria. Two letters from widely separated areas are published here. The first is from Mr. A. G. Wood of Yarram.

On January 20, a report was received at the Yarram S.E.C. office that a "Flying-fox" was caught in powerlines on the outskirts of the town. By the time linesmen were able to remove the animal, it was quite dead.

The bat was identified as a Grey-headed Fruit-bat *Pteropus poliocephalus.* Statistics were rather difficult to obtain, for despite the freshness of the specimen, the natural musky aroma was well spiced with a more pungent odour—possibly caused by electrocution. The wingspan of the specimen was measured at forty-nine inches.

I have made numerous enquiries, but have heard of no other sightings in the district at this time. However, a similar specimen was obtained under much the same circumstances in 1947 and remained on show, in a frozen state, for some time in a local butcher's window!

Large numbers of a small flying-fox, almost certainly *P. gouldii,* stripped plum trees in the district during 1952, My father can remember "thousands" of small flying-foxes sleeping in pine-trees near the Yarram Mechanics Institute during the war!

These isolated sightings prompt me to ask: What is the most southerly area where these animals have been sighted? To what latitude do they normally come?

The second letter is from Mr. K. J. McQuinn of Cobden.

Your organization may be interested to learn that a "Flying-fox", or as I believe is the correct name, Grey-headed Fruit Bat, was found dead at Tesbury recently. Tesbury is a small district in the Lake Purrumbete-Stoney Rises area, approximately seven miles south-east of Camperdown. The bat had been electrocuted on high-tension wires.

After discussing the find with Mr. J. Edge of Allansford, he suggested that I write to you and let you know. He considered that the bat being in this area was most unusual.

The bat was a male and had a wingspan of about four feet. The coat was dark grey in colour with a wide strip of rufous across the shoulders.

The usually recognized distribution of *P. poliocephalus* is along the eastern coastal belt, from Queensland to approximately the Victorian border. On certain occasions, large numbers have been known to migrate southwards over Victoria.

The Fruit-bats are members of the sub-order Megachiroptera which contains all the larger, mainly fruit-eating bats to which the misleading name of Flying-fox is commonly applied.

The small fruit-bats referred to by Mr. Wood as stripping plum trees at Yarram during 1952 are far more likely to have been Little Red Fruit-bats *P. scapulatus,* rather than *P. gouldii* (now *P. alecto gouldii*) which seems to be restricted to northern coastal areas where it frequents the mangrove swamps. *P. scapulatus,* although more common in the north, is a great wanderer ranging great distances inland and occasionally down into Victoria. Without a specimen in

hand it is impossible to make a conclusive identification of these bats because *P. scapulatus* is more particularly a blossom-feeder and much more has yet to be learned of the migratory limits of all Australian species.

See also *Fauna Survey Group—Mammal Reports, April 1965,* on *page* 61 of this issue. —R. H. J. McQ.]

Bird Notes from Tyers

These notes come from Miss Jean Galbraith of Tyers, a regular contributor to this magazine.

Over many years we have kept records of birds at Tyers. The first list, compiled by my father nearly fifty years ago, included the names Rainbow-bird and Broad-billed Roller (Dollar-bird).

As I have not seen either south of the Divide I have sometimes wondered if there was a mistake in these records, and birds seen farther north had been accidentally included in the list. It is interesting therefore to have records of both these birds (and also Satin Flycatchers, not previously recorded here) from Mr. Jones of the Latrobe Valley F.N.C., all in the same season.

The Rainbow-birds and Flycatchers were nesting at Rentoull's Creek, Tyers, and the Dollar-birds although some distance farther east, on Freestone Creek, Briagalong, were near enough to make it likely that the old record was correct.

Galahs were also seen in this district recently, for the first time that I know of, and White Cockatoos, always abundant on the plains a few miles away but not seen here before 1964, now frequently fly over and sometimes alight.

Inland records of the Scarlet Honeyeater *Myzomela sanguinolenta* in Victoria are relatively rare, so it seems worth recording the sojourn of a pair on this northern edge of the Latrobe Valley, just where the Baw-Baw foothills begin.

I had a report in December 1964 of a pair of Scarlet Honeyeaters which visited the garden of Mrs. G. Brady near Rentoull's Creek. Mrs. Brady is a keen bird-watcher and said that both male and female birds visited her garden for about an hour, very early every morning, feeding on the nectar in Woodbine flowers and then departing until the next morning.

For some time they stopped coming, or were not seen, but on February 3, Mrs. Brady rang to say that the cock-bird was back and had spent the whole day in a Tree Fuchsia by her verandah. Two of us went up next morning and watched the vivid little bird for as long as we had time to stay. It shared the Fuchsia with a pair of Spinebills and had their same quick graceful ways amongst the flowers.

During the following week, several bird-lovers visited the garden to watch the honeyeater which now spent most of the day in the garden, although darting off to the surrounding bush at intervals.

So far, the female has not been seen since her early morning visits in December.

I do not know whether it is unusual for Eastern Rosellas to tear pine-cone scales apart to get the seeds, but I have noticed many fallen *Pinus radiata* cones (usually more or less green), almost chewed to shreds. In January I watched a flock of Rosellas on the ground, busily reducing the scales to bits of loose fibre.

The Rainbow-bird occurs at the You Yangs and Anakie each year and appears to come south of the Divide regularly. The Dollar-bird is also known to occur, but less frequently, in the You Yangs. —R. H. J. McQ.]

Was This a Migration?

This interesting observation has been forwarded by Mrs. F. Gladstone of Beechworth.

March 18. All along the creek gums, Tree Martins circled and fluttered throughout the afternoon. Far-flung groups of birds seemed to drop out of the distance to mix with the main congregation. They became so numerous that when some Eastern Rosellas rose up from the grass and settled on a dry limb, several martins were dislodged, and spilled in a fluttering group.

About 5 p.m., the little birds rose together in a winged cloud, and the muted hush of wing motion could be heard as they passed over. Then they were gone.

Was this a migration? The birds flew northwards at the end of our Summer season. I have never seen so many birds at once, rising and flying together with not so much as one bird remaining.

The Tree Martin *Hylochelidon nigricans* is noted for its migrations throughout Australia and nearby islands, although odd pairs will remain in one area throughout the year. The birds arrive in southern Australia in flocks during August and depart again at the end of March or April, after the breeding season.

—R. H. J. McQ.]

The Naturalist and the Microscope

Eristalis (The Rat-tailed Maggot)

By William Genery

No other aquatic dipteron has been the subject of so many incorrect statements and unequalled ignorance as *Eristalis*. These have continued from early Biblical times through the centuries to Ovid and Virgil, and right down to the present day when it is still called by such incorrect names as "Blue Bottle", "Bot Fly", "Blow Fly" and many others.

The larva of *Eristalis* is commonly known as the "Rat Tailed Maggot" for, when the larva is full grown, it has a rounded body over one inch in length and a telescopic tail which can be made to extend a further two inches, in order to reach the surface and permit breathing. The larva has a whitish colour and is generally found in black putrescent mud, or other evil-smelling and decaying matter. It has seven pairs of short round feet, the first being placed near the head and the remaining six pairs at equal distances along the body, the last pair being very close to the root of the tail. Each foot is retractile and has a double circle of short hooks, the outside hooks being larger and less numerous than the inner ones. The first pair of feet are not cylindrical but flat, and the hooks project from it like the fingers on a hand. The tail can be extended to double its length. Since it is transparent it can be studied closely and will be seen to consist of two tubes, one sliding within the other. The outer tube is a prolongation of the body, bears a number of setae and is wrinkled transversely especially when contracted.

The inner tube is the respiratory tube and encloses the tracheae. Its distal extremity is darker and firmer, for here are situated the external openings of the two large tracheae,

The Rat-tailed Maggot

surrounded by a number of fine, plumose setae. These setae open out and cling to the water-film, thus forming a basin-shaped organ which is impervious to water. The setae can be closed at will thus allowing a bubble of air to be carried down when the larva is forced to submerge. The two tracheal trunks run through the tail side-by-side, and continue through the body to become large air sacs. These in turn lead to a pair of anterior spiracles which are not functional in the larval stage.

The head of the larva is rounded and capable of altering its shape. The mouth is often extended and at times can conceal the first pair of legs and their large hooks. The larva has an unusual sucking and filtering apparatus situated in the second segment. This is kept in position by two broad bands of muscles, which with their branches also support the organs of the mouth.

The food consists of organic particles which are scraped off submerged objects and sucked into the mouth in a manner similar to that of a pig working over refuse with its snout. The larva feeds upon decaying vegetation, any putrid animal matter or other refuse. Early naturalists are said to have used human excreta extensively in their experiments with *Eristalis* and nothing was regarded as too putrescent for the larva to consume.

When the time for pupation arrives the larva quits its unwholesome haunts and enters the loose earth. If removed from under the earth, it returns immediately to complete the pupal stage. The pupa, like that of the blow-fly and *Stratiomys,* forms a cocoon out of the larval skin; the tail shrinks up and becomes more wrinkled, the body shortens and becomes thicker than in the larva. After several days two pairs of horns appear at the head-end. These horns are the respiratory organs and are connected to the large tracheal organs of the pupa. Under favourable conditions the fly emerges about ten days after the inception of the pupation period. The four horns which formed the respiratory organs are pushed off with the rest of the skin and other membranes which are no longer needed.

The adult fly is about the same size as a bee and has a similar hairy appearance. It is equally attracted by the sweet-smelling nectar of the blossoms of trees, and many fruit trees are fertilized by these insects. There are two plum-trees in my backyard, which is surrounded by the high, brick walls of a factory and flats. In consequence no bees find their way to the trees, but every September, when the trees are in blossom, there are often about one hundred or so *Eristalis* upon the flowers for the fertilization of which they alone are responsible. In the first place the flies are attracted by the smell of gelatine which is used by a nearby factory. During the weekends this gelatine becomes extremely evil-smelling.

Baron Osten Sachen writes in his book "The Oxen Born Bees of the Ancients," that the resemblance of the fly *Eristalis* to a bee has given rise to the curious belief that bees can be produced by the putrefaction of dead animals, especially oxen and asses. The origin of this erroneous notion lies in the fact that *Eristalis* deposits its eggs upon dead bodies and the larvae hatch out and develop within the putrid matter. A swarm of flies then comes forth and these flies are attracted to the sweet smelling blossoms. After fertilization the female flies again seek some rotten carcases to deposit their eggs.

Baron Sachen also quotes Florentinus, a Byzantine author of the tenth century, who gave the following instructions: Build a house with all sides of equal dimensions with a window on each side and a door; put an ox in it and let a number of men kill it and beat its body with clubs taking care not to spill much blood: let the door and the windows be stopped up with a covering of clay: after three weeks let the house be opened and then, after several more weeks, you will find the house full of bees and nothing left of the ox, but its skin and bones.

Virgil also told a similar story: Build a chamber with four windows and slay the oxen without shedding much blood and when the chamber is opened it will be found to be full of bees and small white animalcules with (trunco pedum primo) "stumps of feet". This is an exact description of the larva of *Eristalis*. Being aquatic the larvae require a pool of putrescent matter. A carcase, which is left in the open, is attacked by ordinary muscid flies. After their larva have pupated, a pool of corrupt fluid is formed about the carcase and it is then that the *Eristalis* takes over, its larvae pupating to give rise later to the flies which ancient husbandsmen regarded as their "Oxen born Bees".

The well-known Biblical story of Samson in Judges 14 may be regarded as another instance of ancient ignorance of insect life. It will be recalled that Samson killed a young lion in the vineyards of Timnath with his hands and on a subsequent visit "there was a swarm of bees and honey in the carcase of the lion." The insects which came out of the carcase of the lion were probably *Eristalis* and not bees.

Baron Sachen, who has an unrivalled knowledge of Diptera, also states that *Eristalis* was not known in the new world until one was found at Cambridge, Mass., in 1875. By 1895 it had overrun the U.S.A. and even Canada, but up to that year had not been found in Australia. The species which found its way from Europe to Australia is *Eristalis tenax*. There is, however, according to Tillyard (1926, *Insects of Australia and New Zealand,* p. 368), an indigenous species, *E. decorus,* the colour of which is a blue-black.

Editor's Note. This interpretation of the Bible story leaves the honey unexplained. Wild bees of the genus *Apis* will hive in almost any dark corner and the carcase of a partly rotted lion would not be unsuitable. —J.R.H.

Review

Your Australian Garden
No. 1 Propagation

Published by the David G. Stead Memorial Wildlife Research Foundation of Australia, Price Sh. 2/6

This little booklet contains a wealth of useful information on the propagation of native plants by cuttings and by seed. It is the first issue of a series designed to promote the growing of native plants in gardens and is the result of the combined work of a number of members of the Foundation and their friends.

The booklet has been produced from typewritten stencils but the text is clear and easy to read. There are a number of helpful illustrations from line-drawings by Susan Heins and the cover, printed in two colours, is very attractive.

Copies may be obtained from,

The Secretary,
David G. Stead Memorial Wildlife Research Foundation,
Box 4840, G.P.O.
Sydney. —J.R.H.

Field Naturalists Club of Victoria

Eighty-fifth Annual Report, 1964-65

This is the last time the Annual Report will be presented to the June Meeting. In connection with the re-arrangement of the Financial Year of the Club, the Annual Meeting will be held early in the year in future.

Membership

For many years now it has been our pleasant duty to record that membership of the Club had increased. Unfortunately, that is not the position this year, as there has been a slight drop. Membership is now:—Ordinary Members 550 (last year 543), Country Members 309 (324) and Junior 41 (49), a total of 900 (916). In addition there are 26 Honorary and Life Members, 101 subscribers and 25 affiliated organizations.

During the year Honorary Membership was conferred on Miss Marie Allender, in recognition of her work as Excursion Secretary.

We have suffered several losses by death, including Mr. Tarlton Rayment, a former President and Medallion winner, Mrs. David Lewis, Mrs. Paula Garner, Miss Isobel Annear and Messrs. W. Meade and H. S. Parris.

Council

For the early part of the year the Club was without an Assistant Secretary, the Secretary being forced to recruit volunteers to take the Minutes, often at very short notice. He would specially like to thank Misses Butchart and Chisholm for their help. However, one of the Council, Mr. Rob. Condon, agreed to accept this office and was duly appointed. The vacancy thus caused on the Council was filled by the appointment of Mr. Bruce Fuhrer.

Junior Clubs

Inspired by the President's remarks at the last Annual Meeting, we are endeavouring to establish Junior Clubs in the suburbs. Recently, with Mrs. Lee as leader, we have started a Preston Junior F.N.C. in that locality. It is too early yet to say how it is going, but we have hopes.

Parks and Reserves

Our activities over the year seem in retrospect to have been a series of attacks on ill-advised projects to turn National Parks into village settlements. An outstanding example is Wilson's Promontory, where the struggle to persuade the Government not to establish a licensed motel still continues. We also protested against the project to exchange land at Mallacoota to the detriment of the Park, and to "develop" the summit of Mt. Dandenong with a most elaborate look-out and car-park.

At Sherbrooke we are still not satisfied that the policing of the Regulations is sufficient to protect the Lyrebird, and have pressed for more patrols. At Cape Conran in East Gippsland we have supported a Lands Department scheme to establish a National Park.

At Seaford, destruction of the foreshore reached such a stage that the local inhabitants found it necessary to form the Seaford Foreshore Preservation League. During the year this Society applied for affiliation with the F.N.C.V. and was accepted with pleasure.

A most important event took place in the Wimmera. It being proposed to develop the Little Desert for agriculture, the Wimmera Regional Committee called a conference of all interested parties to consider what reserves would be required. This Conference was well attended by representatives of such bodies as the Lands Department, the C.R.B. (which pointed out that at least 10 per cent would be required for roads, depots and so forth), the National Parks Association and this Club. It was generally agreed that a reserve adequate to ensure the survival of the Lowan was definitely required.

Wild Life Protection

This is primarily a question of reserves, as it is no use protecting a species if it has nowhere to live. However, some of our efforts were directly concerned with protection.

Wombats

We were astounded to hear that the Minister of Lands had asserted that only two organizations had asked for the abolition of the bounty on wombat scalps, this Club not being one of them. Of course, we had asked again and again for protection of the wombat, and we felt (and feel) that such a request was quite inconsistent with any wombat bounty but we wrote again making our position clear.

Seals

Other protests were against the continued threat by fishermen to exterminate seals.

Water Sports

The Sunraysia F.N.C. having expressed concern at the effect of such sports as water-skiing and speed boat operations on bird life at Kulkyne and Hattah, we raised the question with the appropriate authorities, and were pleased to have assurances that the Forests Commission, the Lands Department and the National Parks Authority were opposed to any such activities on water under their control.

We of course support the Native Plants Preservation Society, and this year had the pleasure of donating a prize to its Photoflora competition.

Publications

We have not published anything for some years except a few reprints from the "Naturalist", but it looks as if that will soon be altered.

With members of the local Committee of Management, we are financing the publication of a handbook by Mr. Garnet, on the flora of Wyperfeld National Park. It is expected this will appear in a few months.

Show

The annual show, held in collaboration with the Society for Growing Australian Plants, was again very successful, attendance being over 6,000, an increase of over 1,000 on the previous year. We look forward to another success this year.

Natural History Medallion

After years of service, the Honorary Secretary to the Medallion Committee, Mr. Colin Lewis, has resigned. The Club is very grateful to him for his good work. We were fortunately able to persuade Mr. J. M. Baines to take his place.

The Medallion for 1963 was awarded to Mrs. Thistle Stead (Thistle Harris) of Sydney. Mrs. Stead visited Melbourne, and the Medallion was presented to her at a General Meeting by Mr. J. H. Willis. She is the first interstate recipient to visit Melbourne to receive the Medallion, and we are very grateful to her, especially as she delivered an address on "Conservation".

Lecturers

We must also thank the other lecturers both members and non-members, who have entertained and instructed us during the past year.

Financial

The Treasurer reported during the year that there would probably be a small deficit in the Club's account. He also mentioned that a financial year ending on April 30 was a nuisance to everybody, especially overseas subscribers, and served no useful purpose.

Council therefore recommended, and the April General Meeting resolved, that the Club's year commencing on May 1st, 1965 should end on December 31st, 1965, members getting only eight months for their annual subscription, and that, commencing on 1st January, 1966 the Club's year and the calendar year should be the same. At the same time ordinary subscriptions and Country Members subscriptions were increased by 10/- each, to £2/10/- and £2 respectively, as from 1st January, 1966.

This made some minor amendments of the Articles desirable, and the Secretary is obtaining the consent of the Attorney General to these amendments.

Council has also increased the price of individual parts of the Naturalist to 3/6d. per part.

Excursions

Excursions have been well attended during the year. The major event was an excursion to Tasmania in January, 1965. Thirty-two members flew to Launceston, then travelled by bus to Scottsdale, Swansea, Eaglehawk Neck, Port Arthur and Hobart with day-trips to New Norfolk and Russell Falls, Mt. Wellington and Huon Valley, then on to Bronte

Park via Great Lake, Strahan, where they had a launch trip to Hells Gates, Wynyard with a detour to Zeehan, then two full days at Waldheim in the Cradle Mountain Reserve, finally a visit to the Mole Creek Caves and Devonport. Members greatly appreciated the hospitality and assistance of the Tasmanian Naturalists who supplied information, helped lead in special areas and arranged special meetings including a luncheon at Devonport.

An extremely interesting weekend visit to Bendigo and Rushworth was led by Mr. J. R. Garnet and Mr. R. Dodds assisted by the Bendigo F.N.C. and Mr. K. King and Mr. C. Fleming of Rushworth. The party was joined on Sunday by several members of the Benalla F.N.C. as well as local folk.

In October a very pleasant week was spent by about thirty members at Wilson's Promontory.

Day excursions were held every month. Two excellent excursions were led by country clubs, one to Enfield under the leadership of the Ballarat F.N.C. and the other to the Tyers River Gorge with the Latrobe Valley F.N.C. Other places visited were Somers, led by Mr. A. Reid, Sherbrooke, Beenak, St. Leonards, Brisbane Ranges (President's picnic), Powelltown, Pt. Lonsdale, Mornington Peninsula, Snobs Creek, Warrandyte and Torquay with members of the Geelong F.N.C.

Many additional excursions were run by the various groups in the Club.

Library

During the year forty volumes were bound at a cost of £67 including the replacement of missing parts. The periodicals bound were volumes of:

Royal Society of N.S.W.
Royal Society of Tas.
Royal Society of S.A.
Royal Society of Qld.
Mem. Nat. Museum
Proc. Linnean Society
Australian Zoologist

Twenty-five new books were purchased for all sections of the Library at a cost of £35. As well as these, 52 books were received from the estate of the late Mrs. Ruby Lewis. These were all valuable additions to the Library.

The Library contains approximately 1300 books, apart from bound periodicals, of which at least 650 have never been catalogued in any way. A completely new system is being introduced, based on modern library practice. The main feature of this is an Accessions Book which lists all the books in the library and allots each an Accession Number. From this it is hoped to derive some better shelf arrangement and an Author-Title card index.

The new loans system, which has been in operation a little over 12 months, appears to be working smoothly. Although it is not quite as convenient for the borrowers and considerably adds to the work of the librarians it has the advantage of greatly reducing the loss of books.

A very small proportion of members still borrow books with complete disregard to any system or to the library hours thus causing added work and loss of books.

Groups

Botany

The Botany Group, under the chairmanship of Mr. Bruce Fuhrer, continued during the year to attract a satisfactory number of interested members to each meeting.

Mrs. M. Salau and Miss M. Allender, programme stewards, arranged the speakers for each meeting and a diversity of botanical subjects included Chenopodiaceae (The Saltbush family), Miss L. White; Lichens, Mr. Rex Filson; The Use of Plants in the Conservation of Soil, Mr. Mitchell; Liverworts, Miss K. E. Hall; Flora of New Zealand, Mrs. Monahan; Leaves and Photosynthesis, Miss M. Lester; Aquatic Plants, Miss H. Aston; Australian and New Zealand Flora, Mr. J. A. Baines.

Excursions were well attended, 27 members being the greatest number at any one outing. Excursions usually tied up with the subjects of the addresses given at meetings and, when possible, were led by the lecturer. Visits were made to Laverton to study Chenopodiaceae, led by Miss L. White; Ricketts Point and Frankston, Conifers; Monbulk, general, led by Mr. F. Irvine; Blackwood, general, led by Mr. B. Fuhrer; King's Falls, Rosebud, led by Mr. T. Sault; Burke Road Swamp, water plants, led by Miss H. Aston; Ricketts Point, seaweeds, led by Mr. B. Fuhrer.

The Group staged an exhibit of Aus-

tralian Conifers at the Nature Show and this year proposes to make an exhibit on the subject of "The Plant Kingdom".

It will be seen from this brief report that the Group is active and enthusiastic and contributing to the work of the Club.

Meetings are held at the Herbarium each month on the 2nd Thursday. All Club members interested in the subject of botany are invited to attend.

Microscopical

This was a most interesting and stimulating year for all members of the Microscopical Group.

The honouring of Messrs. D. McInnes and W. C. Woollard by the award of life membership of the club for their outstanding work in producing the F.N.C.V. Microscope is an event of which the members of the group are justly proud. To further popularise "Microscopy for the Masses", there has been a spate of members adapting various odds and ends from disposal stores to produce such things as "stereo binocular" microscopes and even the making of their own light meters, guided of course by the willing, helping hand of Mr. W. Woollard.

The microscope display at the Nature Show again proved a most popular exhibit, and it is hoped that it will continue to be so.

Three outside speakers gave talks on new models of microscopes, the study of plankton and its importance in the sea, and the chemistry and ecology of drinking water. In addition to these, members were treated to a most interesting evening at the Forest Products Division of the C.S.I.R.O. where they were lectured on the role of the light microscope and the electron microscope. Four members gave talks and demonstrations on the theory of magnification, a showing of photomicrographs of diatom slides, the life and work of Robert Hooke, and the making of a simple stereo-microscope. In addition to these there was an open night, a "gadget night", and a night set aside to discuss home-made camera lucidas.

The average attendance throughout the year was 23 members and comparing this with that of the previous year, when it was 15, the group is showing definite signs of growing. Interest of most of the members is in the general field of microscopy which, of course, is an interesting pastime, but we must realize that the most important work done with the microscope is done when a person narrows down his field of interest. The older members all have a field of microscopy in which they specialize and it is gladdening to find a few of the new members stopping to ponder some isolated but important aspect of microscopy.

Marine Biology and Entomology

Attendance at the Group meetings has not varied in the past two years, the average being fifteen members. There were two guest speakers in 1964, and already two more have been booked for 1965.

Mr. and Mrs. Strong were overseas from May to August inclusive in 1964, during this time Mrs. Zillah Lee kindly officiated as Acting Secretary. Group meetings during this period were held at the Herbarium.

Members gave many short talks on some aspect of marine biology and entomology which were greatly appreciated by the Group.

The number of specimens both marine and entomological which members either brought for identification, or on which to give a short talk, continued an important feature of this Group.

It is hoped to arrange some field days in the next few months. These are popular with members and there is usually a good attendance.

Once again the Group is indebted to Mr. Dan McInnes for bringing along Club microscopes and specimens to show under them so regularly.

Geology

The Group continued to make progress during the year and attracted a few new members. Attendance figures varied between twenty-five and thirty-six which maintained the average of the previous year.

Lectures were arranged to cover as many aspects of geology as possible from a series by members themselves on the geological eras, to field work in various parts of Australia by visiting speakers. These speakers covered subjects as diverse as Kaolin mining at Happy Valley near Ballarat and the newly discovered iron-ore deposits of the Hammersley Ranges in West Australia.

Excursions were held to the Basalt Quarries at Narre Warren, Organ-pipes

at Sydenham, Limestone Quarries at Lilydale and Batesford near Geelong. Weekend trips proved popular when arranged to areas where contacts could be made with the local Field Naturalist Clubs. One to Campbelltown, in conjunction with the Creswick Club, to collect graptolites was much enjoyed, and many fine specimens were found. Another excursion to Colac, at the invitation of the local club, to study the volcanics of the area was most successful.

A pleasing feature of the Group's work is the calls from country areas for speakers. Messrs. Cobbett and Davidson have obliged when time permitted, and ably filled the bill.

The Group's exhibit at the Nature Show was much admired as it displayed an array of specimens to illustrate the origin of many different forms of rocks.

An endeavour has been made to compile a talk on the Building Stones of Victoria, which could be delivered from notes and slides, and so be used by interested country clubs. Mr. Hemmy, after much work and helped by constructive criticism of the members, has almost completed this project.

FIELD NATURALISTS CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR 12 MONTHS ENDED 30th APRIL, 1965

(Figures adjusted to nearest £1)

Receipts

Year 1963-64			
	Subscriptions Received—		
£38	Arrears	£21	
1,663	Current	1,741	
90	Supporting	106	
1,791			£1,868
188	Sale of Victorian Naturalists		167
216	Advertisements in Victorian Naturalist		117
	Interest Received—		
3	Library Fund	3	
42	Bank Account	33	
	Investment of M. Wright legacy	104	
			140
118	Surplus from Excursions		128
14	Sale of Club badges		22
55	Moomba Committee, refund of advances and share of surplus		—
54	Amount transferred from Building Fund Account for payment of rent		81
			£2,523
—	Deficit for the year		162
£2,481			£2,685

Payments

Year 1963-64				
	Victorian Naturalist—			
	Printing		£1,732	
	Illustrating	£392		
	Less from Ingram Trust Grant	51		
			341	
	Despatching		202	
£2,106				£2,275
	Working Expenses—			
73	Postage and Telephone		£71	
65	Printing and Stationery		52	
18	Library Expenses		23	
33	General Expenses		55	
—	Rent of room for storage		25	
20	Affiliation fees, Subscriptions and Donations		15	
—	Preston Junior Naturalists Club		2	
12	Natural History Medallion expenses		15	
	Fauna Group expenses	12		
	Less from Ingram Trust Grant	12		
			—	
78	Typing and clerical assistance		71	329
54	Rent of Hall and Library			81
22	Surplus			—
£2,481				£2,685

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at April 30, 1964	£1,591
Interest on Investments and from Bank Account	72
	1,663
Less amount transferred to General Account for payment of rent	81
Amount of Fund at April 30, 1965, as per Balance Sheet	£1,582

PUBLICATIONS FUND

Amount of Fund at April 30, 1964	£1,554
Surplus for year from—	
Ferns of Victoria and Tasmania	19
Victorian Toadstools and Mushrooms	3
Other Publications	6
Interest on Special Bonds and on Bank Account	42
Amount of Fund at April 30, 1965, as per Balance Sheet	£1,624

CLUB IMPROVEMENT ACCOUNT

Amount of Account at April 30, 1964		£40
Commission earned on sale of books at Meetings and Shows		52
Donations		6
Surplus from Show September 1964		81
		179
Cost of new books purchased for Library	£35	
Cost of binding periodicals in Library	67	102
Amount of Account at April 30, 1965, as per Balance Sheet		£77

FIELD NATURALISTS CLUB OF VICTORIA

BALANCE SHEET AS AT APRIL 30, 1965

(Figures adjusted to nearest £1)

Liabilities

Year 1963-64			
£401	Subscriptions paid in advance		£329
34	Sundry Creditors		—
	M. A. Ingram Trust grant in hand		132
	Special Funds and Accounts—		
1,591	Building Fund	£1,582	
1,554	Publications Fund	1,624	
50	Library Fund	50	
40	Club Improvement Account	77	
100	Excursion Account	100	
2,608	Estate Marion Wright legacy	2,608	
80	Wright legacy interest	—	
167	Microscope Project Account	284	6,325
2,049	Surplus of Assets over Liabilities		2,026
£8,674			£8,812

I report that in my opinion the accompanying Balance Sheet and Accounts 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. Also that the accounting and other records examined by me are properly kept in accordance with the provisions of the Act.

28/5/65.

W. P. J. Evans
Hon. Auditor

Assets

Year 1963-64			
	Current Assets—		
£517	Bank Current A/c and Petty Cash	£718	
252	Sundry Debtors	111	
33	Badges on hand, at cost	12	
51	Books on hand, for sale at cost	73	
203	Microscope Project Stock, at cost	184	£1,098
1,803	Library, Furniture and Equipment, at cost		1,838
	Investment of Funds—		
	Building Fund		
1,050	Commonwealth Bonds, at cost	1,050	
420	S.E.C. Stock, at cost	420	
121	E.S. & A. Bank, No. 2 Account	112	1,582
	Publications Fund—		
600	Commonwealth Bonds, at cost	600	
	Stocks valued at cost—		
285	Victorian Ferns	225	
615	Victorian Toadstools	558	
26	Sundry Debtors	9	
28	E.S. & A. Bank, No. 3 Account	232	1,624
	Library Fund—		
50	Commonwealth Bonds, at cost		50
2,600	Legacy, Estate Marion Wright— C'wealth Bonds, at cost		2,600
20	Cosstick Reserve, Maryborough, at cost		20
£8,674			£8,812

Field Naturalists Club of Victoria

General Meeting—10 May, 1965

The hall at the Herbarium was almost full when the President, Mr. M. K. Houghton, declared the meeting open. After agreeing to take the Minutes as read, the Members present heard a number of announcements from the Hon. Secretary, Mr. E. H. Coghill. He reported that it would be unnecessary to hold an election for Office Bearers and Council Members at the Annual General Meeting in June because only the existing team had been nominated. He mentioned that a request for nominations for the Natural History Medallion had been received and that Council had decided that there was no need to add to the list of worthy naturalists from Victoria already in the hands of the selection committee. A letter had been written to the Minister for Lands regarding the removal of the wombat from the list of vermin and the Minister's reply was read to the Meeting. Mr. Coghill said that, in order to prevent unauthorized persons from entering the building whilst Meetings were in progress, the Herbarium door would be closed half-an-hour after the start of each General and Group Meeting: anyone arriving late would, therefore, have to make sufficient noise to attract attention in order to obtain admittance.

Members had been notified that, at the Annual General Meeting in June, the motion would be put altering the Articles so that the financial year would run from 1 January to 31 December instead of from 1 May to 30 April. Mr. Coghill explained that consequential amendments necessary were, to substitute "January" for "May" in Article 12 and "July" for "November" in Article 13 and he gave notice accordingly. The President said that, in accordance with the Articles, an opportunity for discussion of any proposed changes must be given at the General Meeting prior to the Annual General Meeting at which the motion was to be put. This subject of changing the financial year had been discussed at the March Meeting, but if any Member wished to speak he could do so. There was no further discussion.

Mr. Coghill reported that H.E. the Governor had very kindly agreed to visit the 1965 Nature Show at 11.30 a.m. on 7 September and that the Society for Growing Australian Plants had again formally agreed to co-operate in the Show. Mr. McInnes said that the special exhibit this year would have as its theme "Loss of habitat means loss of fauna" and this would be demonstrated by showing the effects of a bush-fire. He appealed for living plants in tins, not more than 6 in. high, to build into the half of the display illustrating the scene before the fire.

The Subject for the Evening was "Members' Night, Tasmania." The narrator of the story of the Christmas-New Year excursion, Mr. E. Byrne, spoke to a fine series of colour slides lent by at least ten Members of the party of 32 that made the trip. The tour of the island State began at Launceston and, after travelling down the east coast to Hobart, across the central plateau to Strahan, up through Zeehan to Wynyard, and a stay at Waldheim, the party returned from Devonport. The slides illustrated the scenery, geology, botany, and some of the birds and mammals encountered, as well as a number of historic buildings.

The talk and slides were greatly enjoyed by the audience and the speaker and Members lending slides were thanked by the President. Mr. Byrne thanked Mr. Begley for working the projector.

Mr. Coghill mentioned that copies of the Supplementary List of Members were now available for sale at Sh. 3/- per copy.

Introducing "General Business", the President mentioned that a deputation to protest against the proposed motel on Wilson's Promontory was to call on the Minister for State Development on the following day. Mr. Taylor spoke of the need for the National Parks Authority to retain control and the undesirability of permitting Park land to pass to private enterprise. Mrs. Woollard mentioned that no letters opposing the project had appeared in the local press.

Mr. J. Baines referred to the open season for Cape Barren Geese on certain islands in Bass Strait. He could not understand how a Tasmanian Government Agency had permitted the shooting of so noble a bird that was on the verge of extinction. He moved that the Secretary write to the Premier of Tasmania condemning wholeheartedly the action of a Tasmanian instrumentality in permitting an open season for Cape Barren Geese. The motion was seconded by Mrs. Taylor. Mrs. Denny said that Mr. McCann of the Colac F.N.C. had written to Mr. Michael Sharland to obtain more information on the subject and Mr. Coghill suggested that it might be desirable to await further details from Colac. Mr. Ros Garnet expressed the view that the number shot was not of importance: the population was so small that the species should be strictly protected. The motion was put and carried.

There were a number of interesting exhibits. Mr. McInnes spoke to calcite nodules in basalt resembling agate, collected on an expedition to Black Hill and Green Hill. Mr. Hudson described a fungus collected by Mr. W. Mules in his Croydon garden; it resembled the combings from a horse's black mane, the similarity being enhanced by the likeness of the sporangia to bot-fly eggs. It appeared to be a phycomycete.

Two species of *Acacia* on the table for identification, were *A. pruinosa* and *A. rhetinodes*. Mr. J. H. Willis exhibited flowers, leaves and a young pod of the Queensland Black Bean, *Castanospermum australe*, grown in Melbourne where it rarely fruits. Mrs. Salau had brought a number of fossils and other geological specimens from Tasmania. Mr. Peter Kelly displayed a wasp of the family Megalyridae that is a parasite of longicorn beetles and Mr. Ros Garnet a fruiting specimen of the rather rare asclepiad, *Marsdenia australis*, collected beside the Calder Highway, north of Hattah. There were also specimens of the marine worm *Sabellastarte indica* (Sabellidae) from Lorne.

In closing the meeting the President announced that at the Annual Meeting in June Mr. H. Alan Morrison would speak on the Flora of Central and Western Australia.

Microscopical Group February 17, 1965

Twenty-three members attended this meeting which was chaired by Mr. E. Le Maistre.

The Minutes were read and confirmed, after which it was reported that Mr. Hope was still in hospital unconscious and had developed further complications.

Mr. W. Evans displayed some protozoans obtained from a pond near the Princess of Tasmania Ferry Terminal. Mr. W. Genery exhibited some live brine shrimps and described his observations on these interesting crustaceans.

Also exhibited were: Tongue of Bee, Mr. D. McInnes; Diatom Slide of the late Dr. Wishart, Mr. E. Le Maistre.

Microscopical Group, March 18, 1965

In the absence of Messrs. Le Maistre and Genery who sent apologies, Mr. D. McInnes was appointed Chairman and Mr. W. Genery, Acting Secretary.

There were six members' microscopes and four club microscopes with slides on views. These showed diatoms, rock-sections, insects and plant-sections.

A very interesting lecture was given by Mr. K. Trotter on Photomicrography during which many slides of diatoms under varying lighting conditions were shown. He gave an excellent commentary on the slides and described the various methods by which they had been produced. The lecturer informed the group that he always obtained his best results with Agfa 50 A.S.A. daylight film.

A very interesting discussion took place at the conclusion of the talk.

Mr. Rex Filson offered to give a lecture at the May meeting on "The Use of Freezing Microtome for cutting Plant Sections."

Fauna Survey Group—Mammal Reports, April 1965

1. **Grey-headed Fruit-bat** *Pteropus poliocephalus*
   (a) Hughesdale. One specimen dead on powerlines observed by Miss M. J. Wolfenden, middle of April.
   (b) Mt. Dandenong and Elwood. One dead specimen each, Fisheries and Wildlife Department.

2. **Lesser Long-eared Bat** *Nyctophilus geoffroyi*
   Hughesdale. One specimen dead on footpath, April 4. Lodged with Fisheries and Wildlife Department by Miss M. J. Wolfenden.

3. **Mitchell's Hopping Mouse** *Notomys mitchelli*

   Victoria, S.E. of Pinaroo. Caught mid-January by Mr. S. Coburn and received alive by Fisheries and Wildlife Department.

4. **Koala** *Phascolarctos cinereus.*

   (a) Anakie. One specimen observed feeding on leaves of the introduced Pepper-tree *Schinus molle* by Mr. A. Walder.

   (b) Grampians. One specimen observed at night, in the rain, sitting on the bitumen of the Wartook Road. Mr. N. A. Wakefield, April 14.

AFFILIATED CLUBS

Warrnambool Field Naturalists Club

The Warrnambool Club continues to flourish. Mr. J. L. Martin succeeds Mr. W. J. Mathieson as President, Mr. R. J. Edge continues as Honorary Secretary.

The monthly meetings have been interesting and well attended. The Club is now planning to build up attendances and excursions, which are equally important.

ERRATA

Vict. Nat. 81 (Mar. 1965)

p. 310, column 1, line 19—for "shadows" read shallows.

p. 310, column 2, line 14—for "bushes" read brushes.

Vict. Nat. 82 (May 1965)

p. 17, column 2, line 11—for "aroids" read irids.

p. 18, column 2, line 7—for "leasurely" read leisurely.

p. 22, column 1, lines 15 and 38—for "Mannup" read Nannup.

p. 22, column 2, line 1—for "shoots" read sheets.

p. 22, column 2, line 15 from bottom —after "Swan River" insert Coastal Plain.

The Editor regrets that in the report of the Botany Group, *Vict. Nat. 81*: 341 (Apr. 1965), Miss Aston's name was, on each ocasion, incorrectly given.

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

GENERAL MEETINGS

Monday, June 14—Annual Meeting. At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes of Annual Meeting of June 8, 1964.
2. Annual Report.
3. Financial Report.
4. Incoming Officers and Council. No election will be necessary. The following have been nominated:
   President: Mr. M. K. Houghton.
   Vice-Presidents: Messrs. A. J. H. Fairhall and E. Byrne.
   Secretary: Mr. E. H. Coghill.
   Assistant Secretary: Mr. R. Condon.
   Treasurer: Mr. A. G. Hooke.
   Assistant Treasurer: Miss M. Butchart.
   Editor: Mr. J. R. Hudson.
   Assistant Editor: Mr. R. H. J. McQueen.
   Librarian: Mr. P. Kelly.
   Assistant Librarian: Miss M. Lester.
   Excursion Secretary: Miss M. Allender.
   Council: Messrs. E. R. Allan, B. F. Fuhrer, J. Ros Garnet, F. L. Jeffs and T. Sault.
5. Appointment of Auditors.
6. Submission of Motion as a Special Resolution that "From January 1966 the financial year be from January 1 to December 31, instead of from May 1 to April 30, and the Articles of Association be amended by substitution of January for May in the second line of Article 12 and of July for November in the third line of Article 13 to give effect to this."

7. Announcements.
8. Subject for the Evening: Mr. H. Alan Morrison, "Flora of Central and West Australia".
9. Election of Members.

(a) *Ordinary:*
Miss E. Boardman, 6 Boston Street, North Balwyn.
Mr. R. R. Cohen, 28 Angus Drive, Glen Waverley.
Mr. I. A. Cutter, Metallurgy Department, University of Melbourne, Parkville, N.2.
Mr. J. M. Frawley, 40 Park Street, South Yarra. (Interest—Microscopy. Introduced by Mr. D. E. McInnes.)
Miss P. Heath, "Glendale", 5 Crisp Street, Hampton.
Mrs. A. J. Jones, 91 Oakwood Avenue, Noble Park.
Miss E. E. Rice, 14 Florence Street, East Brighton. (Interest—Fauna Survey.)
Mrs. E. Unwin, 1042 Heatherton Road, Noble Park.
Mrs. H. Bridges Webb, 26 Stradbrow Avenue, Heidelberg, N.22.
Mr. E. W. Wolstenholme, 42 Jones Road, Dandenong W.

(b) *Country:*
Mr. H. W. Bond, School of Forestry, Creswick. (Interest—Botany.)
Mrs. M. Corrick, c/o Bank of New South Wales, Hamilton.
Mr. G. J. Douglas, Box 15, Kallista. (Interest—Anthropology.)
Mrs. R. Fry, Ferny Creek Road, Tecoma.
Mr. T. Wood, Devon North.

(c) *Junior:*
Miss V. Gough, 2 Inga Street, East Burwood. (Interest—Entomology.)
Miss G. Lee, c/o Mrs. J. A. Beacham, 3 Simpson Street, Birchip.

10. Nature Notes and Exhibits.
11. General Business.

Monday, July 12—Professor Hills, "Work of U.N.E.S.C.O. in Arid Lands".

GROUP MEETINGS

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

Wednesday, June 16—Microscopical Group. Mr. Paul Genery, "Insect Slides and how to make them".

Friday, June 25—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Mr. Leigh Windsor, "Preservation of Marine Invertebrates".

Thursday, July 1—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.

Monday, July 5—Marine Biology and Entomology Group—at Mr. Strong's rooms, Parliament House. Enter through private entrance at S. end of House, 8 p.m.

Wednesday, July 7—Geology group.

Thursday, July 8—Botany Group. Miss K. Hall, "A Botanist in the Kitchen".

Friday, July 9—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just N. of Bell Street) at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, June 20. Healesville Sanctuary. It is planned to have two buses and make this a combined junior and senior excursion. One bus will leave Batman Avenue at 9 a.m., the other will be at Hawthorn Town Hall at 9 a.m. Mr. McInnes will take bookings for the Hawthorn bus and Miss Allender for the bus from Batman Avenue. The route will be via Warrandyte and Yarra Glen and the party will reach the Sanctuary for lunch. Fare, including entrance fee, adults £1, juniors Sh.10/-. Bring a picnic lunch. All juniors are invited to attend.

PRELIMINARY NOTICE

Friday evening, August 27, to Sunday, September 5—Red Cliffs district. The party will leave Melbourne by coach Friday evening, stop overnight at Bendigo and complete journey to Red Cliffs on Saturday where it will remain for a week making daily excursions organzed by the Sunraysia F.N.C. The party will leave on Saturday, Sept. 4, but will probably stop overnight before reaching Melbourne on Sunday, Sept. 5. Accommodation has been booked at Bendigo and Red Cliffs for coach party. Bus fare, including day trips, £10. A deposit of £4 should be paid when booking.

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, 1964

President:

Mr. M. K. Houghton
20 Trevascus Street, Caulfield (58 1937)

Vice-Presidents: Mr. E. Byrne, Mr. A. Fairhall

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. Hudson, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mr. F. Zirkler, 134 Kangaroo Road, Oakleigh, S.E. 12 (56 4337).

Geology: Mr. R. R. Dodds, 5 Banchory Street, Essendon (379 4309).

Microscopical: Mr. P. Genery, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 81 of the *Victorian Naturalist* is from May 1965 to December 1965.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1

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A fine portrait of a Cattle Egret, *Bubulcus ibis*, by Mr. J. Cooper of the Fisheries and Wildlife Department, Melbourne.

Vol. 82, No. 3 July 8, 1965

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

The elephant seal bull on the left gives up the fight. The proboscis is pulled in as he prepares to back away. See Dr. Csordas's article, page 74.

Filiicolous Lichen from South East Gippsland

By Rex Filson

Recently Mr. J. H. Willis whilst on an excursion in the Alfred National Park, East Gippsland, collected a very interesting lichen growing on the living leaves of *Notelaea longifolia*. This lichen was determined as *Bacidia leucoloma* (Müll.Arg.) Zahlbr. and is the second time that it has ever been recorded. The only other collection is from a tree in Warburton and was made by Rev. F. R. M. Wilson in December 1885. Rev. Wilson's specimen was sent to Dr. J. Müller of Argau, Switzerland, and he described it as *Patellaria* (*Bilimbia*) *leucoloma*. Dr. A. Zahlbruckner later transferred it to *Bacidia*. *Bacidia* is a genus situated in the *Lecideaceae* and similar to most genera in this family it is characterized by having a crustose thallus and uncoloured, thin-walled spores. It is a very large genus and can be found growing on rock, bark, or leaves. Leaf-inhabiting lichens are unusual in Victoria where they occur only in eastern tracts of jungle; the present collection would appear to be the second ever made in this State.

Bacidia leucoloma (Müll. Arg.) Zahlbr.

Bacidia leucoloma. (Müll.Arg.) Zahlbr. Cat.Lich.Univ.Vol.IV. p. 117. (1927).

Patellaria (*Bilimbia*) *leucoloma* Müll.Arg.Bull.deHerb. Boiss. Vol. I. p. 49. (1893).

Thallus forming patches on the upper surface of the leaves, continuous or dispersed, slightly bluish or greenish grey, smooth or minutely farinose, up to 25μ thick; *Algal cells* scattered 8-12μ diam.

Apothecia sessile, slightly constricted at the base, 0·2-0·7 mm. diam., rather numerous; *Disk* reddish-brown to black, non-pruinose, plane to slightly convex; *Margin* not prominent, yellowish, later becoming white, undulate; *Hypothecium* brownish, 35-40μ thick under the hymenium; *Hymenium* hyaline, 60-65μ tall; *Paraphyses* simple not expanded at the apices, coherent; *Asci* clavate, 45-50 x 8 — 10 (-14)μ; *Spores* 8, 3 septate, slightly constricted at the septum, 16 x 4·5μ.

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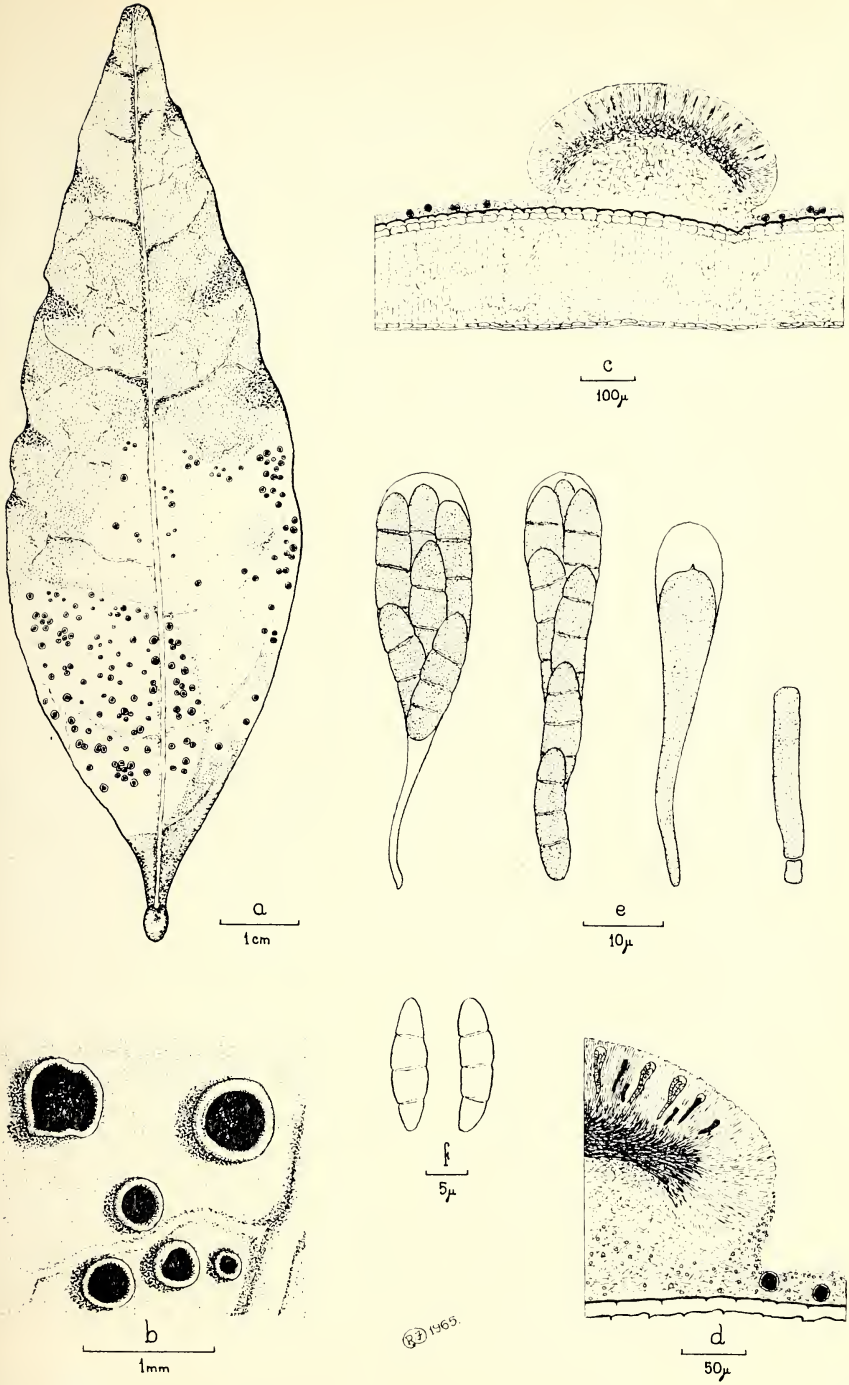
a. Leaf of *Notelaea longifolia* showing the lichen thallus and apothecia.
b. Enlargement of apothecia.
c. Section through the leaf showing an apothecium and the thallus thinly effused over the upper surface.
d. Enlargement of the margin of the apothecium.
e. Development of the ascus (stained with acid fuchsin).
f. Free ascospores.


a
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100μ
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10μ
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5μ
b
1mm
d
50μ

A Few Facts about the Southern Elephant Seal

By Dr. S. E. Csordas*

For the newcomer to Macquarie Island the large groups of lazily resting, fat elephant seals (*Mirounga leonina* Linn.) present a most striking picture. They are everywhere, on the beach, among the tussock-grass, even among the huts of the station.

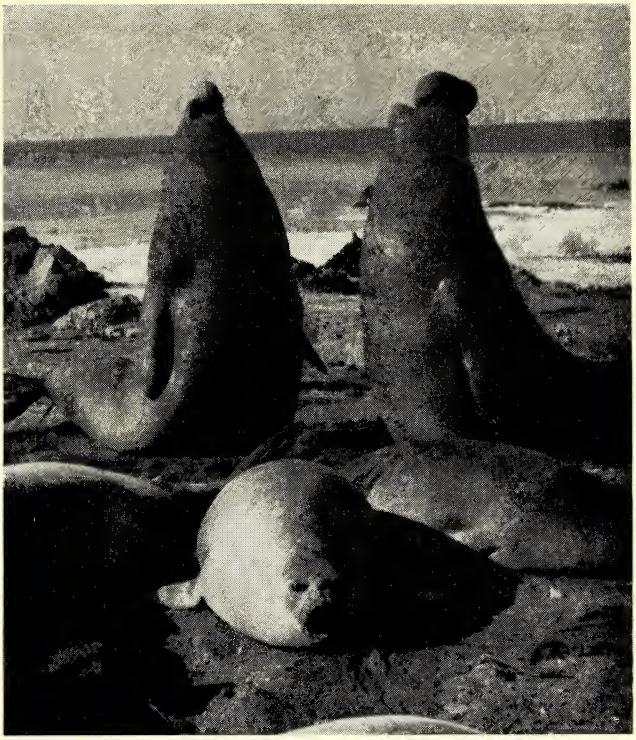
The name "elephant seal" derives from the inflatable trunk, the proboscis, which is so conspicuous in the bulls. The elephant seal is the largest of the true seals (*Phocidae*). A bull can reach a length of 16-18 feet and can weigh about 2-3 tons. You may often read in reports of bulls measuring 20 feet and weighing more than 3 tons, but such measurements are the over-estimates of an untrained observer. The cow is about half the size of the bull and does not have a proboscis. The elephant seal's skin is covered with very short, coarse oily hair and is of no commercial value. The colour varies from yellowish grey to dark brown.

Elephant seal, being true seal, cannot use their hind-flippers for terrestrial locomotion. On land they progress like caterpillars by undulating their bodies. The foreflippers can be a help, especially in climbing on the steeper parts of the beach or on hillsides; but the seals can manage without this aid. During the breeding season many old bulls can be seen moving around with their foreflippers immobilized by enormous scars. In 1959 I saw a young male, one of the foreflippers of which had been bitten off, moving around with the same speed as the others. The older seals can move with the speed of a man's trot, but only for a short distance, 10-20 yards; then they must have a short rest. They often travel a few miles inland. Though, because of their huge, fat bodies, they look clumsy on land, they are fast in the water. The maximum estimated speed in the sea is about 10-12 miles per hour. They swim, with extended hindflippers, by undulating their hindquarters sideways. The foreflippers are used for turning and balancing at low speed.

The elephant seal spends three-quarters of its life in the open sea. That some of the older seals undertake long sea voyages is proved by the hundreds of $\frac{1}{4}$-$\frac{1}{2}$" long goose-barnacles attached to their skin when they return to the island and during these voyages the seals visit places far away from their breeding ground. The most northerly place in Australia, where occasional elephant seals have been sighted is Lady Julia Percy Island (Lat. 38°2′5S, Long. 142°00′E.), 21 miles east of Cape Nelson on the Victorian coast (personal communication). They also travel as far south as the Antarctic Continent.

The elephant seals are at home on all subantarctic islands around the southern hemisphere. Before the sealing industry started they were of much wider occurrence than they are now; but sealing has led to their extinction in many localities. According to Laws (1960) Macquarie Island contains one sixth of the world ele-

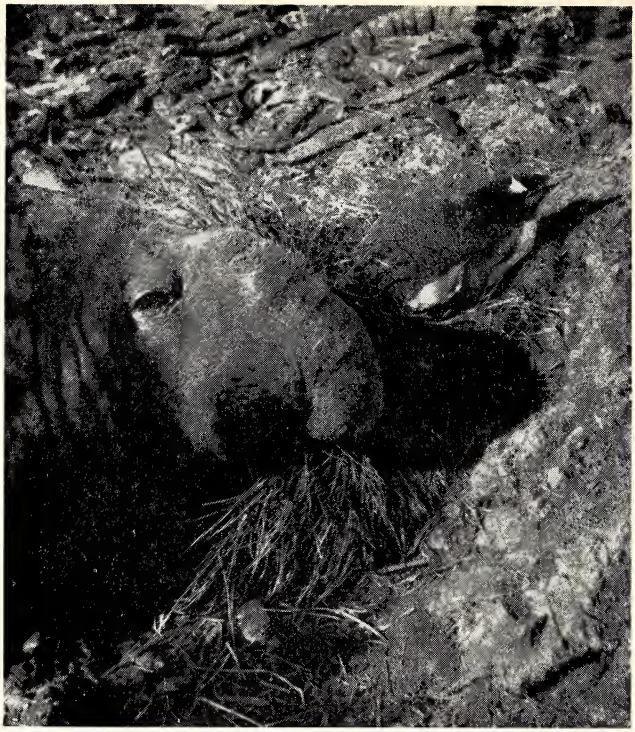
*Medical Officer with the Australian National Antarctic Research Expedition at Macquarie Island in 1955, 1957, and 1959.



Bulls ready to fight. Fat cows in the foreground.

phant seal population, which is now estimated to be about 600,000.

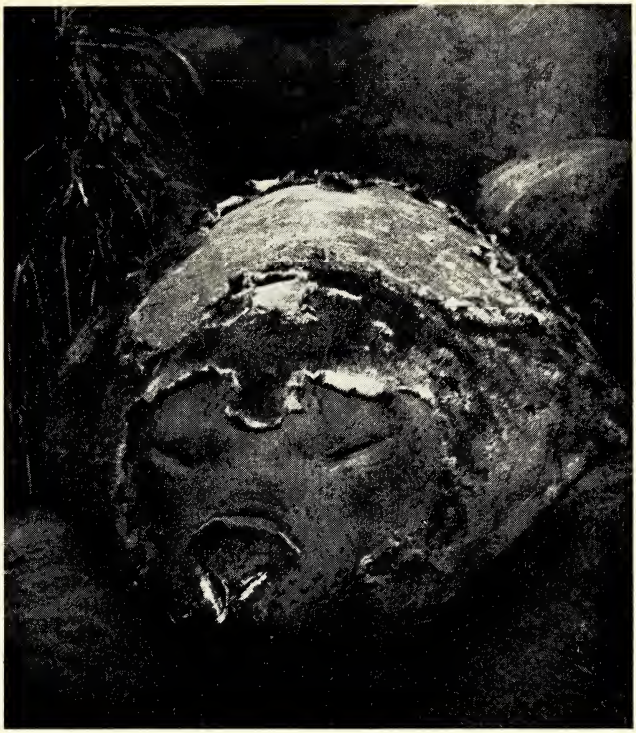
Since 1951 detailed studies have been made on Macquarie Island by the members of the Australian National Antarctic Research Expeditions (ANARE), to obtain more data on the life of the elephant seal. For such studies Macquarie Island is ideal. The main station of the expedition is situated on the north end of the island and is practically surrounded by seals. This part of the island is their most favoured breeding and resting ground. In 1957 during the breeding season I counted 10,483 bulls, cows and pups on the 62 acre area near the station. Without the need for strenuous field trips the biologists are able to keep constant watch on the movement of the seals and, when necessary, they can have the assistance of the whole expedition for such special work as seal branding without disturbing the important daily routine of the station's scientific programme. To be able to follow up the seal's development from birth to death, large numbers have been branded with hot irons. Year by year hundreds of pups have been branded with an individual four letter combination. One letter, M, indicates Macquarie Island. The second letter, which is changed every year (A = 1951, B = 1952, C = 1953, etc.), indicates the age of the animal and the third and fourth letters indicate the seal's "name". The first seals branded on Macquarie Island are now 13 years old and during the past 13 years we have learned many important facts about the elephant seal's habits and movements through this branding programme.



Old bull resting near Gentoo Penguin nest.

The pups are born in September-October, and at birth they average 100 lbs. in weight and 50″ in length. The pups have long black, wooly fur which they lose in 2-3 weeks to acquire the shiny, dark silvery-grey, short juvenile coat. The mother feeds the pup for 21-24 days and during this time the pup's weight increases to 300-400 lbs. and they then look like huge balloons. After they are weaned the cow deserts the pup and until it learns to swim, that is for a period of a month or so, it lives on its blubber. It is interesting to watch the little humpty-dumpties' swimming practices, firstly in shallow water, then gradually further and further from the shore. They play around like children on the beach.

During the first few years of their life the seals remain in the vicinity of the island and often come ashore to have a short rest. Later, their feeding trips become longer and longer, but at least twice a year they return, once for their annual moult and then again for the breeding season. They moult in a peculiar way, which is characteristic for the species. Large patches of the upper layer of the skin are lost and during this period the animal is very irritable. The skin seems to be very itchy, for they scratch themselves very frequently with their flexible fore-flippers and long, black nails. It is hard to believe, but they can reach every part of their body. To sooth the itchiness, the seals very often move into muddy pools, so called "seal-wallows", among the tussock-grass where they stay for 3-4 weeks until the moult is complete. There is a strict time-table for the moulting of the different age-



Immature male elephant seal moulting. They lose the outer layer of their skin in large patches.

groups, the younger seals begin in November-January, in the old ones the process is delayed until February-April.

During the winter months the younger seals come ashore to rest. They spend most of their time sleeping or engaging in mock fighting. When the breeding season starts in September, the young seals disappear in a hurry and the older bulls come ashore first, followed by the pregnant cows. The cows gather in large groups, the so-called "harems", some of which may contain more than one thousand cows. After several hard, but not mortal, fights the bulls take possession of the harems. Winning the first fight does not mean that the bull can now safely and proudly retire among his cows. He will have to defend his harem against other bulls throughout the whole season and fight many battles. The ruler of the harem is called a "beachmaster". In a large harem with more than a hundred cows there are one or two "assistant beachmasters". Bulls which are not experienced enough to win a fight and so obtain a harem are called "challengers" or "bachelor bulls".

It is a very interesting and impressive sight to watch two bulls of equal strength fighting. First they challenge each other with tremendous bubbling, trumpeting roars. Then slowly they move closer and closer, now and then stopping for a blood-chilling roar. The normally flat proboscis is fully inflated. When close enough, they rear up and for a few seconds, balancing on one fifth of their body, they watch each other. Finally the fight starts. The aim of this fight

is similar to that in wrestling, to push the opponent off balance and get him down to the ground. In attempting this, they make use of their strong, upper canine teeth, biting each other on the head and neck and often tearing out large pieces of skin. Soon the bulls become covered with blood. Sometimes they stop for a few seconds, resting peacefully, and then start all over again. The fight lasts for 5, 10 or 15 minutes until, suddenly, one of the bulls deflates and retracts his proboscis and, with a pitiful whining cry, backs away. The other bull often chases the loser for several yards before returning to the harem. During the breeding season the whole island is noisy with fighting bulls, quarelling cows and yapping pups.

At first the harems are tightly packed masses of cows. When a cow feels that her pup will soon be born, she tries to move towards the edge of the harem and thus the groups gradually loosen up. Once a pup is weaned, it leaves the harem and tries to reach a protected, quiet place, usually the grass covered part of the beach, near the foot of the hills. This is quite a dangerous trip for the defenceless fat pups, because they are often attacked by young bulls and every year quite a number are killed.

Not much is known about the elephant seals' feeding habits. Judging by the stomach contents of dissected examples, it feeds on cephalopods, fishes and other small sea-creatures. Twice a year they fast for long periods: during the moult they do not eat for 3-4 weeks and during the breeding season, the bulls starve for 3 months and the cows for 4-6 weeks.

On land these seals have no enemy except man. Although the bulls fight seriously during the breeding season and so receive dangerous-looking wounds, during my three years on Macquarie Island I saw only one young bull dying as the result of an injury, probably the result of an attack by a much older bull. The mortality is very high during the first year of their life. Not infrequently pups are crushed to death by fighting bulls or by a careless cow in a crowded harem. Some pups wander away from their mothers and die of starvation. Rough seas may wash pups into deep water where they may drown. At sea the killer whale (*Orcinus orca*) is the most powerful and most dangerous enemy of elephant seals of all ages. Numerous mutilated carcases are washed up and many seriously injured seals crawl ashore carrying the typical toothmarks of a killer whale. Some of these recover, but many die.

The sealers killed the elephant seal for its blubber oil. Nowadays sealing is permitted only on Kerguelen Island, where in addition to the oil, the bone-meal and meat is also utilized, and on South Georgia where it is a subsidiary of the shore-based whaling industry. Macquarie Island is now a natural sanctuary for seals and an ideal place for making biological observations not only on the different species of seals, but also on penguins, albatrosses, petrels and other wildlife. Reopening the sealing industry on Macquarie Island would have disastrous effects. If sealing were permitted under the control of biologists, it would not be profitable. If the sealers were given a free hand, not only would elephant seals be exterminated, but several other species would also suffer. Although those who applied for a sealing licence on Macquarie Island in 1959 said that they would observe the sanctuary regulations, it is surely better to keep sealers away from the island. Would anyone employ a safecracker as night-watchman in a bank?

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

White-Striped Mastiff-Bat from Geelong

Mr. Trevor Pescott of Belmont writes:

Late in January 1965, Mr. P. Reed of Mannerim on the Bellarine Peninsula, fifteen miles east of Geelong, sent in a specimen of a bat which he had found on his property. It was dark brown in colouring, with a white patch on the body at the base of each wing. It was in a moderate stage of decomposition, useless as a skin, but quite suitable for a skeletal specimen.

The bat was forwarded to Mr. J. McKean of C.S.I.R.O. Canberra, who confirmed the identification as *Austronomus australis,* the White-striped Mastiff-bat. This is the first recorded occurrence of the bat in this district, but it is recorded occasionally from other parts of the State.

Gould records it from around Melbourne, but the precise locality is not readily available.

Troughton records several diagnostic features of the species, and these were evident in this specimen. These include the thickness and large size of the ears, and the curiously grotesque face with the thick, heavily wrinkled lips. The size, too, was interesting, for all other locally occurring bats I have handled have been small, little over half the body length of this *Austronomus*.

Apparently, the Mastiff-bats *A. australis* are solitary in habit, and McKean (pers. com.) records them as fast flyers which stay about the tree-tops rather than venturing below the trees in their search for food. Consequently, the bat is difficult to observe and specimens are difficult to obtain.

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[The Fisheries and Wildlife Department in Melbourne will be pleased to receive for identification any bats found in Victoria.

—R. H.J.McQ.]

Tree Ants, Green and Black

This interesting story comes from Mr. A. Fellows of Charters Towers, Queensland.

Some little time ago, in a tropical scrub near Babinda, I stood under a bush-lemon tree watching green-ants reconstruct their home of leaves that had been struck by a fallen dead bough. While they slowly hauled the leaf-edges together, sealing the joints and busily running in many directions, I paid little heed to some leaves curled up and dead but still attached to a nearby twig. My head was only a foot away from one dead leaf with several wary green-ant sentinels standing still facing me, their mandibles twitching constantly.

Accidentally I touched momentarily one dead leaf and was astounded to hear a rapid, rattling sound commence and keep going for some seconds, its origin being in the dead leaf. The leaf, curled and sealed at one end and with a quarter-inch hole at the other end did not itself vibrate at all, so, ignoring the green ants that had crept a little nearer, I tapped the twig deliberately when pandemonium broke out with a violent rattling easily audible three feet away.

Suddenly from the open hole in the dead leaf there erupted about a dozen quarter-inch long, jet-black ants with the most lustrous sheen that I have ever seen on any ants. I went closer to the leaf-nest and again gently tapped the twig to be astounded by a 'gymnastic' display, each ant raising and lowering its body at a rapid rate but never lifting a foot from the twig. All the ants faced me and the acrobatics went on for some seconds. Then I realized that their backs had bumped the leaf-roof inside many times before their exit and so had produced the rattling sound.

Fascinated, I stayed as close as I dared —about six inches from their heads—and gave one more tap on the twig. Away went the dancers again and suddenly I withdrew. A sudden smell of formic acid and a face that stung as after many insects' bites made me realize that I had been 'shot' and their last volley had scored well and truly.

I wiped off the acid—droplets too fine to see but obviously propelled my way by the 'dance' operation. A moment later two green ants, that had advanced closer, dropped like plumb-bobs on to my arm. Both got a good grip with their mandibles and then slowly lifted their thorax and abdomen into the air, their legs waving aimlessly. I removed them and several more that had dropped on to me from overhanging limbs and with only one look at their nearly completed nest of leaves, roughly football size, I left.

I had two more reminders as I followed the bush-track homeward, green-ants down my back!

Since then I always take a little portable tape-recorder as well as a camera on such trips. I have thought how puzzling the little rattling-dancers would have seemed had no explanation been forthcoming.

Almost certainly the green ants were *Oecophylla virescens,* a very pugnacious species that bites viciously but has no sting. The pupae of a closely related species are regarded as a great delicacy in Cambodia. Possibly the palate has to be educated to their acrid flavour. Having once been offered some cooked as a great honour, the editor had to eat them, but he had regretfully to decline a second helping!

Perhaps a Queensland reader can identify the black species?

—J.R.H.

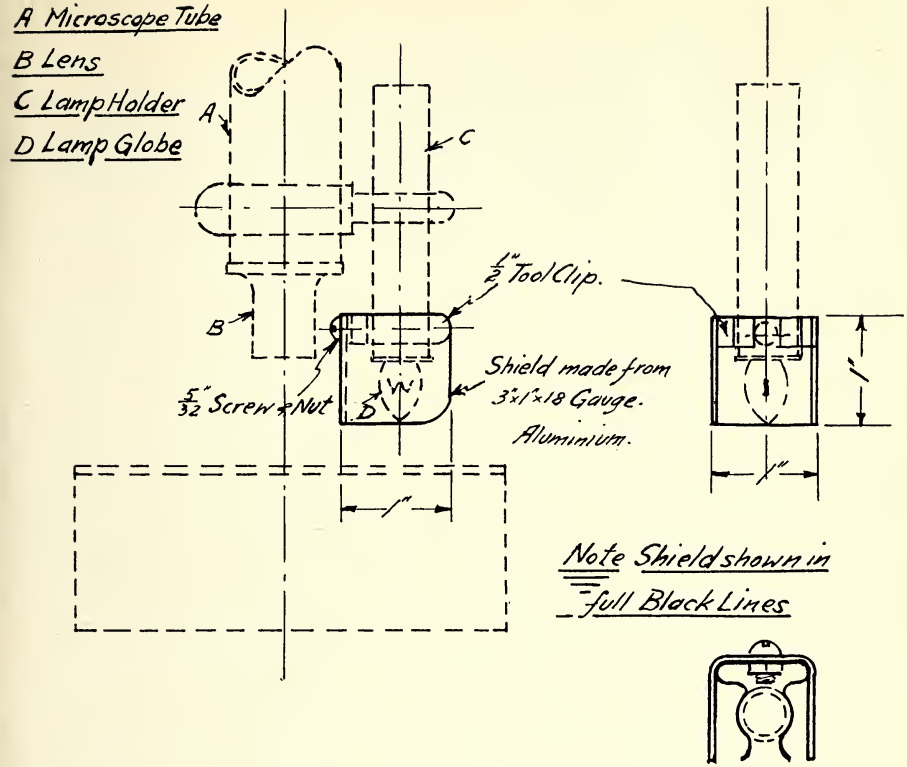
The Naturalist and the Microscope

A Simple Lamp-Shield

By W. C. Woollard

When using an electric globe for illumination of a slide on the microscope stage by top lighting, it becomes necessary to shield the light from striking the glass and mount of the objective lens.

The F.N.C.V. Microscope 6 volt globe has proved a very satisfactory source of illumination for the lens powers recommended for use with this apparatus. The illustration below will show a suitable design of light shield for attaching to the tube of its microscope lamp.



The shield consists of a piece of 18-gauge aluminium, 3" x 1", bent into a trough shape and has a standard ½" tool clip attached to the centre panel of the troughed metal by a 5/32" round-head metal thread screw and nut passing through the clip and trough, the whole as shown on the drawing.

The above particulars and drawing will give all the information necessary for any handyman to make such a shield.

Should you desire to purchase the shield complete, a number of these will be available from Mr. D. McInnes, 129 Waverley Road, Malvern, for the sum of 3/- plus postage of 1/- each.

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for May-December 1965 were due for renewal by May 1. If you will not be paying your fees at one of the forthcomcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

Some Comments on Bird Music

By K. C. Halafoff

Introduction

Since during this century bird song has become a focal point of interest for ornithologists, numerous articles and books have been published on the subject. All these writings however, have been concerned almost exclusively with the biological aspect of the phenomena and so one of the most important feature of bird song, its value as music, has been sadly neglected, even completely overlooked by some. One finds only scattered remarks about the musical properties of bird song in the papers and books on the subject and, although the increase of interest in the birds' creative activity is obvious, no large-scale attempt has yet been made to consider bird song purely as music.

And yet, if those statements found here and there in the literature on bird song are put together, it becomes obvious that bird song proper appears to be the result of a creative process which sometimes takes place under conditions which exclude the possibility that it is due solely to a flow of hormones. Some of the finest bird songs are heard in autumn, after the breeding season, when the bird's preoccupation with the raising of the brood, the defence of the territory and courting its mate are temporarily over, or nearly so. Such song appears to be functionless and yet is the best song of the year.

This is not to say that only nonfunctional songs may be regarded as creative art; bird song may be at other times functional and yet may have a high musical value. Territorial and mating songs belong to this category; however, Littlejohns (1933) noticed, that the Lyrebird song seems to deteriorate in clarity when the female comes near the singing male; the excitement of the latter results in abbreviation and inferior quality of the imitations. It looks as if an excess of the functional stimulus is harmful to the musical value of the song.

Nor are hormones a necessary factor in the creative process. According to Armstrong (1963), the autumn songs of some species are not linked with gonadal recrudescence in adults; on the other hand, the decrease in song of some American species does not seem to be correlated with changes in gonads but with environmental stimuli.

The main source of confusion however, lies elsewhere. Up to now no clear criteria necessary to sort out the calls from the songs exist; consequently many of the purely conversational birds' utterances are regarded and referred to as songs, the cuckoo's call, for instance. Those conversational calls, whose primary purpose is to attract immediate attention, do not have to be musical to do so, alarm calls, for instance, should be rather piercing or harsh to be effective. The same applies to certain mating calls, etc. Driving information home may, on the other hand, involve frequent repetition of the same sound or sequence. To convey a message quickly, all calls should of necessity be short and all these properties are certainly detrimental to their musical value. To consider even some of them on a parity with song means lowering the overall quality of bird music. If however we adopt the definition of calls as stereotyped utterances of the given species, and regard as "song proper" only those utterances in which the pattern of the sounds is *created* by the bird, this pattern could be more easily scrutinized and their

musical properties established. It is not at all important whether such utterances have a function or not, or whether they are prompted by any glandular activity: the only relevant thing is whether such utterances can be classified as music, and what particular characteristics they have.

It would probably be instructive to begin a discussion of bird music by quoting at least some of the above mentioned remarks on the subject found in books and articles on bird song and thus let the general picture emerge gradually in the reader's mind.

I

W. H. Thorpe in his book "Bird Song" (1961) mentions the "almost universal conviction that the more complex utterances of birds do constitute a form of art". He says that "there are many instances of song which . . . suggest that the bird is actively seeking new auditory and vocal experience . . . and that may represent the beginning of a true artistic activity". He states that "birds can sing in the same pitch day after day with a minimum of variation and . . . can transpose within limits." He considers that "there is evidence that birds can analyze the pitch of brief sounds more successfully than we can". Armstrong finds that "pitch discrimination of a budgerigar and at least some songbirds exceeds ours". Thorpe considers that of eight factors involved in music—melody, harmony, rhythm, form, tempo, dynamics, tone colour and nuance, all except harmony (and possibly nuance) are present in innumerable examples of bird song. Armstrong (1963) also considers that "although some birds can sing more than one note simultaneously, harmony in the true sense is absent from their singing". The author however finds it hard to agree with the exclusion of harmony from the properties of bird song, the more so since the occurrence of harmonic intervals and chords in the songs of those multi-voiced birds is about as frequent as it is in musical pieces written for solo violin or solo cello—which we would hardly consider to be devoid of harmonies. Thorpe himself mentions later that the Brown Thrasher and the Reed Warbler may emit two simultaneous notes, and the Wood Thrush up to four.

As for tonal clarity of bird song, C. Hartshorne (1957, 1958) states that "there is clear evidence that birds have something like our sense of the beauty of sounds". He finds in bird song "the absolute absorption in the elementary possibilities of music, in each tiny fragment of exquisiteness". He considers that "few if any musical tones are purer than those of some birds". The tone of the Olive Whistler is referred to by Arthur Groom as "the sweetest in the bush".

Cheney (1891) finds the Black-capped Chickadee notes "the purest this side of Heaven". Skutch (1946) refers to a full-toned warbler female as so beautiful that "no less than music of Orpheus, it seemed to possess power to draw iron tears down Pluto's cheek". Hartshorne (1957) praises the pure flute tones of the Rufous-and-White Wren and compares the Pied Butcher Bird to a "magic flute, a perfection of musical tonality". He finds that the Grey Thrush's deeper notes have a voluptuous richness and terms the higher notes "often utterly exquisite".

Hartshorne terms the song of the Grey Butcher-bird as "flute-like, very definitely so at times" and compares the tone of the White-Throated Warbler with a "super high-pitched but perfectly tuned flute". The chime-like tinkles emitted by the Crimson Rosella

are of great purity, while the Bell-Bird call sometimes sounds like a slightly cracked bell.

That birds can compose their songs appears to be a fact recorded on many occasions. Len Howard (1952) has shown how a Blackbird used its aesthetic judgment by discarding some temporarily adopted adornments which did not prove to satisfy the bird's inborn feeling for form and melodic line. Craig (1943) and Saunders (1951) agree that the Wood Peewee exercises aesthetic choice; in their view the bird can and does compose. Thorpe (1961) finds that the Chaffinch "certainly shows some invention" in its song. Hartshorne terms the majority of Grey Thrush songs "musical masterpieces". Szöke (1957) says that the song of the Woodlark is rich in musical invention and approximates most closely to human music. Birds with longer songs like Blackbirds show considerable skill in combining their musical phrases in a manner which suggests a feeling for a most advantageous order of component tunes, as Joan Hall-Craggs (1962) has proved. She says in her excellent paper on the Blackbird's song that "the bird might be possessed of a natural feeling for rhythmic shape or melodic line" and that "there is a trace of aesthetic activity and the bird's appraisal of its own voice is partly subjective". She admits that "the complexity of full territorial song may overtax our appreciative capacity". Hartshorne (1957) praising the song of the Rufous-and-White Wren says that the leisurely six or eight variations of each song could be surpassed . . . only on a level of complexity higher than the theme itself warrants." P. Szöke (1962) states that the notes of birds may be referred to harmonic series, and that a fully developed song is music in that it is a tonal system based on the transposition of intervals and musical phrases.

Regarding the structure of the songs of mocking birds, Saunders (1929) says that mimicry "suggests that the bird is at least on the threshold of combining utterances by free choice". Hartshorne (1957) regards the imitative capacity as musical intelligence, since it is a grasp of sound patterns as interesting on their own account". Such song is comparable to an "orchestra administered on solo lines" using E. W. White's definition from his book on Music by Stravinsky. The author has demonstrated in his "Musical Analysis of the Lyrebird Song" the striking constructional similarity between Stravinsky's Symphonies for Wind Instruments and a Lyrebird song. It could be added here that the composition and character of the courting song of the latter species bears a close resemblance to Pierre Boulez's "Le Marteaux sans Maître". However, the song of mocking birds is a very complex phenomenon which cannot be fully defined in a few quotations.

From this short review of the characteristics of bird song it appears that (1) birds can compose and even improve on their composition; (2) they seem to possess aesthetic taste; (3) they probably have the gift of absolute pitch and can transpose from one musical key to another; (4) their song is a tonal system; (5) harmony is present in the songs of those birds which can emit more than one simultaneous sound; (6) the melodic line of bird song appears to follow our musical scales closely and (7) all elements of music, except probably nuance, the presence of which is neither proved nor disproved, are present in bird song. This seems to give an affirmative reply to the question whether, from the human point of

view, bird song can be considered as music.

II

The main allegations levelled against birds' music are its alleged short duration and simplicity of melodic pattern. So Hartshorne (1960) comparing our music with bird song says "Man's superiority is in the complexity of patterns he can apprehend, and the length of time they stretch over; his freedom is between elaborate systems of patterns, not just little bits of patterns". As regards bird song, he considers that "the longest quite definite song pattern . . . . is much less than half a minute". However, H. Ansley suggested a misconception in our judgment of the duration of bird song when he stated that "birds live in a faster tempo than we do, so that 'brief' to us and 'brief' to them are probably not quite the same". Thorpe, too, considers that "this temporal limitation of the motifs of bird songs . . . . does not of course necessarily imply that the songs are short from the bird's point of view.

The main reason of the seeming "shortness" of bird songs as they appear to us is that, because of our poor time perception scale, which is very large (Thorpe), we do not hear *all* the notes of bird song; even in such slow songs as the Blackbird's we hear only about one third of the total number of notes uttered by the bird, as Hall-Craggs (1962) has shown. Pumphrey (1961) considered that the bird's time perception characteristics are probably better than ours by a factor of 10.

A revision of the above misconception, long overdue, is likely to change radically the still persisting opinion that birds' music is inferior to our own. Moreover, in all fairness one should frankly confess, that not too many composers possess a clear, laconic melodic language so characteristic of birds, and that the length of our musical pieces is often obtained by stretching and "watering" them by excessive development. To use the length of such works as a measuring stick for duration of music would hardly be fair to the birds.

Another feature of the song for which the birds were frequently blamed was repetition and recurrence of some phrases. This is a device commonly used in human music as well. In short musical pieces it involves the return to the initial theme in the finale; in longer compositions such as a sonata or a concerto the themes reappear throughout the development and often the beginning phrase recurs in the coda. Even an immediate repetition, twice or even many times, of the same short musical phrase is often found (Schumann's Arabesques and many episodes in Stravinsky's Rite of Spring). Ravel's "Bolero" up to its coda consists of repetition by different groups of instruments of the same tune throughout the entire piece. Repetition can of course be misused to the utter boredom of listeners, as the last part of Smetana's "Ma Vlast" shows too obviously. However the use of anti-monotony principle by birds (Hartshorne) resulting in the spacing of phrases, or groups of phrases, by appropriately long pauses helps to let the effect "wear off" in listeners' memory before a new repetition occurs. In the Lyrebird's song a number of items, both its own and imitated, reappear now and then, but this bird uses, instead of pauses, a constant change of order of items to retain the freshness of its song. On the other hand the Song Thrush, which usually repeats each item of its song several times, switches over to the next pattern before the previous one has produced a feeling of boredom—in a manner rather resembling that of "Rite of

Spring". Admittedly some birds' utterances, like the Yellow Robin's endlessly repeated one-note alarm call, can be annoying, but such and similar utterances cannot be termed songs and therefore are beyond the scope of the present analysis.

It remains now to deal with the criticism of the alleged "simplicity" and "primitiveness" of birds' melodies. Such opinions expressed frequently in the past were, in fact, based on a lack of information about the full content of notes in the song, of which the human ear, because of the already explained imperfect time perception scale, heard only a small portion. As a result, the melodic line as it was heard at the normal tempo of singing was entirely wrong, full of gaps and containing the merged together, adjoining notes. Even when a song was written down from a greatly retarded replay, the resulting score proved to differ in the number and pitch of notes from the sound spectogram of the song (see Hall-Craggs, 1962) or differed in the duration of notes and pauses (see Halafoff, 1964).

It took highly sensitive and precise electronic devices like the Vibralyzer and Sonograph to reveal to us the song in all its intricate complexity. When, in addition to the large number of patterns revealed by sound spectograms, the intricacy of some of these patterns is fully realized, it is indeed impossible to regard seriously bird melodies as constituting a "primitive form of music"; when at their best, they are concise, clear-cut statements often reaching the level of a masterpiece, in comparison with which quite a few melodies in our own music may seem rather diluted, unduly stretched and loosely constructed.

III

A subject that has been often discussed is whether birds hear their voices as we hear them, that is to say whether their voices sound mellower to them, as has been suggested by Hartshorne (1957) who wrote: "The significance of the high-pitched quality . . . . may be well in part anthropomorphic. For the upper limit in small song birds seems to be rather higher than the human limit, and hence what to us are extremities of shrillness, to the birds are probably sounds somewhat mellower than to us"; but on the other hand, the absence of bass notes under 100 c.p.s. would increase the shrillness of trebles, as any one in possession of a Hi-Fi set can prove by turning the bass control knob down. However, as the two factors, attentuation of high frequencies which are stronger in birds than in man, and absence of deep bass, tend to cancel one another to some extent, it may be supposed that, in general, birds' voices probably sound to themselves and to us nearly alike.

IV

An intriguing question is the extent to which bird song is a free flow of improvised tunes, in other words, is there any attempt by the bird to control or to arrange that flow.

From Hall-Craggs' graphs it appears that there is not much in the way of improvisation in her Blackbird's song; there are numerous attempts to vary the basic tunes themselves and their combinations. Hartshorne (1953) finds that in a Blackbird's sustained song the items appear always in the same order; one may conclude that such a song is pre-composed, in other words, it is a finished musical piece. However, very few birds follow the same pattern in their songs. The Australian Grey Thrush's song can be defined as a series of variations of the basic tune; the Magpie's song appears to have a number of improvisations along with a few basic tunes.

As for the "mockers" they appear to be pure improvisers with no established order of sequence. In a Lyrebird's song the pattern of imitated and original items is constantly changing, and no section of the song repeats them in the same order as previously, thus avoiding monotony.

It would be useless to try to guess how much conscious effort, if any, is behind a certain bird's musical piece, and what part of it owes its existence to an uncontrolled flow from the subconscious. This is extremely difficult to sort out even in the case of human poetry or music, and a bird's mind does not function in the same way as ours. It appears possible, however, that a Blackbird may rely on its ear in selecting the alternate melodies while combining them into some of its songs, by simply rejecting what it does not like. A Lyrebird may also rely on its ear when picking up its supply of premodulated imitations. There may be, apart from pure instinct, some half-conscious brain activity in this process, but this will remain only a matter for conjecture until some evidence becomes available.

V

This review would not be complete without examining the influence of bird music on human composers. Actual reliable references are few, but many borrowings were probably made without mentioning the source. A few instances can still be traced. Mozart early one morning left on his wife's pillow a note saying: "A bird outside is singing a song that is in my heart. I am going out to catch the strain and write it down *as my own* and yours. I shall be back in one hour." There is no further reference as to what use he made of that melody and where. Mozart also once bought a caged Starling and wrote down some of its song; again, there is no reliable record of what he did with that tune. Beethoven was known to walk in the woods listening to the birds, and a quail and a cuckoo may be heard in his Pastoral Symphony; probably the tune of the first bar of the Scherzo in his Violin Concerto, which Len Howard heard from a Blackbird in her garden, was borrowed by Beethoven from a Blackbird. This particular melody is apparently one of the usual items in the song of this species, as the author heard exactly the same tune from a Blackbird at Ashwood here in Australia. The same bird also sang the first bar of Schumann's "Arabesques" which it later changed, by raising the last note half a tone, into the opening tune of Brahms' Hungarian Dance No. 4. The fact that in all three cases the first bar of a musical piece was involved suggests that the bird's melody may have been the source of inspiration triggering the composer's response.

Quite apart from the mentioned inclusions, intentional or coincidental, of birds' tunes in the musical pieces, there is also some programme music inspired by the birds. Such are, to name just a few, Schumann's "The Bird as Prophet", Liszt's "Francis of Assisi Talking to the Birds", Grieg's "Little Bird", Respighi "The Birds". Among contemporary compositions Messiaen's "Catalogue of Birds", although a piece of programme music by name, stands alone for the content of that massive work is actually based on bird melodies. One cannot help thinking that if eminent composers were often inspired by bird tunes to the extent of literal quotations, they certainly considered them to be on a parity with their own melodic invention—a very high qualification indeed.

VI

On the basis of data analyzed in previous chapters, a comparison can

now be made between bird music and our own. The approach to this comparison may be along two lines. On one hand the musical *abilities* can be weighed against one another; on the other hand, music resulting from the exercise of these abilities may be compared.

In order to reduce to a minimum repetition of what has been already stated, it may be convenient to omit everything which avian and human music have in common, and to concentrate on the points of difference.

It can be stated, first of all, that birds do not possess the degree of intelligence which has enabled us to produce massive and elaborate polyphony by combining our natural voices in choral singing or by the use of man-made instruments which can produce polyphonal effects either within the range of a single instrument, e.g. piano, or by a combination of numerous instruments, each, or each group, with a timbre of its own, such as a larger or smaller orchestra. Birds' musical abilities are restricted by the nature of their vocal organs; within these restrictions some birds can produce more than one simultaneous melody or more than one note, with a 4-note chord (according to Borror and Reese) as the limit. As to the production of sounds of different timbres, while only a few songbirds may produce notes of more than one timbre, e.g. Gouldian Finch, the range of timbres in the songs of some mocking birds may be compared favourably with that of an orchestra. As for communal singing, the abilities of birds do not extend beyond duets—unison and antiphonal—and duet in harmony is rather exceptional. On the other hand, the chordal and glissando effects, which some birds can produce, approximate those in music written for a solo string instrument. Some of these effects are very intricate and many birds show a considerable amount of musical invention, the melodic line very often coming quite close to our conventional combinations of notes (arpeggio, triads, etc.).

The lack of studied data on the harmonies used by birds does not yet allow us to reach definite conclusions regarding the use by birds of consonances and dissonances, but it appears that they may discriminate between these. It is certain that they use both, with consonances largely prevailing. It appears that birds sometimes, instead of resolving a dissonance into consonance, prefer to use a pause after a dissonance as a substitute for resolution thus allowing the effect of the discord to "wear off".

The occurrence of some identical melodies in bird songs and human music has been mentioned already. Some of them are undoubtedly borrowings from birds; Mozart's note to his wife and Messiaen's work are examples. On the other hand, it is not impossible that at least some of these identical melodies may have been the result of two independent creative processes, and that the bird and the composer arrived at the same tune each on his own accord. This problem may never be fully resolved even if fresh evidence becomes available. It is hard to predict the further development of this parallelism, but it may be stated that certain modern classics and especially the music of Von Weber and of the School of "Klangtarbenmelodie", where each note may be allotted to a different instrument, comes very close to the mocking bird's "orchestra administered on solo lines".

It should be mentioned however that the character of birds' tunes differs in some ways from ours. The whole of our melodies are based, as a

rule, on a pattern of sustained notes, in bird music glissandos, so rare in ours, play a prominent part. The tempo of bird music is faster than our allegro by about 2 (Lyrebird) to 15 times (American Winter Wren, River Warbler). Since our hearing of individual notes becomes confused already at Lyrebird's tempo, it explains why we missed so many notes of bird song until the sound spectrograms proved their existence. Bird trills also differ from ours in that they are slurred both ways, up and down. Some birds use highly sophisticated devices in their music, for example unequal swelling and fading of simultaneously struck notes in a chord (Blue Jay). Such a device appeared in human music quite recently ("Stockhausen's Zertmasse" bar 187) and this fact is one of the most startling proofs that birds are not such musical simpletons as some still think. It even appears that sometimes certain birds resolve a consonant chord into a dissonant (Carolina Wren). Strangely enough, the effect, even in a greatly retarded version, is not easily noticed by the ear, but becomes strikingly obvious if the tape is played backwards and the musical episode starts with that dissonant chord. Interval trills, gradually increasing intervals in a tremolo and held notes in glissando passages are also among the refined devices freely used by birds.

CONCLUSION

To conclude this article, it would be proper to state that our study of birds' music as such is still in its cradle. Too much emphasis on the numerous different functions of the song so diverted the attention of ornithologists that the musical aspect of bird song remained almost completely unexplored. Only in the recent past, when the advance of electronics made it possible to record the astonishingly complex song-patterns, the interest of scientists turned to the musical properties of bird song. Apart from a few trifling bits, we know nothing about the birds' use of harmonies and counterpoint, about the flow of melodic line of the song, about special musical devices used by birds; we are not even sure what kind of musical scale the birds are actually using, and the little we have found has been stated in the literature in non-musical terms, which do not reveal much of the nature of all these phenomena. We are only starting to talk in terms of consonances and dissonances about birds' intervals and chords which up to now have been regarded as simultaneous notes. Yet it is to be hoped that the thrill of opening up this new field of science will induce some keen pioneers to explore its fascinating riches, the value of which, for human music and human culture in general, we can now only dimly guess.

List of Birds Mentioned in the Text

Blackbird (*Turdus merula*).
Black-capped Chickadee (*Parus atricapillus*).
Blue Jay (*Cyanocitta cristata*).
Brown Thrasher (*Toxostoma rufum*).
Budgerigar (*Melopsittacus undulatus*).
Carolina Wren (*Thyrothorus ludovicianus*).
Chaffinch (*Fringilla coelebs*)
Crimson Rosella (*Platycercus elegans*)
Crested Bell Bird (*Oreoica gutturalis*)
Cuckoo (*Cuculus canorus*)
Gouldian Finch (*Poephila gouldiae*).
Grey Butcher-bird (*Cracticus torquatus*).
Grey Thrush (*Colluricincla harmonica*).
Lyrebird (*Menura novaehollandiae*).
Magpie (*Gymnorhina hypoleuca*).
Olive Whistler (*Pachycephala olivacea*).
Pied Butcher bird (*Cracticus nigrogularis*).
Quail (*Coturnix coturnix*).
Reed Warbler (*Acrocephalus scirpaceus*).
Rufous-and-white Wren (*Thryothorus rufalbus*).

Song Thrush (*Turdus philomelos*).
Starling (*Sturnus vulgaris*).
White-throated Warbler (*Gerygone olivacea*).
Woodlark (*Lullula arborea*).
Wood Peewee (*Contopus virens*).
Wood Thrush (*Hylocichla mustelina*).
Yellow Robin (*Eopsaltria australis*).

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Lyrebird-Fowl Hybrids, Mendel and Evolution

By Keith P. Hertzog

Recently interest has been revived in a very unusual reported hybrid, that between the fowl and the Lyrebird (*Gallus domesticus* x *Menura novaehollandiae*). As a perhaps unique case of reported interordinal hybridization, the material involved merits very special investigation and interpretation. The original material has been admirably summarized by A. H. Chisholm (*Vict. Nat.* Dec. 1964). In this short paper the present author would like to present a discussion of two aspects of great possible interest concerning the hybrids and an even briefer preliminary analysis as to the validity of the claims.

In recent years there has been a controversy concerning the mechanics of the evolution of higher taxonomic categories (often called macro-evolution or trans-specific evolution), such as families, orders and classes. One school has maintained that macro-evolution is not qualitatively different from micro-evolution, i.e., natural selection operating on variation within a population. This synthetic theory, held by Simpson, Mayr and Rensch, to name a few, is now virtually universally accepted. The other school maintains that macro-evolution is qualitatively different from micro-evolution, and one of the concepts used by this group is that of the saltation, or the origin of a new taxonomic group in a single jump. It is with reference to saltations that the Lyrebird-fowl hybrids have great interest.

Before continuing, it is of importance to note that these hybrids were produced in the wild and that Milligan's birds were fertile *inter se*. They were not hybrids produced in an artificial laboratory environment nor were they sterile. If either of these had been the case, the evolutionary interest in these hybrids would be virtually non-existent, since sterile animals do not pass on their genes and evolution has attained its results without the benefit of human laboratories.

The parental species of these hybrids are presently classified in two separate avian orders (perhaps a re-examination of their relationship might be warranted by the confirmation of these hybrids). The hybrids themselves had a combination of characteristics from both distantly related species. The question is, how would they be classified? If Milligan had continued to breed his hybrids and a population of them existed today, *and if* they were reproductively isolated from both parental species, it would be hard to see how placing the hybrids in any taxonomic group which included one parental species and not the other could be justified (cf. creation of new genus *Raphanobrassica* for fertile *inter se* cabbage-radish hybrids). In short, the hybrids would almost have to have been considered a new order. Thus the situation appears to be that of the origin of a new higher taxa or form in a single jump.

Does this mean that the widely acclaimed synthetic theory idea of macro-evolution is wrong? Emphatically no! The vast preponderance of evidence supports it. One can think of a myriad of problems involved in the occurrence of a new form by this process, megahybridization, to coin a term, and its survival. Vitally important evolutionary considerations concerning the Lyrebird-fowl hybrids are whether they were reproductively isolated from both parental species, and whether they would have been ecologically competitive in the wild. The chances of the survival and successful evolution of a higher taxa produced by megahybridization are probably as small as the production of the hybrids themselves. Megahybridization is undoubtedly of no great evolutionary significance, but reported naturally occuring (of course fowls are not native to Australia) fertile interordinal hybrids are of considerable evolutionary interest and should not be completely ignored.

A second field in which these hybrids have great potential interest is the history of genetics. According to O'Donoghue, Milligan had been experimenting with his hybrids, which were on the whole more fowl-like than Lyrebird-like, to try to get features of the Lyrebird, and had raised two generations before he ceased his experiments. Milligan, in his 1892 letter, writes, "I have not heard any sound from them to indicate that they inherit the imitative faculties of the Lyrebird but it is within the region of possibility that they may yet develop them." (*Vict. Nat.* Dec. 1964). This would seem to indicate that the train of thoughts which led to experimentation had already begun in Milligan's mind. The special interest here is due to the fact that, as O'Donoghue points out, Milligan's work was done prior to the rediscovery of Mendel's paper in 1900.

The exhibition of ancestral traits by a hybrid after having been absent for one or more generations was loosely known in the 19th Century as reversion or atavism, and all the main theories of inheritance of the time attempted to explain this phenomenon. For example, Darwin explained reversion as being due to dormant gemmules, and the fact that the offspring of hybrids are more variable than the first generation was explained by assuming that the reproductive system of the hybrid was seriously affected by changed conditions.

The explanation in terms of Mendel's work is fairly simple. If two individuals are crossed, one homozygous for the dominant gene of a certain trait and the other homozygous for the recessive, the offspring of the cross (F_1 generation) will have to be heterozygous, since each individual receives only one gene from each parent, and each parent has only one kind of gene; thus the offspring will all show the trait of the dominant gene since the recessive gene is masked. If the F_1 generation is now inbred, the offspring (F_2 generation) will not all be alike because now each parent has both kinds of genes, and which one an offspring gets is determined by chance. The statistically expected ratio is $\frac{1}{4}$ inheriting the dominant gene from both parents, $\frac{1}{2}$ inheriting the dominant gene from one parent and the recessive from the other, and $\frac{1}{4}$ inheriting the recessive gene from both; thus the recessive phenotype will show up in $\frac{1}{4}$ of the cases, and it has reappeared after being absent in the F_1 generation.

Observation of the fact that ancestral types reappeared in the second hybrid generation was made several times prior to 1900, probably beginning in 1822. But apparently no one

was determined or interested enough to do anything further than mention the fact and perhaps list the frequency of the F_2 types.

Milligan, on the other hand, perhaps was in a frame of mind closer to Mendel than any of the other pre-1900 workers. He knew that his parental types were the fowl and the Lyrebird and also that the F_1 hybrid generation was principally fowl-like (his 1892 letter), but he must have thought that certain Lyrebird traits were still present even though masked and he attempted to get these traits in succeeding F generations. One cannot help but wonder what would have happened if Milligan's purpose and interest had been working on very simple genetic traits such as Mendel had used; it is not impossible that he would have discovered Mendel's principles independently. Unfortunately the genetics involved in the Lyrebird-fowl hybrids were without doubt far too complex for him to have succeeded. It seems quite possible that his failure had something to do with his apparent lack of eagerness to publish.

What can be said as to the validity and scientific acceptance of the reports? In the face of the lack of further information, the situation boils down to inherent skepticism and discrepancies in description vs. the multiplicity of cases and the competence of the observers.

The weightiest factor is undoubtedly the inherent scepticism which is immediately invited by the unique inter-ordinal status. A more serious point against the validity of these reported hybrids involves the fact that Davis's birds and those from Twofold Bay were described as being more similar to Lyrebirds, while Milligan's were more like fowl. The extreme brevity and quality of the first two descriptions should be taken into account here, but a solution to this problem must await further developments.

The first thing that can be put forth in favour of the validity of these enigmatic birds is the fact that there is not just one case of reported hybridization but at least three; earlier the present author had thought there to be four (*Vict. Nat.* Feb. 1964) but he now agrees with Chisholm that Maclean's skin was probably from one of Davis's birds—the dates, type of fowl and area seem to check. A second point involves the competence of the observers involved. Milligan, Maclean and O'Donoghue (the tone of his article seems to indicate that he was personally familiar with Milligan's birds) were all expert observers, and all thought that they were dealing with actual Lyrebird-fowl hybrids. Milligan in particular was, to quote Chisholm, "a keen ornithologist and a competent writer" (*Vict. Nat.* Dec. 1964) and must have been utterly certain of his facts to have engaged in lengthy experimentation. In addition, when Milligan's birds were exhibited at a poultry show in Melbourne, the judges were sufficiently impressed to award them a special prize. The other two groups of hybrids would seem to have achieved a moderate notoriety of sorts. Finally, before lack of confirmation of this hybrid is cited, one should keep in mind that when Whittell made his initial request for additional information, the O'Donoghue, Maclean, Davis, and Pennycock materials were not generally known. Whittell and Chisholm, by themselves, tracked down these four confirming, if you will, reports.

In conclusion the author agrees with Chisholm's statement, " . . . it seems to me that it would be presumptuous to suppose that several men, each functioning independently must all

have been wrong in reporting the existence of hybrids between Lyrebirds and fowls."

Editor's Note. We suggest that, in view of the scientific importance of the subject, an attempt be made to repeat Milligan's experiments.

Ronald Campbell Gunn

By Violet E. Balaam

Ronald Campbell Gunn was born on April 8th, 1808, at Cape Town, where his father was a lieutenant in the garrison. He was educated in England for the army and was attached to the Royal Engineers' office at Barbados; but in 1829, he emigrated to Tasmania, then known as Van Dieman's Land, where he was made Superintendent of Convicts for the Northern Division (1830). In 1836 he was made Police Magistrate for Circular Head. In February, 1836, he chartered a small vessel and visited various parts of Victoria—Port Philip, Western Port and Port Fairy —with a view to squatting, but the drawbacks at the time were so numerous that he preferred to retain the office of Police Magistrate at Circular Head. Here he remained until 1838, when he was transferred to Hobart. In 1839 he was made private secretary to the Governor, Sir John Franklin. His intimacy with Sir John and Lady Franklin continued until their deaths. In 1841 he left the public service to take charge of a large estate near Longford in Northern Tasmania and employed his spare time for the next 14 years in botanical researches. In 1855 he was elected by Launceston to the Legislative Council and, later, to the Legislative Assembly by Selby, the district in which all his property lay. He held minor official posts in Launceston. In 1864 at the request of the New Zealand Government he was appointed by the Tasmanian Government one of the three commissioners to choose the New Zealand capital. The various offices he filled from 1860 onwards, namely those of Deputy Commissioner of Crown Lands, Clerk of the Peace and Deputy Recorder of Titles, he was at last compelled to vacate because of ill health. He was presented with a highly complimentary address and a purse containing 300 guineas, and was granted a pension of £250 per year.

But the work and service for which he was chiefly honoured in Tasmania was his scientific investigation. Botany was his favourite study and this subject he pursued with unfailing energy. At an early age he was elected a Fellow of the Linnean Society of London, and subsequently a Fellow of the Royal Society of London, the highest scientific honour that can be conferred on any person.

He began to investigate the botany and natural history of Tasmania within two years of his arrival and in prosecution of his researches he rambled over most of the colony. Accounts of his excursions and other scientific labours appear in the Annals of Natural History, the Journal of Botany, and similar publications. He was one of the Founders of the Royal Society of Tasmania, being the secretary from 1844 onwards, and frequently contributed to its Journal. He was also editor of the Tasmanian

Journal, a scientific serial published by the Royal Society of Tasmania. The late John Gould in his valuable work upon the birds of Australia acknowledged the great assistance which he had received while in Tasmania from Mr. Gunn.

Sir Joseph Hooker, the great English botanist and President of the Royal Society of London, was his firm friend and admirer. He dedicated his Flora of Tasmania to Gunn and in this great work gives an account of Gunn's botanical labour, often quoting his very words. He named a genus *Gunnia** (a small alpine herb) after him and about 50 species of Australian plants. In addition there is a bandicoot named in his honour. Among the plants is one of the commonest species of *Cordyceps*, a eucalypt (a small tree 20'-30' high with yellow blossoms) and an *Acacia* (a small bush 2'-3' high with phyllodes of various shapes and solitary, deep yellow flower heads. Many alpine plants were named after him as were also some beautiful native Tasmanian shrubs. Among the more familiar flowers we find a *Pultenea*, a white *Epacris*, a white *Tetratheca*, a creamy perennial *Stackhousia* having a rather disagreeable odour, and a fine pink *Boronia* with extra large blooms.

As a man Ronald Campbell Gunn was of a genial, kindly nature. Through a trying illness lasting for some years, his faculties remained remarkably clear. When well enough to see friends they were struck by his cheery manner and conversation. His death on March 13th, 1881, just before his 73rd birthday, was a happy release from long suffering, but it cast a gloom over the whole community, for he was a man universally loved and respected.

* *Neogunnia* (F.v.M.) Pax and Hoffmann (Aizoaceae) also commemorates Gunn. *Editor.*

Field Naturalists Club of Victoria

Annual Meeting, June 14, 1965

About 140 Members and friends attended the 1965 Annual Meeting of the Club. The President, Mr. M. K. Houghton, was in the Chair. The Minutes of the 1964 Annual Meeting held on June 8, 1964 were taken as read on the motion of Mr. W. Woollard, seconded by Mr. E. S. Hanks, and confirmed.

The Hon. Secretary's Report, published on pages 52-56 of the June *Naturalist*, was adopted on the motion of Mr. E. H. Coghill, seconded by Mr. J. R. Hudson.

The Hon. Treasurer's Financial Statements and Balance Sheet, printed on pages 57-59, were summarized briefly by Mr. A. G. Hooke. He mentioned that the loss of £162 in the year, the largest that the Club had ever experienced, had been foreseen. Although the day-to-day expenses incurred in running the Club showed a tendency to rise in parallel with the general increase in costs, the main increase in expenditure had been occasioned by the rise in the cost of producing the *Naturalist*. On the other side of the Statement of Receipts and Expenditure, the increase in Supporting Subscriptions was a pleasing feature. A new item amongst the receipts was the interest on the Marion Wright legacy. It was expected that the rise in subscriptions, to which Members had already agreed, would enable the Club to balance the General Account in future.

Turning to the Balance Sheet, Mr. Hooke said that the Microscope Project showed, at the moment, a surplus of £284. This had not been paid into the General Account as it was the intention of Council to ask those who had been responsible for instigating the Project to suggest a use to which it should be put.

Moving the adoption of the Financial Statements and Balance Sheet as published in the *Naturalist* Mr. Hooke said that they had been examined by the Finance Committee, by Council and by the Hon. Auditor. Mr. Fairhall seconded the motion and after the President, Mr. M. K. Houghton, had asked if there were any queries for the Hon. Treasurer to answer, the motion was put and carried. The President congratulated Mr. Hooke on the way in which he looked after the Club's finances and thanked him on behalf of all Members for his work.

The President said that, since only one nomination had been received for each position, no Election of Officers would be necessary. He, therefore, declared the following elected unopposed:

President: Mr. M. K. Houghton.
Vice-Presidents: Messrs. A. J. H. Fairhall and E. Byrne.
Secretary: Mr. E. H. Coghill.
Assistant Secretary: Mr. R. Condron.
Treasurer: Mr. A. G. Hooke.
Assistant Treasurer: Miss M. Butchart.
Editor: Mr. J. R. Hudson.
Assistant Editor: Mr. R. H. J. McQueen.
Librarian: Mr. P. Kelly.
Assistant Librarian: Miss M. Lester.
Excursion Secretary: Miss M. Allender.
Council: Messrs. E. R. Allan, B. F. Fuhrer, J. Ros Garnet, F. L. Jeffs and T. Sault.

On the motion of Mr. W. Woollard, seconded by Mr. E. R. Allan, Mr. W. P. J. Evans was re-elected auditor. The President thanked Mr. Evans for his audit of the 1964-65 accounts.

The next item of business was the proposed change in the Financial Year. The President said that this had been discussed at the March, 1965, General Meeting and an opportunity for further discussion had been given at the May Meeting. Since this change involved amendments to the Articles of Association, the change could only be made with the permission of the Attorney General and by a Resolution at a Special or Annual General Meeting. The Attorney General had given his consent. Mr. Coghill then moved that "From January 1966 the financial year be from January 1 to December 31, instead of from May 1 to April 30, and the Articles of Association be amended by substitution of January for May in the second line of Article 12 and of July for November in the third line of Article 13 to give effect to this". This resolution was seconded by Mr. J. Ros Garnet. There was no discussion and, when the motion was put by the President, it was carried *nem. con.*

Mr. Coghill reported that he had received a letter from a Member living at Tailem Bend, South Australia, asking to be put in touch with a specialist on ants. He announced that copies of "Your

Australian Garden. No. 1: Propagation". published by the David G. Stead Foundation, would be available for purchase by Members at meetings. He asked that the Member who had volunteered to represent the Club at the ANZAAS meeting in Hobart contact him again as he appeared to have the initials wrong. Mr. Coghill then read the letter on shooting Cape Barren Geese that, on the instructions of the May Meeting, he had addressed to the Premier of Tasmania. As yet no reply had been received. He had very great pleasure in announcing that the 1964 Natural History Medallion had been awarded to Miss Winifred Waddell and he knew that this award would be approved by all Members who knew her and her work. Miss Waddell hoped to be able to attend the October meeting to receive the Medal.

The Subject for the Evening was an illustrated talk by Mr. H. Alan Morrison on "Wildflowers of W. Australia and Central Australia". Mr. Morrison described two tours by road, the first via Port Augusta, Coober Pedy, Mt. Connor, Ayer's Rock and the Olgas and the George Gill Range to Alice Springs and back to Melbourne, a journey of 3,800 miles, and the second via Port Augusta, Eucla, Norseman to Kalgoorlie and then north to Menzies and Leonora, west to Geraldton, north again to Carnarvon and then south to Perth, Albany, the Stirling Ranges, Lake Grace, Lake King, south again to Esperance, up to Norseman and back across the Nullarbor again and home to Melbourne, some 8,500 miles. Slides of the Western Australian spring wildflowers are always enjoyable: Mr. Morrison's examples displayed his mastery of the art of photography and his botanical knowledge. Unfortunately it is not possible to list the great number of plants illustrated; they included acacias, everlastings, orchids, trigger-plants, banksias, grevilleas, leschenaultias and many other groups. On behalf of Members present, the President thanked Mr. Morrison for showing his wonderful collection of slides and Miss J. Woollard for working the projector.

The new Members listed on page 63 of the June *Naturalist* were elected.

Mr. Swaby spoke to a number of cultivated native plants that he had brought. These included the Murray Lily, *Crinum flaccidum;* Sunshine Wattle, *Acacia brachybotrya; A. podalyrifolia* from Queensland; buds of *Eucalyptus caesia;* Brush Cherry, *Eugenia paniculata* from New South Wales and Queensland and *Myoporum viscosum*. Other exhibits on the table were Beaked Mussels, a valve of the Fritted Venus shell and a portion of the cartilaginous backbone of a young shark collected at San Remo and brought by Mr. Tony Chambers: ripple marks on sandstone from the foot of Mt. William in the Grampians: flowers of *Erica* and cells of a geranium petal shown under F.N.C.V. microscopes: a series of moths from Box Hill, two species of the hepialid genus *Oxycanus* and *Trictena argentata, Thalaina clara* and other species and, from Kew, a Crusader bug all brought by Mr. R. Condron.

Mr. Ros Garnet informed Members that the "Vegetation of Wyperfeld National Park" should be available in time for the July meeting of the Club. Mr. McInnes said that he could at last report that a few F.N.C.V. microscopes were available for sale "off the shelf". The Project would soon come to an end. He appealed again for suitable plants in tins for the main exhibit at the 1965 Nature Show. He had had no offers since the request was made at the May meeting. Miss Young asked when the original Entomological Society was formed and Mr. McInnes promised to find out for her.

Mr. Woollard asked if the cost of the *Naturalist* could not be reduced by using a cheaper paper. Mr. Hudson explained that a cheaper paper had been adopted during the previous year: it was necessary to use an art paper to obtain satisfactory reproduction of half-tone blocks. Mrs. Woollard announced that copies of the Bird Observers Club's booklet on the Birds of Mallacoota were available. Mr. Baines mentioned that, in addition to the Tasmanian government's attitude to Cape Barren Geese, the Victorian government's proposals in regard to the motel in the Wilson's Promonotory National Park, he had heard that the new Minister of Lands in New South Wales was considering modification of the Mt. Kosciusko National Park.

Geology Group—May 5, 1965

Twenty-four members and visitors attended with Mr. Angior in the Chair.

It was reported that 12 members had made the trip to Colac for the week-end,

10-11 April, at the invitation of the Colac Field Naturalists Club. On Saturday afternoon, the party was met on arrival by the local President and other members and taken on an excursion to Red Rock from which interesting views were obtained of Lake Corangamite, crater lakes and volcanic cones of the district. Scoria pits, at the base of Red Rock, were next visited, a feature being the occurrence in the scoria of numerous blocks of Tertiary fossiliferous limestone which had been ejected with the scoria during eruption.

On Sunday the excursion included lava caves in the Stony Rises and Mt. Porndon, a volcanic cone, around which volcanic bombs were plentiful.

Members attended on the Saturday evening the meeting of the local club at which our Mr. Cobbett gave an interesting illustrated talk on vulcanicity.

Thirteen members went on the excursion, led by Robert Whatnough, to the Cheltenham-Beaumaris area on 25 April. After observations of the inland topography, with its sand ridges, shallow valleys and drainage pattern, various shore locations were visited, the chief features being the Beaumaris monocline, fossiliferous cliff strata and, at Red Bluff, a sedimentary bed representing a swamp deposit.

For the evening's syllabus item, Mr. Hemmy's "model" talk on The Building Stones of Victoria, a project now nearing completion and comprising script and coloured projector slides, was given an experimental run. Members were impressed with the high quality of Mr. Hemmy's work and constructive suggestions for further improvement were submitted and discussed.

Exhibits:

Mr. Wigmore. Phosphate rock (Christmas Island and Nauru) and gypsum crystals (Mornington).

Mr. Angior. Fossiliferous limestone block (Red Rock), volcanic bombs and scoria (Mt. Porndon), malachite, flint and rock-salt.

Mr. Whatnough. Tertiary fossils and gypsum (Torquay).

Mr. Sault. Tertiary fossils (Beaumaris) and Tertiary fossils and gypsum (Torquay).

Miss Bennett. Granite (Nelson Bay, N.S.W.).

Mrs. Salau. Fossil wood (Anglesea).

Mr. Dodds. Photographs taken on the Campbelltown week-end excursion.

Botany Group—May 13, 1965

Mr. Bruce Fuhrer occupied the chair and 47 members and visitors were present. Mr. J. Willis was the speaker and his subject was "Fungi around Victoria". Mr. Willis defined fungi as flowerless and leafless plants which lack green pigment or chlorophyll. He said that there were at least 100,000 species in the world and each year dozens of new species were being found. At least 1,000 species were found in Victoria and the work of Mr. Gordon Beaton of Camperdown, a member of the Club who had classified 200 species new to Victoria, was mentioned.

Mr. Willis brought out many interesting points in his address and afterwards answered a number of questions asked by members. He also illustrated his address with a selection of interesting slides.

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

GENERAL MEETINGS

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

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Professor Hills, "Work of U.N.E.S.C.O. in Arid Lands".
3. Election of Members.
4. General Business.
5. Nature Notes and Exhibits.

Monday, August 9—Wyperfeld Film.

GROUP MEETINGS

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

Wednesday, July 21—Microscopical Group. "Books of Interest for the Microscopist". General discussion. Bring your books.

Friday, July 30—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Mr. A. J. Swaby, "Mosses", illustrated by colour slides by Mr. F. Collet.

Wednesday, August 4—Geology Group.

Thursday, August 5—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.

Thursday, August 12—Botany Group. Preparations for the Nature Show.

Friday, August 13—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just N. of Bell Street) at 8 p.m.

There will be no meeting of the Marine Biology and Entomology Group in August.

ELECTION OF MEMBERS

(a) *Ordinary*:

Mr. and Mrs. F. H. Baker, 22/17 Park Street, St. Kilda, S.2.

Mr. G. Ross Cochrane, 18 Young Street, Middle Brighton (Interests—Botany and ecology).

The Misses J. and S. Cullimore, 7 Town Hill Road, Glen Iris, S.E.6 (Joint with Mrs. D. Cullimore).

Mr. J. R. English, 302 Lower Heidelberg Road, East Ivanhoe.

Mr. H. G. Gunn, 37 Mount Dandenong Road, Ringwood East (Interest—Geology).

Mr. J. T. McDonald, Mr. D. S. Saunders, Mr. A. G. M. Yorston, c/o National Parks Authority, 276 Collins Street, Melbourne

Mr. R. R. Osborn, 30 Dinsdale Road, West Boronia.

Mr. R. M. Stitson, 22 Leinster Street, Ormond (Interests—Mammals, marine biology).

(b) *Country*:

Mrs. A. M. Black, Nicol Street, Yarram.

Miss B. Breen, 22 Sheather Street, Khancoban, N.S.W.

Mr. R. D. Howell, State Bank of S. Australia, Tailem Bend, S.A. (Interest—Ants).

Mr. A. E. Perry, 15 Lilley Street, Ballarat North.

(c) *Junior*:

Tony Chambers, 38 Orana Drive, Watsonia.

Maxwell Thompson, "Sunnyside", Traralgon S.

F.N.C.V. EXCURSIONS

Sunday, July 18—Kallista. Subject—Lyrebirds. Leader, Miss M. Elder. The coach will leave Batman Avenue at 9 a.m. Fare 12/-. Bring one meal. Cars can join party at Kallista picnic ground at 10 a.m.

Friday evening, August 27, to Sunday, September 5. Red Cliffs district. The excursion will be made under the leadership of the Sunraysia F.N.C. and will include day-trips to Hattah Lakes, Kulkyne, etc., and an excursion on the Murray River. The coach will leave Whight's Tourist Bureau in Flinders Street at 6.45 p.m. (or may be joined at the depot at 6.15 p.m.) on Friday, August 27 and will stop overnight at Bendigo completing the journey to Red Cliffs on the Saturday. On the return journey the party will leave Red Cliffs on Saturday, September 4, stop overnight at Maryborough to reach Melbourne at lunchtime on the Sunday. A picnic lunch should be taken for lunch on Saturday, August 28. Bus fare £10. A deposit of £4 should be paid on booking and the balance before July 30. Accommodation has been booked at Bendigo, Red Cliffs and Maryborough for the coach party, but individuals will pay their own accounts. Please check that a seat is available before sending any money to the Excursion 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, 1964

President:

MR. M. K. HOUGHTON
20 Trevascus Street, Caulfield (58 1937)

Vice-Presidents: MR. E. BYRNE, MR. A. FAIRHALL

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. A. G. HOOKE, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. HUDSON, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MR. F. ZIRKLER, 134 Kangaroo Road, Oakleigh, S.E. 12 (56 4337).

Geology: MR. R. R. DODDS, 5 Banchory Street, Essendon (379 4309).

Microscopical: MR. P. GENERY, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

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 for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 82 of the *Victorian Naturalist* is from May 1965 to December 1965.

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3/6

The 1965 Wild Flower and Nature Show

The above Show, staged annually in the Lower Melbourne Town Hall by the Society for Growing Australian Plants and by the Field Naturalists Club of Victoria, will be held on Monday, Tuesday and Wednesday, September 6th, 7th and 8th. It will be open daily from 10 a.m. until 10 p.m.

The Patron of the F.N.C.V., His Excellency Sir Rohan Delacombe, and Lady Delacombe will honour us with a visit on Tuesday September 7th at 11.30 a.m.

The Society for Growing Australian Plants will stage a comprehensive display of native plants and flowers, all garden grown. If the season is favourable it expects to exhibit as many as sixty species of acacias in bloom. A special feature will be a display of flowers from the Maranoa Gardens, Balwyn. As the loss of habitat of many of our native plants continues with increasing land use for development purposes, the growing of suitable species in our gardens is a part answer to a national problem.

An information centre will be provided to answer any queries about availability, growing and care of native plants.

As the main aim of the F.N.C.V. is the conservation of our fauna and flora, conserving a place for both "to live in" is the first consideration. This is vividly portrayed in the main scene staged by this Club. On the one hand is a lush bush area capable of providing a home and food in abundance, while on the other a denuded area, the result of fire, stresses the complete loss of "habitat" and consequently of all wild life.

As usual the various groups of the F.N.C.V. will stage individual exhibits. The "Plant Kingdom" is the theme of the exhibit prepared by the Botany Group.

The Geology Group will stage an exhibit showing some geological features of several areas near Melbourne.

The Hawthorn Junior Branch of the F.N.C.V. will have a working exhibit to demonstrate how one may polish the ever popular Australian gemstone. The enthusiastic Juniors will also provide a "Do-it-yourself" feature, where one may collect aquatic life from ponds, and examine it under a microscope. They will also show some methods used in preserving specimens of marine life.

"The Evolution of Insects" and "Butterfly Families" will be two interesting features displayed by the Entomological and Marine Biology Group. They will have on view live crabs, and in tanks, live marine life and aquatic insects.

Other very popular live exhibits will be snakes, lizards, fresh-water tortoises, and even small crocodiles.

There will be a well-staged exhibit of spiders, both preserved and alive.

"How to attract birds to your garden" is part of an exhibit by a bird enthusiast. The other feature is "Bird-banding", now a world-wide means of studying the movements of our birds.

There will be a Publications and Information stand where journals and books dealing with natural history subjects may be purchased, and where information relative to the F.N.C.V. may be obtained.

F.N.C.V. microscopes will demonstrate subjects shown with top lighting, bright field and dark-ground illumination and the use of polarised light.

The National Film Centre has made available an excellent selection of

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Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Front Cover:

We are again indebted to Mr. J. Cooper of the Fisheries and Wildlife Department, for this photograph which shows Pilot Whales, *Globicephalus melaena*, stranded at Waterloo Bay, Wilson's Promontory.

The Fruit of *Eucalyptus preissiana* Schauer

By Jean Galbraith

Those of us who study plants have the perennial interest of discovery. Everything one notices for the first time is new and full of interest, and occasionally one sees something that appears not to have been recorded.

This applies to the opening of the capsules of the yellow-flowered *Eucalyptus preissiana,* the Bell-flowered Mallee. These capsules are unique, at least amongst those eucalypts which I have seen. In most eucalypts the seed capsules are closed by triangular valves which are lifted by the drying and consequent shrinking of the ripe fruit. The lifting of the valves opens the locules and releases the seeds.

The opening of *E. preissiana* capsules is more complicated. The locules are not closed by triangular valves but by circular plugs like little wooden corks. There are valves, very short ones. They fit into triangular recesses between the locules, acting as wedges to keep the walls of the locule closely pressed against the plugs.

When the fruit is ripe and shrinks in drying, these valves lift exactly as in other species and allow the locule walls to shrink back and split longitudinally. This leaves the plugs loose in the top, and they soon fall out releasing the seeds.

I watched the whole outwardly simple, but really rather complicated, opening of many capsules, and always with a sense of discovery, for it showed that the "globular gland-like protuberances between the valves", mentioned in a technical description of *E. preissiana,* are really the tops of plugs closing the locules and held in place by the valves.

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nature films which will be shown *free* at frequent intervals.

As the co-operation of members is necessary to ensure the success of the show, forms will be distributed at the August General Meeting, on which members will be asked to indicate at what times they will be available to assist, particularly with the supervision of the exhibits and the performance of various small duties.

If any members are free to assist in the setting-up operations on Sunday, September 5th, their help will be greatly appreciated. Also at the General Meeting, leaflets, window-cards and car stickers will be available for distribution—by one and all!

Members are asked to make the show as widely known as possible.

The admission fee will be 2/6 for adults and 6d. for children.

Fruit of *Eucalyptus preissiana* Schauer.

1. Spray of *E. preissiana* with ripe capsules. 2. Top of capsule, showing lifted valves and two valves fallen. 3. Plugs. 4. Seeds. 5. Transverse section showing valves, plugs and seeds of graduated sizes to fit the locule. Apparently all but the lowest one were fertile.

Painting: C. Jakobson

Seed Storage in Soils of Several Victorian Plant Communities

By Elizabeth J. Carroll[1] and
D. H. Ashton[1]*

If favourable conditions are provided, the surface soil may yield a remarkable density and variety of seedlings. The fate of seed falling on the soil surface can be of great importance to the continuity of vegetation on a given site. Seeds may enter the soil by falling down cracks opened in dry weather, by burial in earthworm casts, by ant harvesting or the activity of lyre-birds, rabbits, bandicoots, etc. They may be unable to germinate on moistening because of environmental limitations such as high CO_2 and low O_2 concentrations, the absence of light, or the existence of temperatures too low or too steady. In addition, the physiological condition of the embryo, or the impervious nature or toughness of the seed coat may prevent germination. The conditions required for the germination of even individual seeds of a species vary tremendously, and in the natural environment dormancy and induced dormancy serve to distribute the species over long periods of time.

Ewart (1908) classified seeds on their longevity as:

Microbiotic—with viability of less than 3 years

Mesobiotic—with viability of 3-15 years

Macrobiotic—with viability of 15 to over 100 years.

The seeds of some exceptional species, notably of the order Leguminosae (*Albizzia, Acacia, Hovea* and *Goodia*), are viable after 100-147 years, whilst the oldest authentic viable seeds are those of the lotus (*Nelumbium*), which were germinated after 237 years (Godwin and Willis, 1964).

Generally one may expect a high density of seeds in the surface layers of the soil and a progressive diminution with depth. The species composition of deeply buried seeds may or may not reflect the composition of the present vegetation growing on or near the site. This is due to seasonal or yearly fluctuations of species and seed production, variable longevity of seed, and destruction of seed by animals. Seeds that are buried usually do not germinate till by some accident they are returned to the soil surface or near to it.

Method

Pairs of students collected exactly one square foot of soil (except in the Mallee) at depths of 0-2 inches and 2-4 inches from six sites in chosen vegetation types in early March. A general treatment of stratification* at 2°C for one month was carried out and the soil then sieved of rocks, roots, rhizomes, corms and tubers. Only a proportion of the total fresh weight of the soil was used to provide a 2 inch layer over the seed-free sand in the 8 inch test pots. In early April, the experiment was set up in a heated

1 Botany School, University of Melbourne, Parkville, N.2, Victoria, Australia.

* The work was carried out by the following final year B.Sc. Students of the Botany School:—
A. D. Benson, Jeanette Boer, Estelle Canning, Elizabeth J. Carroll, G. J. Cross, D. J. Groot Obbink, G. S. Hope, F. Ingerswen, Suzanne Ridgway, R. N. Webb, Georgina H. Zammit, and S. Y. Zee. Messrs. H. F. Kosmer, P. R. Lawson, A. Sebire and R. Smith were final year students of the Forestry School.

glasshouse, so as to obtain as much germination as possible. Considerable thinning of seedlings was often necessary before identification could be made, and although transplants were catalogued, difficulties were such as to necessitate the lumping together of some closely related species or genera, e.g. *Monotoca* and *Leucopogon*.

Between April and October the daily maximum and minimum temperatures in the glasshouse varied from 70-90°F and 60-65°F respectively and the number of hours over which higher temperatures were sustained increased with the hours of daylight. Soil temperatures, measured on two afternoons with thermocouples, were only 1-2°C higher than the air temperatures. The germination results were calculated as seedlings germinated per square foot of soil at depths of 0-2″ and 2-4″. This was done by multiplying the number counted by the proportion of total soil weight collected to soil weight used in the test. Although great care was taken, it is possible that some field contamination of the lower layer occurred after removal of the top layer in the lighter and drier soils.

Results and Conclusions

The results summarized in table 1 show that the number of seeds in the surface soils under native vegetation can be enormous. Very high seed numbers in surface soil for pasture in England (Harper 1960) equal those of the grassy woodlands of this study. The most rapid germination occurred in the soils from the drier environments, such as the mallee and grassy woodlands, whilst the slowest occurred in the soils from the heath and the wet forests. This may reflect the relative length of time normally available for germination in these areas. The species varied in their rates of germination, resulting in flushes of seedlings; grasses in general were early, and rushes and sedges late. A brief burst of germination occurred in August when all soils were turned over to expose underlying seeds to light and better aeration.

Interesting differences in the rate of germination and flowering occurred in some species. In the woodland soils for example, *Agrostis avenacea* and *Aira caryophyllea* appeared and developed more quickly in the Chiltern soil than in the Yan Yean soil. This could be due either to the direct effect of the soil or to some adaptive response by the species to the climate of the original site. The development of mosses, liverworts and ferns from spores was slow but often dense. It was interesting to note the development of Bracken from a prothallus in the *Nothofagus* soil, and the surprising lack of tree ferns from the *Eucalyptus regnans soil**.

The rock fern (*Cheilanthes tenuifolia*) occurred in all the woodland soils and was absent from the heath, mallee and wet forests soils. The bryophyte flora was a restricted one, and contaminants from the glasshouse were disregarded. The abundance of *Pogonatum* in the *Nothofagus* soil and the thallose liverworts *Riccia* and *Anthoceros* in the mallee soils were of great interest.

There was a general tendency for soil seed to increase in abundance from the friable soils of the wet forests to the gravelly and clay soils of the woodlands, and to decrease again in the sandy soils of the mallee and heath. However considerable variation occurs from site to site in each

* Stratification is the storage of moistened seed at temperatures between 0 deg. and 10 deg.C.

* The prothalli of these have been obtained in great abundance from such soils from Wallaby Creek (D. H. Ashton).

vegetation type, and further collections at different times of the year are necessary. More sophisticated treatments are also needed to ensure that all seed germinates. The germination rates of all species, except for some in the Red Gum woodlands, had fallen to a very low value by October. It is well known however, that several years are necessary to germinate all seed present in the soil, and that diminished peaks of germination occur in successive years (Thurston 1960). Because the species assemblages in the soils were in general distinct or as expected from the botanical description of the sites, it is felt that very little contamination occurred during the experiment. However light mobile seed such as *Sonchus, Erigeron* and *Senecio* are somewhat suspect, since Silver Birch seed did in fact blow into the glasshouse in windy periods.

Important members of many communities such as *Eucalyptus, Atherosperma, Callitris* and the Proteaceae are conspicuous by their absence. The major distinction between the surface and sub-surface soils lies in the number of seeds germinating. The most notable difference in species composition is the restriction of the few Eucalypts to the surface layer. This is in agreement with the view that there is little or no soil storage of Eucalypt seed (Ashton, 1955).

Many of the species listed in the following table are herbs and grasses, some of them having quite minute seeds. It is likely that in some soils their accumulated weight may make a significant contribution to any chemical assessment of soil fertility.

Acknowledgements

Thanks are due to Mr. E. J. Sonenberg for help in identifications, Mr. Charles Aberli for constant attention to the glasshouse, and to Messrs. A. M. Gill and R. F. Parsons and Mrs. J. Frankenberg for their assistance throughout the year.

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Appendix

Description of vegetation sites and germination results.

Myrtle Beech Forest—Mt. Victoria, Cement Creek.

(Workers: A. Sebire and H. Kosmer)

Soil was collected from the forest on a southerly aspect of a gully on the slopes of Mt. Victoria at an altitude about 2,000 ft.

The soil was a deep friable brown loam (similar to a krasnozem) on a dacite bedrock. Lyrebird activity in the surface layers was well in evidence.

The vegetation at this site was a mature beech forest 60-70 ft. high with a tall surrounding overstory of *Eucalyptus regnans*. Tree species were Myrtle beech (*Nothofagus cunninghamii*), *Atherosperma, Acacia melanoxylon* and *Hedycarya* with *Dicksonia* and *Coprosma* forming an uneven understory. The ground stratum of *Australina, Clematis* and *Blechnum procerum* was patchy. Lianes such as *Parsonia straminea* were present.

SOIL SEED 1964 (Collected March, 1964, set up April 1964, terminated October 1964)

Vegetation	Rainfall	Locality	Soil type	Parent rock	Seedlings/sq. foot 0-2″	2-4″	0-4″ (total)	Ratio 0-2/2-4	Percentage growth forms: trees	shrubs	climbers	dicot herbs	monocot herbs	Workers
Myrtle beech forest	±60″	Cement Creek	brown friable loam	dacite	120	94	214	1·28	52·0	3·6	2·7	39·9	1·8	Kosmer and Sebire
Mountain ash forest (wet sclerophyll forest)	±51″	Kallista	red friable loam	dacite	60	80	140	0·75	12·6	5·9	3·5	73·4	4·3	Cross and Benson
Messmate stringybark forest	±47″	Kinglake National Park	red to grey friable loam	mudstone	WSF 243	75	318	3·24	2·3	26·9	0·3	57·2	13·3	Carroll and Hope
(wet sclerophyll forest)					152	50	202	3·04	0	58·7	0	31·7	9·6	
(dry sclerophyll forest)					DSF 92	34	126	2·71	1·1	42·8	0·1	44·4	11·4	
Dry sclerophyll forest *E. tereticornis* *E. macrorhyncha*	±25″	Chiltern	gravelly loam	granite	1143	220	1363	5·20	0·03	0·03	0	44·5	55·4	Canning and Boer
Savannah woodland *E. camaldulensis*	±27″	Yan Yean	grey clay	basalt	2303	548	2851	4·20	0	0	0	24·7	75·3	Ingerswen and Webb
Savannah woodland *E. camaldulensis*	±22″	You Yangs	gravelly loam (granite outwash)	granite	2953	378	3331	7·81	0	0·3	0	33·0	66·7	Lawson and Smith
Mallee *E. oleosa—Callitris*	±11″	Mildura	red loamy sand	sand hills	422	150	572	2·81	0	5·4	0	83·7	10·8	Groot Obbink and Zee
Heath *Leptospermum myrsinoides*	±28″	Cranbourne	grey and yellow sands	sand hills	36	26	62	1·38	0	39·4	0	33·1	27·5	Zammit and Ridgway

Results:

0-2": 120 seedlings/square foot.

Composition %: *Hedycarya angustifolia* 51·0%, *Australina muelleri* 36·8%, *Tieghemopanax sambucifolius* 2·5%, *Carex appressa* 2·5%, 2% (*Clematis aristata, Cirsium* sp., *Oxalis corniculata, Nothofagus cunninghamii, E. regnans, Gnaphalium purpureum*).

2-4": 94 seedlings/square foot.

Composition %: *Hedycarya* 50·3%, *Australina* 35·3%, *Clematis* 3·7%, *Tieghemopanax* 3·6%, *Senecio* sp. 2·1%, <2% (*Cirsium, Carex appressa, Acacia melanoxylon, Cassinia aculeata*).

Ferns: *Histiopteris incisa, Hypolepis punctata, Pteridium esculentum.*

Bryophytes: *Pogonatum subulatum, Funaria hygrometrica, Funaria gracilis, Fissidens leptocladus, Chiloschyphus* sp.

Mountain Ash Forest—Kallista.

(Workers: G. J. Cross and A. D. Benson)

Soils were collected from a steep easterly slope at an altitude about 1,000 ft. The soil type was a deep brown friable loam of the krasnozem type developed on dacite.

The vegetation was wet sclerophyll forest dominated by Mountain Ash (*E. regnans*). There was an understory of *Acacia dealbata* and *A. melanoxylon* with a more or less continuous shrub layer of *Pomaderris, Olearia, Bedfordia, Cassinia, Dicksonia* and *Cyathea*. The climbers *Clematis* and *Billardiera* were also present. The field layer was for the most part patchy with *Tetrarrhena, Histiopteris, Pteridium, Polystichum* and *Australina*. Lyrebird activity was much in evidence and the first few inches of soil were greatly disturbed. Soils of the lower level were more compact than those of the upper level.

Results:

0-2": 60 seedlings/square foot.

Composition %: *Hydrocotyle geraniafolia* 20·5%, *Galium* sp. 17·5%, *Olearia argophylla* 14·6%, *Oxalis corniculata* 9·6%, *Gnaphalium japonicum* 5·1%, *Cardamine dictyosperma* 4·7%, *E. regnans* 4·2%, *Stellaria flaccida* 4·2%, *Acaena anserinifolia* 3·4%, *Veronica notabilis* 3·0%, *Tetrarrhena juncea* 2·9%. <2% (*Rubus fruticosus, Juncus* sp., *Australina muelleri, Bedfordia salicina, Clematis aristata, Gnaphalium purpureum, Senecio quadridentatus, Cerastium* sp., *Acacia dealbata, Cassinia aculeata, Leycesteria formosa*).

2-4": 80 seedlings/square foot.

Composition %: *Hydrocotyle geraniafolia* 31·3%, *Galium* sp. 22·8%, *Oxalis corniculata* 10·0%, *Olearia argophylla* 4·8%, *Juncus* sp. 4·2%, *Solanum xanthocarpum* 3·2%, *Festuca dives* 2·7%, *Pomaderris aspera* 2·4% (=*Pomaderris apetala*). <2% (*Stellaria flaccida, Gnaphalium japonicum, Cassinia, Tetrarrhena, Clematis, Australina, Erigeron* sp., *Cardamine dictyosperma, Rubus fruticosus, Geranium pilosum, Hydrocotyle hirta, Centaurium australis, Pimelea axiflora, Anagallis arvensis, Senecio quadridentatus, Solanum nigrum*).

Ferns: *Histiopteris incisa, Hypolepis punctata, Culcita dubia*

Bryophytes: *Funaria gracilis*

Messmate Forest—Kinglake National Park.

(Workers: Elizabeth J. Carroll and G. S. Hope)

Soil was collected from several sites in the Kinglake National Park. The sites were not well chosen as three types of vegetation were represented; wet sclerophyll forest, dry sclerophyll

forest and tall woodland. The sites ranged in altitude between 1400 ft. and 1800 ft.

Wet sclerophyll forest:

This vegetation was present on two sites. The standing vegetation was dominated by Messmate (*E. obliqua*) and Mountain Grey Gum (*E. cypellocarpa* re *E. goniocalyx* of Ewart, Blakeley). There was an understory of *Acacia dealbata, Bedfordia* and *Pomaderris*. The forest floor was unusually grassy for a wet sclerophyll forest with *Poa australis* and *Tetrarrhena* as the most prominent grasses. The ground stratum was semi-continuous and contained *Viola hederacea, Halorrhagis tetragyna* and *Brachycome multifida* as well as the grasses.

The soils of the area are grey to red friable loams developed on Silurian mudstone and there is apparently little disturbance of the surface soils.

Results:

0-2": 243 seedlings/square foot.

Composition %: *Cassinia aculeata* 19·3%, *Halorrhagis tetragyna* 15·6%, *Viola hederacea* 8·5%, *Cerastium* sp. 8·1%, *Centaurium australis* 6·5%, *Pomaderris aspera* (*apetala*) 4·7%, *Gnaphalium japonicum* 4·5%, *Deyeuxia* sp. 4·5%, *Bedfordia salicina* 4·5%, *Juncus* sp. (perennial) 4·2%, *Goodenia ovata* 3·2%, *Brachycome multifida* 3·2%, *Oxalis corniculata* 3·2%, *Luzula campestris* 2·4%. <2% (*Helichrysum ferrugineum, Wahlenbergia gracilis, Argostis avenacea, Sonchus oleraceus, Senecio arguta, Sagina apetala, Billardiera scandens.*)

2-4": 75 seedlings/square foot.

Composition %: *Cassinia* 21·5%, *Viola* 18·5%, *Centaurium* 16·4%, *Halorrhagis* 10·8%, *Juncus* sp. (perennial) 6·2%, *Gnaphalium* 5·9%, *Luzula* 4·1%, *Deyeuxia* sp. 3·5%, *Erigeron canadensis* 2·1%, *Geranium pilosum* 2·1%. <2% (*Oxalis, Brachycome, Wahlenbergia, Prostanthera lasianthos, Pimelea* sp.)

Dry sclerophyll forest:

This vegetation was present on three sites. Standing vegetation was dominated by *E. obliqua* and *E. radiata* with an underscrub of sclerophyllous shrubs and bracken. Main shrub species were *Pultenaea scabra, P. muelleri, Cassinia aculeata, Helichrysum ferrugineum* and *Acacia mucronata*. Some tussocks of *Lepidosperma* and *Gahnia* were also present. The ground layer was discontinuous and consisted of *Drosera, Halorrhagis, Viola* and a few tussocks of *Poa australis*.

Here also the soils were red or grey friable loams.

Results:

0-2": 92 seedlings/square foot.

Composition %: *Cassinia aculeata* 49·1%, *Viola hederacea* 7·2%, *Opercularia varia* 7·5%, *Gnaphalium japonicum* 5·2%, *Deyeuxia* sp. 5·2%, *Xanthosia dissecta* 3·7%, *Acrotriche serrulata* 2·3%, *Poa australis* 2·3%, *Helichrysum ferrugineum* 2·3%. <2% (*Oxalis corniculata, Juncus bufonious, Hydrocotyle hirta, Erigeron canadensis, Drosera auriculata, Senecio quadridentatus, S. lautus, Hypochoeris radicata, Pultenaea gunnii, Amperea ziphoclada*).

2-4": 34 seedlings/square foot.

Composition %: *Cassinia* 58·0%, *Xanthosia* 7·4%, *Poa* 7·3%, *Opercularia* 7·3%, *Viola* 6·7%, *Gnaphalium* 6·6%, *Microlaena* 3·4%, Unknown Epacrid 3·3%.

Ferns: *Histiopteris incisa*

Bryophytes: *Riccia* sp., *Anthoceros sp., Bryum truncorum, Funaria gracilis.*

Dry Sclerophyll Forest—Chiltern.

(Workers: Estelle M. Canning and Jeanette M. Boer).

Soil was collected at a site 2-3 miles from Springhurst in north central Victoria. Soils had formed on a granite bedrock and were grey brown gravelly loams.

Standing vegetation was dominated by *E. tereticornis* and *E. macrorrhyncha* with some *Acacia melanoxylon*. In the shrub layer the dominant species was *Brachyloma daphnoides* with some *Hibbertia stricta* and *Indigofera australis*. There was a fairly continuous grassy field layer with annuals such as *Aira, Agrostis avenacea, Vulpia bromoides* and *Bromus sterilis* as the dominants, and some herbaceous dicots, e.g. *Trifolium, Halorrhagis, Ranunculus,* etc.

Results:

In the early stages of the experiment monocotyledons germinated in such great numbers that they had to be removed before identified sufficiently and the results for grasses and sedges have therefore been quoted as a whole. "Grasses and sedges" include the following species: *Aira caryophyllea, Agrostis avenacea, Briza minor, Bromus sterilis, Juncus bufonius, J. capitatus, Scirpus antarcticus* and *Vulpia bromoides. Aira* and *Agrostis* were the most common grasses.

0-2": 1143 seedlings/square foot.

Composition %: Grasses and sedges 53·0%, *Centaurium* (Erythraea) *australis* 12·2%, *Moenchia erecta* 10·6%, *Crassula sieberiana* 6·1%, *Trifolium arvense* 4·1%, *Hypochoeris radicata* 3·8%, *Hypericum* sp. 2·3%, *Hydrocotyle capillaris* 2·0%. <2% (*Linaria pelisseriana, Drosera auriculata, Wahlenbergia quadrifida, Galium parisiense* var. *australe, Halorrhagis tetragyna, H. elata, Stuartina muelleri, Helipterum demissum, Sagina apetala, Anagallis arvense, Prasophyllum* sp., *Brachyloma daphnoides, Oxalis corniculata, E. tereticornis, Epilobium glabellum.*

2-4": 220 seedlings/square foot.

Composition %: Grasses and sedges 57·7%, *Centaurium* 16·4%, *Crassula* 5·2%, *Moenchia* 5·2%, *Trifolium* 3·6%, *Hypochoeris* 3·4%, *Linaria* 2·5%, *Hypericum* 2·2%. <2% (*Hydrocotyle, Drosera, Lythrum, Anagallis, Sagina, Halorrhagis, Stuartina*).

Ferns: *Cheilanthes tenuifolia*

Bryophytes: *Riccia* sp., *Anthoceros* sp., *Bryum agrenteum, B. dichotomum, Triquetrella papillata, Campylopus clavatus, Barbula australasicae.*

Red Gum Woodland—Yan Yean.

(Workers: R. N. Webb and F. Ingerswen)

Soils were collected from ungrazed land near Yan Yean. The vegetation was an open red gum woodland (*E. camaldulensis*) with a few large red gum and a dense grass ground layer. In this area many young red gum have regenerated due to protection from grazing.

The soil is a grey clay developed on basalt. The hummocks and hollows of a gilgai structure have developed on these soils, but its effect on the vegetation was not noted. The variability of the results could be due to the variation of the vegetation on these soils, and to the proximity of the sites to the old red gums.

Results:

0-2": 2,303 seedlings/square foot.

Composition %: *Anthoxanthum odoratum* 19·6%, *Juncus capitatus* 13·6%, *Centaurium* (*Erythraea*) *australis* 13·4%, *Juncus bufonius* 10·9%, *Scirpus antarcticus* 9·9%, *Cyperus tenellus* 6·9%, *Romulea rosea* 4·4%, *Plantago lanceolata* 3·4%, *Briza minor*

3·3%, *Hypericum sp.* 2·9%, *Juncus* sp. (perennial) 2·7%. <2% (*Themeda australis, Hypochoeris* sp., *Trifolium glomeratum, T. dubium, T. repens, Oxalis corniculatus, Agrostis avenacea, Drosera auriculata, Sonchus aspera, Gnaphalium japonicum, Crassula sieberiana, Taraxacum officinale, Lolium perenne, Holcus lanatus, Aira caryophyllea, Sporobolus indicus, Cerastium* sp., *Sagina apetala, Carex inversa, Lobelia pratinoides, Epilobium glabellum, Lythrum hyssopifolium, Microlaena stipoides, Aster squamatus, Centunculus minimus, Bromus sterilis, Vulpia bromoides, Stipa* sp., *Cirsium* sp., *Veronica gracilis, Bromus mollis, Erigeron* sp., *Vicia angustifolia*).

2-4": 548 seedlings/square foot.

Composition %: *Juncus cap.* 30·9%, *J. bufonius* 14·6%, *Scirpus antarcticus* 13·2%, *Cyperus tenellus* 9·4%, *Anthoxanthum* 5·8%, *Plantago* 4·3%, *Cerastium* 4·2%, *Centaurium* 3·4%, *Juncus pauciflorus* 2·7%, *Romulea* 2·4%, *Briza* 2·0%. <2% (*Trifolium glomeratum* + *T. dubium, Gnaphalium, Hypericum, Medicago* sp., *Agrostis, Bromus mollis, Sonchus, Oxalis, Crassula, Vulpia, Bromus sterilis, Carex, Aira, Microlaena, Trifolium repens, Aster, Lolium, Sporobolus, Cirsium*).

Ferns: *Cheilanthes tenuifolia*

Bryophytes: *Riccia sp., Fossombronia* sp., *Funaria gracilis, F. hygrometrica.*

Red Gum Woodland—You Yangs.

(Workers: P. Lawson and R. Smith)

Soil was collected from a forest reserve at the You Yangs near Geelong. The soils are gravelly loams formed on granite outwash from the You Yangs.

The vegetation is a savannah woodland. *E. camaldulensis* although mostly confined to water courses in the area, occurred as a regrowth stand in the area chosen for study. The canopy is quite open and beneath it are the shrubs *Acacia pycnantha* and *A. decurrens* with occasional *Exocarpos* and *Casuarina stricta.* The ground cover is dominantly grassy with *Briza maxima* and *Danthonia* as the most common grasses. There are many annual dicot herbs. *Hypochoeris radicata* and *Halorrhagis* are also common.

Results:

0-2": 2,953 seedlings/square foot.

Composition %: *Scirpus antarcticus* 36·7%, *Lythrum hyssopifolium* 19·1%, *Centrolepis fascicularis* 7·1%, *Juncus bufonius* 7·4%, *J. capitatus* 7·1%, *Anagallis arvensis* 4·7%, *Hypericum japonicum* 4·5%, *Crassula recurva* 3·0%, *Gnaphalium luteoalbum* 2·7%. <2% (*Centaurium australis, Agrostis avenacea, Stuartina muelleri, Juncus planifolius, J. subsecundus, Centunculus minima, Schoenus latelaminatus, Cyperus tenellus, Gnaphalium purpureum, Hypochoeris radicata, Gnaphalium candidissimum, G. japonicum, Hallorrhagus elata, Holcus lanatus, Phytolacca octandtra, Calandrinia calyptrata, Oxalis corniculata, Vulpia bromoides, Danthonia caespitosa, Carex inversa, Briza minor, Toxanthus muelleri, Helipterum australe, Rumex brownii, Limosella aquatica, Wahlenbergia* sp., *Leptorhynchus tenuifolius, Prostanthera nivea, Aira caryophyllea, Drosera peltata, Acacia implexa*).

2-4": 378 seedlings/square foot.

Composition %: *Scirpus* 50·3%, *Lythrum* 13·1%, *Juncus capitatus* 11·0%, *Centaurium* 3·7%, *Centrolepis* 3·5%, *Juncus subsecundus* 3·5%, *Anagallis* 3·1%, *Hypericum* 2·7%, *Juncus bufonius* 2·3%. <2% (*Vulpia, Crassula, Gnaphalium luteoalbum, Prostanthera, Phytolacca, Agrostis, Gnaphalium japonicum, Centunculus,*

Danthonia, Cyperus, Oxalis, Limosella, Stuartina, Solanum sp., *Helipterum, Galium, Gnaphalium purpureum*).

Ferns: *Cheilanthes tenuifolia*

Bryophytes: *Riccia* sp., *Triquetrella papillata, Bryum dichotomum.*

Heath—Cranbourne.

(Workers: Georgina H. Zammit and Suzanne B. Ridgway)

Soils were collected from a northerly slope at an altitude of about 45 ft. near Cranbourne. The vegetation was characteristic of the coastal heaths in the area with occasional manna gums (*E. viminalis*). Most common shrubs of the area are *Leptospermum myrsinoides, Epacris, Dillwynia, Hakea* and *Banksia*. There is a sparse ground cover of *Hypolaena fastigiata, Juncus* spp., *Poa* and various orchids and composites.

Soils were grey and yellow sands from the soil type known as Cranbourne sand, a sandy podzol.

Results:

0-2": 36 seedlings/square foot.

Composition %: *Monotoca* + *Leucopogon* 29·1%, *Oxalis corniculata* 15·9%, *Hypolaena fastigiata* 12·5%, *Leptospermum myrsinoides* 12·1%, *Caesia parviflora* 8·5%, *Hydrocotyle capillaris* 3·6%, *Opercularia varia* 3·6%, *Juncus* sp. (perennial) 2·4%, *Schoenus* sp. 2·4%, *Juncus bufonius* 2·4%, *Scirpus antarcticus* 2·4%. <2% (*Comesperma calymega, Dillwynia* sp., *Danthonia eriantha, Hibbertia* sp., *Leptospermum laevigatum*).

2-4": 26 seedlings/square foot.

Composition %: *Monotoca* + *Leucopogon* 25·8%, *Scirpus antarcticus* 14·7%, *Comesperma* 12·8%, *Wahlenbergia* sp. 9·4%, *Hypolaena* 5·6%, *Leptospermum myrsinoides* 5·6%, *Juncus bufonius* 5·6%, *Erigeron* sp. 5·6%, *Hydrocotyle* 3·7%, *Dillwynia* 3·7%, *Danthonia* 3·7%. <2% (*Caesia, Centrolepis* sp.)

Bryophytes: *Bryum truncorum, B. dichotomum.*

Mallee—Mildura.

(Workers: D. J. Groot Obbink and S. Y. S. Zee)

Soils were collected at a site about half a mile west of Mildura airport. The soil was a red sandy loam developed on sand hill country. Some of the area showed marked salt accumulation and one sample chosen was on a salt scalded patch. Results from this sample were not included.

The vegetation is dominated by oil mallee (*E. oleosa*) with some *Callitris verrucosa*. The shrub layer included *Calocephalus sonderi, Atriplex muelleri, Zygophyllum apiculatum* and *Rhagodia nutans.*

Results:

0-2": 422 seedlings/square foot.

Composition %: *Crassula sieberiana* 43·6%, *Mesembryanthemum crystallinum* 35·5%, *Nicotiana glauca* 3·7%, *Zygophyllum apiculatum* 3·7%, *Asphodelus fistulosus* 3·4%, *Schismus calycinus* 2·6%. <2% (*Rhagodia nutans, Centipeda cunninghamii,* unidentified monocot, *Calocephalus sonderi, Atriplex muelleri, A. campanulata, Geococcus pusillis, Chenopodium cristatum, Tetragona expansa, Erodium cicutarium, Sisymbrium officinale, Trisetum pumilium, Juncus subsecundus*).

2-4": 150 seedlings/square foot.

Composition %: *Mesembryanthemum* 33·3%, *Crassula* 24·0%, *Asphodelus* 7·8%, *Schismus* 7·0%, *Zygophyllum* 7·0%, *Nicotiana* 7·0%, *Calocephalus* 6·1%, *Rhagodia* 3·6%, *Centipida* 2·0%. <2% *Geococcus, Erodium cicutarium.*

Bryophytes: *Riccia* spp., *Anthoceros* sp., *Bryum argenteum, B. dichotomum, Ditrichum flexifolium, Funaria gracilis.*

The Port Albert Frog and the White Rock

By Aldo Massola

The legend of the Port Albert Frog, with its inference to an Aboriginal belief in a Deluge, was first published in "The Aborigines of Victoria" in 1878. In this work the author, R. Brough-Smyth, gave two versions of the story, one from his own pen, and the other from that of A. W. Howitt. Although differing in some details, the two versions are basically the same, and probably both originated from the Rev. John Bulmer, who, at the time, was in charge of the Lake Tyers Mission Station.

A. W. Howitt's account gives two separate versions of the one story; one he calls "Aboriginal Legend of a Deluge" and the other "The Port Albert Frog." Bulmer's own story has also been found. This is in manuscript, and he calls it "An Aboriginal Idea of the Flood".

When the three stories are compared we can detect the reason for the legend: it was the aborigine's endeavour to account for the numerous inlets off Port Albert, and for the unusual colour of the islet called White Rock by modern cartographers. It also proves that the Gippsland natives were well aware of the existence of islands in Bass Strait, and there is even the possibility that some of these were occasionally visited by them.

Brough-Smyth's version of the legend is as follows:

"The aborigines of Lake Tyers say that at one time there was no water anywhere on the face of the earth. All the waters were contained in the body of a huge frog, and men and women could get none of it. A council was held, and the wisest amongst all the animals enquired into the circumstances connected with this extraordinary drought. It was ascertained beyond doubt that the monster Frog had himself all the waters that should have covered the waste places of the earth, and further, that if the frog could be made to laugh, (*Kramban*) the waters would run out of his mouth, and there would be plenty in all parts. It was agreed that an effort should be made to make the monster Frog to laugh. Several animals danced and capered before him, but he remained as solemn and as stupid as any ordinary frog, even when their gestures were sufficient to make mirth anywhere. All the animals tried and failed. At length *No-yang* (the Eel) began to wriggle and distort himself, and the Frog's jaws opened. He laughed outright. When he laughed, all the waters came out of his mouth, and there was a flood (*Koorpa*). Great numbers were drowned in the flood. Many, very many, perished in the waters. The Pelican (*Booran*), who before the flood was a blackfellow, took upon himself to save the black people. He cut a very large canoe (*Gre*), and sailed among the islands which appeared here and there in the great waters, and he took the people into his canoe, and kept them alive. Bye and bye the Pelican had a quarrel with the people whom he had saved. He quarrelled with them about a woman, and the Pelican was turned into a stone."

The only difference in Howitt's two versions is that in the first which he calls "Aboriginal Legend of a Deluge" he says that 'a very long time ago there was a great flood', while in the second "The Port Albert Frog", he says that the flood was caused by the frog.

The following is the second version:

"Once, long ago, there was a big frog, *Tidda-lick*. He was sick, and got full of water. He could not get rid of all this water, and did not know what to do. One day he was walking near where Port Albert is now, and he saw a sand-eel dancing on its tail on a mud flat by the sea. It made him laugh so much that he

burst, and all the water ran out. There was a great flood and all the blackfellows were drowned except two or three men and a woman, who got on a mud island. While they were there a Pelican came by in his canoe. He took off the men one at a time but left the woman to the last. He wanted to get her for himself. She was frightened, and so put a log in her 'possum rug, like a person asleep, and swam to shore. When the Pelican returned he called her to come. No answer. Then he was angry, and kicked the 'possum rug. There was in it a log. Then he was angry, and went off to paint himself with *Marloo* (pipeclay) to go and 'look out fight' with the blackfellows. Before that time Pelicans were all black. When he was partly painted with *Marloo,* another Pelican came by, and not liking the look of him, hit him with his beak and killed him. That is the reason why Pelicans are partly black and partly white to this day."

The beginning of Bulmer's version is very similar to Brough-Smyth's but after the eel made the frog laugh and the flood came, he states:

" . . . but the most wonderful part of the story is that a white man (*loorn*) made a big canoe, and saved many people from the flood. Those who inhabited the various islands were his particular care. As payment for his trouble he kept back one female to make her his wife, she however got away by a cunning ruse, she cut off her hair and put it in a pillow on the bed where she had lain, seeing the hair the *loorn* took no notice, and went on with his canoe voyages of delivery, but on finishing his work he soon found out the way the woman (*woorcat*) had made her escape, so he daubed himself with pipeclay (*marloo*) and arming himself with club and shield he left the island for the mainland, and declared war with those he had delivered, but before he could accomplish his purpose he was turned into stone, where say the blacks, he may still be seen on the rocks out from Port Albert. The only remains of this event is to be seen in the Pelican who is white from the pipeclay used from that time."

If the veiled allusions to the Biblical account of a Universal Flood, and the 'wonderful' appearance of a white man in a large canoe are disassociated from the legend, it will be seen that what happened is as follows:

The inlets off Port Albert were caused by the sudden freeing of a lot of water, which had been swallowed by a huge frog. The White Rock was once a Pelican who journeyed to-and-fro amongst the inlets (as they still do). He was turned into a rock because of a dispute over a woman. (This was a perfectly good reason in the aboriginal mind). Previous to the dispute, pelicans were black but have been white and black since their ancestor daubed himself with pipeclay, as the natives did when about to fight.

But where is the White Rock? Persistent enquiries amongst the crew members of the fishing fleet at Port Albert revealed the fact that nothing except sand or mud-banks is found in the vicinity of the Port or in any of the inlets. The nearest 'rocks' are the Seal, or Direction Islands, the northernmost of which is, in fact, known as White Rock.

A visit was next paid to the Harbour Master at Port Welshpool. Leaning over nautical charts this officer confirmed the fact that there were no 'rocks' in any of the inlets, or close to shore. What I was looking for must be *white rock*. There was, he said, a large 'sunken' rock, sometimes covered by high tides. It was a mass of white granite, contrasting with the darker colour of the other islands of the group. These islands are situated about eight miles to the south-east of Rabbit Island, which is a mile off the eastern coast of Wilson's Promontory. The tallest island of the group is Seal Island. Although it rises 154 feet above sea level, it cannot be seen from Port Welshpool, because Snake Island is in the line of vision.

Even if the aborigines did not actually cross over to this group

Sketch-map showing the position of the White Rock.

during calm weather, or to quote the Harbour Master, 'when the sea is as smooth as glass', they would have been able to see it readily from Mt. Roundbank and other eminences on the eastern side of the Promontory. It is obvious that, with their fertile imagination, the white colour of the one, contrasting against the darker colour of the other islands of the group would have been explained by the invention of the legend of the Pelican daubed with pipeclay and turned into stone.

Although White Rock is not exactly 'off Port Albert', it must be remembered that the port is the oldest in Gippsland, and that for many years it was the only place of entry for European goods into Gippsland. In modern aboriginal geography and folk lore it is still "The Port". To them anything off the main-land must necessarily be off Port Albert.

The Plant Kingdom

To the Plant Kingdom we owe the very pattern of life on earth as we know it.
In the steaming waters of the Proterozoic era the first single-celled organisms began to form. From this simple beginning grew the early Bacteria which were the basis from which all modern plant and animal life evolved.

By Bruce Fuhrer and Rex Filson

Through their unique property of using chlorophyll, in the presence of sunlight, to synthesize organic material from water and atmospheric carbon dioxide, plants provide us with three fundamental necessities for the sustenance of life.

1. They have provided directly and indirectly the basic food material for all animal life on earth since Proterozoic times.
2. Primitive man learned to use the plants around him to construct his simple shelters; timber today plays an important part in modern building construction and furnishings. From the advent of man's first controlled fires, plant fuels have become increasingly important in the development of human industry and comfortable living.
3. The air we breathe would rapidly stagnate with a build-up of carbon dioxide, if the main by-product of plant respiration were not pure oxygen.

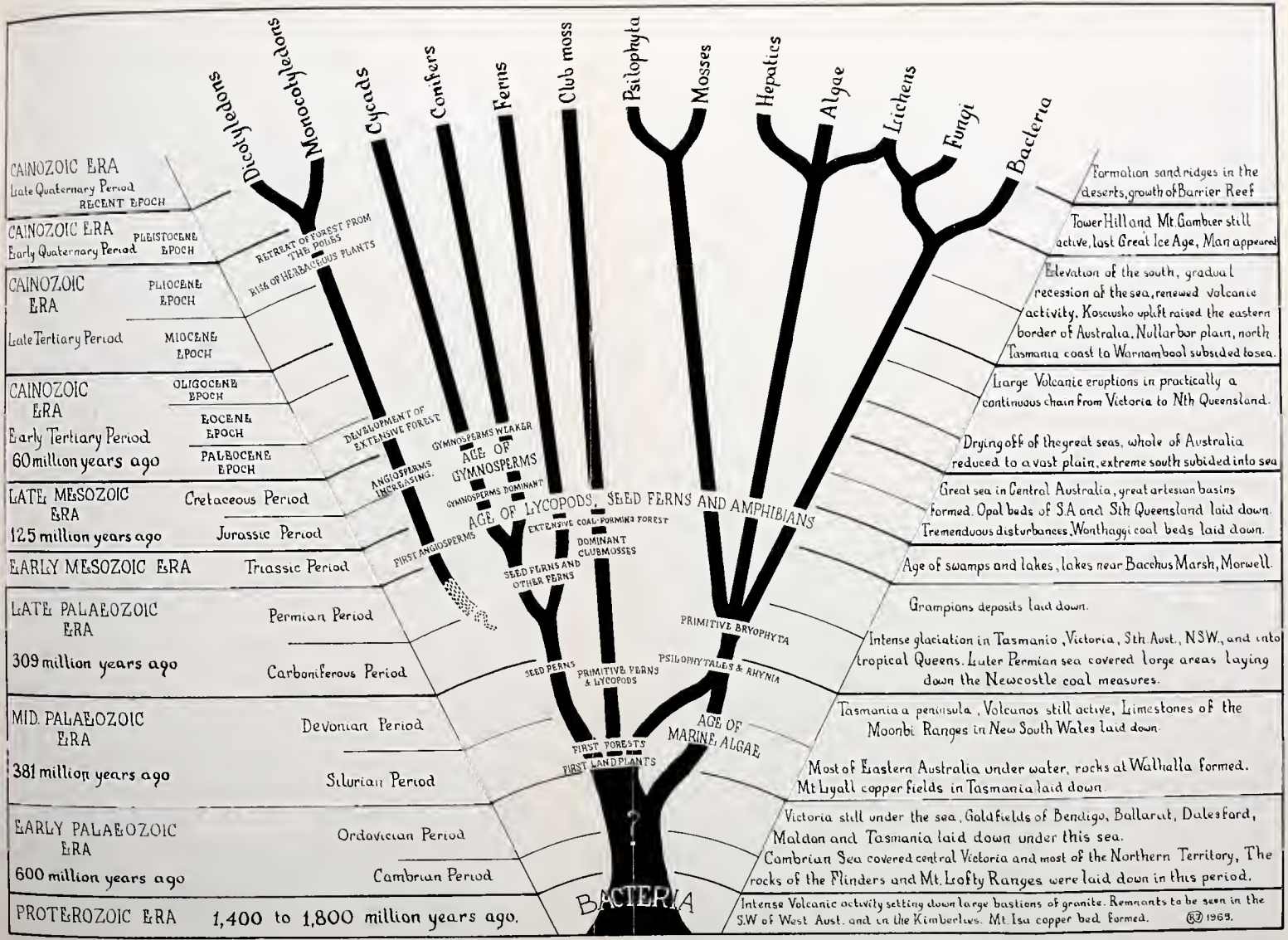
The annual yield of photosynthetic activity of the aquatic and land floras is in excess of 140,000,000,000 tons of organic material. The products from plants also play a vital role in modern medicines.

Bacteria we believe were the earliest forms of plant life to exist on the earth. A glance at the base of our illustration will indicate that from these lowly organisms, there have evolved the countless varieties of land and marine flora that have populated our planet through the ages. Although fossil records are incomplete, there is ample evidence to demonstrate the existence of *Bacteria* in early geological times. Examples of typical bacterial decay have been noted in Devonian plant fossils, and ancient mineral deposits have certainly been precipitated by bacteria similar to those that are actively depositing almost identical mineral accumulations in our present day.

Bacteria do not utilize chlorophyll to synthesize food materials, but absorb minerals and organic substances directly from their environment, and it is difficult to establish when plant life began to depend upon chlorophyll. The first definite plant structures have been found in early Palaeozoic fossil beds in the form of well developed *Algae*. The soft and perishable nature of plant life prior to this age leaves a gap in the fossil record, but it is probable that the first departure from the Bacterial stage is to be found in the evolution of single-celled alga-like plants.

The *Algae* developed very rapidly and became the dominant vegetation

CAINOZOIC ERA Late Quaternary Period RECENT EP	Formation sand ridges in the deserts, growth of Barrier Reef
CAINOZOIC ERA Early Quaternary Period	Tower Hill and Mt. Gambier still active, last Great Ice Age, Man appeared
CAINOZOIC ERA Late Tertiary Period	Elevation of the south, gradual recession of the sea, renewed volcanic activity. Kosciusko uplift raised the eastern der of Australia, Nullarbor plain, north ania coast to Warrnambool subsided to sea.
CAINOZOIC ERA Early Tertiary Period 60 million years ag	Volcanic eruptions in practically a s chain from Victoria to Nth. Queensland. f the great seas, whole of Australia vast plain, extreme south subided into sea
LATE MESOZOIC ERA 125 million years a	ral Australia, great artesian basins of S.A and Sth. Queensland laid down. ances. Wonthaggi coal beds laid down.
EARLY MESOZOIC	kes, lakes near Bacchus Marsh, Morwell.
LATE PALAEOZOI ERA 309 million years	laid down. nia, Victoria, Sth. Aust., NSW., and into ian sea covered large areas laying stle coal measures.
MID. PALAEOZOIC ERA 381 million years a	s still active, Limestones of the uth Wales laid down. ater, rocks at Walhalla formed. laid down.
EARLY PALAEOZ ERA 600 million years	of Bendigo, Ballarat, Dalesford, der this sea. most of the Northern Territory, The s were laid down in this period.
PROTEROZOIC E	s of granite. Remnants to be seen in the copper bed formed.


Dicotyledons
Monocotyledons
Cycads
Conifers
Ferns
Club moss
Psilophyta
Mosses
Hepatics
Algae
Lichens
Fungi
Bacteria
CAINOZOIC ERA
Late Quaternary Period
RECENT EPOCH
CAINOZOIC ERA
Early Quaternary Period
PLEISTOCENE EPOCH
CAINOZOIC ERA
PLIOCENE EPOCH
Late Tertiary Period
MIOCENE EPOCH
CAINOZOIC ERA
OLIGOCENE EPOCH
EOCENE EPOCH
Early Tertiary Period
60 million years ago
PALEOCENE EPOCH
LATE MESOZOIC ERA
Cretaceous Period
125 million years ago
Jurassic Period
EARLY MESOZOIC ERA
Triassic Period
LATE PALAEOZOIC ERA
Permian Period
309 million years ago
Carboniferous Period
MID. PALAEOZOIC ERA
Devonian Period
381 million years ago
Silurian Period
EARLY PALAEOZOIC ERA
Ordovician Period
600 million years ago
Cambrian Period
PROTEROZOIC ERA
1,400 to 1,800 million years ago.
RETREAT OF FOREST FROM THE POLES
RISE OF HERBACEOUS PLANTS
DEVELOPMENT OF EXTENSIVE FOREST
ANGIOSPERMS INCREASING.
GYMNOSPERMS WEAKER
AGE OF GYMNOSPERMS
GYMNOSPERMS DOMINANT
AGE OF LYCOPODS, SEED FERNS AND AMPHIBIANS
EXTENSIVE COAL-FORMING FOREST
DOMINANT CLUBMOSSES
FIRST ANGIOSPERMS
SEED FERNS AND OTHER FERNS
PRIMITIVE BRYOPHYTA
PSILOPHYTALES & RHYNIA
SEED FERNS
PRIMITIVE FERNS & LYCOPODS
AGE OF MARINE ALGAE
FIRST FORESTS
FIRST LAND PLANTS
?
BACTERIA
Formation sand ridges in the deserts, growth of Barrier Reef
Tower Hill and Mt Gambier still active, last Great Ice Age, Man appeared
Elevation of the south, gradual recession of the sea, renewed volcanic activity. Kosciusko uplift raised the eastern border of Australia, Nullarbor plain, north Tasmania coast to Warrnambool subsided to sea.
Large Volcanic eruptions in practically a continuous chain from Victoria to Nth Queensland.
Drying off of the great seas, whole of Australia reduced to a vast plain, extreme south subsided into sea
Great sea in Central Australia, great artesian basins formed. Opal beds of S.A and Sth Queensland laid down. Tremendous disturbances. Wonthaggi coal beds laid down.
Age of swamps and lakes, lakes near Bacchus Marsh, Morwell.
Grampians deposits laid down.
Intense glaciation in Tasmania, Victoria, Sth Aust., NSW., and into tropical Queens. Later Permian sea covered large areas laying down the Newcastle coal measures.
Tasmania a peninsula, Volcanos still active, Limestones of the Moonbi Ranges in New South Wales laid down.
Most of Eastern Australia under water, rocks at Walhalla formed. Mt Lyell copper fields in Tasmania laid down.
Victoria still under the sea, Goldfields of Bendigo, Ballarat, Daylesford, Maldon and Tasmania laid down under this sea.
Cambrian Sea covered central Victoria and most of the Northern Territory, The rocks of the Flinders and Mt. Lofty Ranges were laid down in this period.
Intense Volcanic activity setting down large bastions of granite. Remnants to be seen in the S.W of West Aust. and in the Kimberlies. Mt Isa copper bed formed.
© 1965.

during Mid-Palaeozoic times. This era is commonly referred to as the **Age of Algae**. To illustrate the success of these plants some startling fossil records exist:

> "In 1859, Sir William Dawson described from the Lower Devonian of Canada some silicified 'trees', which from certain structural features they possessed he inferred a coniferous relationship, and named them *Prototaxites* ('first yew-tree'). Subsequently, Mr. Wm. Carruthers, by detailed examination proved these fossil trunks to be gigantic Algae and, consequently, changed their generic name to *Nematophycus* ('thread-sea-weed'). They have been obtained up to three feet in diameter and twenty feet or more in height. They are supposed to be related to the brown-sea-weed group, that includes the *Laminarians,* or 'sea tangles', the largest of existing algae, the stems of which sometimes have the thickness of a man's thigh". (Howchin 1925.)

Land plants were developing concurrently with the algae, and the first consisted of Cryptogams with well developed vascular systems. Although fossil records are again almost non-existent, the development of these forms would have required a long period of evolution. A typical cross-section of the flora would include *Astrophyllites, Calamites, Cordaites, Dadoxylon, Leptophleum, Platphyllum, Psilophyton,* and *Sigilaria.* Australia, like most countries of this time, had developed extensive marine, swamp and dry land floral communities.

The Carboniferous age saw the most striking development of land flora in the Earth's history. Compared with our present flora the species were relatively few, but the growth rate under the existing conditions was luxuriant. Giant forms of *Cryptogams* (ferns, lycopods, calamites etc.) dominated the landscape and are richly represented in our black-coal measures. The *Angiosperms,* which are now dominant on the earth, were, to our knowledge, non-existent.

Towards the end of the Carboniferous period and the beginning of the Permian period saw a vast change in the flora, old forms dying out and related forms replacing them. *Calamites,* very abundant reed-like plants in the Carboniferous flora were replaced even more abundantly by *Phyllotheca.* The small fern-like plants continued as a type, but were replaced by new genera of which *Glossopteris* and *Gangamopteris* were the most significant. The remains of the fern-like seed-bearing plant, *Glossopteris,* form the vast coal fields of New South Wales, Central Queensland and Collie in Western Australia. This plant appears to be confined to the Southern Hemisphere, as it is not known from Europe or North America. An interesting and one of the most important discoveries of modern times, is the occurrence of fossils of *Glossopteris* within 100 miles of the South Pole on the Antarctic Continent. The giant lycopods, *Lepidodendron,* along with *Rhacopteris* and *Cardiopteris,* were also typical plants of this period.

As we advance farther into the Permian Period the giant clubmosses, having reached their peak are now declining. Tall trees, *Dadoxylon,* with diameters of three feet or more were now beginning to populate the landscape. This tree has been placed in the extinct group of *Cordaitales* which were probably the ancestors of the modern pines and cycads. The balance of Permian flora consists of both seed ferns and true ferns; *Sphenopteris* was a small graceful plant resembling Maidenhair.

The most striking feature of the Triassic times was the disappearance of *Glossopteris,* giving way to numerous other small plants. The predominant plant was *Phyllotheca,* which had developed a more luxuriant habit than in Permian times, growing together with an undercover of *Macrotaeniopteris* and *Thinnfeldia,* which were primitive ferns resembling the common bracken and the bird's nest fern respectively.

As the Triassic merged into the Jurassic, the cycads, palm-like plants similar to the modern *Macrozamia* were now appearing, to remain on the scene to the present day. Other plants usually placed with this group are *Podozamites, Taeniopteris* and *Otozamites.* In the North Australian forests the true conifers or pines were now well established, one of these, *Cedroxylon,* a large cedar-like tree was similar to the living *Araucaria* and closely related to the Queensland Bunya Bunya.

The cycads and pines increased considerably at the beginning of the Cretaceous Period. This period is referred to as the **Age of Gymnosperms.** Extensive pine forests fringed the great lakes of our continent. The material from these forests formed the Burrum-Howard and the Styx River coal measures, these deposits with the Maryborough Marine Series (Qld.) provide an excellent cross-section of the Cretaceous flora of Australia. Two pines of particular interest, *Araucarites,* which is similar to and probably the ancestor of the Queensland Hoop Pine, and *Protophyllocladus,* possibly has the same relationship to the Celery-top Pine of Tasmania.

The development of the Australian flora was more or less parallel to that of most countries, up to and including the Cretaceous Period, but towards the end of this period the existing land-bridges became submerged, isolating Australia. As a result of this isolation the Australian flora began to develop its present, unique characteristics.

The *Angiosperms,* already present in the forests, formed the basis from which the *Eucalypts, Melaleucas* and *Callistemons,* as we know them, have evolved. Although fossil material from the time following the Cretaceous period is abundant, it is surprising how little we know of the evolution of the plant kingdom as we know it today. The floral structures, upon which we rely so much for determination of the higher plants, are by nature so soft and transient, as are the fruits, that their chances of preservation as fossils are remote. However, the stems, leaves and hard woody trunks fossilize readily or provide excellent casts and it is from these that we can separate the different species, for example *Eucalyptus* leaves are distinct and have been identified from many localities from all periods since Late Cretaceous to the present day. *Banksia* has been found in the Eocene fossil beds in Queensland. *Melaleuca, Callistemon* as well as *Acacia* occur in the Oligocene. Fossil remains of other indigenous plants, such as waratah, have also been determined.

Referring once more to our illustration we can see at a glance that certain classes of plants have had a remarkably stable development until the Recent epoch, when once more strong evolutionary branches are evident. This is the position of the Plant Kingdom now. The wheels of evolution are still turning. Without doubt man will have a considerable influence on the flora of the future.

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ERRATUM

In the title of Mr. Rex Filson's article on page 68 of the July issue for "Filiicolous" read "Foliicolous".

All Aboard !

By Trevor Pescott

During the summer of 1964, I spent much of my time at Corio, to the north of Geelong, for here were to be built roads and stormwater drains prior to the construction of a new housing estate. Some workmen brought to me several large, grey Wolf spiders of a species which was not then determined. They were the largest Wolf spiders I had seen, and they lived in holes or cracks in the dry, fissured earth. The workmen found an easy way to extract them—a cup full of petrol into the hole, and usually the spider emerged at full speed! (unless, of course, the petrol soaked into the parched ground before it reached the spider).

One day, I was brought a very interesting subject, a female Wolf spider with a tribe of spiderlings covering her body. The fact that she was a

Female Wolf spider with young on back.

Photo: *T. Pescott*

The head is kept clear.

Photo: *T. Pescott*

large specimen, and extremely well endowed with offspring, made her all the more interesting, and photogenic.

It was interesting to watch her with the young; no junior dared trespass to her face, and all of her eyes had to be kept clear—those that looked up, forward or sideways all had to be free from obstructions. She liked to keep her legs free too, but this seemed less important; perhaps the spiderlings realized what would happen if they tried to cling onto her legs when she ran—as like as not they would be kicked or brushed off and left without transport. If they did become dislodged, they ambled back to join their many brothers and sisters on their mother's back.

Perhaps, I should have kept her under observation for longer, to record how the young fared, and when they became independent. But they had given us some hours of entertainment, and they had shown the workmen something of the wonders of natural history. So they were released. If the interlude had not served any real scientific value, at least it convinced the workmen that spiders are something more than objectionable hazards in their profession, at every opportunity to be ground underfoot to a messy pulp!

[According to McKeown's "Australian Spiders" (Sirius Books edition, 1963, p. 69), the practice of carrying her young spiderlings on her back is usual among the females of the species of *Lycosa*. —J.R.H.]

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for May-December 1965 were due for renewal by May 1. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

The Devonian Rocks of Lilydale, Victoria

By Edmund D. Gill*

Melbourne was founded in 1835 as a pastoral settlement, and it was not till gold was found in quantity that people became interested in the geology. The Geological Survey of Victoria was formed and many beds rich in fossils were discovered including those at Lilydale. The geologists who worked here were trained in the United Kingdom and naturally saw parallels with beds they knew there. The Lilydale limestone reminded them of that at Wenlock in England. The latter is of Middle Silurian age and the same age was given the deposit at Cave Hill. The first Professor of Natural History at the University of Melbourne was Professor Sir Frederick McCoy who was also the first Director of the National Museum. In his Prodromus of the Palaeontology of Victoria (1874-1882) he described some of the Lilydale fossils.

During his tenure as Professor of Geology, Professor J. W. Gregory published a paper (1903) in which he divided the local "Silurian" rocks into Melbournian and Yeringian. The latter are the beds at Lilydale, so called because they occur in the Parish of Yering. Before the establishment of the rules of stratigraphical nomenclature, terms were employed in varying senses, and readers differently interpret Gregory as to whether he was thinking of (1) lithological units, (2) of the time during which they were laid down, or (3) both, when he applied the name "Yeringian". My opinion is that he had both in mind. Under the rules now in force "Yeringian" must be applied to a rock unit (or group of rock units), or to a span of time (a Stage). Although the term Yeringian has been used in a time sense (e.g. Chapman and Thomas, 1935, Gill 1945), there is a tendency now to use the time nomenclature of the classic areas in Europe, so it would appear better to apply the rules to the Lilydale sequence by employing Gregory's term to represent a series of lithological units or formations, thus:

Youngest	4. Cave Hill Conglomerate	YERING GROUP	Lower Devonian
	3. Lilydale Limestone		
	2. Ruddock Siltstone		
Oldest	1. Christmas Hills Sandstone		Siluro-Devonian

These names have been approved by the Stratigraphical Nomenclature Committee.

The approximate thicknesses of the formations of the Yering Group are:

Cave Hill Conglomerate . .	100 ft.
Lilydale Limestone	700 ft.
Ruddock Siltstone	8000 ft.

1. **Christmas Hills Sandstone.** This formation consists of a sandstone silicified to varying degrees. It constitutes the Croydon Scarp (Keble 1918, Hills 1934, Gill 1949), and the hard rocks forming the extension of this scarp at Yering Gorge. The formation

* National Museum of Victoria.

is poorly fossiliferous. A few fragments have been found in a quarry on the south side of the Maroondah Highway where it descends the scarp. At the intersection of Wonga Park Road and Bryson Road near Wonga Park further to the north, *Notanoplia australis* has been found along with a trilobite eye (phacopid) and crinoid stem columnals. At Yering Gorge the brachiopod *Plectodonta bipartita* was collected by me at the south end of the long straight section of the Gorge, and this indicates a Lower Devonian age. It is not suggested that this is the age of all the rocks forming the scarp because there is a facies change in a northerly direction, and considerable pitching of the strata at Wonga Park and in the big bend of the Yarra River at the Yarra View Estate. A lithological unit may transgress time boundaries.

2. **Ruddock Siltstone.** This formation obtains its name from the long known Ruddock's Quarry, N.W. of Lilydale (see map Gill 1940). The quarry has not been used for about 30 years, and has been made into a dam, but plentiful fossils can still be obtained. It is not now known locally by this name. Most of the fossils are in siltstone (muddy facies), but in the occasional sandstone bands there are fossils belonging to the sandy facies. The Ruddock Siltstone is a very thick formation, continuing right up to the Lilydale Limestone. The Ruddock's Quarry fauna is characterized by the very plentiful brachiopods *Chonetes ruddockensis, Plectodonta bipartita* and *Howellella.* This horizon is repeated in a cutting on Switchback Road "West of Lilydale Cemetery" (loc. 23, Gill 1940), and south of this locality in the excavations connected with the development of the Chirnside Park Estate. Just below this horizon is one rich in the minute pelagic shell *Styliolina fissurella* (Chapman 1904, Gill 1941) and *Nowakia matlockiensis* (= *acuaria*?) which is proving to be of intercontinental importance (Boucek 1964). This latter fossil is found West of Ruddock's Quarry (loc. 41), and at a new locality in Breakaway Pass, Chirnside Park Estate, Lilydale.

In the upper part of the Ruddock Siltstone there is a fauna easily separated from the Ruddock's Quarry fauna, being characterized by the brachiopods *Chonetes cresswelli, C. robustus, C. micrus, Acrospirifer lilydalensis* and *Megakozlowskiella cooperi.* It is likely that *C. cresswelli* evolved from *C. ruddockensis,* and that the intermediate stage can be used for further stratigraphical subdivision. The two above faunas (that at Ruddock's Quarry and that at Lilydale) could be regarded as two stages. These two faunas have been used to define the Lower Yeringian and Upper Yeringian (Gill 1945). *Megakozlowskiella* is known only in the highest beds and so could also be used for stratigraphical subdivision.

3. **Lilydale Limestone.** This is a lenticle of carbonate sediments derived from a coral reef with its accompanying fauna of plentiful stromatoporoids, crinoids and gasteropods, but rare pelecypods, brachiopods and trilobites. It may be called a coral-stromatoporoid biostrome. The position of the reef (bioherm) in relation to these sediments is not known. The Christmas Hills Sandstone was formed from sandy sediment, the Ruddock Siltstone from a finer muddy sediment, while the limestone was formed from carbonate sediment (with a minimum of terrigenous matter) ranging from limey mud to boulders of coral and large gasteropods. The large boulders in this environment of rather fine sediments suggests the reef was not far away. This generally fine sedimen-

tation suddenly changed with the incoming of the next formation, presumably as a result of marked tectonic movements.

4. **Cave Hill Conglomerate.** This is a siliceous and not carbonate mass of sediments with grain size ranging from sand to large pebbles. Cresswell (1893), Stirling (1899), and Morris (1914) regarded the conglomeratic quartzite outcropping on the hills east and south of Cave Hill quarry as a Palaeozoic formation conformable with the limestone. Some later workers regarded these sediments as being a capping of Tertiary age. Soon after commencing the study of the geology of Lilydale, I found a number of pieces of silicified wood, including a whole stump, of Tertiary age in the sands above the limestone at Cave Hill Quarry. The C.S.I.R.O. Division of Forest Products determined this wood as belonging probably to the lauraceous genus *Beilschmiedia*. In 1906 a sample of ferruginized wood from a "tree trunk about six feet high and three feet wide standing up under the Older Basalt cap of Cave Hill" was presented to the National Museum by Mr. A. G. C. Campbell. These sediments containing the fossils at least were Tertiary. Later, when conducting an excursion to Cave Hill for University students, Dr. C. Teichert found that the east side of the quarry had been cut back further, revealing a silicified sandstone with poorly preserved, but indubitably Palaeozoic, brachiopods. The writer also has since collected such forms. Thus the discussion as to whether the beds capping Cave Hill were Tertiary or Palaeozoic presented a false antithesis in that beds of both ages occur there.

A curious feature of the Tertiary sands is the presence of sheared and crushed pebbles (Gill 1942b, 1946) which, having sharp edges, could not have been transported far. They could not have been deformed in the soft sands. These pebbles have now been found in the Palaeozoic beds and so their origin has been established.

Age of the Yering Group

As has already been stated, the first geologists thought the Lilydale Limestone was of Middle Silurian (Wenlock) age, and the underlying rocks (now called Ruddock Siltstone) older still. Chapman (1914) accepted this age, but in mentioning Lower Ludlow gave hint that he recognized younger elements. Later (1926), while still considering the beds to be Silurian, he referred to the presence of "Devonian types" in them. Ripper (1937) gave a Devonian age to the limestone after studying the stromatoporoids. Hill (1939) studied the corals and declared them to be of Lower or Middle Devonian age. The writer studied the brachiopods and trilobites of the Ruddock Siltstone under the Lilydale Limestone, and also to the south of the limestone at Mooroolbark where there are silty beds of the same age as the limestone, referring them all to the Lower Devonian (Gill 1942a, 1951, 1953, 1958). It is suggested that all the rocks at Lilydale comprising the Yering Group as here defined are Lower Devonian in age, comparable with the Gedinnian and Siegenian of Europe but not reaching the highest part of the Lower Devonian, i.e. the Emsian.

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Field Naturalists Club of Victoria

General Meeting—July 12, 1965

About 120 members and friends attended the meeting. The President, Mr. M. K. Houghton was in the Chair. The minutes of the Annual Meeting held on May 10, 1965 were taken as read on the motion of Mr. A. J. Swaby, seconded by Mr. J. Strong and confirmed.

The secretary, Mr. E. H. Coghill appealed for two delegates to attend the A.N.Z.A.A.S. congress on August 16-20 in Hobart. He announced that the Blackburn Tree Preservation Society was having an excursion from Ouyen to Pinaroo from August 27-30. Mr. Coghill told the meeting that the F.N.C.V. was help-

ing the V.N.P.A. Victorian survey to determine which areas should be preserved. Attention was directed to the magazine *Wild Life in Australia* for sale and subscriptions.

Mr. Coghill commented on a campaign to restrict the spread of weeds in native plant sanctuaries. Members were asked to assist by destroying any specimens of the South African Bone Seed *Crysanthemoides* (*Osteospermum*) sp. in or near these areas. It was suggested that, as the Soil Conservation Authority had planted this weed at Portland, the matter should be taken up with that Authority.

The subject for the evening was an illustrated talk by Professor Hills on "The Work of U.N.E.S.C.O. in Arid Lands." Professor Hills said that this work was commenced by a committee following the suggestion by an Indian delegate that the United Nations investigate the problems of improved productivity and living conditions in these areas. The project became a major one and continued for six years. Professor Hills worked with the advisory Committee and visited institutes set up in various countries. A world map showing the vast arid areas was shown. One of the dangers associated with irrigation in these areas is the scalding of vegetation by bore-water which is often strongly saline. Coloured slides were used to contrast the scant vegetation of North African sand ridges and gibber country with the rich crops produced by natural irrigation along the Nile. The present aridity of most of Egypt and Africa was indicated by aerial photographs showing old river valleys—now only rivers of sand. Professor Hills said that to improve productivity in these areas, education of the people must be the first concern as they are often strongly opposed to changes associated with modern ideas. The work of various institutes was shown and their progress indicated. This is especially spectacular in Israel where there is now a well developed agriculture. The situations in Andalusia, Spain; Pakistan and Persia were also discussed. Professor Hills gave a very realistic picture of the places he had visited as advisor and the audience enjoyed every minute of the journey. On behalf of the members present, Mr. R. Davidson thanked Professor Hills for his entertaining and informative talk.

Exhibits: Agates from Agate Creek, Queensland; large garnet crystals of rhodonite from Broken Hill, exhibited by Mr. R. Davidson. The endemic *Grevillea steiglitziana* from the Brisbane Ranges, Mr. A. J. Swaby. Fossil wood, a butterfly wing and foraminifera under Club microscopes, Messrs. D. E. McInnes and W. C. Woollard.

The seventeen new members whose names appeared on page 95 of the July *Naturalist* were elected.

Members were reminded that *The Vegetation of Wyperfeld National Park* by J. Ros Garnet was now available.

Marine Biology and Entomology Group—April 5th, 1965

Fifteen members attended the meeting which was chaired by Mr. R. Condron.

The speaker for the evening was Mr. H. R. Schurr, his subject being "North Sea Herring Fisheries and plankton". Mr. Schurr gave a very comprehensive and interesting talk on this subject, tracing the history of this well known fishing ground, and detailing a lot of the research work into the plankton which is the North Sea Herrings' food. At the conclusion of his talk, Mr. Schurr was asked many questions. A vote of thanks was moved.

Exhibits:

Mr. D. McInnes showed one of the marine amphipods, *Caprella,* under a Club microscope, also a section of a species of *holothurian,* showing the silica plates which strengthen the animal's skin.

Miss L. White displayed a species of ghost moth.

Marine Biology and Entomology Group—May 3rd, 1965

Twenty-one members were present. Mr. R. Condron took the chair.

Mr. D. McInnes spoke on the forthcoming Nature Show to be held on 6th-8th September. Several members expressed their willingness to work at a display. Mr. McInnes will ask the Committee to allocate the usual space, as the Group's display was such a success last year. Master Tony Chambers agreed to help with a display of crabs. Mrs. G. Lee as president of the Northern Suburbs Junior Field Naturalists, hopes to be able to organize a display for that Group. Mr. R. Condron will have a display on the evaluation of insects. Mrs. Strong will arrange a display of shells.

Guest Speaker for the evening was Mr. J. Barnes, Quarantine Officer of the Ag-

riculture Department, his subject being "Quarantine". Mr. Barnes gave a most interesting talk on this subject, and brought along several prohibited articles which had been confiscated from immigrants. At the conclusion of his talk, Mr. Barnes was plied with questions. A vote of thanks was moved by Mr. McGavin.

Exhibits:

Miss White showed a species of cricket which was identified as the common field cricket. Mrs. McGavin showed a species of stick insect which was unidentified. Mr. McInnes showed several species of rotifers under a club microscope.

Marine Biology and Entomology Group—June 7th, 1965

The meeting was chaired by Mr. R. Condron, seventeen members being present.

Mr. D. McInnes reported that the allocation of space for the September Nature Show had been filled.

Nominations were called for the positions of Chairman and Secretary of the Group. The outgoing Chairman and Secretary were both re-elected.

The speaker for the evening was Dr. D.H.S. Horne, his subject being "The metamorphosis and colour changes in insects and crustaceans". Dr. Horne gave a very interesting and learned talk on this subject, showing the immense amount of research he must have put into it. At the conclusion, many questions were asked and a vote of thanks to Dr. Horne was moved by Mr. M. Harrison.

Exhibits:

Mrs. McInnes showed the pupa of a case moth, probably Saunder's Case-moth. Mr. Harrison showed a very interesting collection of marine specimens taken on a recent trip to Kangaroo Island, S. Australia. Mr. Condron showed three species of moths of the family *Hepialidae*.

Mr. D. McInnes called for a volunteer to give a talk to the Northern Suburbs Juniors. Mr. R. Condron offered to do this.

Microscopical Group—May 19, 1965

17 members and visitors attended this meeting which was chaired by Mr. Le Maistre.

The minutes were taken as read so as

to leave as much time as possible for the speaker.

Mr. Rex Filson gave the group a most interesting lecture and demonstration on the study of lichens and the role and use of the freezing microtome in producing plant sections. He explained that the unusual partnership, that exists between the fungi and algae components of lichens, was not a true symbiosis for the fungi gained more from, and were more dependent upon, the algae.

The speaker then demonstrated and explained that the freezing method of sectioning was more suitable for lichens than for most other types of plant life. The lichen specimen is given a preliminary soaking in water or water plus detergent, then placed on the microtome platform. The carbon dioxide is turned on, the specimen is frozen quickly and the sections are then cut. The simplicity of the operation amazed all present.

The method of using disposable syringes as containers for the stains used was of particular interest to all.

Eight microscopes were on display exhibiting a number of specimens.

Microscopical Group—June 16, 1965

26 members attended this meeting which was chaired by Mr. E. Le Maistre.

After a welcome to visitors, the minutes of the last meeting were read and confirmed.

Mr. D. McInnes informed the group that the late Mr. Rob, who had been a very active microscopist, had left to the Group a number of items of equipment and books. It was decided that some of the books be put in the library and the rest distributed among the members.

Mr. E. Le Maistre made available to all members present a quantity of plastic penicillin syringes for use as stain containers.

Mr. P. Genery gave the group a demonstration and talk on the making of microscopical slides. The role of Canada balsam in making the slide specimen and cover a homogeneous unit was discussed.

Then members were taken step by step through the process of treating specimens such as insects and small crustaceae. A very useful method of pressing insects between two slides and kept in place with elastic bands was demonstrated. Finally specimens were fixed in alcohol, dehydrated, cleared and mounted in Canada balsam.

Various other mountants were discussed: Euparal, glycerin and Berlese, their advantages and disadvantages being pointed out. Finally ringing with nail polish and the use of the infra-red lamp instead of the usual brass heating table or plate was demonstrated.

The speaker concluded by projecting onto the screen a number of his prepared slides.

Fauna Survey Group, Mammal Reports—May, 1965

1. **Tuan**. *Phascogale tapoatafa.*
   Forest near Moyhu, King River Valley. A male collected and released on May 12 by B. Thompson.
2. **Feathertail**. *Acrobates pygmaeus.*
   Trawalla Forest Reserve. One specimen (female) collected from a felled tree on June 2. Lodged with Fisheries and Wildlife Department by Mr. Hodge, Forest Officer at Beaufort.
3. **Lesser Long-eared Bat**. *Nyctophilus geoffroyi.*
   East Buchan. One specimen collected and released on May 17 by N. A. Wakefield.
4. **Greater Glider**. *Schoinobates volans.*
   (a) 10 miles N.W. Buchan. Observed in Blue Gum, *Eucalyptus bicostata* on May 18 by N. A. Wakefield.
   (b) Tulloch Ard Road, near Buchan. Observed in Messmate *Eucalyptus obliqua* and Manna Gum *E. viminalis* on May 19 and 20 by N. A. Wakefield and J. McCallum.
   (c) Britannia Creek Road. Observed by W. King on May 29.
   (d) Yellingbo. Observed by W. King on May 29.

Fauna Survey Group, Mammal Reports—June, 1965

1. **Squirrel Glider**. *Petaurus breviceps.*
   Dadswell's Bridge. One specimen, dead, with two young in pouch, collected in May by Mr. E. Hoffman.
2. **Ringtail Possum**. *Pseudocheirus laniginosus.*
   Warrandyte. One specimen observed eating shoots of Peppermint Gum *Eucalyptus radiata,* by Mr. W. King on June 6.
3. **Pygmy Possum**. *Cercartetus nanus.*
   Tidal River. The Ranger, Mr. A. Miller, reported a female nesting in a cupboard in April. Three young were

produced and the nest vacated by June 5.

General: Yellingbo, June 19. Mr. W. King sighted one Sugar Glider *Petaurus breviceps;* 8 Brushtails *Trichosurus vulpecula;* 11 Ringtails *Pseudocheirus laniginosus;* 2 Short-nosed Bandicoots *Tsoodon obesulus;* one Eastern Water-rat *Hydromys chrysogaster.*

AFFILIATED CLUBS

Maryborough

This Club reports two bright spots in the year under review—an excellent display at the Golden Wattle Festival, and the high standard of the Club's newsletter. Mr. G. Williams is President and Miss M. L. Peck the new Honorary Secretary.

Bairnsdale

This Club, like many others, is battling against the proposed motel at Wilsons Promontory by putting pressure on its local member. Mr. C. Bowden is President and Mr. E. V. Barton is the Honorary Secretary.

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

GENERAL MEETINGS

Monday, August 9—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Mr. J. Ros Garnet, Wyperfeld Film.
3. Election of members.

(a) *Ordinary*

Miss Grace Black, 6B Pasadena Mansions, 517 St. Kilda Rd., Melbourne.
Mr. W. J. Blackley, 16 Almay Grove, Heidelberg (Interest—Botany).
Mr. B. A. Callanan, 20 Reynolds St., Coburg.
Mr. and Mrs. R. Gough, 2 Inga St., East Burwood (Joint with Miss V. Gough.)
Miss Mona La Reux, 25 Mabel St., Camberwell.
Mrs. N. V. Nixon, 53 Stawell St., Kew (Interest—Plants and animals. Introduced by Mrs. K. Hough.)
Dr. Elizabeth Turner, Royal Children's Hospital, Parkville, N.2. (Introduced by Miss M. Butchart).
Mr. G. J. York, 22 Steven St., Hurstbridge.

(b) *Country*

Mrs R. Douglas, c/o Forest Office, Mansfield.
Mr. A. Fisher, Private Bag, Piangil (Introduced by Anne Sutherland and Daisy Wood).
Mr. P. J. Gresser, 117 Keppel St., Bathurst, N.S.W.
Mr. P. L. C. Grubb, Kallista (Introduced by G. Douglas and Miss M. Elder.)
Mr. F. E. Jones, "Boola-Boola", Tyers, via Traralgon
Mr. D. M. O'Neill, SS2090, Plenty Rd., Whittlesea.

4. General Business.
5. Nature Notes and Exhibits.

Monday, September 13—Prof. Canny, "The Mystery of the Sausage Trees."

GROUP MEETINGS

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

Thursday, August 12—Botany Group. Preparations for the Nature Show.
Friday, August 13—Preston Junior Club—at the Rechabite Hall, 251 High Street Preston (just N. of Bell Street) at 8 p.m.
Wednesday, August 18—Microscopical Group.
Friday, August 27—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Birthday Night. 22nd. Members' Exhibit display.
Wednesday, September 1—Geology Group.
Thursday, September 2—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.
Monday, September 6—Marine Biology and Entomology Group—at Mr. Strong's rooms, Parliament House. Enter through private entrance at S. end of House, 8 p.m.
Thursday, September 9—Botany Group. Mr. Rex Filson, "Lichens".

F.N.C.V EXCURSIONS

Sunday, August 15—Begley's Bridge. Leader: Miss M. Lester. Subject: Ferns. The coach will leave Batman Avenue at 9 a.m., Fare 13/-. Bring one meal. The bus will make a short stop at the Kallista picnic grounds about 10 a.m.
Friday, August 27 to Sunday, September 5—Red Cliffs. The coach will leave Whight's Tourist Bureau in Flinders Street at 6.45 p.m. Bring a picnic meal for Saturday. Other details in last month's *Naturalist*.

PRELIMINARY NOTICE

Saturday, December 25, 1965 to Monday, January 3, 1966. Snowy Mountains, Kosciusko. The coach will leave Melbourne at 2.45 p.m. for Orbost and reach Cooma on Sunday. On Monday a three day tour of the Snowy Mountains Scheme will commence. Thursday night will be spent at Cooma, leaving Friday morning for Mt. Kosciusko where the next two nights will be spent. On the return journey, there will be an overnight stop at Wangaratta. The total cost will be approximately £45. A deposit of £10 should be paid when booking to the excursion secretary.

Field Naturalists Club of Victoria

Established 1880

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

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MEMBERSHIP

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

Rates for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 82 of the *Victorian Naturalist* is from May 1965 to December 1965.

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Stereum fasciatum growing on a dead log, Sherbrooke Forest, May 1965.
Photo: *A. Owen*

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The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Front Cover:

Mr. J. Cooper of the Fisheries and Wildlife Department of Victoria kindly sent us this photograph of the lizard *Amphibolurus muricatus.*

Distribution of Cave-dwelling Bats in Victoria

By E. Hamilton Smith*

Introduction

George and Wakefield (1961) first drew attention to the correct identification of three species of cave-dwelling bats occurring in Victoria and listed some localities in which these had been recorded. Since that date, the work of the Australian Bat-Banding Scheme has revealed further localities and has partly elucidated the patterns of seasonal movement in two species. Accordingly, it seems timely to publish a progress report on this work.

At the same time, it is hoped that this paper will point out the importance of reporting any banded bat seen. Details of the band number and place and date collected should be forwarded to the secretary of the Australian Bat-Banding Scheme at the C.S.I.R.O. Division of Wildlife Research, Canberra. Any other reports of the occurrence of bats will be welcomed by the author, as these will help add to our somewhat patchy knowledge of Victorian species.

Bent-Winged Bat

Miniopterus schreibersi Kuhl

This species is found not only in the Eastern and Northern Coastal areas of Australia, but also throughout the Australasian archipelago, Asia, Southern Europe and Africa. In South-Eastern Australia, it forms large populations, each centred upon a single maternity colony. Dwyer (1963) has demonstrated the importance of these colonies and elucidated the seasonal movements and breeding behaviour of the populations in North-Eastern New South Wales. Most of the populations in South-Eastern Australia appear to follow a similar pattern.

The pregnant adult females, accompanied by a large number of year-old bats, both male and female, return to the maternity colony in late spring or early summer. Birth of the young takes place in December or early January. By mid-March, the young are weaned and the population disperses in various directions during autumn. Many individuals travel as far as 200 miles from the maternity colony and may even fly further, sometimes joining other populations. Movements from site to site are common during autumn or spring while the population is dispersing or gathering at the maternity colony. Some movement also occurs during winter as true hibernation does not occur. However, wintering populations are extremely torpid and spend much of their time in sleep. Adult males do not return to the maternity colony each year but remain in outlying colonies.

At least four such populations are represented in Victoria. The first originates from a maternity colony at Naracoorte, South Australia. Bats of this population disperse throughout South-Eastern South Australia and South-Western Victoria. This population is atypical in that adult males return to the maternity colony in large numbers, and that birth occurs in late October and November. The second centres upon the maternity colony at

* 17 Helwig Ave., Montmorency, Vict.

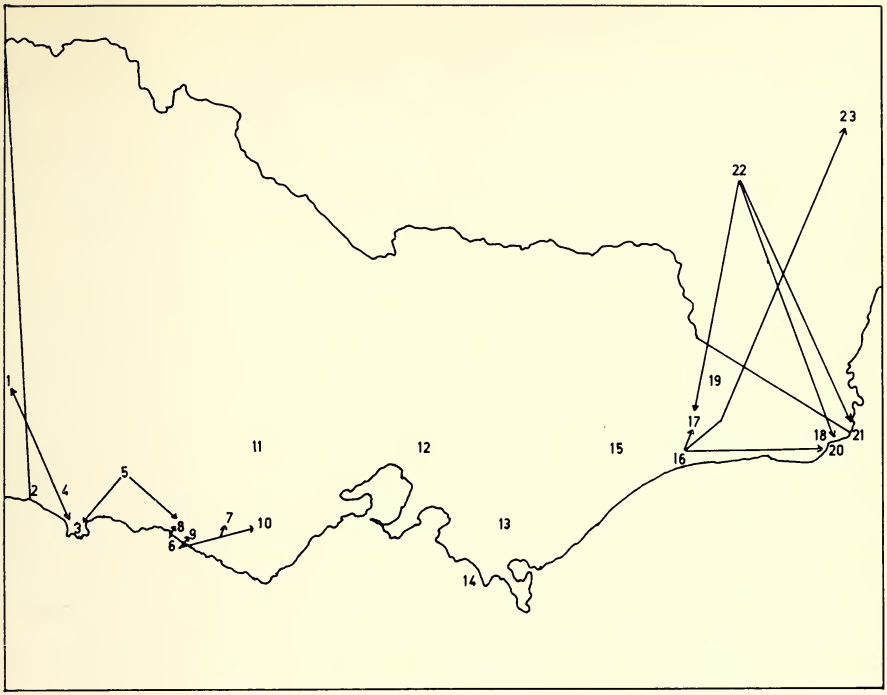

Fig. 1—Recorded localities and selected movements of *Miniopterus schreibersi* in Victoria.
1—Naracoorte, 2—Glenelg River, 3—Bat Ridges, Portland, 4—Fern Cave, Portland, 5—Byaduk, 6—Lake Gillear Guano Cave, 7—Terang, 8—Grasmere, 9—Panmure, 10—Mt. Porndon, 11—Mt. Widderin, 12—Warrandyte, 13—Berry's Creek, 14—Arched Rock, 15—Den of Nargun, 16—Nowa Nowa, 17—Buchan-Murrindal, 18—Genoa, 19—McKillop's Bridge, 20—Mallacoota, 21—Gabo Island, 22—Wee Jasper, 23—Bungonia.

Lake Gillear near Warrnambool and occupies caves in Western Victoria. This group appear to have a more limited range of movement than is usual in the species.

East Gippsland is populated by bats originating from the Nowa Nowa maternity colony. One record to date exists of a bat from this population joining that at Bungonia, New South Wales. The fourth population centres upon a cave at Wee Jasper, New South Wales, and enters Victoria each year at Mallacoota and Gabo Island. Again, one bat has been recorded as joining the Nowa Nowa population at Buchan. It is possible a further maternity colony exists in Central Victoria but there is insufficient evidence at present to either confirm or deny this.

All recorded localities are listed below, including those already named by George and Wakefield (*op. cit.*). These are also shown in Fig. 1, together with some selected movement records. Naturally, many local movements cannot be depicted and interstate movements are only shown where these include Victoria. Localities detailed in banding records are indicated by the abbreviation ABBS, while those for which no reference is given are detailed in the present author's field notes. Cave numbers are those used in the records of the Victorian Speleological Societies.

Locality	References	Comments
Glenelg River—various caves		Small groups appear sporadically, apparently being part of the Naracoorte population.
Portland, Bat Ridges—various caves	ABBS	One cave houses bats throughout the year, being used as a wintering site by part of the Naracoorte population, while some males and non-pregnant females remain in summer. Other caves used occasionally by small groups.
Portland—Fern Cave	Wakefield (1963)	
Byaduk, Church Cave	ABBS	Small groups at intervals. Bats banded here have been recovered at both Portland and Grasmere. Like Mallacoota (see below) two populations apparently meet at this site.
Lake Gillear Guano Cave, near Warrnambool	ABBS	Maternity Colony. Edge (pers. commun.) reports that many young are born in Recess 2 of Gill (1948) but later transfer to higher domes within the cave. Peak size of colony est. 20,000. McKean and Hall (1964) drew attention to moth wings in this cave. Mr. A. Neboiss has identified from these the following three species, all belonging to the family Noctuidae: *Agrotis infusa* (Boisd.) *Perspectania ewingii* Westw. *Pseudaletia australis* Feaud.
Terang	ABBS	A single bat banded at Lake Gillear has been recovered here.
Grasmere Cave	ABBS	Occupied virtually throughout the year. Part of Warrnambool population.
Panmure Cave	ABBS	As Grasmere Cave. This cave is described by Gill (1944).
Mt. Porndon—Arch Cave	ABBS/G. & W.	Referred to by George and Wakefield as O'Callaghan's Cave. Small groups from the Warrnambool population occur here at intervals.
Mt. Porndon—Rubbish Cave		This cave is sometimes also used by small groups.
Mt. Widderin Cave, Skipton	Simpson & Smith (1964)	Now abandoned. Apparently used by large numbers until approx. 80 years ago.
Warrandyte	ABBS/G. & W.	Small numbers occur at irregular intervals.
Berry's Creek—abandoned mine	ABBS	A small number banded here, but no details of movement or affinity yet obtained.
Arched Rock, near Cape Liptrap	ABBS	A wintering colony, probably related to the Nowa Nowa population, but this is unconfirmed. The Southernmost recorded occurrence.
Den of Nargun	Elliott (1961)	Apparently only sporadic occurrences.

Locality	References	Comments
Nowa Nowa:		
Nargun's Cave	ABBS	Maternity colony. Peak population est. 60,000.
Cave NN2		Occasional individuals only.
Buchan:		
Spring Creek Cave (B1)	ABBS/G. & W.	Houses bats virtually at all times. Part of Nowa Nowa Population. Many adult males apparently remain in this cave at all times. Used as winter site by others.
Moon Cave (B2)	ABBS/G. & W.	Small numbers of bats on occasion.
Greenhouse Cave (B3) = Maze Cave	ABBS/G. & W.	Small numbers of bats on occasion.
Duke's Cave (B4)	ABBS	Houses a large population in spring, primarily of pregnant females, and apparently serves as an assembly point prior to movement into Nargun's Cave. Few at other times.
East Buchan:		
Mabel Cave (EB1)	G. & W.	
Clogg's Cave (EB2)	G. & W./ABBS	Small numbers on ocasion.
Wilson's Cave (EB4)	G. & W./ABBS	Primarily a wintering cave, with a few bats remaining at other times. In some years apparently also serves as an assembly cave for pregnant females prior to moving to Nowa Nowa.
Trog-dip Cave (EB10)		Generally used only by small numbers, but in 1964 housed large spring colony, with many pregnant females. In this instance some young were actually born prior to movement to Nowa Nowa.
Slocombe's Cave, The Basin	ABBS	Rarely visited by banders so no details yet available.
Murrindal:		
Shades of Death (M3)		Small numbers only.
Anticline (M11)	ABBS/G. & W.	Primarily a wintering site. Part of Nowa Nowa population.
Dickson's Caves (M30)	ABBS	Sporadic groups at most times of year.
Cave M44		Apparently little used today but with large guano deposits from which the author has taken skulls of *M. schreibersi.*
Genoa	G. & W.	
McKillop's Bridge —mine tunnel	G. & W.	
Mallacoota —radar tunnels	ABBS	A wintering site from which bats of both the Nowa Nowa and Wee Jasper populations have been collected.
Gabo Island	ABBS	Bats captured by the lighthouse keeper during two winters have included individuals banded at Wee Jasper.

Other unconfirmed reports, not detailed above, but almost certainly referable to this species have been noted at abandoned mines at Panton Hills, Walhalla, and Cooper's Creek and caves at Jackson's Crossing and New Guinea Ridge.

Eastern Horseshoe Bat

Rhinolophus megaphyllus Gray

By contrast, this species does not appear to make long journeys from the maternity colony. However, the occasional occurrence of individuals at long distances from any known maternity colony shows that either some long journeys do occur or that further maternity colonies must exist. At present, two maternity colonies are known in this State at Anticline Cave, Murrindal and Nargun's Cave, Nowa Nowa. Adult males rarely return to these caves, and the spring-summer populations consist almost entirely of females. The young are born during November and leave the maternity colony in late January and February. Approximately 1,000 young appear to be born in each colony annually. During the remainder of the year, this species occurs as single individuals or small groups in many caves throughout the Buchan-Murrindal area. At this time, it is not known where the Nowa Nowa population spend the winter, although many of them may well move to Buchan. However, no winter recoveries have yet been made of bats banded at Nowa Nowa.

Horseshoe bats have been recorded in the following other caves of the area:

Buchan: Spring Creek (B1)
Moon (B2)
Greenhouse (B3)
Fairy (B5)
Royal (B6)
Cave B12

East Buchan: Mabel (EB1)
Clogg's (EB2)

The Basin: Slocombe's

Murrindal: Shades of Death (M3)
Lilly-Pilly (M8)
Cave M22
Cave M25
Dickson's (M30)
Cave M35
Cave M44
Cave M49

Outside of the Buchan-Murrindal and Nowa Nowa area, Wakefield (1961) has recorded the species from a mine tunnel near McKillop's Bridge. Krefft (1866) also records it as "frequently observed near Gunbower Creek". Apparently no specimens were collected which might validate this report, and there seems good reason to doubt the accuracy of it. Despite further collecting in this district, no further specimens or sightings have been reported since; the area does not provide a habitat similar to that of *Rhinolophus* in other parts of Australia; and from a study of the general distribution of this species in Australia by the present author (in press), one would expect no more than a very occasional single specimen at the most to be found in such an area. Although it seems hard to understand a misidentification of this very characteristic species, this record should be treated as doubtful.

Large-Footed Bat

Myotis adversus Horsfield

Although recorded from Clogg's Cave, East Buchan on a number of occasions since noted by George and Wakefield (*op. cit.*), the numbers of this bat appear to have diminished and it appears to be less often present. On many visits to the cave, no bats are present. This species appears extremely rare and it seems likely that it responds

unfavourably to human interference. The species has also been recorded by J. L. McKean (in press) from caves on the Glenelg River in the extreme South West of the State.

Little Brown Bat

Eptesicus pumilus Gray

George and Wakefield (*op. cit.*) refer to an unconfirmed record of this species from the Anticline Cave at Murrindal. On checking the records of the Victorian Cave Exploration Society, the bat concerned was described in notes taken at the time as being larger than *R. megaphyllus*. This description certainly does not fit *E. pumilus* which is one of Australia's smallest species. Although the specimen concerned cannot be traced, there appears to be no doubt that it was wrongly identified. From the size described and the date of collection (at Easter), it seems reasonable to suggest that it was in fact *Miniopterus schreibersi*, as this species first moves into this cave each year from Easter onwards.

Acknowledgements

The work described in this paper has been assisted by a grant from the M. A. Ingram Trust.

Obviously, the observations of many persons too numerous to name individually have contributed to any paper of this type. However the author would particularly thank his colleagues who are registered banders and the members of Speleological Societies who have reported occurrences or recoveries. Mr. A. Neboiss of the National Museum provided identification of the moth wings from the Lake Gillear Cave and Mr. John Coventry of the same institution first reported the Nowa Nowa maternity colony.

Mr. W. Carlyle, curator of the Buchan Caves Reserve, has been most helpful in allowing access to caves under his control and in many other ways. Finally thanks are also recorded to many landowners who have also allowed access to their property.

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(Paper received for publication 28/4/65)

Footnote: Since the completion of the above paper, bats from mines at Panton Hills and Walhalla have been identified as *M. schreibersi*. Some individuals from each of these localities had been previously banded at Nowa Nowa. This suggests strongly that the bats of this species in Central Victoria are part of the Gippsland population, and that no further maternity colony is likely to be found in this state. (11/8/65)

Thelymitra antennifera, Rabbit-Ears

By J. M. and W. H. KING

Thelymitra antennifera, one of our most easily recognized sun-orchids, gets its common name from the red-brown appendages on the column which resemble a pair of ears.

The other floral parts are yellow and striped with brown on the underside. This type of coloration is unusual for the genus, most species of sun-orchids being blue.

The plants are relatively frail, about six to eight inches high and have a cylindrical leaf. There is usually one, but occasionally up to three flowers. These flowers are sweetly scented and, as with all sun-orchids, the labellum is not marked, but gives the appearance of an even petal in the lower part of the flower.

The flowering season is during Spring, when it is often found in large groups. The overall distribution is wide; Victoria, Tasmania, South Australia and Western Australia—where it is called the Lemon Orchid.

The plants appear to prefer sandy soils and are abundant in parts of the Mornington Peninsula, although we have found it on rocky soils at Warrandyte and in the Brisbane Ranges.

Thelymitra antennifera

Photo: *J. M. King*

Tadpoles of the Melbourne Area

By A. A. Martin

Littlejohn (1963), in an account of the frogs of the Melbourne area, included no data on tadpoles since there was insufficient knowledge of them. Subsequent studies have enabled the identification of the larvae of the eleven species of frogs inhabiting the area within a twenty-five mile radius of the Melbourne G.P.O. While these species occur throughout much of southern Victoria, care must be used when attempting to identify tadpoles collected away from the Melbourne area, since many larval structures are subject to geographic variation.

The identification of tadpoles is more difficult than that of frogs, and usually microscopic examination of some characters is necessary. The key and the descriptions are based on the characters that are visible at a magnification of ten diameters. Some of the features used in diagnosis, particularly the form of the mouth disc, do not reach their full expression until the tadpole has reached a certain degree of development, and it may therefore be difficult to identify the earlier stages. Tadpoles nearing metamorphosis may often be identified by use of the key to adult frogs (Littlejohn, 1963).

Some of the terms used in the descriptions may require explanation, and most of these are illustrated in *Fig. 1*. The *spiracle* is the opening of the gill chamber, and in all the species considered it is situated on the left (sinistral) side of the body, *Fig. 1A*. The *anus* may open medially in the ventral fin (median) or to the right of it (dextral), *Fig. 1B*. The *mouth disc, Fig. 1C,* is the most useful diagnostic feature at the species level. It consists of a pair of *horny jaws* and several rows of *labial teeth,* which vary in number, length and position. The number and arrangement of the labial teeth are sometimes represented by a formula, e.g. the mouth disc in *Fig. 1C* may be formulated as $\frac{2}{3}$ (2 rows of teeth in the upper labium, 3 in the lower) or $\frac{1\quad 1}{1\quad 1}$, which gives an indication of which of the rows are divided. An easier method of formulation has been suggested by Cogger (1960), but diagrams remain the most satisfactory way of describing mouth structure. The mouth disc is bordered by one or several rows of *labial papillae*. The whole structure forms an efficient rasping or scraping organ, and most tadpoles feed by scouring algae from the surface of leaves, stones, etc.

During the period of larval development the limbs form and grow. The buds of the forelimbs are internal (in the gill chamber) and hence not visible until very late in development, but the hindlimb buds are external (*Fig. 1A*), and their development can be followed (*Fig. 1D*). Their growth provides the basis, in part, for a staging system, which is a method of defining tadpole development in exact qualitative terms. The stages illustrated comprise only a part of the total series (Limbaugh and Volpe, 1957; Gosner, 1960), but represent the stages at which the species are described and illustrated.

It is often desirable to confirm the identity of tadpoles by raising them to metamorphosis, since juvenile frogs

* Zoology Department, University of Melbourne.

are easier to identify than tadpoles. Larvae are best reared in aquaria or enamel trays and fed on lettuce which has been boiled for a few minutes. It is essential that the tadpoles are not overcrowded. Growth is fastest at high temperatures (about 25°C), but this necessitates frequent cleaning of the containers, and temperatures of 15-20° C are therefore recommended. When the forelimbs appear the tadpoles should be placed in shallow water, and provision made for their emergence.

The key and descriptions refer to living larvae. For preserving tadpoles, Tyler's (1962) fixative is recommended, but 5% formalin is also satisfactory, except that it modifies colour and pigmentation more extensively. No difficulty should be experienced in using the key except in category 5, which includes the autumn-breeding species of the leptodactylid

Key to Species

1. Anus dextral. Two rows of teeth in upper labium . . . . . 2.
   Anus median. Three to five rows of teeth in upper labium (Leptodactylidae: Cycloraninae) . . . . . 6.

2. Labial papillae continuous around sides and back of mouth disc (Hylidae) . . . . . 3.
   Labial papillae absent from part of posterior margin of mouth disc (Leptodactylidae: Myobatrachinae) . . . . . 4.

3. Up to 100 mm; a narrow band of papillae along sides and back of mouth disc . . . . . *Hyla aurea.*
   Up to 50 mm; band of papillae around mouth disc expanded into "wings" at the sides . . . . . *Hyla ewingi* and *H. verreauxi*

4. Back colour mottled light brown. Dorsal fin with a finely reticulated pigment pattern . . . . . *Crinia signifera.*
   Back colour uniform dark brown. Dorsal fin coarsely mottled or with isolated dark patches of pigment . . . . . 5.

5. Plump body. First lower row of labial teeth usually entire . . . . . *Crinia victoriana.*
   Narrow body. First lower row of labial teeth usually divided . . . . . *Pseudophryne semimarmorata* and *P. bibroni.*

6. Three rows of teeth in upper labium . . . . . *Neobatrachus pictus.*
   Four or five rows of teeth in upper labium . . . . . 7.

7. Mouth disc oval in outline. Labial papillae in two to three rows . . . . . *Limnodynastes tasmaniensis.*
   Mouth disc squarish in outline. Labial papillae in a mostly single row . . . . . 8.

8. Creamy-white at hatching; later light brown or silvery-grey in colour . . . . . *Limnodynastes peroni.*
   Black at hatching; later dark brown or black in colour . . . . . *Limnodynastes dorsalis.*

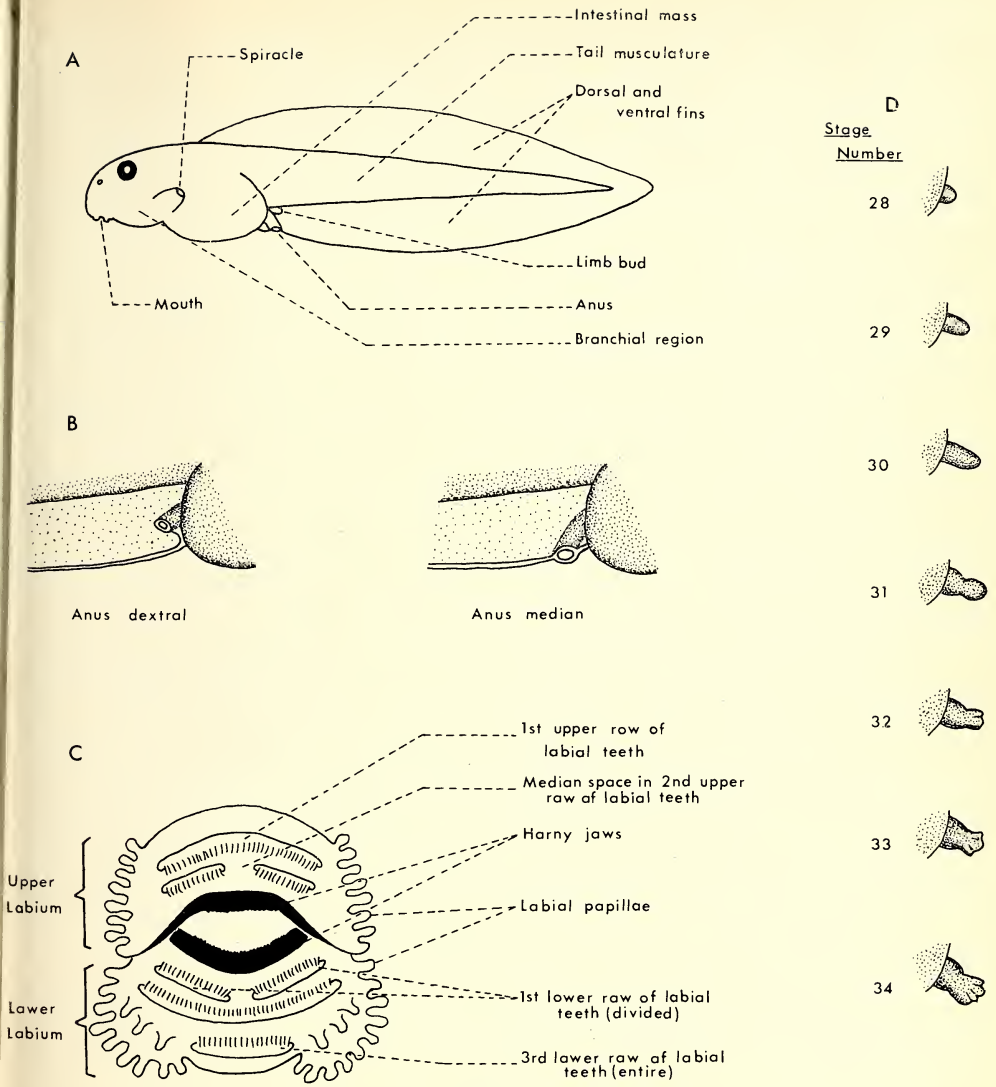


Fig. 1

A. lateral view of tadpole. B. Right ventrolateral views of base of tail showing position of anus. C. Mouth disc. D. Early stages in the development of the hind limbs (based on Limbaugh and Volpe, 1957).

sub-family Myobatrachinae (Parker, 1940). The species in this group are often virtually impossible to diagnose on larval characters, and rearing to metamorphosis may offer the only certain method of identification.

Hyla aurea Lesson

(sub-species **raniformis)**

Description: Anus dextral; spiracle sinistral and not visible from above; eyes lateral. A large, narrow-bodied

tadpole. The dorsal fin is deep and extends almost half-way up the back. The mouth disc has a narrow band of papillae on its lateral and posterior margins. There are two rows of teeth in the upper labium and three in the lower, the inner row in each labium being divided.

The body wall is somewhat transparent, and this enables some of the internal structures to be seen. Dorsally, there is a dark, arrowhead-shaped mark between the eyes (probably the pigmented layer over the brain), and the intestinal mass also appears dark. Ventrally the heart is visible. The body has a pinkish-grey appearance, while the tail is yellowish. There is little pigment in the fins except along the blood-vessels, which are thus clearly visible.

Size: Tadpoles at stages 30-31 have a total length of 38-48 mm, and a mouth width of 3-4 mm. The maximum length attained is 100 mm, making this the largest tadpole occurring in the area.

Habitat: Generally found in well-vegetated, permanent dams and swamps, swimming near the surface.

Metamorphosis: It is probable that larval life extends over two seasons, metamorphosis occurring in January through April. Newly metamorphosed juveniles have a body length of 25·5-27·6 mm.

Hyla ewingi Dumeril and Bibron

Description: Anus dextral; spiracle sinistral and not visible from above; eyes lateral. Generally similar to *H. aurea,* but smaller and with a relatively wider body. The dorsal fin is conspicuously arched and extends some distance up the back. The mouth disc has the same tooth-row configuration as that of *H. aurea,* but is relatively wider since the papillary border is expanded into "wings" at the sides. Occasionally the second upper row of labial teeth is entire.

The coloration varies from pale golden-yellow to dark grey. In the former case the body wall has little pigment, and some internal organs are visible, as in *H. aurea.* The tail is virtually unpigmented except along the blood vessels and the dorsal edge of the musculature. In older tadpoles, however, the tail musculature and fins may become dusky brown.

Size: Tadpoles at stages 29-31 vary in total length from 22-30 mm, and have a mouth width of 2·4-3·0 mm. The maximum length attained is 50 mm.

Habitat: Generally found swimming near the surface in both temporary and permanent pools.

Metamorphosis: Metamorphosing individuals have been taken in November through April. The body length of newly metamorphosed frogs varies from 11·1 to 13·6 mm.

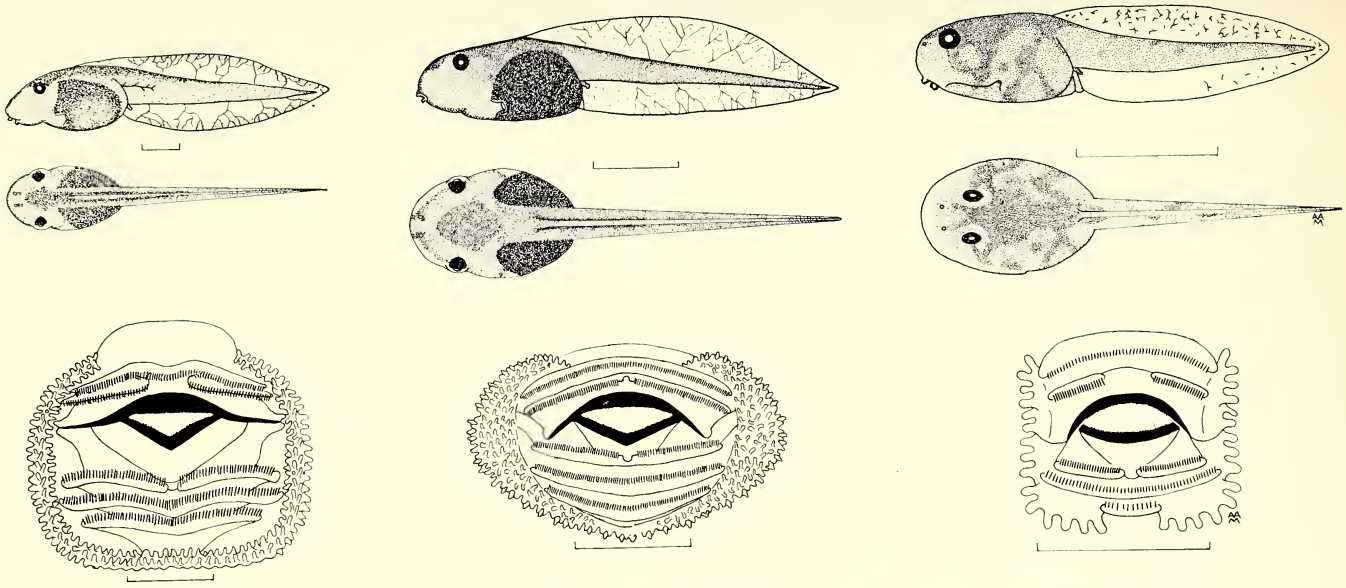
Hyla verreauxi Dumeril

Description: Except for some possible minor differences in pigmentation, available material indicates that tadpoles of this species are virtually identical to those of *H. ewingi.* At any rate, no reliable method has been found for distinguishing the two species.

Size: As for *H. ewingi.*

Habitat: As for *H. ewingi.*

Metamorphosis: Probably occurs in February through April.



Hyla aurea raniformis

H. ewingi and *H. verreauxi*

Crinia signifera .

For the tadpoles the scales represent in each figure 5 mm. and for the mouth discs below they are equivalent to 1 mm.

Crinia signifera Girard

Description: Anus dextral; spiracle sinistral and visible from above; eyes dorsolateral. The inner edge of the spiracle is often free from the body wall, the spiracle then forming a short "nozzle". The mouth disc has an incomplete papillary border, two rows of teeth in the upper labium (with the second divided), and three rows in the lower labium (with the first divided). The third lower row is very short, and usually consists of only 12-15, or as few as 3-5, teeth.

Tadpoles are light-coloured, usually being golden-brown with darker brown mottling. Ventrally, the abdominal wall is transparent and the coils of the intestine are visible. There are numerous scattered melanophores in the dorsal fin, giving a reticulated appearance, but very few melanophores in the ventral fin.

Size: At stage 29 the total length is 13·5-16·2 mm, and the mouth width 1·0-1·7 mm (Littlejohn and Martin, in press). The maximum length attained is 22·5 mm.

Habitat: Shallow temporary or permanent ponds, swamps, and roadside ditches.

Metamorphosis: Larval life lasts for 6-10 weeks, and metamorphosis occurs in April through December. The body length of newly metamorphosed frogs is 8·3-10·3 mm.

Crinia victoriana Boulenger

(formerly *C. laevis* Günther, in part; see Littlejohn and Martin, 1964)

Description: Anus dextral; spiracle sinistral and visible from above; eyes dorsolateral. Generally resembles *C. signifera,* but is larger when similar stages are compared. The mouth disc is also similar to that of *C. signifera,* but usually has the first lower row of labial teeth entire, and the third row almost half as long as the second.

The body colour is commonly uniform or somewhat variegated dark brown, dorsally and ventrally. The tail musculature is also dark-coloured, while the fins, especially the dorsal one, are usually mottled with large dark spots.

Size: Tadpoles at stage 30 have a total length of 19·7-23·6 mm, and a mouth width of 1·2-1·8 mm. A maximum length of 27·5 mm is reached.

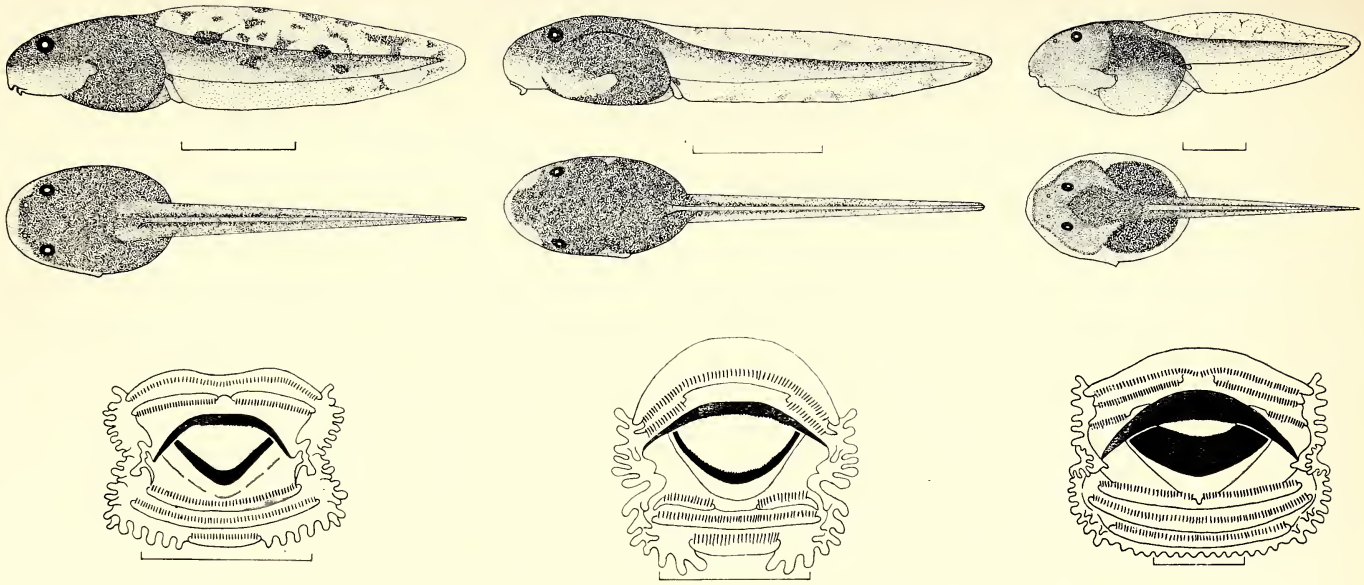
Habitat: Generally found browsing near the bottom in shallow, shaded pools.

Metamorphosis: Occurs 6-8 months after hatching, i.e. in October through December. Newly metamorphosed juveniles have a body length of 8·2-10·3 mm, and are easily recognized since their dorsal surface is covered with small bluish-white spots.

Pseudophryne semimarmorata Lucas and **P. bibroni** Günther

Description: At present no reliable method has been found for distinguishing the larvae of these two species from each other. However, they may usually be identified on the basis of where they are found, *P. semimarmorata* occurring in the south and east of the area, and *P. bibroni* in the north and west (Littlejohn, 1963).

The *Pseudophryne* tadpole closely resembles that of *Crinia victoriana,* having the anus dextral, the spiracle sinistral and visible from above, and the eyes dorsolateral. However, it



Crinia victoriana

Pseudophryne bibroni and
P. semimarmorata

Neobatrachus pictus

For the tadpoles the scales represent in each figure 5 mm. and for the mouth discs below they are equivalent to 1 mm.

may be distinguished by a number of features: the snout is longer and more pointed, and the body is narrower and flatter. (The body is half as wide as it is long in *Pseudophryne,* and two-thirds as wide as long in *C. victoriana.* In *Pseudophryne* body depth is less than half body length; in *C. victoriana* it is more than half.) Some distinction may also be possible on the basis of the mouth structure: in *Pseudophryne* the second upper labial tooth row is divided, and the median space in the tooth row is often as long as the parts of the row. In *C. victoriana* the second upper labial tooth row is entire or but narrowly divided. Likewise the first lower row is usually clearly divided in *Pseudophryne* and entire or nearly so in *C. victoriana.*

The coloration of *Pseudophryne* tadpoles also resembles that of *C. victoriana,* being uniform dark brownish. The tail fin is mottled with pigment cells, but lacks the large dark spots often present in *C. victoriana.*

Size: Tadpoles at stages 28-31 have a total length of 16·5-23·0 mm, and a mouth width of 1·4-2·0 mm. A maximum size of 31 mm is attained.

Habitat: Found in the same situations as *C. victoriana,* i.e. shallow, shaded pools.

Metamorphosis: Occurs 6-7 months after hatching. Newly metamorphosed individuals have been taken in October and November, and have a body length of 10·0-12·8 mm.

Neobatrachus pictus Peters

Description: Anus median; spiracle sinistral, visible from above; eyes dorsolateral. The inner edge of the spiracle may be free. This is a highly characteristic tadpole with a plump body and relatively short tail. The mouth disc is distinctive, having three rows of teeth in the upper labium (with the second and third rows divided) and three in the lower labium (with the first divided). The papillary border is complete around the sides and back of the mouth.

Tadpoles at stage 28 are silvery-grey in colour, with the tail musculature whitish and the fins almost clear. Dorsally, the intestinal mass appears darker than the general body colour, but ventrally it has a silvery sheen, while the branchial region is transparent and the heart visible. Older tadpoles are darker in overall colour, and have the tail fins heavily mottled.

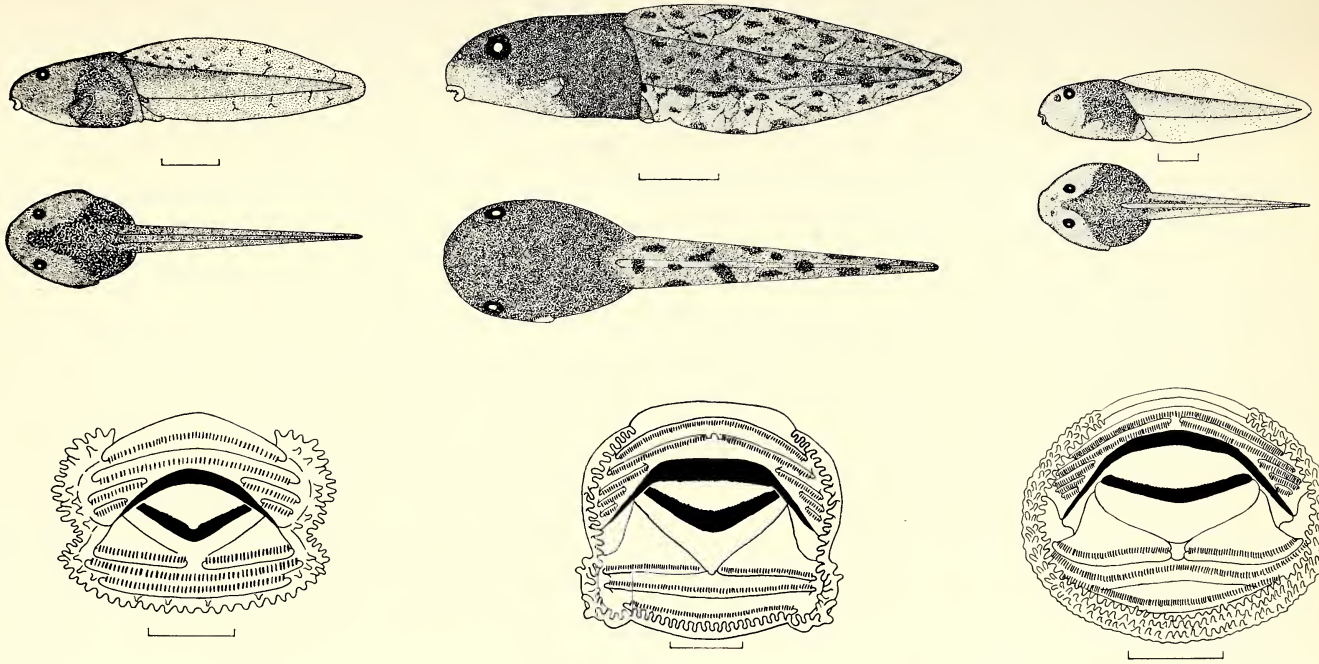
Size: At stage 28, larvae have a total length of 25·5-28·0 mm, and a mouth width of 2·5-3·2 mm. The maximum length achieved is 73·0 mm.

Habitat: Temporary and permanent pools; particularly common to the north-west and west of Melbourne.

Metamorphosis: Larval life extends over 4½-7 months and metamorphosis occurs in September through November. Newly-metamorphosed frogs have a body length of 15·2-17·4 mm.

Limnodynastes peroni Dumeril and Bibron

Description: Anus median; spiracle sinistral, visible from above, inner edge usually free; eyes dorsolateral. The dorsal fin is arched near the middle and narrowed at the tip.



Limnodynastes peroni *L. dorsalis* *L. tasmaniensis*

For the tadpoles the scales represent in each figure 5 mm. and for the mouth discs below they are equivalent to 1 mm.

The mouth disc is squarish in outline and has its lateral and posterior margins bordered by a mostly single row of papillae. There are four rows of teeth in the upper labium. Of these, the first is entire, the second entire or narrowly divided, and the third and fourth short, divided, and placed at the sides of the upper jaw. Rarely a remnant of a fifth row, containing two or three teeth, is present. The lower labium has three rows of teeth, the first being divided.

The body colour is dark brown, while the tail musculature is lightly pigmented and the fins dusky or sparsely spotted. Ventrally, the branchial region is transparent and the intestinal mass is covered by an iridescent coppery layer.

Size: At stages 28-31 the total length is 24·3-35·4 mm, and the mouth width 2·7-3·6 mm. The maximum length reached is 60 mm.

Habitat: Permanent ponds and swamps.

Metamorphosis: Larval life lasts for up to 11 months, and metamorphosing individuals have been collected in November and December. The body length of newly-metamorphosed frogs varies from 15·8 to 18·6 mm.

Limnodynastes dorsalis Gray

Description: Anus median; spiracle sinistral, visible from above, inner edge may be free; eyes dorsolateral. The fins are of moderate depth and the dorsal fin barely extends on to the back. The mouth disc has five rows of teeth in the upper labium, the second to fifth being divided, and the third to fifth short and placed at the sides of the upper jaw. There are three rows of teeth in the lower labium, of which the first is divided. The papillary border is complete around the sides and back of the mouth disc, and consists of a single row of papillae in most places.

Tadpoles are invariably dark-coloured. In extreme cases the whole body, tail and fins are deep velvety black; but more usually the tail is lighter in colour and patterned with dark spots. Older tadpoles are generally lighter in overall colour.

Size: Tadpoles at stages 28-33 have a total length of 30·5-55·8 mm, and a mouth width of 3·3-4·5 mm. A maximum length of 68·0 mm is attained.

Habitat: Usually found swimming actively at all depths in dams and other permanent water.

Metamorphosis: Larval life commonly extends over 13-16 months, and metamorphosis occurs in December through March. Newly-metamorphosed frogs have a body length of 22·4-25·3 mm.

Limnodynastes tasmaniensis Gunther

Description: Anus median; spiracle sinistral, visible from above; eyes dorsolateral. The dorsal fin is characteristically arched near the middle and narrowed towards the tip. The mouth disc has five rows of teeth in the upper labium, with the second to fifth rows divided. The lower labium has three rows of teeth, with the first divided. The labial papillae form a continuous band around five-sixths of the circumference of the mouth disc, and are absent only from a short an-

terior sector. The papillae form two to three rows in most places.

Young tadpoles are dark grey to black in colour, with the fins more or less clear. After the limb buds are formed the colour becomes progressively lighter, and large tadpoles are usually pale golden-yellow, with brownish mottling on the back and tail. Ventrally, the anterior half has little pigment and the heart is visible, while there is a whitish layer over the posterior half.

Size: Larvae at stages 29-34 vary in total length from 27·8-37·4 mm, and have a mouth width of 3·0-3·6 mm. The maximum length reached is commonly 45·0 mm. However, individuals are frequently found which, even in early limb-bud stages, have a length of 50-60 mm. It is probable that these are in their second season as larvae.

Habitat: Usually found swimming in deep water in permanent ponds and swamps.

Metamorphosis: This species has a relatively long breeding season (August to January; Littlejohn, 1963) and it is likely that larvae hatching near the end of the season over-winter as tadpoles and do not metamorphose until late in the following spring. Thus in the same pond in October may be found larvae of two separate age-classes—those that hatched in the previous summer, which have a total length of 50-60 mm, and those resulting from the spring breeding, which are 15-25 mm long.

Moore (1961) reared a single individual from egg to metamorphosis in four and a half months, while a locally collected batch of eggs gave rise to larvae which began metamorphosing after three and a half months. Metamorphosing individuals have been taken in September through January, and March through May, and the newly-metamorphosed frogs have a body length of 14·6-16·5 mm.

Acknowledgements

My thanks are due to Dr. M. J. Littlejohn, who collected many of the specimens used in this study. The expenses for much of the field work were met by the University of Melbourne Research Grant to the Zoology Department.

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Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Bird Notes from Balranald

These bird observations have been sent in by Mr. H. R. Hobson of Rosebery, a regular contributor to these columns.

On the morning of June 15, after an overnight stay near Balranald, N.S.W., a surprising number of bird species were observed during a short walk through an area of Casuarina and Acacia country some 2 miles south of the township.

The first birds met with were a number of Chestnut-Crowned Babblers that proved to be most difficult to observe. They hopped swiftly along the ground about 60 to 80 yards in front of me. After an almost futile pursuit I walked in front and headed them back towards the road where my vehicle was standing. On reaching my vehicle I proceeded slowly along the bitumen for perhaps 400 yards when the Babblers most conveniently came out on the bitumen from both sides of the road and gathered in a little flock. From a distance of about 40 yards I was able to count 25 birds gathered on and around the spot. With the aid of field-glasses, identification was positive as they showed their chestnut-crowns and clean white fronts into the morning sunlight.

It was most pleasing also to see the numbers of pairs of Mulga Parrots about the area. Other parrots seen were Blue Bonnets, Mallee Ringnecks, Red-backs and as I was only about 2 miles from the Murrumbidgee River, the Yellow Rosella was also present. Other birds seen included Bronzewing Pigeon, Crested Pigeon, Grey Butcherbird, Grey Thrush, Rufous Whistler, Hooded Robin, Red-capped Robin, Black-capped Sittella, Brown Tree-creeper, Eastern Whiteface, Spiny-cheeked Honeyeater.

Some 25 miles south, at the Wakool River, the Pied Butcherbird was seen.

Refuelling in Flight

Mr. A. G. Fellows of Charters Towers has forwarded this note:

One evening, just at dusk, a grey moth was noticed apparently "attacking" verbena florets with short, sudden approaches, as sudden retreats to about six inches distance, and then forward to two inches, never nearer. Wondering why the approach was never varied, I hurriedly produced a flashlight.

No wonder it approached no nearer. Undaunted by the beam of light it continued its "attacks". With its tongue it was capable of contacting each verbena floret from a distance of two inches. Close observation showed the tongue to be straight for one inch from the floret, then continuing in a curve for the remainder of the distance.

At least two seconds elapsed after each floret connection, the moth's hovering being perfect and beautiful to watch. Then there was a second's retreat, forward again at "express" rate, a sudden stop with silent wing-movements and then it was hovering again. Over fifty florets were treated in this way, to the amazement of others who came to my call, and then suddenly the moth "took off" into the night. If fortunate enough to witness this procedure again, a camera and flash will be available.

Mr. Fellows wondered if the moth was a "Humming-bird moth" of which he had recently read. The feeding habit described is usual among members of the Hawk-moth family, *Sphingidae*. The family, which includes the Humming-bird Hawk-moths, is cosmopolitan and several species occur in Australia; but without a more detailed description of the insect, it cannot be more closely identified.—J.R.H.

Birds of Curlett's Road, Lara

The following note comes from the Rev. Alex Mills of Lara.

Over five year's watching of the behaviour of birds in this locality, has convinced me that we live on a "bird road". Our house stands on the northern bank of Hovell's Creek, which in any time except winter, is a string of attractive water holes fringed by rushes, and we have noticed that birds of many kinds always follow the windings of this creek in their flight. For instance, the ibis, now very plentiful, usually fly in the evenings to the area at the foot of the Brisbane Ranges, about 10 miles as the ibis fly; flocks of 60 or less, but many flocks, and they follow the creek. The Straw-necked Ibis, (*Threskiornis spinicollis*) travel regularly, and will do so early in the afternoon if a storm threatens. The Royal Spoonbill (*Platalea regia*) is not numerous, and travels alone, or in pairs. At night the call of swans may be heard, and the birds sometimes seen, following the creek in the moonlight. An ocasional Little Pied Cormorant (*Phalacrocorax melanoleucos*) also can be seen on the "Road". We do not see many ducks here. The waterhen (dusky?) are very plentiful, and once Stephen, one of my sons, caught two tiny waterhen chicks in his canoe; they must have just hatched, and followed him very enthusiastically, calling out, and were quite tame when handled before being replaced. Another regular visitor, or visitors, is a pair of Black-shouldered Kites; lately we have seen four of them circling round the spire where a large family of starlings hide. This is *Elanus notatus*. They cry out almost continually; we call it whistling.

The "Road" is evidently connected with racial memories, as the district was called "Duck Ponds".

Unusual Food for Honeyeaters

For some months we have been encouraging honeyeaters in our Essendon garden by providing honey in "gum-nuts" attached to a lemon-tree branch. On February 14 this year, having run out of honey, we tried treacle as a substitute. Both the White-plumed Honeyeaters and the Red-wattle Birds fed on this with enjoyment. Possibly the former wiped their beaks on the branch more frequently than when taking honey, but there was nothing else in their behaviour to suggest that they had detected a difference.

In the evening, having some lemon-cheese sponge-cake that was becoming rather stale, it was put on the bird-table for such birds as might care to eat it. To our surprise one of the Red-wattle Birds soon arrived and consumed a quantity. Although lemon cheese might be expected to attract a honeyeater, the cake itself seemed unusual fare for these birds.

—J.R.H.

Obituary:

Mr. CLOSE VALLIS

On May 26 last, the death occurred of Eliah Close Vallis, foundation and current President of the Rockhampton Field Naturalists' Club, at the age of 75.

Affectionately known as "Closie", he had been a keen collector for more than half a century. His interest included reptiles, orchids and shells and he was Vice President of the Keppell Bay Shell Club, Yeppoon.

But his main interest lay in entomology, specimens he had taken in Central and Northern Queensland being widely distributed among Australian and overseas museums. One species of jewel beetle and one dragon fly bear his name.

The many southern naturalists who have enjoyed his hospitality and the pleasure of an hour going over his varied collection with him at his home in North Rockhampton will greatly mourn his passing.

—J. C. Le Souef, Blairgowrie.

Field Naturalists Club of Victoria

General Meeting—August 9, 1965

The hall at the Herbarium was almost full when Mr. M. K. Houghton, the President, opened the Meeting. He reported with regret the deaths of two Members, Mr. Jephcott, in England in June and Mr. A. L. Scott, an Honorary Member who joined the Club in 1909, in July. Mr. A. G. Hooke said that at the time he joined the Club, Mr. Scott was a very active Member who attended most of the Club's excursions. His interest was geology and he had a remarkable gift of explaining this subject in simple terms. Mr. E. S. Hanks supported Mr. Hooke and Mr. A. J. Fairhall said that he had known Mr. Scott for many years before he, himself, had joined the Club, that he was a keen cricketer and a very fine man indeed. Members stood in silence as a mark of respect.

After signing the minutes of the July General Meeting, which were taken as read, the President asked Mr. D. E. McInnes to speak on the arrangements for the forthcoming Nature Show and roster forms were distributed to those able to assist in manning the exhibits.

The Hon. Secretary, Mr. E. H. Coghill, announced that he had received, from Mrs. D. M. Collins of Stawell, information about the Western Victoria Field Naturalists Clubs Association which held outings and meetings periodically at different Club centres in turn. Members of affiliated Clubs were invited to attend (see p. 155). He tabled papers describing a symposium on the Victorian Mallee to be held at the headquarters of the Royal Society of Victoria, 9 Victoria Street, on September 9 and the Council of Adult Education's programme for the Spring Session.

The Subject for the Evening was "Wyperfeld Park". Mr. J. Ros Garnet traced the history of the Park from the time that large sheep stations were taken up in the area in 1842. It was largely due to the activities of some old members of the F.N.C.V., Messrs Mattingley, Leach and the two Barretts, that Government was persuaded to establish the Park. The present Park covers 218 square miles. Mr. Ros Garnet illustrated the fauna and flora of the Park with an excellent selection of colour slides. Following this introduction, a new film on the Park produced by the Tourist Development Authority with the assistance of the Committee of Management was shown. The film, which ran for about 13 minutes, contained some good sequences on bird-life, kangaroos and other mammals, lizards and the different types of vegetation. Mr. Ros Garnet answered a number of questions put by Members whose interest in visiting Wyperfeld had been stirred. Mr. J. Baines raised the question of preventing, in future, such disastrous fires as that of 1959 and Mr. Ros Garnet said that access tracks had now been cut to enable tankers to penetrate different areas, tanks were being dug in lake-beds and lined with clay or polythene so that they would retain water after rain and, in addition, the attitude of the Forest Commission and local authorities and landholders to the Park was now such that he felt sure that they would collaborate in fighting any fires that might threaten the Park.

Votes of thanks were passed to Mr. Ros Garnet for his talk, to Miss J. Woollard for working the projector and to Mr. E. Byrne for projecting the film.

The new Members listed on p. 127 of the August *Naturalist* were elected on the motion of Mr. Coghill seconded by Mr. E. R. Allan.

Miss M. Lester showed some colour slides of ferns likely to be seen on the excursion to Begley's Bridge on August 15.

Under the heading General Business, the President announced that the present Editor would be vacating the position next year as he would be returning to England. Council had decided that in future there would be an Editorial Board to share the work involved each month in producing the *Naturalist*. Mr. A. B. Court, Mr. R. Filson, Mr. R. McQueen and Mr. J. Baines would be members of the Board and he would like to have further suggestions.

Mr. J. Baines raised three items on Conservation. He wished to praise Mr. Hamer, the Minister for Local Government, for adding three further acres to the Yarra Valley Park and he wished to draw attention to the bill being intro-

duced into the Papua and New Guinea House of Assembly to declare an open season for birds of paradise and to Mr. Alan Moorehead's article on the shooting of crocodiles in Queensland. After some discussion, Mr. Baines moved and Mr. Quirk seconded a motion that the Hon. Secretary write to Sir Donald Cleland expressing the Club's support for the protest of other bodies against the slaughter of birds of paradise for their plumes.

A member raised the question of feeding cheese to the Lyrebirds at Sherbrooke and this was referred to Council.

Amongst the exhibits were a number of records brought by Mr. Ros Garnet in connection with his talk on Wyperfeld and a pelecypod bivalve collected from a sand hill there in 1950. There was a specimen of a lattice fungus, *Clathrus* (Gastromycetes) from Rosebud. Mr. D. McInnes had brought a nest for identification and Mr. A. J. Fairhall an interesting specimen of a rhubarb leaf with a small second leaf growing out from the midrib. Under Club microscopes there were shown butterfly eggs and scales on a butterfly-wing. Mr. Swaby had tabled a chart on the evolution of plants which differed somewhat from that published in the August *Naturalist*.

Marine Biology and Entomology Group—July 5, 1965

Mr. R. Condron chaired the meeting which was attended by twenty-two members.

Minutes of the previous meeting were read and confirmed.

Speaker for the evening was Mr. M. Harrison, ably assisted by Master Phillip Harrison who projected some beautiful slides. Mr. Harrison gave a most interesting talk on his trip last year to Cairns, Northern Queensland, New Guinea, Hong Kong, Taiwan, the Phillipines, Guam and Japan. Mr. Harrison exhibited many specimens of shells, some Rhinoceros Beetles and other objects collected on the trip. At the conclusion of the talk, questions were asked and a vote of thanks moved by Mrs. J. Strong.

Exhibits: Mr. D. E. McInnes showed some interesting species of rotifers under the microscopes. Scales of the Candlegrease Lerp *Lasiopsylla rotundipennis* were shown under low power magnification by Mr. J. Strong.

Geology Group—June 2, 1965

Thirty-nine members and visitors attended with Mr. Angior in the Chair.

Mr. Angior reported a good attendance at the Group excursion to the Kyneton district on 9th May. Members were met on arrival by Miss McGregor of Castlemaine, who led the way to places of interest. The first location visited was a large granite quarry at Black Hill. Following lunch in the Campaspe Gorge, the basalts of Green Hill, mainly the boulders in stone fences, were searched for calcite nodules, which infill cavities in the basalt and which resemble agates in structure and appearance. Many attractive specimens of the nodules were obtained up to one-half inch in diameter, but no large specimens up to one inch or so in diameter such as were in the possession of Miss McGregor were discovered.

The main topic for the evening was a talk by Mr. Hollis on "The Geology and Geography of the Nullarbor Plain". Mr. Hollis was one of a party of students who made a trip of 17 days, by coach, to the area recently. Mr. Hollis firstly described some of the rocks seen along the route, the granites, gneisses, iron oxides and jaspers of the Middleback Ranges and other parts of the Eyre Peninsula, and went on to explain that the Nullarbor Plain comprises some 400 feet of Tertiary marine limestones resting on a base of ancient Pre-Cambrian rocks. A feature of the limestone is the large number of caves of which about 40 have so far been explored. The earlier wet conditions responsible for the formation of the caves changed to dry conditions about 20,000 years ago and the caves are now generally "dry caves". They consist of shallow, intermediate, and deep types. The shallow caves lead off from small surface sink holes up to 3 feet in diameter. The intermediate types are up to about 100 feet in depth while the deep types range to a depth of 300 feet with domes up to 150 feet in height and with miles of passages. Marine fossils are plentiful in the limestones.

Mr. Hollis illustrated his informative talk with many lantern slides of the various caves visited, the coastal plain, coastal sand dunes and other interesting features of the area.

Geology Group—July 7, 1965

Twenty-eight members and visitors were present, with Mr. L. Angior in the

Chair. Mr. T. Sault reported that favourable progress was being made with the Group's exhibit for the next Nature Show. Mr. R. Davidson advised that two specimens collected by himself and Mr. Cobbett were on public display in the geology section of the National Museum in Melbourne. A letter was read from a Mr. Cass asking for particulars of caves and tunnels which show geological formations. The Visual Aids Section, Education Department, wrote that a lecture on Volcanoes with slides and notes would be supplied to the Group for the August meeting. Owing to a clash with other engagements, it was decided to postpone a zeolite collecting excursion to Flinders until September.

The main item of the evening's programme was a Members Night to which the following contributed: Mr. Davidson spoke on Smoky Quartz from Strathbogie Ranges and distributed crystals of same to members. He also showed specimens of zeolite in basalt (Analcite), selenite and "Star Sand". The small star particles in the sand from the Barrier Reef were probably foraminifera. Master R. Whatmough demonstrated supposed coral in sandstone from Mordialloc. Master G. Smith exhibited two slides comparing volcanic cones in Fiji and Glasshouse Mountains, Qld., and one of a coral atoll taken from the air. Mr. T. Sault showed pictures of Werribee Gorge showing synclines and tillite. Mr. Hemmy spoke to pictures, taken on the Colac excursion, of Crater Lakes and Mt. Porndon, stone from Warby Ranges as seen in the new Anglican Cathedral at Wangaratta, quarries in sandstone at Hall's Gap and granite at Harcourt and Dromana. Miss Bennett exhibited a view of the slate quarry, Warrenmang, near Avoca. Mr. Wigmore showed a volcanic bomb containing olivine from Mt. Porndorn. Mrs. Costermans and Mrs. Salau projected pictures taken on excursion to Tasmania featuring pre-Cambrian formations in the western section, Permian sandstone used in old buildings in Hobart, dolerite on Mt. Wellington, and fossil deposits near Wynyard. Scenes of the Yarra River at Yering Gorge were also shown and hand specimens were used to support the illustrations. Mr. Angior displayed specimens of stone from Scots Church, Collins Street, obtained whilst renovations were

proceeding. Limestone was being replaced by Mt. Gambier stone which had superior weathering qualities. Wind action on the steeple had ruined the limestone, making it necessary to replace this with sandstone. He also showed pictures of a basalt cave near Colac which is floored with bats' guano. Messrs Dodds and Angior exhibited slides of the Grampians to explain the geology of the Hall's Gap area.

Exhibits: Sandstone showing ripple-marks from Mt. William and various other sandstones from the Grampians; gold specimens from Deep Lead near Stawell washed from old workings on Mrs. Bennett's property.

AFFILIATED CLUBS

Creswick Field Naturalists Club

The tenth Annual Report of this Club sounds a note of exultation. Not only is it flourishing despite the pessimists who predicted its early demise, but last year it held a very successful Nature Show. Meetings are usually held at the homes of members. Mr. A. E. Perry, of Ballarat, is President, and Mr. H. L. Barclay is Secretary-Treasurer.

Western Victorian Clubs

We have received a most interesting series of reports from the Western Victorian Field Naturalists Clubs Association. Meetings are held at week-ends, one of the member Clubs arranging accommodation and providing leaders for excursions in the day-time, with meetings and talks at night. A most successful outing to Portland was held last May, and it is proposed to visit Maryborough in September and Hamilton for the Annual Meeting in October.

Visitors, whether members of an affiliated Club or not, are welcome to attend excursions and lectures, and to take part in meetings, but of course voting rights at meetings are restricted.

Mr. I. R. McCann is President and Mrs. D. M. Collins is Secretary. Nominations have been called for the Annual Meeting, but the Notice makes the very sensible suggestion that any Club nominating a member for the office of President, should be prepared to provide a Secretary also.

Portland

This Club is working for the proposed National Park in the Lower Glenelg, and specially mentions the amazing McEacharn Cave, which some of its members are opening and exploring.

Mr. A. Fred Davies is President, and Mr. Hugh Keiller, who was the Club's first President twenty years ago, is the Honorary Secretary.

Stawell

The Stawell F.N.C. holds one meeting, and approximately two excursions per month. It has been raising money, by a series of Slide Nights at Halls Gap, to fence a new 10 acre reserve.

There has been a re-shuffle of Office-bearers. The former Secretary, Mr. J. E. Miles, is leaving the district, the outgoing President, Mr. N. S. Bennett, has taken the position of Secretary-Treasurer, and Mr. I. R. McCann is the new President.

NATIONAL CONSERVATION SURVEY IN VICTORIA

Members may or may not know that our organization is one of the 50 Corporate Members of the Victorian National Parks Association, whose aims and objects include:

> To strive for the preservation of National Parks.
> To strive for further reservations of National Parks.
> To form a link between the public and the National Parks Administration.

The V.N.P.A. with the assistance of the Melbourne University is about to undertake a nature conservation survey which it is hoped will form the basis for a comprehensive plan for the better conservation of nature in Victoria.

At present, less than 2/3 of 1% of the area of Victoria is preserved as National Parks which are the most secure types of reserves we have. With the prospect of the world's population doubling within the next 35 years, more and more space will be required in which to live, work and produce food. At the same time our society is becoming more urban and more and more people are finding that the comforts of our civilized society by no means satisfy all man's wants, and there is an innate urge in many men to

get away from it all—to Ayer's Rock, Barrier Reef, Wilson's Promontory, or even the Dandenongs on Sunday afternoon.

There seems to be some special fascination about nature in the raw and there is every reason to believe that future generations will be no less possessed of this urge with infinitely less opportunity to give effect to it. This has led thinking people all over the world to come to realise that conservation is a legitimate and noble form of land use.

The V.N.P.A. feel there is a great sense of urgency about the situation in Victoria and are determined to raise the funds to complete a survey which will help to determine what needs to be preserved before it is too late. It will cost at least £2,000 in the *first year* and they need our help.

Donations should be sent to their Hon. Treasurer,

Miss Joan Blackburn,
Allenby Road,
Glen Iris.

The executive of this organization will also consider whether we should not make a direct donation as well.

LIST OF NATURALIST AND SIMILAR CLUBS IN VICTORIA

Clubs and societies affiliated with F.N.C.V. are shown in italics.

Anthropological Society of Victoria

Ararat F.N.C.
Miss Z. Banfield, 5 Ligar Street, Ararat.

Astronomical Society of Victoria
Mr. Dunstan, Box 1059 J., G.P.O., Melbourne.

Australian Wattle League, Victorian Branch
Miss E. Campbell, 10 Elm Grove, Armadale.

Bairnsdale F.N.C.
E. V. Barton, 10 Sharpe Street, Bairnsdale.

Ballarat F.N.C.
Mrs. E. G. Bedggood, 809 Barkly Street, Ballarat.

Beaumaris Tree Preservation Society
Mrs. G. R. Weate, 11 Summerhill Road, Beaumaris.

Benalla F.N.C.
Mr. E. Harrison, Warrenbayne, Baddaginnie.

Bendigo F.N.C.
Mr. J. Ipsen, 15 Smith Street, Bendigo (Phone 3-2486).

Bendigo Street Tree Preservation Society
N. Oliver, Box 241, Bendigo.

Bird Observers Club
Mr. R. Wheeler, 59a Upton Road, Windsor, S.1.

Blackburn Tree Preservation Society
Mr. O. S. Green, 31 Malcolm Street, Blackburn.

Casterton Naturalists' Club
Miss E. McCombe, "Strabane", Casterton.

Cave Exploration Society
Mr. R. Bailey, 15 Riverside Road, Ivanhoe.

Colac F.N.C.
Mr. Robert M. Missen, "Flowerfield", Beeac.

Compost Society
Box 2605 W, Melbourne.

Creswick F.N.C.
Mr. H. D. Barclay, Raglan Street, Creswick.

Doncaster and Templestowe Tree Preservation Society
Mr. W. H. Algar, Garden Road, Donvale.

Eltham Tree Preservation Group
Mr. P. Glass, John Street, Elwood.

Fauna Protection Council
Box 1803 Q, Melbourne.

Field Naturalists' Club of Victoria
E. H. Coghill, 15 Baker Avenue, North Kew, E.5.

Frankston F.N.C.
Mrs. W. Bounds, 6 Rosslyn Avenue, Seaford.

Geelong F.N.C.
Miss V. Boardman, 262A Latrobe Terrace, Geelong. Phone No. 9-5093.

Gould League of Bird Lovers (Vic. Branch)
J. A. McMillan, S.S. 1886, Lithgow Street, Abbotsford, N.8.

Grampians District Tourist Association
Miss L. Banfield, Ararat.

Hamilton F.N.C.
Mr. L. K. M. Elmore, Box 317, Hamilton.

Hawthorn Junior F.N.C.
Miss Jenny Scott, 34 Inverness Way. North Balwyn.

Heathmont Advancement League
Mr. J. B. Harper, 360 Collins Street, Melbourne.

Horsham F.N.C.
Mrs. T. Lilian McKenzie, "Achiltibvie", 11 Rose Street, Horsham.

Landscape Preservation Council of the National Trust
"Como", Como Avenue, South Yarra.

Latrobe Valley F.N.C.
J. Belgrader, 179 Lloyd Street, Moe.

Leach Memorial Bird Club
Mrs. L. Howe, 61 Doncaster East Road, Mitcham.

Lorne League of Bush Lovers
Mr. J. S. Hayes, Box 31, Lorne.

Malacological Society of Australia
Mrs. J. Hartley, 351 Glenferrie Road, Malvern, S.E.4.

Maryborough F.N.C.
Miss E. M. Thompson, 106 Forge Street, Maryborough.

Melbourne Women's Walking Club
Miss J. Blackburn, 4 Allenby Street, Glen Iris, S.E.6.

Murray Valley Development League
Box 359, Albury 3S, N.S.W.

McCoy Society
Botany School, University, Carlton, N.3.

Native Fauna Protection Society
Dr. Marion B. Wanliss, 4 Beaumont Street, Vermont.

Native Plants Preservation Society
Miss W. Waddell, 3 Denham Place, Toorak, S.E.2.

Ouyen District Naturalists' Club
Mrs. A. Eggleton, P.O. Hattah.

Photographic Society of Victoria
Miss M. M. Anges, 41 St. Andrews Street, Brighton, S.5.

Portland F.N.C.
Basil F. Hardy, 100 Palmer Street, Portland.

Preston Junior F.N.C.
C/- Mrs. Z. Lee, 197 Edwards Street, Reservoir, N.19.

Ringwood F.N.C.
Mr. F. Flentze, 35 Wonga Road, Ringwood.

River and Parklands Protection League
Mr. E. Stones, 3 Locksley Road, Ivanhoe.

Robinvale F.N.C.
Miss J. E. Phillips, Consolidated School, Robinvale.

Royal Australian Ornithologists Union
386 Flinders Street, Melbourne, C.1.

Royal Society of Victoria
Victoria Street, Melbourne, C.1.

Royal Zoological and Acclimatisation Society of Victoria
Zoological Gardens, Royal Park, Parkville, N.2.

Save the Dandenongs League
Miss M. Moon, "Kakirra", Kalorama.

Save the Yarra League

Science Teachers Association of Victoria
C/- J. A. Rodgers, 174 Grey Street, East Melbourne.

Seaford Foreshore Preservation League
Mr. John Nix, 74 Fortesque Avenue, Seaford.

Society for Growing Australian Plants
Sister E. R. Bowman, 4 Homebush Crescent, Hawthorn, E.3.

Stawell F.N.C.
Mr. J. E. Miles, 52 Barnes Street, Stawell.

Sunraysia F.N.C.
Mr. O. J. Frost, 114 Pine Avenue, Mildura.

Town and Country Planning Association of Victoria
Mr. R. A. Gardner, 40 Lonsdale Street, Melbourne, C.1.

Victorian National Parks Association
J. Ros Garnet, 23 Camdon Street, Pascoe Vale, W.8.

Victorian Sub-aqua Group
J. R. Ager, 438 High Street, East Prahran.

Warragul F.N.C.
Clive Fisher, Armours Road, Warragul.

Warrnambool F.N.C.
John Edge, Allansford

Western Victorian Field Naturalists Clubs Association
Mrs. D. M. Collins, 33 Campbell Street, Stawell.

Wimmera F.N.C.
Miss A. M. Jordan, "Listervale", Kiata.

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for May-December 1965 were due for renewal by May 1. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

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

GENERAL MEETINGS

Monday, September 13—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Prof. Canny, "The Mystery of the Sausage Trees."
3. Election of members.

(a) *Ordinary*

Mr B. Berry, 18 Dover Street, South Caulfield, S.E.8 (Interest—Botany. Introduced Mr. W. Woollard).

Mr. K. Hammond, 36 Brunel Street, Essendon, W.5 (Interest—Geology. Introduced J. R. Hudson).

Miss E. Kidd, Flat 18, 45 Kensington Road, South Yarra, S.E.1.

Country:

Miss E. V. Conabere, Box 22, Mansfield, Vic. (Interest—Botany).

Mr. and Mrs. L. A. Furlong (Joint), Pinnocks Road, Emerald. (Interests—Botany and birds. Introduced Mr. E. Wolstenholm).

Miss C. Lardner, 5 Turner Avenue, Boronia, Vic. (Interest—Botany. Introduced Mr. J. H Willis.)

Junior:

Miss Susan Beattie, 2 Clyde Street, Glen Iris (Introduced Mr. P. Kelly).

4. General Business.
5. Nature Notes and Exhibits.

Monday, October 11—Mr. N. A. Wakefield, "Study of Mammal Bone Deposits."

GROUP MEETINGS

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

Wednesday, September 15—Microscopical Group.

Friday, September 24—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Mr. R. Hemmy, "Geology of the Melbourne Area".

Monday, October 4—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Wednesday, October 6—Geology Group. Mr. R. T. Matthews, M.Sc., University of Melbourne, "Geology of Oil and Gas."

Thursday, October 7—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.

Friday, October 8—Preston Junior Club—at the Rechabite Hall, 251 High Street Preston (just N. of Bell Street) at 8 p.m.

Thursday, October 14—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, September 19—Watsons Creek, Kangaroo Ground. Leader Mr. A. Lewis. The coach will leave Batman Avenue at 9 a.m. Fare 14/-. Bring one meal.

PRELIMINARY NOTICE

Saturday, December 25, 1965 to Monday, January 3, 1966. Snowy Mountains, Kosciusko. The coach will leave Melbourne at 2.45 p.m. for Orbost and reach Cooma on Sunday. On Monday a three day tour of the Snowy Mountains Scheme will commence. Thursday night will be spent at Cooma, leaving Friday morning for Mt. Kosciusko where the next two nights will be spent. On the return journey, there will be an overnight stop at Wangaratta. The total cost will be approximately £45. A deposit of £10 should be paid when booking to the excursion 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, 1964

President:

Mr. M. K. Houghton
20 Trevascus Street, Caulfield (58 1937)

Vice-Presidents: Mr. E. Byrne, Mr. A. Fairhall

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. Hudson, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mr. F. Zirkler, 134 Kangaroo Road, Oakleigh, S.E. 12 (56 4337).

Geology: Mr. R. R. Dodds, 5 Banchory Street, Essendon (379 4309).

Microscopical: Mr. P. Genery, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 82 of the *Victorian Naturalist* is from May 1965 to December 1965.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1

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Photo: *W. H. King*

Grey Kangaroo.

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The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

Once again we are indebted to Mr. J. Cooper of the Fisheries and Wildlife Department of Victoria for our cover photograph, an excellent picture of a Lewin Rail, *Rallus pectoralis*.

Distribution of the Large-footed Myotis, *Myotis adversus*, in Australia

By John L. McKean* and
L. S. Hall*

Summary

The distribution of the bat *Myotis adversus* in Australia is discussed in detail. The validity of several localities is questioned. Possible factors for its comparative rarity are discussed. The species frequently lives in close proximity to streams or lakes.

I. Introduction

The Large-footed Myotis, *Myotis adversus* is a small greyish-brown michrochiropteran bat, 92-99 mm. in length (from tip of nose to end of tail). It can be easily distinguished from other Australian species of a similar size by its unusually large feet (10-12 mm. in length). Its forearm ranges from 37·7-40·00 mm. in length.

The distribution of *M. adversus* has not previously been fully detailed. In the course of other studies on this bat we have collected all available distribution data and our present knowledge is described in the following text in the hope that workers throughout Australia will look for this bat.

II. Methods

The following localities, Glenelg River, Victoria, and South Australia, East Buchan, Vic., Burrinjuck Dam, New South Wales, Nimbin, N.S.W., and Samford, Queensland, were visited on several occasions. Museums known to contain collections of Australian mammals were contacted for details of any *M. adversus* specimens. The following museums, American Museum of Natural History, New York, U.S.A., the Australian Museum, Sydney, N.S.W., British Museum (Natural History), London, U.K., Museum of Comparative Zoology, Massachusetts, U.S.A., National Museum of Victoria, Melbourne, Vic., Queensland Museum, Brisbane, Qld. and the South Australian Museum, Adelaide, S.A., hold Australian specimens of *M. adversus*. The records of the Australian Bat Banding Scheme were examined.

Distribution

South Australia.—*M. adversus* is stated to occur in South Australia by Wood Jones (1925) on the basis of "a specimen of Gould's taken in South Australia" and another specimen "from the River Murray in South Australia". Mr. P. F. Aitken, Assistant Curator of Mammals, South Australian Museum, has on our request kindly checked the collection and register for *M. adversus* specimens. Only one specimen could be located and was in spirit with the skull removed and thus may be the specimen referred to by Wood Jones. According to the register however, there should have been two specimens under the number (M509) which was entered on May 12, 1915, as part of an "old collection".

As far as can be seen Wood Jones was mistaken in inferring that it

* C.S.I.R.O. Division of Wildlife Research, Canberra, A.C.T.

came from the River Murray by assuming that the "dash" signs (—), which appear in the columns of the register where locality and collector are given, were "ditto" marks referring to the specimen registered above, which does come from the River Murray. On studying the writing habits of the registrar at that time it was noted that invariably if a "ditto" entry was meant, the abbreviation "do" was given. It can only be inferred that the "dash" sign meant that there were no accompanying data with the specimen. It is thus considered that this record requires substantiation and the locality has been omitted from the map showing distribution (Fig. 1).

The British Museum has three specimens (Reg. Nos. B.M. 56.10.28. 1., B.M. 7.1.1.514), two from the Gould collection and one from the Tomes collection all with the locality given as South Australia. The Gould collection specimens are listed by Dobson (1878). Likewise vague localities are given for the specimen (Reg. Nos. B.M. 53.10.22.32), Australia from the Gould collection and specimens 'o' North Australia and 'g' Australia as listed by Dobson (1878) and hence, they cannot be included in our Figure 1. J. E. Hill (in litt.) has been unable to trace the last two mentioned specimens.

In the course of the present investigations a small number of *M. adversus* were found in Dry Creek Cave on the Glenelg River just over the South Australian border on December 29, 1963. Confirmatory specimens were not taken as two specimens were collected on the same day in nearby Kates Slide Cave, Victoria.

Victoria.—*M. adversus* was found in three caves on the Glenelg River near the South Australian-Victorian border in late December 1963. Dry Creek Cave in South Australia has been mentioned previously. The Guano or Amphitheatre Cave (approximately 5 miles N.N.W. of Nelson, Vic.) contained approximately 30 *M. adversus* and 20 *Miniopterus schreibersi*. Kates Slide Cave in the same area contained a cluster of 10 torpid male *M. adversus*. Eight were banded and released and two were collected (CSIRO Nos. MH56-57). The same cave was again visited on 11 November 1964 and contained a group of 30 *M. adversus* of both sexes and a dozen *M. schreibersi*. Most of the females examined were noticeably pregnant. Two specimens (CSIRO Nos. MH328-329), ♀ and ♂ respectively, were collected. The Glenelg River area presumably holds a maternity colony but we have not yet located it.

Amphitheatre Cave contained a large sub-fossil bone deposit and a collection was made of the bone material by A. C. Beauglehole, McKean and others. The Chiroptera material from this preliminary collection was examined and *M. adversus* was represented in the material by 4 skulls, 6 left lower jaw bones and 3 right jaw bones. *Miniopterus schreibersi* far outnumbered *M. adversus* with 31 skulls, 118 left lower jaw bones and 103 right jaw bones; *Nyctophilus geoffroyi* was represented by 6 skulls, 11 left lower jaw bones and 13 right jaw bones and *Chalinolobus gouldii* by 1 skull, 6 left lower jaw bones and 2 right jaw bones.

Cloggs Cave, East Buchan, in eastern Victoria, is used as a maternity cave by *M. adversus* (George and Wakefield 1961). Although fluctuations in numbers indicate movement, the species has not as yet been recorded from other caves in the district.

Eleven specimens from Cloggs Cave are in the collection of the National Museum of Victoria (Reg. Nos.

C.2985-6, C.3568-71, C.3684-7, C.4352) and seven are in the CSIRO Division of Wildlife Research collection (Nos. D.P.44-47, M.H.149-151).

New South Wales.—Narrengullen Cave on Burrinjuck Dam near Wee Jasper, N.S.W., is used by *M. adversus* as a maternity cave (Purchase and Hiscox 1960). Fluctuations in numbers and in the sex ratio occur throughout the year but as yet the species has not been located in any other caves in the area. Ten specimens from Narrengullen Cave are in the CSIRO collection (Nos. M.H.6, M.H. 177-185).

Two specimens in the Australian Museum Collection (Reg. Nos. M.5452-3) were collected at Tyalgum, Tweed River, N.S.W., and registered at the Museum on January 12, 1934. Unfortunately no details of the method or date of collection were supplied by the collector.

In January 1965 a small colony of *M. adversus* was located in a crevice under a bridge at Nimbin in Northern N.S.W. Two specimens were collected (Nos. M.H.383, 384) but no estimation of the size of the colony could be made. The locality was visited in April, 1965 and three specimens were collected (Nos. M.H.465-467) from the nine females present.

Queensland.—A specimen in the Queensland Museum (Reg. No. J.11611) was collected when it flew into a city store in Queen Street, Brisbane, on May 10, 1963. A colony of approximately 60 *M. adversus* was present during April and May, 1963 in a disused railway tunnel at Samford. Three specimens were collected for identification (CSIRO Reg. No. C.M.634, Qld. Mus. Reg. Nos. J11516-7). Samford is 11 miles N.W. of Brisbane. The Samford Railway Tunnel was visited on August 3, 1964 and 40 *M. adversus* were found. Twenty bats were captured of which 6 were collected (CSIRO Nos. M.H. 221-6) and 14 released after banding.

The British Museum has one specimen (Reg. No. B.M.10.10.25.12) collected on the Mossman River, inland from Port Douglas, North Queensland. The specimen was presented to the Museum in 1910 by F. Muir, unfortunately the date of collection is not known. There are three specimens from Cairns in the American Museum of Natural History (Reg. Nos. 154635-6, 155010). Tate (1952) reports that they were taken from the floor joists of a house during April, 1948.

The Australian Museum has a specimen (Reg. No. M.4901) from Lake Barrine, North Queensland. The collecting data are not known for this specimen which was registered on March 12, 1930. The Museum of Comparative Zoology, U.S.A., has a series of 23 specimens (Reg. Nos. 28504-21, 29115-8, 29295) collected in April, May, June, and July 1932 at Lake Barrine. Most of the specimens were collected in a house at night and others were shot over the lake at dusk.

Northern Territory.—The British Museum has two specimens (Reg. Nos. 47.7.14.15) from Port Essington, N.T. They were presented to the Museum by the Earl of Derby and J. Macgillivray in 1847. Unfortunately no collecting data other than the locality is known. The validity of this locality must be questioned as Glauert (1947) has pointed out that a number of specimens including the type of the Black-faced Kangaroo, *"Macropus melanops,"* received by the British Museum during the 1840's and alleged to have been collected from Port Essington, do not occur there at all.

The lack of recent specimens from the Northern Territory may only

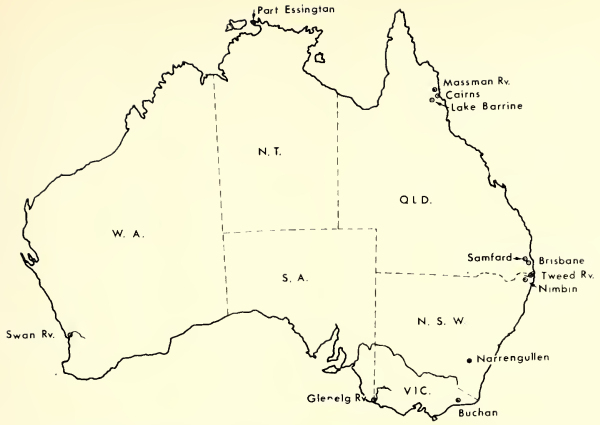

Figure 1.—Map of Australia showing localities where *Myotis adversus* has been recorded.

reflect the lack of systematic collecting of bats in this area*.

Western Australia.—The British Museum has three specimens from the Swan River. Two (Reg. Nos. B.M.43. 12.30.24., B.M.43.12.30.26) were presented to the Museum by Sir George Grey and one (Reg. No. B.M. 7.1.1.513) is from the Tomes collection, but was apparently obtained by Tomes from the British Museum in 1857 and was presumably collected by Grey. While in Western Australia, Grey had many opportunities to collect bats as he visited many caves including several in the "Swan River" area (Grey 1841). It is, however, surprising to find that *M. adversus* has not since been collected from Western Australia.

III. Discussion

The distribution of *Myotis adversus* previously described in the text is illustrated in Figure 1.

It can be seen that *M. adversus* is a species widely distributed in Australia but known from very few localities. The Western Australian and Northern Territory localities require confirmation and further collecting in these States is desirable. In the eastern States the localities are well documented and the authors consider *M. adversus* to be a comparatively rare bat.

The impression of rarity could partly result from a lack of collecting or the ability of *M. adversus* to hide itself in rock crevices or cluster in "avens" in caves out of the reach of extension nets. In such situations it would be easy to overlook the bat or mistake it for another species. Likewise the rarity could be an effect of habitat specialization and in this respect it should be noted that all authenticated localities are in close proximity to water, either a lake or stream.

An examination of stomach contents is in progress and when sufficient material accrues an explanation of their preference for dwelling near water may become apparent.

In the southern part of its range *M. adversus* is apparently only cave dwelling, but in the far northern part of its range this is not the case. The colonies

*Two specimens of *M. adversus* were collected at Port Essington, N.T., by J. R. Burt during August, 1965. J. H. Calaby pers. comm.

roosting in the disused railway tunnel near Brisbane and under the bridge at Nimbin, could be regarded for the purpose of this discussion as modified cave dwellers. It would seem possible that the widely different temperature and humidity patterns of far North Queensland and south-eastern Australia could well influence selectivity of roosting sites.

Acknowledgements

Information supplied by the various Museums and Institutions mentioned throughout the text is gratefully acknowledged. R. L. Hughes and J. H. Calaby kindly read and commented on the manuscript.

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(Manuscript received 24/6/65)

Freshwater Tortoises in Victoria

By John Goode

Three species of freshwater tortoises are found in Victoria. They are *Chelodina longicollis, Chelodina expansa* and *Emydura macquari*. Like all aquatic tortoises in Australia, they are pleurodires (their necks retract sideways) and are members of the family Chelidae. Because the taxonomy of all tortoises in this region is in need of revision, brief descriptions are given below to identify the Victorian species.

All tortoises in the family Chelidae may be divided into two broad groups. One is typified by short necks, the other by particularly long necks. It is now known that the short necked tortoises in Australia and New Guinea may in turn be placed into four distinct groups encompassing between seven and twelve different species. The "long-necks" are readily divided into two groups encompassing six to eight species. The three species of freshwater tortoises found in Victoria represent three different groups: one with short necks and both the long-necked groups.

Key to Species

1. Length of cervical vertebrae greater than that of vertebrae beneath carapace; skull has neither parieto-squamosal nor supraoccipital arches; lower jaw weak, no external horny sheaths; intergular shield situated behind gular shields; four claws on each foot; tail short, that of male believed to be fatter but not much longer than that of female . . . . . 2.

   Length of cervical vertebrae shorter than that of vertebrae beneath carapace; skull has parietal roof; jaw strong with external horny sheath; intergular shield marginal; four claws on fore feet, 5 claws on each hind foot. Tail moderately long, that of male considerably longer than that of female (one male with shell length of 8½ inches had tail 4¾ inches long) . . . . . *Emydura macquari* Cuvier 1826.

2. Skull deep in relation to width and small; upper surface of neck has fine pointed tubercules; plastron length rarely exceeds 1·75 × maximum plastral width at front edge of bridge; maximum width of front lobe of plastron almost as wide as that part of carapace above . *Chelodina longicollis* Shaw 1793.

   Skull wide and depressed; upper surface of neck covered with fine wrinkled skin; plastron length generally more than twice width at front edge of bridge; front lobe of plastron, considerably narrower than carapace . . *Chelodina expansa* Gray 1856.

Fig. 1

Chelodina expansa, a mature adult female with a shell length of 15¼ inches (38.6 cm), a head and neck length extending a further 10¾ inches (24.2 cm) and a weight of 12½ lbs (6.63 kilo). It was collected at Patho, northern Victoria.

Distribution in Victoria

In Victoria, all three species are found in waters of the River Murray and its northern tributaries, in adjoining irrigation channels and in nearby lakes and lagoons. While all three species extend into New South Wales inland streams, it is believed that only *E. macquari* and *C. longicollis* extend south along the Murray to where it flows into Lake Alexandrina, though it is not known how far *C. expansa* extends into South Australia.

C. longicollis seems to extend south in Victorian tributaries of the Murray to, at least, the northern slopes of the Divide foothills. This species is

Fig. 2

Chelodina longicollis and *Chelodina expansa* showing difference in attitudes of neck and skull. *C. longicollis* can raise its head and neck well above the carapace edge. *C. expansa* when mature, is never known to carry its head or neck higher than that illustrated.

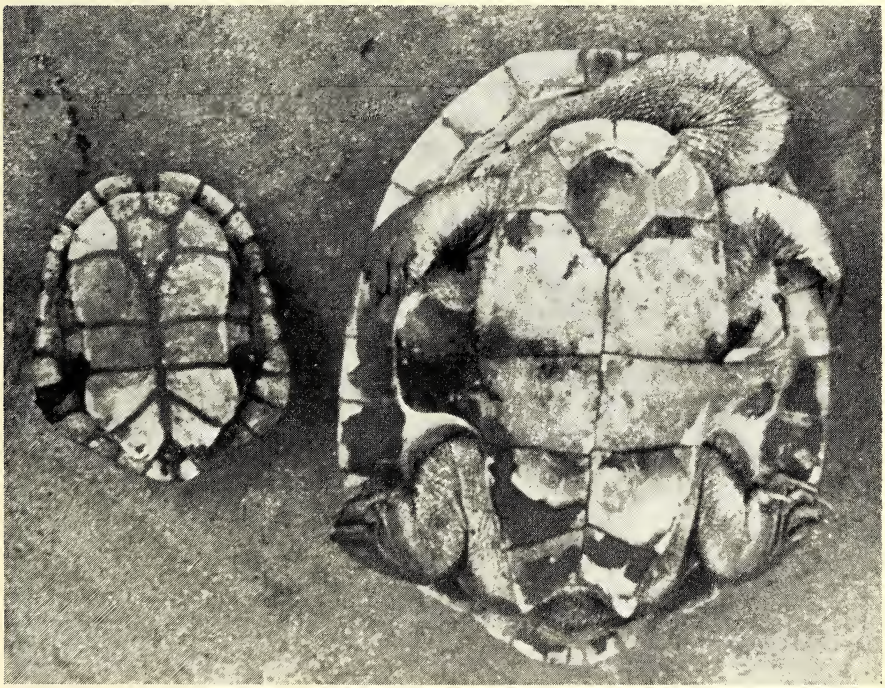

Fig. 3

Plastral view of *C. longicollis* (left) and *C. expansa* (right) showing difference in relative plastral proportions, degree of neck protection by plastron and the regular darkened seam markings of *C. longicollis* compared to staining of *C. expansa*.

also found in Gippsland and may possibly be present in lakes near Portland and Mount Gambier.

General Information

Surprising local ignorance exists among residents in the Murray region of Victoria regarding identification of these tortoises. While confusion between *C. longicollis* and *C. expansa* in specimens of the same size would be excusable, some farmers questioned, although they see them frequently, do not know the difference between long and short-necked tortoises. As far as is known, *C. longicollis* would appear to be the most numerous tortoise though *E. macquari* is not uncommon throughout the Murray River area. *C. expansa* is the rarest and least known species. According to Tanner, *C. expansa* is found mainly in still waters of certain lagoons while the other two species commonly inhabit still and flowing waters. It should be stressed that no thorough scientific counts have been made in the known locations of these (or any other species of) Australian tortoises for their numbers to be properly assessed.

C. longicollis is known in some areas as the "stinker" because, when handled, it emits a pungent fluid from glands in the leg openings. These glands are said to be present in all species (Worrell, 1963) but only tortoises in the group which includes *C. longicollis* emit a strong and unpleasant odour.

C. longicollis does not seem to grow to a shell length of much more than 10 inches (240 mm) and the somewhat serpentine appearance of its head and neck led to the popular name "The Australian snake-necked tortoise".

Chelodina expansa is the largest known species of aquatic tortoise in Australia and New Guinea. The author has measured specimens with a shell length (measured horizontally between two vertical rules) exceeding 16 inches (384 mm). On these, the head and neck, when extended, were measured at 11½ inches (276 mm) from the tip of the snout to the front edge of the carapace at the centre.

Distinguishing Between **C. longicollis** and **C. expansa**

The main distinguishing characteristics between *C. longicollis* and *C. expansa* are as follows:

Plastron:

On *C. longicollis,* the front lobe of the plastron is almost as wide as the front of the carapace; on nearly all specimens, the seams (joins) between the plastral shields are outlined by dark pigmentation. The plastron on *C. expansa* is long and narrow and on most specimens the neck is never completely covered by the carapace and is hardly covered by the plastron. The plastron on *C. expansa* is generally of a pale, bone hue but can be marked with large dark patches. This appears due to environmental staining and is not natural coloration. There is never any regular dark outline to the seams.

Head and neck:

The head of *C. longicollis* is relatively narrow and rounded. The head on *C. expansa* is wide and depressed. The neck of *C. longicollis* is covered with black skin, bearing fine, pointed tubercules. The neck on *C. expansa* is very thick and is covered with fine, rather olive-tinged, wrinkled skin. Live specimens of *C. longicollis* are able to lift their head and neck high in the air (well above the horizontal) and can carry the head with the snout held above the back of the skull. *C. expansa*

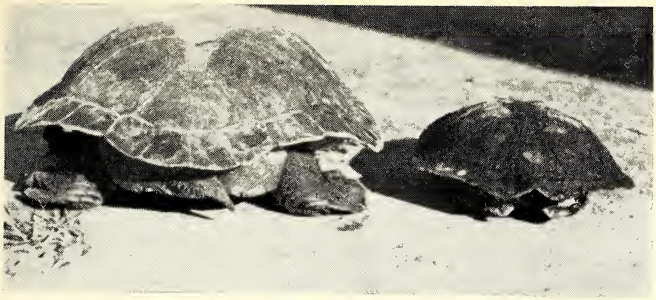

Fig. 4

Rear view of *C. expansa* (left) and *C. longicollis* showing particularly the difference in the hindmost pair of marginal shields and the tendency of the shell of *C. longicollis* to turn up like the brim of a hat.

seems unable to lift its head above the level of the edge of the carapace and its snout is generally held horizontally on a line with the back of the skull. Frequently *C. expansa* carries the bottom of its neck only a very short distance above the ground.

Carapace:

Viewed from the rear, the two hindmost marginal shields on the carapace of *C. longicollis* form a raised, inverted "V" as though to accommodate the short tail. The

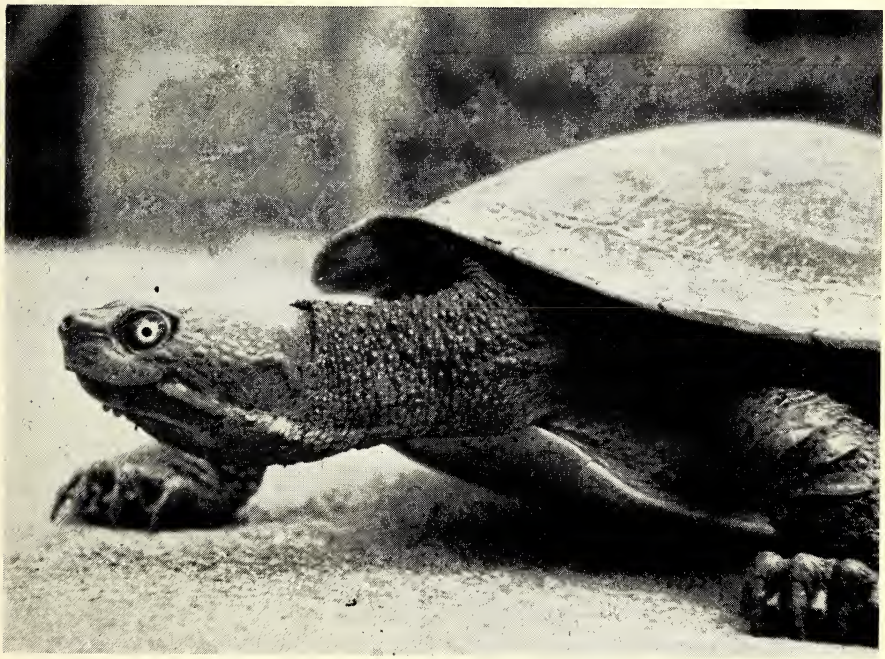

Fig. 5

Head study of female *Emydura macquari* from the Patho area of Victoria. On older specimens, the distinctive single yellow mark may disappear; on others, the prominent barbels of this specimen may be retractile or infantile.

equivalent shields on *C. expansa* project downward below the general line of the rear carapace edge, as though to conceal the tail. At the sides, on mature specimens of *C. longicollis*, the carapace edge curls up and sometimes inwards as on the brim of a hat. No curling occurs on the sides of the carapace of *C. expansa*.

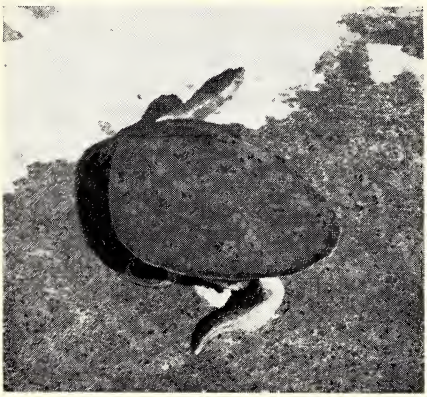

Fig. 6
View of male *E. macquari* with particularly long tail. On this specimen, carapace length is 8½ inches (21.5 cm) and the tail measured 4¾ inches (12.0 cm).

It should be emphasized that with specimens of all sizes, there should be no confusion in distinguishing *C. longicollis* from *C. expansa* if all the foregoing factors are considered.

Emydura macquari

The short-neck Murray tortoise is easily identified by its short neck, horn encased "beak" and rather oval carapace. This is considerably expanded and depressed in medium sized adults.

Fig. 7
Plastral view of female (left) and male *E. macquari* showing comparative lengths of tail. Damage to plastrons was due to captivity in a concrete-floored pond.

With this species, as with all Australian short-necked tortoises, considerable variations occur in the shape of the carapace at various stages of its development. In juveniles, from carapace lengths of an inch to five inches, the carapace, when viewed from above, is almost circular with the marginal shields overlapping and giving a serrated appearance at their edges. The contour of the carapace (viewed from the side) shows each vertebral shield to rise in the centre to form a distinct ridge which, in smaller specimens, is higher at the back of each vertebral shield than on the front of the shield behind it. With maturity, the front of the shell deepens, although the back seems to remain depressed until a carapace length of more than 10 inches (240 mm) is reached. Above this size, the carapace begins to assume a uniform depth throughout its length which may be up to 12 inches (288 mm).

Barbels

On all three species, small or prominent tubercules or barbels may be present beneath the lower jaw. On *E. macquari* only two barbels may be present. These may be erect or retractile, or may be absent.

On *C. expansa,* up to six barbels may be present, ranged around two basic barbels in the centre.

Two barbels may be present on *C. longicollis,* or there may be none at all. At present, no one has investigated what significance may be attached to these chin appendages.

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Book Review:

The Vegetation of Wyperfeld National Park

A handbook dealing with the fauna, flora and natural features of any national park adds so greatly to its value and interest for visitors that it is hard to overestimate its importance. The mere fact of knowing what to look for enables those who would otherwise be blind to many things to see them, while it is an immeasurable help to all who go open-eyed if there is a handbook which tells where they may see what the park has to offer. Even the expert is better able to add to the sum of knowledge if he has

a convenient record of what is already known.

These are some reasons why the 95-page handbook, *The Vegetation of Wyperfeld National Park,* is welcome. One hopes it may be the forerunner of similar handbooks concerned with other national parks. The fact that it is by J. Ros. Garnet with a foreword by J. H. Willis is an assurance that it is authoritative. It is also absorbingly interesting, especially to anyone who plans a visit to Wyperfeld.

Twenty-two photographs, as well as line drawings of about 100 species of plants, add immeasurably to its value. The photographs are clear and attractive, but even more helpful are Mr. Garnet's beautiful little drawings, for they show characters and details of structure which cannot be seen in photographs.

Thus on pages 42 and 44 one may see Wyperfeld's 14 species of wattles with the differences in their inflorescence, and shape and venation of phyllodes, while on page 40 drawings of enlarged flowers of two small species of Arrowgrass show the features by which they may be identified. In another place, beside drawings of small daisies, their variously patterned fruits, important in determination of species, are shown.

The general discussion of the park is full of interesting information. One learns from it the best place to look for a lowan's mound; how to quench thirst from the root of a Mallee eucalypt; why Blue Rod springs up after floods; where to find Old Be-al, the giant Red Gum, and very much more.

There is a valuable record of botanical collecting at Wyperfeld, a check list of its ferns and flowering plants, and a note on the necessary procedure if one wishes to share in the investigation of the vegetation of the park.

The checklist of 418 species gives technical and common names, records of collecting and brief notes on localities and other points of interest, while the detailed map of the park at the end of the book is itself enough to make one long to go there.

The book has real value for anyone interested in Mallee flora and should be helpful to anyone botanising in the north-west of Victoria or similar areas in adjoining States.

—Jean Galbraith.

The book, published by the F.N.C.V., is available from booksellers at 15/- ($1.50) but members of the F.N.C.V. may obtain it at the concession price of 12/6 ($1.25), plus 8d. extra if posted, from the Hon. Sales Officer, c/o National Herbarium, The Domain, South Yarra, S.E.2.

The same concession is available to members of the Victorian National Parks Association, but the members of the V.N.P.A. should order their copies from the Hon. Secretary of the Association, 23 Camdon Street, Pascoe Vale, W.8.

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for May-December 1965 were due for renewal by May 1. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

Facets of Nature

By Evan Rowlands

In a justly famous series of experiments designed to discover how animals learn, B. F. Skinner, an American psychologist, trained hungry pigeons to peck a disc in the wall of their box by occasionally allowing a food pellet to fall into their food tray as they were pecking the disc. Skinner experimented with various routines. In some experiments, the pigeon was rewarded with food after a fixed number of pecks, say every tenth peck; in other experiments the pigeon was given a pellet after fixed time-intervals regardless of its pecking rate. In all cases, the pecking behaviour of pigeons persisted for astonishingly long times after Skinner stopped rewarding them; the pecking habit had become very resistant to extinction. Skinner found that if he rewarded pecking pigeons, not regularly, but after a randomly chosen number of pecks, sometimes the next peck, sometimes after many, that the tendency to peck long after the pigeon had received its last reward, was most deeply ingrained. Skinner himself noticed that such behaviour might be analogous to that of the pathological gambler—he plays often, he is rewarded at unpredictable intervals and his habit is very difficult to eradicate even when patently unrewarded.

It has often seemed to me that some such explanation underlies the fascination of nature for the amateur naturalist. He challenges nature frequently; she disappoints him. Then quite unexpectedly she presents to him a lustrous facet of her secret self; the long walk, the difficult climb and biting wind are forgotten and the elated naturalist savours his prize and immediately plans preparation of mind and body for the next attempt on nature's capriciousness. She has him firmly in her lure. Indeed this has been my experience as perhaps a few incidents may illustrate.

I

I had walked into sand dunes covered with Oil and Dumosa Mallee, and Porcupine Grass (*Triodia*) about 17 miles from Robinvale and, hearing wren-like calls, I sat down in the shade of a tree to watch for the birds concerned and was soon to witness a highly amusing performance, for it was soon apparent that these birds were even more curious about me, than I about them. From an arc distant about 25 yards, about five small reddish-brown birds with erect tails began to stalk me. From the shelter of one grass tussock, each would scuttle with a rapid bouncing ball gait, to another tussock a little closer to me, remain hidden for half a minute or so, then race to a closer vantage point. While I remained motionless, the party, one by one, crept up to within 9 feet or so. Then one member emerged, ran a couple of feet closer, stopped abruptly, raised its head and voiced a single, loud alarm cry and dashed back to the shelter of its tussock. No further attempts at closer approach were made, and in the next few minutes I knew myself to be closely surveyed from within the

shelter of their tussocks by my hidden, silent, watchers. I stood up eventually and walked slowly toward them and found that they flushed readily at my advance, but far from running and hiding again, they kept a steady 9 feet or so away from me. In time, as I sauntered about examining various plants, they seemed to take little further notice of me apart from keeping that short minimum distance away. At no time did they show real alarm, or make any attempt at hiding.

I returned to that spot on succeeding days and found no trouble either in locating such a bird party, nor in walking quietly to within a few yards of them. But nature teases. I viewed these birds closely, but I am not an expert bird-observer. I pored over Leach and Cayley—the evidence strongly suggested that I had met the Striated Grass Wren (*Amytornis striatus*). And yet I could not be sure of that stripe on the cheek, and the birds' lack of inhibition was very reminiscent of the White Browed Scrub Wren (*Sericornis frontalis*). Nature hides a smile and lures me back again.

II

Veronica had brought me a kangaroo's heart and lungs and with my Leaving Biology class gathered around the demonstration bench, I began to dissect them. Now dissection brings out the Ben Casey in me and, in imagination invested with his aura, my scalpel cut down the bronchioles and into the spongy lung tissue. Suddenly, within a bronchiole a few millimetre in diameter, a white, segmented larva was uncovered and in adjacent bronchioles, several more. About half an inch long, blind and armed with fine hooks on the anterior end, it lay in the tube, its underside convexity matching the bronchiole curvature. Placed on the dry bench, one wriggled energetically into a pool of watery blood. Here was the larva of the Oestrid or Nasal Fly, *Tracheomyia macropi,* the only native species of Oestrid infesting the tracheae of kangaroos. The fly lays its eggs on the hairs of the nose and lips and the young larvae make their way up into the sinuses and finally into the tracheae and bronchioles. The fully grown larvae are either coughed up or migrate into the sinuses and are sneezed on to the ground where they pupate, finally emerging as adult flies. We noted how well this larva was adapted to its environment. What use for elaborate sense organs to aid in a search for food when the irritated bronchial membrane secreted nutrient fluid ready for absorption? What better means than those fine hooks to irritate the membrane to provoke the food supply and then to anchor the parasite during the blast of the coughing host? A whim of nature sets aside a lesson in respiration, and deftly directs attention to that most delicate balance, the relation between parasite and host.

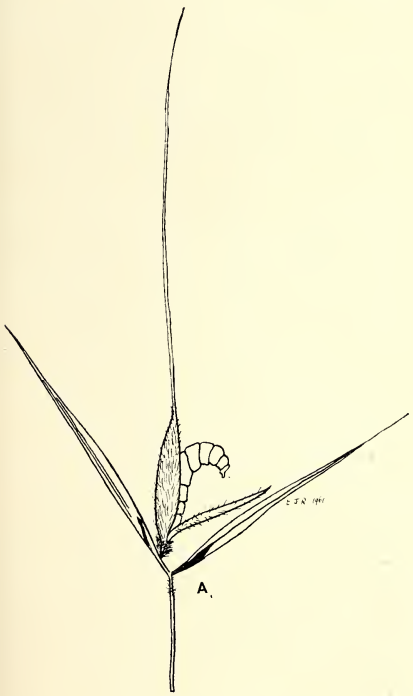
III

Spear Grasses (*Stipa*) are hardly likely to excite anything in the naturalist except annoyance as the sharp fruit with its twisted awn works relentlessly into the clothing. But we shall see. From a number of grasses gathered six miles south of Robinvale in June 1961, I had been dissecting the florets of *Stipa variabilis,* Variable Spear Grass, one of the commonest Victorian species. On separating the lemma and palea in a particular floret, I was surprised to find a complete absence of floral parts, and in their place, snug as a baby in a cradle, a minute pale orange maggot. (Fig. 1) Further dissection proved this sample

of *Stipa variabilis* to be heavily infested. Examination of the specimen with the microscope, and thumbing through references threw no light on the identity of this intruder. I need not have been disappointed. The National Museum ultimately decided that these were larvae of a Cecidomyid fly (Family Cedidomyidae-Diptera) but could not identify the species without seeing an adult. (There are hundreds of species of leaf-mining and gall-forming flies and wasps, less than 1% of which are recognizable in their larval stage.) I kept some of this grass, in comparable conditions of light and humidity in an attempt to raise an adult, but without success. A tantalizing glimpse, and Nature changes her whim. But this story has a sharp concluding twist. That same collection proved to contain specimens of *Stipa tuckeri* (Fig. 2) a grass collected only once before in Victoria (See J. H. Willis "A Handbook to Plants in Victoria" (M.U.P. (1962) p. 181.)

IV

The uninhabited Mallee stretches of Victoria hold me with an inexpressible fascination. They remain as they have been for centuries, a timeless and mysterious solitude. They stir a deep and restless depth in me, an inscrutable echo of a primitive nomad ancestry. I am attuned to their infinite shadowy abyss of evolutionary eons; their imponderable subleties silently saturate their atmosphere. These changeless places focus my temporal span in stark contrast. My family and I have frequently spent an idle afternoon in Mallee Scrub and, effortlessly and unexpectedly, Nature has yielded herself. One afternoon, in Feb. 1960 such a casual excursion to Bannerton yielded the first Victorian specimen of a Native Tobacco, *Nicotiana goodspeedii* (See Victorian Naturalist, 78 (1), May 1961, p. 10). In June 1961, the very spot where we sat for afternoon tea on the bank of the Murray



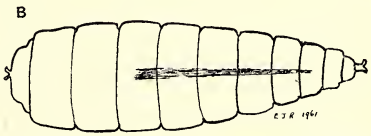
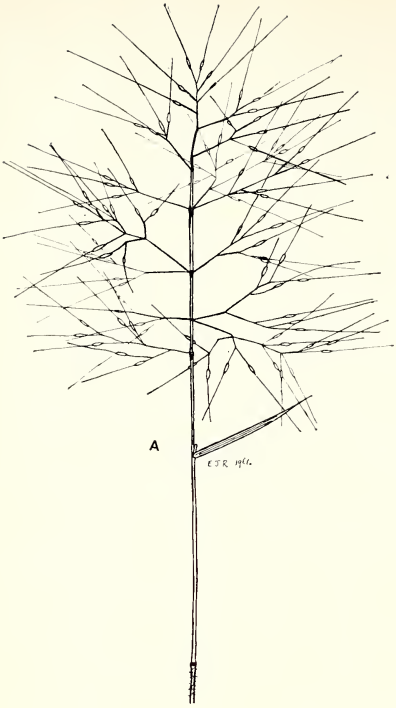
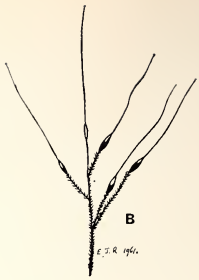


Fig. 1 A. Larva of fly of the Family Cecidomyidae in throat of *Stipa variabilis* (palea has pulled back).

B. Larva as seen under low power of microscope. Specimen collected at Robinvale, Vic., June, 1961.





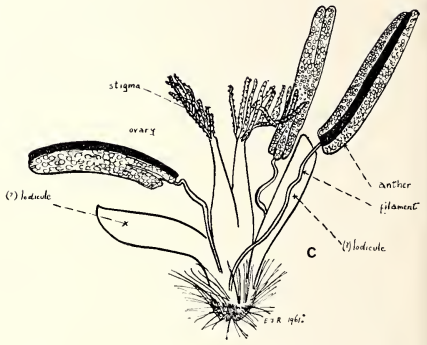
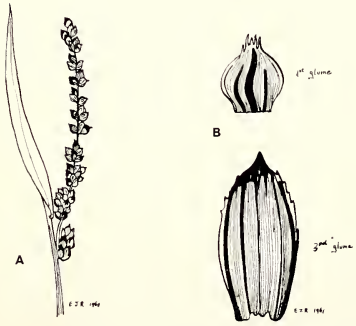


Fig. 2. *Stipa tuckeri*. Specimen collected at Robinvale, Vic., June, 1961.

A. Panicle.

B. Panicle branch showing shortly plumose branches (cf. *S. elegantissima* which has branches plumrose with long hairs).

C. Floral parts (third lodicule obscured).



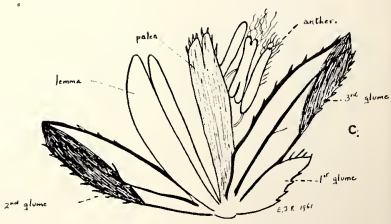


Fig. 3. *Echinocloa colonum*. Specimen collected at Robinvale, Vic., June, 1961.

A. Panicle.

B. Sterile glumes.

C. Expanded spikelet.

at Robinvale provided the second Victorian record of *Echinocloa colonum*, an introduced grass. (Fig. 3) (J. H. Willis "A Handbook to Plants in Victoria", Vol. 1, p. 194.)

* * *

I am not flattered to be likened to Skinner's pigeons, but Nature has me firmly held and I am glad. "In Nature's infinite book of secrecy, a little I can read" (William Shakespeare).

Field Naturalists Club of Victoria

General Meeting—September 13th, 1965

There was a large gathering of members and friends when the President, Mr. M. K. Houghton, opened the meeting. The minutes of the August Meeting were taken as read on the motion of Mr. A. E. G. Webb, seconded by Mr. J. Ros. Garnet.

The President reported that the 1965 Nature Show had been most successful. It had been seen by 2595 adults and 2010 children, a total of 4605 which was somewhat lower than the previous year's record of 6201, but nevertheless sufficient evidence of the usefulness of the Show in demonstrating to the public the aims of the Club and the Society for Growing Australian Plants. He congratulated the Groups and independent members on the standard of the exhibits: it was to their credit that so many new displays could be produced each year. He thanked all those who had planned and worked for months ahead, those who had manned the exhibits and those who had helped to clear up afterwards. He wished to mention only two names, Mr. Dan McInnes, Chairman of the Show Committee, and Mrs. McInnes. The meeting showed its appreciation by applause.

Mr. McInnes said that he would like to associate the whole Show Committee with the expression of thanks. The Committee comprised Sister Bowman and Mr. Hargreaves, of S.G.A.P., Mrs. Salau, Miss McLaren, Miss Allender, Mr. Houghton, Mr. Kelly, Mr. Condron, Mr. Sault, Mr. Fairhall and Mr. Begley. Mrs. Woollard said that the Hawthorn Juniors had also made a very important contribution. The President invited all members who had new ideas for the 1966 Show to submit them in writing now to Mr. McInnes.

The Hon. Secretary, Mr. E. H. Coghill, announced that the Lower Melbourne Town Hall had been booked for September 5, 6 and 7 for the 1966 Show and Sister Bowman had written to advise him that the S.G.A.P. would again be glad to be associated with the Club in this annual venture. Dealing with other matters, he reported that the Photoflora Competition would be held again next year. Owing to his absence from Melbourne the letters to the Minister for Local Government re Yarra Valley Park and to Sir Donald Cleland re birds of paradise had been typed but not yet despatched: they had not been forgotten. He had received a letter from the "South West Committee" of Tasmania asking for support for its proposals to develop the south-west of that State in which were included plans for the creation of Parks. He proposed to refer this matter to Council.

The President then introduced Professor Canny, of Monash University, who gave an illustrated talk entitled "The Mystery of the Sausage Trees". Before dealing with his subject Professor Canny thanked the Club for its help in obtaining five copies of Ewart's "Flora of Victoria" for the Botany Department of Monash.

Professor Canny said that the Sausage Tree, *Kigelia aethiopica*, was a member of the Natural Order Bignoniaceae that was a native of tropical Africa and had been planted in other tropical areas such as Florida and parts of northern Australia. It had large, dark, evil-smelling flowers that were pollinated by bats, and heavy, dense, sausage-shaped fruits. The method of disposal of the seeds was not known, but it had been suggested that they passed through the food canal of

rhinoceros. The main mystery was how the fruits could develop so quickly. They could attain a weight of 12 lbs one month from the fertilization of the flower and this meant the transport of a great quantity of dry matter down a long and relatively narrow stalk. The speaker described the physiological mechanism by which the sugar in solution was believed to pass along the sieve-tubes in the inner bark. The process was the same as that involved in the formation of a pumpkin or an orange, but more dramatic because of the distance between the fruit and site of production of the sugar in the leaves.

Sometimes more than one fruit set for one inflorescence, but it appeared that fruits developed only from the upper flowers of the pendant inflorescence. The pedicels of the fruiting flowers thickened and long, thinner flower-stalks from non-fertilised flowers were a characteristic feature of fruiting trees. A further mystery was whether lower flowers were not pollinated or, if they were, why fruits did not develop. It was not known whether the pedicels lengthened as the fruits grew although this was probable.

After his talk Professor Canny answered many questions and he was thanked by the applause of his audience.

Miss Allender and Mr. Lewis gave details of the next Club excursion and Miss Allender mentioned a proposed outing arranged by the Botanical Group. The new members listed on p. 159 of the September *Naturalist* were elected on the motion of Mr. Coghill, seconded by Mr. Fairhall.

Mr. Peter Kelly spoke to four volumes, of the set of 12 of Matthew's "Birds of Australia" in the Club's library, displayed on the table. A set of this valuable work had recently been sold in Australia for £1000. The work was available for reference in the library. Also on the table was the Natural History medallion to be awarded to Miss Winifred Waddell at the October meeting. Mr. A. J. Fairhall mentioned a booklet on Chowilla Dam. When this project came into being 100 miles of the river Murray and much riparian country would disappear beneath its waters. The impact on all types of wildlife in the north west of Victoria would be very marked: there would be loss of some species and of Aboriginal meeting places and points of historic interest.

Mr. B. Berry showed a number of specimens of different Australian timbers. He mentioned that a true ebony occurred in Queensland as did the same camphor as was found in eastern Asia. In addition to the marked difference between the heart and sapwood, there were often great differences in the figuring of different pieces of heartwood from the same tree. He displayed some beautiful examples of wooden bowls and plates that he had turned.

Mrs. Bennett and Mr. J. Baines discussed the origin of the name Melbourne and Miss E. Dixon raised the question of access to river banks in Victoria. Referring to Mr. Norman Wakefield's article in "The Age" newspaper of that morning, Mr. Baines drew attention to the fact that two species of wallaby, now rather rare in Victoria, were thriving overseas; Rock-wallabies in the Peak National Park in England and the Brush-tailed species in Honolulu.

Geology Group—August 4, 1965

Twenty-seven members and visitors were present, with Mr. Angior in the chair.

Mr. R. Hemmy reported on the excursion held on Saturday afternoon, July 10, to examine some of the building-stones of Melbourne. After viewing the Law Courts and Eight-Hours Day Monument, the party proceeded by car to the west end of the city. Buildings in Collins, Queen and Bourke streets were checked carefully, the types of stone noted, and properties explained. Further enquiries were to be made about the stone used in parts of the R.A.C.V. building. Mr. Harrison explained to members his campaign to improve staff conditions at the National Museum.

Arrangements were well in hand for the Group's weekend excursion to Maldon on September 25 and 26.

The subject for the evening was "Volcanoes", by Mr. Dodds and Mr. Angior. A series of thirty-two slides, complete with explanatory notes, were borrowed from the Visual Aids Section of the Education Department to illustrate the talk. After a brief introduction to the subject each slide was shown, the notes read, and a discussion followed. The pictures covered volcanoes in all parts of the world, listing the types of different lavas and forms of eruption.

Discussion took place on the chemical and thermal action in magma from its probable origin at deep-seated levels, to final changes when contact was made with the atmosphere. Australian aspects of the subject included pictures of Mts. Leura and Hamilton near Camperdown, crater lakes at Colac, caldera lakes at Mt. Gambier, the Glass-house Mountains, Qld., dyke at Bacchus Marsh, Mt. Franklin near Daylesford, tuff beds at Warrnambool and the Stony Rises in the Western District.

Exhibits: Crystal of leucite in tuff, Vesuvius, Italy; pitchstone, Scotland; obsidian, Lipari Island; banded pumice and obsidian, New Zealand (Mr. A. Cobbett); stauralite and garnets of large size, Thackaringa (Mr. R. Davidson); white and red ash, obsidian, calcite-banded type of onyx, lead, zinc, nickel crystals, all from Yugoslavia and Greece (Mr. L. Angior); foraminifera recovered from "Star-sands" of the Barrier Reef mounted as microscope slides (Mr. D. McInnes); books and publications ilustrating volcanoes and vulcanicity (Mr. R. Dodds).

Geology Group—September 1, 1965

Thirty-six members and visitors were present, with Mr. L. Angior in the chair. The Chairman extended a cordial welcome to a number of visitors from the Council of Adult Education Geology Group. The secretary read a letter from the Stawell Field Naturalists Club, requesting the loan of the Group's Building Stones Project for their meeting on September 29. It was agreed that this be forwarded by Mr. Hemmy, and the Stawell Club asked for their comments. Arrangements were finalized for a weekend excursion to Maldon on 25th and 26th September.

Subject for the evening was a lecture by Mr. D. Carruthers on the "Geology of Broken Hill". The speaker first drew attention to the economics of the area, stressing the immense wealth which had been won from the lode. The development was a striking example of how great mineral wealth can benefit a country with a small population. Since 1884, vast quantities of ore had been mined for lead, zinc and silver, making the works the largest lead producer in the world. The wealth of Broken Hill had helped to finance many other great industrial enterprises including the aluminium industry. For the geologist, Broken Hill was almost a paradise on earth. The whole lode area was a pre-Cambrian block, of Proterozoic Age, rising a few hundred feet above the vast semi-arid inland plains. On the Western side sections could be traced through Radium Hill and Mt. Painter, to the regions of similar age near Adelaide. The East side could be classed as a fault scarp. Using a map the speaker pointed out the salient features of the Block which is all highly metamorphosed. To the geologist it is known as Willyama, and consists of intrusive granites and altered shales which show sillimanite, cerussite, and a variety of gneisses and schists. The main ore deposit is four miles long, and is world-famous as being stable, except for one small section, throughout its whole length. It is also remarkable in that the deposit is in defined layers or lenses, of which six have been classified, with different proportions of zinc and lead and the silver content increasing with depth. This brings forward the theory of a sedimentary origin for the lode, but this is in dispute, for it conflicts with the general theory as to the origin of ore bodies from a gas or magma in cavities or fractures. The lecture concluded with slides showing the lodes in section, panoramic views of Broken Hill, and illustrations of some of the outcrops. Mr. A. Cobbett moved a vote of thanks to Mr. Carruthers for his comprehensive survey of Broken Hill, which was heartily endorsed by all present.

Exhibits: Beryl crystal, calcite, native copper, cerussite, rhodonite, beryl, galena crystals, garnets, all from Broken Hill and Thackaringa (A. Cobbett); dendrite chalcedony, galena, rhodonite crystals in galena, garnet crystals, all from Broken Hill and Thackaringa (R. Davidson); granite Cape Woolamai, chert, and other specimens from Heathcote for identification (Mr. Windsor).

Botany Group—August 12, 1965

Mr. Bruce Fuhrer occupied the chair. The meeting discussed and decided upon the arrangement of the Group's exhibit at the forthcoming Nature Show.

It was decided to make a joint excursion with members of the Junior National Trust on Sunday, September 26, to the Dandenongs district.

A vote of appreciation was accorded to Mr. Bruce Fuhrer and Mr. Rex Filson for their article and elaborate diagram in the August issue of the *Victorian Naturalist*.

Botany Group—September 9, 1965

The subject for the evening was "Lichens", by Mr. Rex Filson, who illustrated his talk with blackboard sketches, as well as a number of pen and ink drawings of lichens as seen under a microscope. Mr. Filson told us that there were three main groups of lichens: Foliose, Fruticose, and Crustose. Lichens are a working combination of Fungi and Algae; the fungus being parasitic to the alga.

On Sunday, 26th September, the group will make a combined excursion with the Junior National Trust to the Mount Dandenong district. The next Botany Group meeting will be held on Thursday, 14th October, 1965, the speaker being Mr. Swaby on "Mechanism of Flowers".

Microscopical Group—July 21, 1965

Sixteen members and visitors attended this meeting which, because of the absence of Mr. Le Maistre, was chaired by Mr. D. McInnes.

Apologies were received from Mr. Le Maistre, David Stout and Mr. Barratt. The minutes were read and confirmed.

It was moved that the secretary publish in the *Naturalist* the full details of his last talk on the preparation of insect slides.

The subject for the night was "Books on Microscopy". Those discussed by Mr. D. McInnes were: "Fresh-Water Life", by F. J. Plaskitt, a copy of this most comprehensive book being in the Club library; "Principles of Microscopy", by A. E. Wright and "The Microscope", by S. H. Gage, two other very useful books. In addition to these he displayed some of the Club's books on diatoms including those by Van Heurck and the Smith Atlas which are amongst the most valuable assets in the library.

Mr. H. Barratt sent along for discussion: "The Microscopical Dictionary" and "Foraminifera", by Cushman.

Mr. J. Strong discussed some very useful aspects of "The Microscope", by J. Beck, and "Lecture Notes on Microscopy", by R. Barer.

Mr. W. Woollard had a copy of "Photomicroscopy", by Kodak.

Mr. P. Genery discussed Hooke's "Micrographia", "Using the Microscope", by A. Barron, and the Teach Yourself Series, "Microscopy", by W. G. Hartly.

Exhibits shown under the microscopes were: castor-oil plant, *Ephydra* larva and "stars of the sea".

Microscopical Group—August 18th, 1965

Nineteen members and visitors attended the meeting which was chaired by Mr. E. Le Maistre. Visitors present were Mr. Bill Bowman and Mr. Setford. The minutes of the previous meeting were read and confirmed.

Mr. D. McInnes reported to the group the arrangements for the Nature Show and roster sheets were circulated.

Mr. K. Trotter offered to contact Mr. G. Senator with the object of seeing if he would give the group a talk on some aspect of microscopy.

As the topic for the evening, Mr. P. Genery introduced to those present something novel in the form of 8 mm cine-photomicrography. He projected quite an amount of film, both black

and white and colour. Faults and difficulties were pointed out and members contributed to the discussion with their suggestions. The films taken were of various forms of pond life including several rotifera, brine shrimps, plumed gnat and *Ephydra* larva. Lighting was both bright-field and dark-field; some of the rotifera under the latter were most spectacular in appearance.

Exhibited under the 8 microscopes at the bench were diatom slides by Mr. K. Trotter, one of which shown under his newly acquired Wenham Binocular was particularly fine. One young member showed some pond life. Mr. W. Genery displayed some living *Ephydra* larvae and Mr. Woollard showed a diamond beetle and some parts of a microprojector which he was in the process of making.

AFFILIATED CLUB

Robinvale Field Naturalists Club

Mrs. Kaye Grose is President, Mrs. Margot Harrop Vice-President, Miss Joan E. Phillips Secretary-Treasurer. There are twenty members. Our bank balance is £3.

This year we are making a list of birds seen in the district. We have also started a collection of specimens of local flora. We meet on the third Sunday in the month for a half-day excursion. A recent excursion took us into mallee scrub where there are the mounds of lowans. A pair of chestnut-backed Quail-thrush were also observed. During our outings we hold our club meetings.

JUNIOR EXCURSION TO HEALESVILLE AND SURROUNDING DISTRICTS

On Sunday, June 20th, 33 members of the Hawthorn Junior F.N.C. and 2 members from the newly formed Preston Juniors attended the F.N.C.V. excursion to Healesville and surrounding districts in one of two buses.

After an early start we first visited Warrandyte. Here the Pound Bend tunnel was pointed out and Michael Coulthard gave us a short history of the district with special reference to the tunnel. Apparently it was built towards the end of the last century so that water could be diverted from the Yarra and much of its former course scoured for gold. The project was a success and although the tunnel has now been abandoned by the miners it is a haven for birds. In the Warrandyte township a halt was made and the juniors walked along the river for a short time.

From Warrandyte the coach drove north to Kangaroo Ground where we visited the tower. Jonny Temby told us that the tower is situated at one of the best lookout points near Melbourne and it is used as a fire spotting tower in summer. The tower itself is situated in a forest of tall trees and is built from stone readily available in the district.

Travelling onwards towards Yarra Glen a stop was made overlooking Yering Gorge. From our vantage point we could see the Yarra entering and leaving the gorge and the high saddle on the opposite bank. Mr. R. Hemmy explained to both F.N.C.V. and junior members how the gorge was formed. The short halt gave many juniors a chance to explore the bush. Three species of fungi were found as well as a number of beetles. Mr. McInnes noted that the area was good in the way of eucalypts and several different types were seen: Long-leaved Box, Red Box, Messmate, Ironbark and Narrow-leaved Peppermint. Many of these were pointed out while travelling.

At Yarra Glen Susan Beattie gave a short talk about the district and coming on to Healesville, Bernadette Hince and I gave talks on the sanctuary itself and the district respectively.

Arriving at the sanctuary members had lunch outside and spent the afternoon wandering through the grounds. A notable new feature at the Healesville Sanctuary is the lyrebird run.

At 4 p.m. the party set out on the return trip to Melbourne via Lilydale.

Checking through our past records I find that on only one other occasion have the Hawthorn Juniors had their own bus with the F.N.C.V. This was on the Sherbrook Forest/Kallista excursion in June, 1950. In most cases our members have attended F.N.C.V. excursions through the assistance of the late Mr. Paul Fisch and others. With this advantage several juniors were asked to prepare talks on each district and Mr. McInnes pointed out all other features through the bus microphone. The excursion was a success and the Juniors hope further outings will be organised on this line.

—Barry Cooper, Excursion Secretary,
Hawthorn Juniors.

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

GENERAL MEETINGS

Monday, October 11—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Mr. N. A. Wakefield, "Study of Mammal Bone Deposits".
3. Election of members.

(a) *Ordinary*

Mr. D. H. Ashton, Botany School, University of Melbourne, Parkville.
Mrs. I. Betheras, 3 Winifred Crescent, Toorak.
Mrs. J. A. Dickens, 14 Taylor Road, Mooroolbark.
Mr. A. T. Hall, 266 Buckley Street, Essendon.
Mr. A. Rogers, 911 Mount Alexander Road, Essendon (Interest—Microscopy. Introduced by Mr. D. E. McInnes).
Mrs. E. J. Werner, 14 Toorang Avenue, North Balwyn, E.9 (Interests—Geology and botany. Introduced by Miss J. Annear).
Mrs. M. Woolf, 183 Springvale Road, Nunawading (Interest—Native flora).

(b) *Country*:

Mr. and Mrs. D. Chable, "Ironbark", Dawson Road, Kangaroo Ground (Joint) (Introduced by Mr. D. E. McInnes).
Mr. C. R. Crouch, 4 Camp Street, Kaniva, Vic. (Introduced by Mr. N. A. Wakefield).
Mr. A. L. Gerrard, Box 19, Kyneton.
Mr. E. Perkins, St. Leonard's Road, Healesville.
Mr. J. Whinray, Memana, Flinders Island, Tas.

(c) *Junior*:

Peter Noel Homan, 40 Howard Street, Reservoir, N.19 (Interests—Australian birds and mammals. Introduced by Mr. J. Womby).
Linton Spencer, 2 Laird Street, Croydon, Vic. (Interest—Geology. Introduced by Mr. R. Dodds).

4. General Business.
5. Nature Notes and Exhibits.

Monday, November 8—The Geology Group, "Building Stones of Victoria".

GROUP MEETINGS

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

Thursday, October 14—Botany Group. Mr. A. J. Swaby, "The Mechanism of Flowers".

Tuesday, October 19—Geology Group. Special meeting at Geology School, University of Melbourne. Professor Edwin S. Hills, "Australian Fossil Fishes".

Wednesday, October 20—Microscopical Group. Further discussions of reproduction of simple forms of life.

Friday, October 29—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Mr. Gilmore, "Marine Biology".

Monday, November 1—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House. Mr. D. Howick, C.S.I.R.O.—"Rôle of Woodboring Insects in Forest Products Research".

Wednesday, November 3—Geology Group. Messrs Angior, Sault and McInnes, "An Evening with Rock Sections" (illustrated).

Thursday, November 4—Fauna Survey Group—at Fisheries and Wildlife Department at 7.45 p.m.

Thursday, November 11—Botany Group.

Friday, November 12—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street), at 8 p.m.

F.N.V.C. EXCURSIONS

Sunday, October 17—Mt. Beckworth. Leaders—the Ballarat Field Naturalists Club. The coach will leave Batman Avenue at 9 a.m., arriving at the corner of Sturt Street and Albert Street, Ballarat, about 11 a.m. Fare £1, bookings with the Excursion Secretary. Bring two meals.

Tuesday, November 2—President's Cup Day Excursion. Blackwood Ranges. The coach will leave Batman Avenue at 9 a.m. Fare 17/-, bookings with the Excursion Secretary. Bring two meals.

PRELIMINARY NOTICE

Saturday, December 25, 1965 to Monday, January 3, 1966. Snowy Mountains, Kosciusko. The coach will leave Melbourne at 2.45 p.m. for Orbost and reach Cooma on Sunday. On Monday a three day tour of the Snowy Mountains Scheme will commence. Thursday night will be spent at Cooma, leaving Friday morning for Mt. Kosciusko where the next two nights will be spent. On the return journey, there will be an overnight stop at Wangaratta. The total cost will be approximately £45. A deposit of £10 should be paid when booking to the excursion secretary and the balance paid by the December meeting. Please check for vacancies before sending money.

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, 1965

President:

MR. M. K. HOUGHTON
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: MR. E. BYRNE, MR. A. FAIRHALL

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. A. G. HOOKE, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. HUDSON, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MRS. P. E. MATCHES, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: MR. R. R. DODDS, 5 Banchory Street, Essendon (379 4309).

Microscopical: MR. P. GENERY, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

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 for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 82 of the *Victorian Naturalist* is from May 1965 to December 1965.

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Editorial Note

At its meeting in March, Council decided that an issue of the *Victorian Naturalist* should be dedicated to the memory of the late Mrs. Ruby Lewis. We had hoped for something special to mark the occasion and are glad that Mr. David Fleay's article, with the rare opportunity to reproduce what must be amongst the first coloured photographs ever published of a living planigale, arrived so opportunely. We are grateful to Miss E. Dixon for the short biographical note, to Mrs. H. A. Watt of Essendon, a niece of Mrs. Lewis, for the photograph of Mr. and Mrs. Lewis, and to Mrs. K. Hough for providing a short article on a bird subject. The assistance of the Ingram Trustees in enabling us to reproduce the fine collection of planigale photographs accompanying Mr. Fleay's article is gratefully acknowledged.

What is to be the Subject for Our Next Meeting?

How many hundred times has this vexed question been asked at group or club meetings?

The difficult job of finding a speaker and subject for small groups or country clubs may be lessened by an innovation to be tried out at the November General Meeting of the F.N.C.V.

The Subject for the night will be "The Building Stones of Victoria" and it will be presented by Mr. Lloyd Williams.

The innovation is that the selection of slides to illustrate the subject, and the commentary that accompanies the slides, has been compiled by Mr. Dick Hemmy of the F.N.C.V. Geology Group, and donated to the F.N.C.V. for use by all clubs.

Mr. Lloyd Williams is to represent a member of a country club which has borrowed Mr. Hemmy's "Building Stones of Victoria" and is to act as the speaker on the subject to his club.

Think of the possibilities of this method of providing a subject for a meeting!

Every country club could make it a project to build up a collection of slides and a commentary with them, to form one complete subject that would be available to other clubs.

What could your club do?

Try to be at the F.N.C.V. Meeting on Monday 8th November, your club may be interested to present "Building Stones of Victoria" on its own programme.

—D. E. McInnes

(The Editor regrets that this note was received too late to be included in the October issue—J.R.H.)

PHOTOFLORA 1966

In February and March 1966 the Native Plants Preservation Society will hold Photoflora '66, its fourth annual photographic competition for colour slides of Victorian wildflowers and native plants.

Suitable slides include those showing wildflowers, orchids, natural bush landscapes or an association of wildflowers and native plants with birds or insects.

Entry forms with full particulars are available from the Competition Secretary, Miss B. C. Terrell, 24 Seymour Avenue, Armadale, S.E.3.

Go into the bush with your camera and take your photographs now!

Vol. 82, No. 7

F.N.C.V.

November 4, 1965

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Front Cover:

We have chosen this photograph of the Allied Rat, *Rattus assimilis,* by Mr. J. Cooper of the Fisheries and Wildlife Department of Victoria, for the cover of this number. This mammal is, of course, a rodent and no relation of the marsupial planigale illustrated on p. 197, in spite of the similar appearance of the two.

The Late Mrs. Ruby Lewis

By E. Dixon

Mrs. Ruby Lewis and her husband, David, were very nature minded and were members of all the nature clubs for many years. They attended meetings and outings regularly, including the R.A.O.U. Annual Camps, and so had a wide circle of friends. They were among the main workers at the F.N.C. shows and at one time Mrs. Lewis was in charge of exhibits at the monthly meetings.

The late Mr. and Mrs. D. Lewis.
Photo: *Kindly supplied by Mrs. H. A. Watt.*

David Lewis was employed by the Railways Department and so on his days off private excursions were undertaken, their main interests being botany and birds. They were keen members of the Bird Observers Club. Holidays were mostly spent interstate and during these all States were visited. Once they travelled from Perth to Darwin by boat and returned home via Central Australia. After David Lewis's retirement they travelled interstate again and it was on a trip to Broken Hill in September, 1959, that he died suddenly.

Ruby Lewis continued her interest in the Clubs and until her own health began to fail was seen regularly at all meetings and outings. Her last big trip was with the R.A.O.U. to New Zealand. She passed away suddenly in September, 1964. On a visit to see her a few days before her death she was interested to hear about the Nature Show and disappointed not to be there to help.

Suburban Nesting of Spotted Pardolotes

By Katherine Hough

In September, 1964, a pair of Spotted Pardalotes *(Pardalotus punctatus)* started burrowing in a bank about 2 ft. high in our outer-suburban garden. For a few days they tunnelled away with the female doing most of the work while the male kept look-out on a nearby lemon-scented gum *(E. citriodora)*. Then followed some days of building, though the birds were so quick at flying down and straight into the hole that they were almost too fast for the eye and were seldom caught in the act.

For the next few weeks they were not seen at all, and it seemed possible they had deserted the nest until one day they were noticed carrying food. Extreme caution while egg-laying and brooding were in progress had kept them all but invisible. At first the visits were made about every 20 minutes to half an hour, with the birds arriving in turn, and they were carrying what looked like a beakful of white fluff. Each bird had its own route. Both arrived in the "citriodora" at about the same place, but while the male dropped to a lower branch about 12 ft. up, moved out to the end then down to the hole, the female dropped to a closer shrub, moved to the outer foliage about 4 ft. up, then flew into the hole.

As time went on the visits became more frequent till they occurred every 10 minutes or less and the ration then resembled a white pellet. It appeared to consist of lerp insects complete with shield compressed into an oval shape. Often the birds' throats were noticeably distended with additional food.

During this feeding period the birds became accustomed to all the interest shown in their activities and were quite fearless, flying down over the shoulder of anyone within three feet of the hole and quite undisturbed by cars pulling in and out nearby. A stick was placed in the bank near the hole, they soon accepted it as a landing platform and both were photographed and eventually banded without any interruption of their routine.

By now tiny squeaks could be heard coming from the hole when the parents arrived and the soil all around it was hollowed out where the fledglings had been coming out at night and exercising their wings.

On the 4th December, just ten weeks later, all was quiet. A small leaf placed in the entrance was undisturbed and it was apparent the family had flown. The young were never seen and their number remained unknown.

At the end of January, after heavy rain, a car wheel collapsed the bank over the hole and the nest was dug out. It was 20 in. in and about 10 in. down, a complete domed nest of fine strands of bark lined with fine grasses and had a side entrance. The tunnel inclined slightly upwards to the nesting chamber.

Early in May, 1965, when mist-netting was in progress in the garden, the male was caught and with him two immature birds with yellow spots on the crown, just the beginnings of

a yellow bib and a touch of red above the burnt orange upper tail coverts—evidently both young males. These were almost certainly two of the family and were also banded. A very attractive bank will be ready and waiting next August in the hope that some of them will be back.

The male was in rather dull plumage when the pair first started tunnelling, though it brightened towards December. When re-trapped in May, however, his plumage was brilliant with almost the entire underside a rich buff.

It is interesting to note that during the ten weeks this pair of pardalotes took to raise a brood, a nearby blackbird had launched two broods of four each and was sitting on another four eggs—making twelve blackbirds to perhaps four pardalotes.

Photos: *Stan Breedon*

Adult Male Ingram's Planigale at West Burleigh.

Australia's "Needle-in-a-Haystack" Marsupial

Vicissitudes in the Pursuit and Study of Ingram's Planigale, the Smallest Pouch-Bearer

By David Fleay

Driving north up the Bruce Highway in Queensland on a hot October afternoon in 1956 we entered a cutting on a range beyond Gunalda en route for the nesting territory of Wallaville Barking Owls near Gin Gin. Walled by great blocks of basaltic (andesite) rock this Gunalda cutting twenty miles north of Gympie remains forever etched in my memory because it was the unexpected setting for my first meeting with a member of Australia's genus of tiniest marsupials.

Half way up the grade a minute furry creature appeared to skip momentarily on the roadway ahead of the truck. Stopping the vehicle as abruptly as possible, I raced back only to find nothing stirring and absolutely nothing in sight. About me only the black bitumen strip sizzled in the uninterrupted glare of the sun. Suddenly I perceived what was apparently a very small and very ordinary mouse "frozen" in that uncomfortable, unfriendly waste in the hope of avoiding detection. However a careful stalk and quick grab revealed that here for the first time I had met a midget among marsupials recognised as a *Planigale* only from what I knew of its description in text books.

In any event this was a most exciting moment for scarcely anyone knew a thing about planigales.

Perhaps the most startling initial impression was the disproportionate size of the scrotal sac of this male specimen. Typically, as I found later, it filled almost the whole of the external abdominal area.

Superficially, although smaller, this dark-nosed Lilliputian bore the closest resemblance in colour, shape and eye-size to the common mouse; but it was browner with limbs not so long, its eyes were even smaller (cf. the very large eyes of *Sminthopsis, Dasycercus, Antechinus* and *Phascogale*), its hairy ears were wide and close set to the head while the jaws possessed a terrific gape with many teeth. In fact this flat-headed, wide-skulled, pin-eyed little fellow was none other than Ingram's Planigale, and planigales are recognised not only as the smallest but the least known of the lesser pouched animals. Most adult specimens weigh less than a quarter of an ounce apiece and yet a female may carry a pouch-load of nine babies at a time.

What a contrast to the Great Red Kangaroo which at the other end of the marsupial scale weighs perhaps 2,400 ounces and has room usually, as far as the doe is concerned, for only a single joey.

Sad to say in spite of accommodation in a grass-filled box little *ingrami* was with us on the further journey for a brief half hour. Apparently uninjured at the time of our meeting he may have suffered prior heat stroke, shock or perhaps had been dropped by a feathered predator. Whatever the cause it was a great

sorrow to have the little fellow die so soon, for despite years of search this remains one of a mere two meetings ever to come my way with planigales in the field.

At the time it touched off terrific enthusiasm, but subsequent trips to the Gunalda Range proved that a deliberate hunt for planigales is about as hopeful as the finding of the proverbial needle in a haystack. Crawling for hundreds of yards beneath lantana thickets at the mercy of scrub ticks while setting all manner of choicely-baited box-traps, laying trails and quietly spot-lighting by night all proved fruitless. I found myself sympathising wholeheartedly with G. H. H. Tate (A.M.N.H.) who in 1937 began intensive trapping of a great rock-strewn slope at Rona Falls, Port Moresby following the exciting capture of the one and only *Planigale novaeguineae* known to science. Likewise his further efforts were entirely fruitless.

It is said that everything comes to him who waits but planigales were but a memory and I had not thought of waiting when, on February 27 1960, a packet arrived with a live animal for identification. It came from G. A. Main of "Mungungo", Monto, Queensland, who had written describing the turning over of stacked posts neighbouring blady grass. There he had found a sharp-nosed creature scarcely half the size of an ordinary mouse.

Cutting the wrappings of the container I expected either an *Antechinus* or *Sminthopsis* (we receive many) but imagine the shock. Peeping at me was an adult, female *Planigale ingrami* with a bunch of seven newly-furred youngsters anchored behind her by merciless tooth-grips on the teats in her pouch! Here at long last, delivered to me on a platter, was not one, but eight of the least known marsupial "mice".

Thoroughly intrigued by the fact that Madame "Mouse" ate untold quantities of grasshoppers, more than her body weight daily, Mr. Main had flown her down out of sheer interest, little realising that he had not only found the smallest and probably the least known of marsupials, but given us the means of investigating a badly-needed life-history.

The flat-headed little mother had a maximum depth of skull from base to crown of slightly more than an eighth of an inch, a lizard-like flattening that has evidently been evolved as a result of the specialization of the species for slipping into narrow rock-crevices and cracks in the ground or in logs and dense undergrowth. Her family of seven totalled six males and one female, a state of affairs not uncommon among Dasyurids, and typically like other Dasyurids of the unenclosed pouch area, she dragged the long-suffering babies over all obstacles in her path, coming forth repeatedly, as she did even in broad daylight, from a grass nest built in a hollowed out "seat" beneath a shell of wood to seize mealworms, field crickets and paralyzed spiders robbed from mud-dauber wasp nests. Even the juicy larvae and pupae of the wasps themselves were devoured.

Captivity in a large earth-floored box with gauze wire only in the roof worried the little pin-eyed mother not in the slightest and at all times she maintained a small, neat, saucer-shaped nest of dry grass beneath concave shells of wood or bark. Once in deeper grass she constructed a more elaborate nest not unlike that of the Blue Wren.

Within a fortnight she tucked away her seven dwarfs within the "nursery" and hunted untrammelled at night for the immense quantities of insect food she needed. Calculations revealed that daily now she consumed *more* than

Male Ingram's Planigale found by Steve Williamson. Locality Burleigh—Miami Swamp (S.E. Queensland).

Photo: *David Fleay*

Restrained by the tail, a midget adult male planigale retaliates on the author but with little hope of penetrating his skin.

Photo: *Stan Breeden*

her body weight in grasshoppers! Large locusts or winged grasshoppers were prime favourites and such quarry usually exhibited far greater strength than the tiny hunter. Size of the victim meant nothing to this mighty midget for she clung on fiercely, even during aerial rides when enormous grasshoppers tried space jumps to dislodge her, sometimes clearing the length and breadth of the enclosure a number of times. Beneath the wooden shells, legs, wings and other tough discarded sections of the victims grew apace.

If handled the small animal immediately seized a finger in her widely opening jaws to exert the greatest pressure possible. Being so small her tiny teeth scarcely penetrated the skin yet the dogged determination in pinching hard and hanging on was remarkable.

By June all youngsters were subadult in appearance and development, with males, as expected, beginning to exceed females in size (though never excessively so as in *Antechinus*). Only on the rarest occasions did they cling to her back and sides (a common method of carriage in *Sminthopsis*) even in earlier times when the grip was invariably the "do-or-die" clutch and drag on the long-suffering teats.

The youngsters and their female parent were, if anything, more rapid in ground scurries than the common mouse, contrasting greatly with *Sminthopsis crassicaudata*. When disturbed they "melted" in lightning dashes to the cover of the next available shelter or into thick grass, but although quite adept at it, they seldom climbed.

Full of surprises these small characters bit like threshing machines, if handled, and they revealed a habit of sneaking quietly into sunlit spaces and basking at full stretch like a crowd of lizards.

Rapidity of movement of these midgets is, in my opinion, the main reason why planigale nests are more often discovered beneath debris than the animals themselves. They depart at speed into the vastness of Mother Earth immediately a disturbance is sensed. Sometimes by sneaking quietly to the cage at night (planigales are mainly nocturnal though given to odd daylight forays and much sunbasking) their vocal sounds could be overheard. These consisted of twittering, sibilant notes so rapid as to be almost a vibration. In this respect they reminded me strongly of insectivorous bats.

The general insect-seeking habit of these midget marsupials gives way under opportunity to a scavenging carnivorous trend. One of the youngsters sickened and died in the enclosure only to be devoured immediately by its relations. Dead sparrows, or any small defunct birds for that matter, were reduced to skeletons within a matter of hours, in fact one sparrow in particular was cleanly picked by the family in less than 50 minutes.

Since the arrival of the Monto animals we have maintained planigales at West Burleigh almost continuously into 1965, breeding them twice. The first occasion (summer 1960-61) was also a first record for captivity though only three offspring reached maturity. Some successfully-reared young have been liberated in neighbouring rocky areas considered highly suitable for them. Obviously the little creatures are mature at the age of less than twelve months.

Curiously, as already inferred, there is none of the marked disparity in the size of the sexes so characteristic of larger Dasyurids (quolls, mulgaras, phascogales) though in conformity male planigales are mostly, though not invariably, slightly larger than females. Average measurement of males in our collection at the moment runs to three

With covering wood shell removed abruptly, the mother planigale, nursing young, churs angrily at the disturbance and prepares to bite vigorously with her tiny but ever-ready teeth. The nest is entirely of material gathered and arranged by the animal herself.

Photo: *David Fleay*

Churring angrily because of inability to escape under the handicap of 6-7 weeks old infants clinging to her teats (one on her fur) mother Ingram's Planigale opens her un-mouse-like mouth at the photographer.

Photo: *David Fleay*

inches combined head-body length with two-inch tails. Females are slightly smaller at 2·6 inches head-body length and 1·9 inches tail. Weight of a typical adult male totalled 6·451 grams (just over one quarter of an ounce) while that of a larger than usual female provided the unexpected figure of 7·860 grams.

Interestingly enough, unlike other small Dasyurids that I have studied, they appear definitely to be summer rather than winter breeders. Usually silent over a good deal of the year, their most vocal periods range over the pairing month of November when nocturnal "Stit-tit-tit-tit" sounds are quite frequent and unbelievably loud for such little animals. Earliest pouch development recorded here also dates to the first week in November when, as in the case of the Mulgara, longer and lighter protective hairs grow out from the sides of the open pouch area, a strong ridge or fold develops anteriorly and short reddish hair appears inside it. Should no young appear (usually some time in December) recession of the "active" pouch condition is complete by mid-January.

Our first success began with one of the young Monto pairs isolated for the purpose because of the cannibalistic tendency of most carnivorous and insectivorous marsupials towards newborn young. Embryos (of which the greatest number seen in a pouch area at one time totalled nine) appeared during the last days of December 1960. Possibly as in the case of the Yellow-footed Pouched-mouse (*Antechinus flavipes*) the number of teats and, therefore, the number of young supported at one time is variable. Plate 8 *Victorian Naturalist* **65** (1949) shows a photograph of mine featuring a "Yellow-foot" with the extraordinary total of twelve newly-born young attached to twelve teats (other records of teat-numbers in the associated paper are eight, ten and eleven).

With the mother planigale it proved unwise to hold many inspections with the object of observing progress, for one of this little animal's sisters ate or otherwise disposed of her family in protest against forcible prying. With the father removed for his family's good, the mother planigale wove dry grass blades and stalks into an extra comfortable structure beneath curled bark and resented even the gentlest interference quite fiercely. Any lifting of the cover automatically brought her wide open jaws churring angrily through the top of the nest. She bit fiercely and refused to budge.

By mid-February at five-six weeks of age the grey, crisp-furred pouch-young hung tenaciously to the teats for most of the twenty-four hours, but for the first time could be left at home, which was frequently built up with new material, while the mother set off in search of food. Her appetite for chafer-grubs, crickets, grasshoppers, spiders, meal-grubs and steamed egg was always good, but now, as in the case of her own mother a year previously, it became phenomenal. Naturally this period proved the only photogenic one. Because of her anchorage during daytime by well grown youngsters gripping her elastic teats and now of course any teat proving available, mother planigale was handicapped in her usual lightning tactics and I had the only reasonable opportunities with her as a camera subject. Perhaps that statement is not entirely accurate considering that, on exceptionally cold mornings, it is also possible to picture a planigale with a fair degree of success because the occasional drop in body temperature induces temporary sluggishness. Nevertheless pictorial difficulties were ever present and inevitable in an animal so tiny, so very restless and so fast. A humor-

Six young planigales retard their mother's escape during daylight by their unshakable grip on her elastic teats. Only one clings to the mother's flank. The babies were aged 6-7 weeks.

Photo: *David Fleay*

Litter of six baby planigales, 7 weeks old, retard their mother's progression as they hang for dear life to her elastic teats in the open pouch area. The superficially mouse-like appearance of the mother animal is clearly seen.

Photo: *David Fleay*

ous episode (not considered funny at the time) concerned the sudden disappearance of the mother with pouch-attached babies up a photographic assistant's trouser-leg followed minutes later by her reappearance with youngsters still safely in tow at the neck of the same fellow's shirt!

By the end of March the youngsters had reached a half-grown stage. With any lifting of the wooden shell covering the nest they scattered like cockroaches and disappeared in all directions. Now after three months in the care of the parent they were capable of an independent existence. As in the case of most other small Dasyurids the after-effect of a really cold night was reflected, as mentioned, in sharp drops in body temperature with the planigales occasionally torpid in their nests by the morning.

Other Evidence of Planigales

Although literature on the subject tends to leave one with the impression that planigales haunt rock-strewn areas and, of course, as in the Gunalda experience, they definitely do, subsequent contacts have given me new horizons.

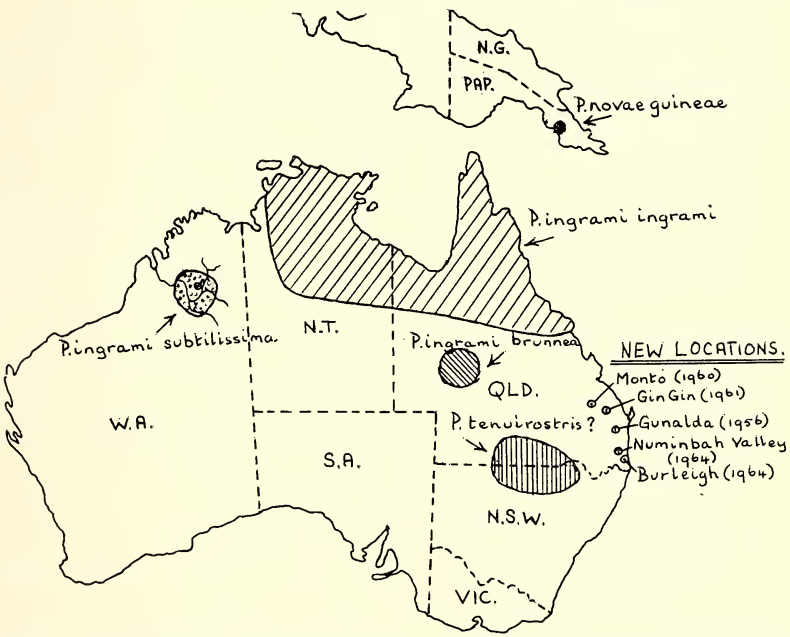
When Mr. Main encountered the Monto family, upon which our early observations were made, the mother planigale was ensconced beneath a heap of old fence-posts six feet distant from a chain-square clump of blady grass. Little other cover existed in the area of savannah woodland (tall eucalypts and "wild apple" trees) save for sparse grass. This site was bounded on one side by a permanent running creek and on the other by a sandy soil cultivation paddock.

In March 1961 Messrs. L. Farrell and G. Lynn were cutting fire-wood on a saw-bench on Gin Gin cattle station when a planigale (unrecognised as such) with well-grown family attached, fell from a cavity, nest and all. Taken alive to Eric Zillman, who guessed their identity, they were eventually forwarded to me. Once again it was a confirmed occurrence of Ingram's Planigale—this time inhabiting shelter provided by a fallen hollow limb in timber country.

Following heavy rain in early April 1964 and the inundation of the Burleigh-Miami peat-swamp in south-eastern Queensland the whole area with marginal exceptions became partially flooded and generally soggy. At this time an observant 13-year-old schoolboy, Stephen Williamson by name, who happened to be hunting displaced snakes, turned over some old sheets of iron on the edge of the marsh. Thinking the "mouse" he captured in a sketchy little nest was "different", he brought it along and all of us were delighted when it proved to be an immature male Ingram's Planigale. Burleigh is my home district and, with this first indication that Ingram's Planigale is a local resident, we went to the length of dissecting pellets from a local Barn Owl tree in the hope of obtaining further evidence. However no positive findings were made. Meanwhile fired with enthusiasm over his discovery young Steve Williamson searched the swamp and its environs for months on end. Scarcely a sheet of derelict galvanized iron, masonite, or timber remained unturned anywhere. On December 23rd of the same year his rummaging beneath a pile of old three-ply in a dense forest of coarse, high grass beneath Swamp Mahogany Gums (where field-crickets abound) paid off. He arrived with an adult female showing a pouch area in the state associated with the feeding of advanced young. These were evidently in a nearby nest but so great was the profusion of tall rank vegetation in the area that we failed to find a trace of the nursery. Therefore we turned the tiny mother loose

At 9 weeks, baby Ingram's Planigales cling nervously to their mother in unaccustomed surroundings but are able to undertake excursions of their own in the vicinity of the nest at night.

Photo: *David Fleay*



Map giving indications of the range, after Marlowe (Australian Museum), of the genus *Planigale*. The localities are based on a handful of specimens (in the case of *P. ingrami subtilissima* of one only) and are approximate only.

to continue the care and management of babies which going by the time of the year could not yet have attained an independent age. The rapidity of that Lilliputian creature's exit into the jungle of dense growth was magical! Certainly members of the species shine not only in penetration of narrow crevices in rocks but equally facile is their swift ease of movement through grass jungles and the blady grass cover so common in much of coastal Queensland.

In addition there is the evidence of Jack Thomson, another careful observer who dairy-farms in the Numinbah Valley below the frowning escarpment of the Lamington Plateau National Park. During the winter of 1964 he discovered the decomposed corpse of a tiny mouse-like creature on the floor of his cow-bails and preserved it in spirit for identification. It was a planigale. Later, down by the rock-strewn Nerang River, at the bottom of his property on November 15, 1964, Mr. Thomson overturned a small, concave, water-worn shell of timber to expose a well-built nest. This contained a mother Ingram's Planigale with nine sparsely-haired joeys in a compact mass adhering tenaciously to her nipples. In the most unprotected open habitat so far observed the find was also notable in being, not only the earliest planigale breeding event we had on record (birth time early October?), but the greatest tally of offspring in a pouch-load.

The new occurrences of *Planigale ingrami* from Monto through Gin Gin to Burleigh Heads and Numinbah extend the range of the tiny animal some 800 miles further south along the coast than the Townsville-Mackay limit previously established for this native of the north. It is indeed most likely the minute size of the marsupial, coupled with its extremely mousy appearance, rapid movement and general elusiveness that causes the casual observer to overlook or miss it altogether. In addition its appearance following heavy rain, under ready-made shelters is due rather to eviction from the variety of cracks, crevices and other hiding places normally dry and snug, than to an increase in numbers as formerly supposed. In time members of our needle-in-a-haystack genus of smallest marsupials (two species with three sub-species of *ingrami*?) may prove to be more numerous and wider spread than is at present realized. They do manage, however, to remain most successfully hidden!

Finally, in view of the new locations recorded here there is particular interest and food for thought in the comments of Hobart M. Van Deusen, mammalogist of the American Museum of Natural History, whom I consulted on the subject of planigales in 1960 during one of his field-trips to Queensland and New Guinea. Following detailed examination of a Monto specimen and consideration of the genus as a whole, Van Deusen wrote (March 1961) "You know even better than I do that *Planigale* is one of the least known of the Australian genera of marsupials. With due respect I believe there is still too little material available for study at the present time to justify even the New South Wales species *tenuirostris* . . . Who is to say these western N.S.W. specimens are not part of a cline extending from New South Wales right up to the Northern Territory? One day when we do have comparative species, we may find that the New South Wales population differs enough to receive a subspecific name under *ingrami*. Or we may find that it really is a good species, thus justifying Troughton's description . . . In the light of our present knowledge, I would unhesitatingly use Thomas' specific name *ingrami* for your Monto (Queensland) specimen."

Classification of Some Australian Flower Perfumes

By J. H. Willis*

Under title "Flower Perfumes and Their Classification", in *Vic. Nat.* **61**: 134-36 (Dec. 1944), the present writer furnished a classified list (with explanatory notes) of a number of floral scents that he had tested—belonging both to native and exotic plants. Short supplementary lists were also published in *Vict. Nat.* **69**: 75 (Sept. 1952) and **71**: 129 (Dec. 1954). During the past eleven years, about three dozen other indigenous flowers have been examined olfactorily, and it now seems appropriate to try arranging results according to the same categories that were adopted in 1944, thus:

1. **Indoloid**

2. **Aminoid**

3. **Heavy**

   Privet type—

   Acacia victoriae (very sickly), *Grevillea hilliana, G. paniculata* and *G. tridentifera.*

4. **Aromatic**

   Spicy type—

   Lysinema pungens, Epacris obtusifolia and *E. paludosa* (both faintly stock-like), *Sarcostemma australe* (as of Japanese Allspice), *Clerodendron tomentosum* (cinnamon-like).

   Cumarin type—

   Melaleuca ericifolia.

   Vanilla-chocolate type—

   Sowerbaea juncea (vanilla), *Conostylis phathyrantha* (vanilla), *Thelymitra dedmanae* (strong overtone of burnt-sugar), *Grevillea integrifolia, Aphanopetalum resinosum.*

5. **Alcoholic-fruity**

   Quince type—

   Eucalyptus behriana and *E. microtheca, Pultenaea angustifolia, Avicennia marina.*

   Pineapple type—

   Dasypogon bromeliifolius

   Raspberry type—

   Eucalyptus ficifolia (deep rosy-crimson form).

   Others—

   Acacia montana (like amyl acetate or banana), *Tristania laurina* (somewhat like daffodil), *Goodenia grandiflora* var. *macmillanii.*

6. **Honey**

   Cryptandra tomentosa, Leptospermum lanigerum, Calytrix sullivanii, Logania floribunda.

7. **Musky**

   Dryandra polycephala, Melaleuca micromera and *M. acerosa* (strongly odorous).

8. **Animal**

   Myoporum floribundum (unpleasant, as in Shasta Daisy).

9. **Seaweed**

   Acianthus caudatus, Pterostylis mutica.

10. **Poppy**

11. **Violet**

12. **Boronia**

    Conospermum mitchellii (faint but unmistakable).

13. **Lemon**

    Petrophila longifolia, Litsea dealbata (faint).

* National Herbarium of Victoria.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Eastern Water-Rat

Mr. Jim Peterson of Morwell has sent in a very interesting account of the activities of an Eastern Water-Rat. This is a valuable piece of information about the behaviour of *Hydromys chrysogaster* of which little is known.

The animal was sighted in the South Cascade Creek, on the Thompson Valley Road, about 14 miles from Erica township at an altitude of 2,700 ft. At 3.00 p.m. on April 16, when the creek was running unusually high, Mr. Peterson watched the water-rat swim up and down a 20 ft. stretch of water for some time. The animal was 15-18 inches from nose-tip to tail, with dark coloured upper parts and whitish underneath. The tail had a white tip. It was swimming with its head just breaking the surface, moving on one side of the body then the other, giving a fast snakelike motion.

The rat was seen to make 8-12 trips from a small underground distributary of the creek to a point about 20 ft. upstream, hidden by overhanging treeferns at the mouth of a little stream. On each trip it carried 2-3 inches of the tip of a fern frond in its mouth, from the fern bank to the tunnel of the distributary. Approximately one minute was spent under the ferns and two minutes in the tunnel on each trip. The fern collected was probably the Fishbone Water Fern *Blechnum nudum*. Ray Water Fern *Blechnum fluviatile* which was growing along the edge of the main stream was not touched.

On one occasion, the fern frond caught in the mouth of the tunnel. The rat performed a back-flip, exposing its white under-surfaces, and caught hold of the fern. Finding the fern firmly caught, it returned for another without entering the tunnel. After its last trip, the rat came out of the tunnel to the entrance, unhooked the piece caught there and was not seen again.

The rat was observed from a footbridge 6 ft. above the mouth of the tunnel. An attempt was made to photograph the animal by flashlight, and after the first flash, which caused it to dive, it took no notice. The animal was not sighted again during the next few days which Mr. Peterson spent in the area.

[The Fauna Survey Group thanks Mr. Peterson for his careful observations.—J. Frankenberg, Sec., Fauna Survey Group.]

The Gellibrand Grinding Rocks

This interesting note, and a request for further information has been sent in by Val and Rob Glover of 53 Swanston Street, Terang.

August is a terrible month for tramping over wet, boggy paddocks looking for evidence of aboriginal industry. But despite it, we located the Gellibrand Grinding Rocks described in the *Naturalist*, 79(3) for July 1962, with little difficulty. As this was our first glimpse of such rocks, we determined to search further afield.

Some half-mile from the first site and in a south-easterly direction, we were fortunate to find what appeared to be a third grinding area. We had to clear away a deep layer of loam which covered the greater part of the stone's surface. The rock measured roughly 5 ft. by 4 ft. and was marked by six well-defined oval grooves; two smooth areas where rubbing appears to have taken place; and two groups of small indentations.

We were unable to tell if any more fine markings were present because the damp loam hindered adequate cleaning.

We would be interested to hear from readers who know of any other grinding, camping or quarry sites in the Gellibrand vicinity.

Unusual Flowerings of Orchids

Miss W. Renshaw has forwarded through Miss M. L. Peck, Hon. Secretary of the Maryborough F.N.C., the following note.

I noticed the orchids, the Musk Orchid, *Caladenia angustata,* and the Waxlip, *Glossodia major,* in bloom from 4th April to 25th April this year. They were growing at Strangways in rough, uncleared country on a range of hills between the Newstead-Ballarat road and the Newstead-Daylesford road. I particularly noticed the flowers because I had never previously seen them flower except in the springtime.

A Freak Tree

Some months ago a Junior Member, Fred Becker, of Genoa sent us a coloured photograph, which we could not use, of an unusual phenomenon. Unfortunately a black and white print received subsequently is not sufficiently clear to make a good block. We quote his description.

We came across this tree while felling timber in the bush. It is most unusual because one limb has come out from the tree's trunk and then grown back through the tree again and come out on top. This curious limb is about 20 or 30 feet from the ground and now penetrates the solid trunk of the tree. The tree is a Rough-barked Apple, *Angophora intermedia.* My father and brothers have worked in the bush all their lives and have never seen a tree like this before.

[The only explanation of this curious result that occurs to us is that the limb was bent back as a young branch close to the side of the then narrower trunk and as both became thicker the limb pressed against the bark which reacted and eventually the limb became enclosed. The photograph shows a thickening of the trunk to one side of the penetrating limb.—J.R.H.]

Sparrows and Eucalyptus Blossoms

Mr. W. Perry of Eaglehawk wrote on September 20:

For the last month or more, we have had a eucalypt tree (*E. leucoxylon*) in flower. It is not far from the back door, and has enabled the habits of honey-eating birds to be observed conveniently. One unusual observation made, was the great number of Sparrows which have been feeding on the blossoms. Both males and females have been noted, and these particular Sparrows hang upside-down, and appear able to feed from the flowers as skilfully as the honey-eaters. The Sparrow is a finch. As the main food of finches usually consists of seeds and a small percentage of insects, I wondered if the Sparrows observed were feeding on nectar. I examined half a dozen of the eucalyptus flowers under a low-powered microscope. Running around among the stamens in all the flowers were many tiny insects. Although no definite conclusion can be made, I am inclined to think the sparrows were after the insects.

I have on occasions noted Sparrows feeding on the trigonous nuts of the Hog-weed (*Polygonum aviculare*). The specific name *aviculare* means "sought by birds", and in this case is most appropriate.

[Mr. C. H. E. Hagger reported in 1961 (*British Birds* **54**, 29) that English House Sparrows, *Passer domesticus,* had been seen inserting their beaks into the centre of greengage-plum blossoms, sometimes hanging nearly upside down to do so. The calyx-cups of the flowers contained a clear, very sweet liquid, but no insects could be seen, and it was believed that the sparrows were drinking nectar. Sparrows, in our Essendon garden, take honey put out for honey-eaters and Mr. Perry's sparrows could have been feeding on nectar.—J.R.H.]

Field Naturalists Club of Victoria

General Meeting—October 11, 1965.

After the President, Mr. M. K. Houghton, had called the Meeting to order and welcomed Members and visitors, the Minutes of the September General Meeting were taken as read on the motion of Mr. J. W. H. Strong, seconded by Mr. J. Ros Garnet. The Hon. Secretary, Mr. E. H. Coghill announced that he had been advised that the Native Plants Preservation Society would be holding a Photoflora Competition again in 1966 (see p. 190).

The President said that he had received a letter from Miss Winifred Waddell regretting that her health did not permit her attending the meeting as had been planned, to receive the Natural History Medallion. He was, therefore, arranging to present the Medallion to her at her house in the presence of a number of her friends who were members of the Club. The President explained, for the benefit of newer members, that the Natural History Medallion was inaugurated in 1940 by Mr. J. K. Moir who provided the actual medallion annually until his death, since when the F.N.C.V. had been responsible. Natural history organizations in each State made nominations annually for the award and these were examined by an Awards Committee of six judges under the chairmanship of the President of the Royal Society of Victoria. The President then summarized some of Miss Waddell's achievements in the preservation of native plants. She had been secretary of the Native Plants Preservation Society since its inception in 1952. In 11 years this Society had been responsible for the distribution of 70,000 leaflets on plant preservation through schools and had played an active part in the establishment of wild-flower sanctuaries of which there are now 80 of different sizes in Victoria. Miss Waddell, who came to Australia from England fifty years ago and had been honoured by an M.B.E. last year, had been largely instrumental in persuading Miss Jean Galbraith to write "Wildflowers of Victoria". All who knew of Miss Waddell's work would approve of the Awards Committee's choice for 1964.

Mr. N. A. Wakefield was the speaker for the evening and his subject, "Mammal Bone Deposits". He showed pictures of three caves, the Pyramids Cave and Mabel Cave near Buchan and McEachern's Cave in Western Victoria and described the relative composition in species of mammal bones in the different levels in each. In the first two the deposits derived from owl pellets, although the lowest level in the second was attributable to the cave having been a native cat's den; in the third the deposits were due to the cave being a death trap: animals fell in and could not escape. There was a similar pattern in the proportion of different species at the three sites and, when the studies had been completed, knowledge of climatic changes that had occurred over the period of formation of the deposits would be improved. Mr. Wakefield had brought a large collection of bones, some of which he used to illustrate his talk, and all were available for inspection after the meeting. Specimens from a number of species that no longer lived in Victoria were included.

After Mr. Wakefield had answered questions, the President thanked him for his interesting talk and the audience showed its appreciation by applause.

The new members listed on p. 186 of the October *Naturalist* were elected on the motion of Mr. Coghill, seconded by Miss Allender. Mr. J. H. Willis pointed out an error in the list: the first name should read Dr. D. H. Ashton.

In addition to Mr. Wakefield's collections of bones and historical records relating to the Natural History Medallion, there were a number of other exhibits. There were no fewer than three different galls. Mr. D. E. McInnes spoke to some large galls found on Long-leaved Box near Maldon Cemetery. These were probably caused by a wasp and in addition to their large size, about 1½ inches in diameter, they were very numerous indeed. Mr. E. H. Coghill showed female galls of the coccid, *Apiomorpha conica,* on *Eucalyptus cinerea* var. *multiflora* from South Belgrave and mentioned the interesting fact that the eggs destined to give females produced a much larger gall than the insignificant ones that formed around those eggs that would give males. Mr. R. Condron had brought galls like a bunch of grapes that had been found on a Cootamundra Wattle.

Mr. Ros Garnet had two species of orchid, both rare in Victoria, that had been growing together in a pot for many years. The species, *Pterostylis squamata*

and *Chiloglottis trapeziformis* came originally from Cootamundra. He had also brought a selection of cultivated native plants in flower, *Prostanthera nivea, P. malvaefolia, Kunzea parviflora, K. ambigua, Melaleuca wilsonii* and *Lasiopetalum behnii.* Mr. Coghill had on display specimens of the Crusader bug, *Mictis profana,* from N. Kew and Mr. H. Stewart had brought another branch of Geraldton Waxflower from the large bush from which he produced a similar flowering specimen last year. There were specimens of the Bell-animalcule, *Vorticella,* to be seen under the F.N.C.V. microscope.

Under the heading "Other Business", Mr. Jeffs mentioned a new book "West Australian Plants" by Dr James Beard. This listed, with brief notes, the plants of that State and many were illustrated in the sixteen coloured plates.

The President announced that Members would be very sorry to learn that Mr. Dick Hemmy was seriously ill in the Bethesda Hospital. He also asked if anyone who knew the area between Waratah Bay and Sunday Point would contact him after the meeting.

Fauna Survey Group—Mammal Reports —July 1965.

1. Brushtail Possum *Trichosurus vulpecula.*

A single specimen was found dead beside the Midland Highway, two miles from Stanhope on June 6 by Mr. A. Howard. The surrounding country was marshy with no trees in sight.

2. Platypus *Ornithorhyncus anatinus.*

Two specimens were observed in the Goulburn River just below Shepparton by Mr. Howard.

The following are items of interest from Fisheries and Wildlife Department records for July:

3. Long-nosed Bandicoot *Perameles nasuta.*

One specimen collected from Reedy Creek near Broadford. Local reports indicate that this species has recently become more abundant in the area.

4. Tuan *Phascogale tapoatafa.*

One specimen collected at Whiteheads Creek near Seymour.

5. Lesser Long-eared Bat *Nyctophilus geoffroyi.*

Two specimens were collected two miles west of Colac.

6. The seal which disrupted traffic on the Geelong Road some weeks ago had to be shot. In its stomach were several large squid beaks and some large stones, up to two inches in diameter.

Marine Biology and Entomology Group —October 4, 1965.

Twelve members attended the meeting, which was chaired by Mr. R. Condron.

Apologies were received from Mr. M. Houghton, Mr., Mrs. and Master Harrison, and Miss McLaren.

The Secretary suggested that no meeting be held in September in future, as it clashed with the Nature Show. This was agreed to.

Speaker for the evening was Mr. R. Crozier of the Zoology Department, Melbourne University, his subject being "Ants and their methods of communication". Mr. Crozier gave a very interesting and learned talk on this subject interspersed with blackboard illustrations and projector slides.

At his own suggestion members asked questions during the course of his talk and at its conclusion. Dr. D. Horne moved a vote of thanks.

Mr. D. McInnes showed some very large galls which he had obtained at Maldon from a group of Box trees. The trees had been severely damaged by them. Mr. E. Coghill showed some small galls made by the female *Apiomorpha conica.* These were taken from Stringybark trees at South Belgrave.

AFFILIATED CLUBS

Frankston

In addition to the usual round of meetings and excursions, this Club reports that it has held a combined excursion to Labertouche with the Warragul and Latrobe Valley Clubs. It has changed its meeting-place, and now meets at the Frankston Teachers' Training College.

As of 30th June last, Mr. W. Ogden was President and Mrs. W. Bounds Honorary Secretary.

Horsham

This Club has recently been given twenty acres of land for a sanctuary. Plans for its management are proceeding. It has found 20 subscribers to "Wild Life in Australia".

Mr. Con Kroker is President and Mrs. T. Lilian McKenzie Honorary Secretary.

The absence of a Cumulative Index to the *Naturalist* is most unfortunate. Recently a new Member asked for help with regard to the literature on Wilsons Promontory, which was supplied by Mr. Ros Garnet. In case others want the same information, I repeat it here.

Victorian Naturalist:

April	1906, **22**:	(12) 212.
January	1909, **25**:	(9) 144.
January	1910, **26**:	(9) 128.
January	1911, **27**:	(9) 178.
March	1913, **29**:	(11) 174.

Other references will be found scattered throughout—

Ewart, *Flora of Victoria.*
Bentham, *Flora Australiensis,* 7 vols.
Mueller, *Fragmenta Phytographiae Australiae,* 11 vols.
Mueller, *Plants Indigenous to the Colony of Victoria.*
Records of the McCoy Society, Botany School, Melbourne University.
Records of the National Herbarium, Melbourne.

Mr. Garnet also has an unpublished list which he thinks covers all findings that have ever been reported, officially or unofficially. It contains well over 800 items. He allows applicants to consult it, but warns that to do so is a tremendous task.

Other Bibliographical Items

The Secretary has an Author Index to Vols. 1-60 of the Naturalist.

The Index of Blocks has been recently revised, and may be consulted.

If any Members have any similar lists, I suggest they supply a note of them to the Editor.

—E. H. Coghill.

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

GENERAL MEETINGS

Monday, November 8—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: The Geology Group, "Building Stones of Victoria".
3. Election of members.
   (a) *Ordinary*
   Mr. G. Bauckham, 17 Brunel Street, Essendon, W.5. (Introduced by Mr. D. McInnes. (Interest: Geology.)
   (b) *Country*
   Mrs. J. M. Hunt, "Happy Sparrows", Gembrook Road, Pakenham Upper.
   (c) *Junior*
   Colin Thomas Boord, Yarrara, via Red Cliffs.
4. General Business.
5. Nature Notes and Exhibits.

Monday, December 13—Mr. Graeme George, "New Guinea Animals".

GROUP MEETINGS

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

Thursday, November 11—Botany Group. Mr. Bruce Fuhrer, "Seaweeds".

Friday, November 12—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street), at 8 p.m.

Wednesday, November 17—Microscopical Group. Mr. Gordon Senator, "The Appraisal of the Microscope".

Friday, November 26—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Mrs. R. J. Rowlands, "Aboriginal Implements and How to Recognize Them".

Wednesday, December 1—Geology Group. Mr. R. T. Mathews, "Drilling and Oil-field Practice".

Monday, December 6—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Thursday, December 9—Botany Group. Miss M. Lester, "Rot" and Mr. S. Marshall, "Warrumbungle Ranges".

F.N.C.V. EXCURSIONS

Sunday, November 21—Labertouche. Leader, Mr. A. Morrison. The coach will leave Batman avenue at 9 a.m. Bring two meals. Car parties may join excursion at the Labertouche turn-off, on Prince's Highway, approximately 10.30 a.m. Coach fare 18/-, bookings with Excursion Secretary.

Sunday, December 5—Point Addis. The coach will leave Batman Avenue at 9 a.m. A second coach will leave Hawthorn Town Hall at 9 a.m. and Mr. McInnes will take bookings for this. Fare 20/- for adults, 12/- for juniors. Bring two meals.

PRELIMINARY NOTICE

Saturday, December 25, 1965, to Monday, January 3, 1966.—Snowy Mountains and Kosciusko. Details in last month's *Naturalist*. Members are reminded that payment should be made at the December General Meeting.

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, 1965

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Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. E. Byrne, Mr. A. Fairhall

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Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

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Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. R. Dodds, 5 Banchory Street, Essendon (379 4309).

Microscopical: Mr. P. Genery, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for May-December 1965 are:

Ordinary Membership	40/-
Country Membership (over 20 miles from G.P.O., Melbourne)	30/-
Junior Membership (under 18 years)	25/-
Subscription to the *Victorian Naturalist* (non-members)	30/- (post free)

Note: The currency of the present club year and Volume 82 of the *Victorian Naturalist* is from May 1965 to December 1965.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1

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Ringtail Possum, *Pseudocheirus laniginosis.*

Photo: *W. H. King*

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The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

We thank Mr. J. Cooper of the Fisheries and Wildlife Department for this fine picture of Leadbeater's Possum, *Gymnobelideus leadbeateri.* Until rediscovered in the Marysville area in 1961 (see H. E. Wilkinson, 1961, *Vict. Nat.* **78**, 97) this little marsupial was thought to be extinct.

Notes on the Comparative Ecology of the Common Brushtail and Mountain Possums in Eastern Australia

By W. H. Owen and J. A. Thomson*

Although the common brushtail possum (*Trichosurus v. vulpecula* Kerr) is widespread in southern Queensland, New South Wales and Victoria, the distribution of this species overlaps only narrowly that of the closely related mountain possum (*T. caninus* Ogilby) in these States. The mountain possum is restricted to wet sclerophyll, sub-tropical and temperate rainforest communities of the Great Dividing Range. Limited areas in which both species occur together were located in foothill ecotones in which eucalypt species characteristic of dry sclerophyll communities were associated with an unusually dense understorey similar to that of the typical habitat of the mountain possum. No evidence of hybridisation was encountered in the field, and repeated attempts to interbreed the two forms in the laboratory were unsuccessful.

During a wider study of the comparative ecology of these two possums, a detailed analysis was made of the stomach contents from a series of individuals collected from representative communities (Table 1).

The mountain possum regularly utilises a wide variety of field layer plants, including herbaceous species, fungi and occasionally lichens, in addition to the leaves of shrubs and trees. In natural communities outside suburban areas, the common brushtails of eastern mainland Australia feed chiefly on the foliage of *Eucalyptus* spp. as well as on a narrow range of indigenous and introduced shrubs and trees. In this portion of its natural range, the latter species is thus largely arboreal in its feeding habits, whereas the mountain possum feeds to a considerable extent on the ground and on understorey species. However, in several instances following the destruction of eucalypt foliage by bushfires, the stomach contents of the common brushtail were found to contain an increased proportion of field layer plants. There was little evidence of seasonal variation of diet in the case of this species. The mature foliage of *Eucalyptus* rather than young leaves and shoots is preferred by both possums, so that the availability of suitable food in sclerophyll forests is relatively constant throughout the year. The food of the mountain possum was generally more diverse in summer. Stomach contents of animals collected at this time showed increased utilisation of field layer herbs and foliage plants, the seeds of *Acacia* spp. and fruits such as those of the introduced blackberry (*Rubus* sp.). A similar observation was made on the introduced populations of *T. vulpecula* in New Zealand by Mason (1958).

The choice of nest sites shown by the two species also differs markedly. Typical mainland populations of the common brushtail utilise the hollow trunks and limb spouts of standing eucalypts, both living and dead, at any height above the ground. The dens of the mountain possum are formed in hollow fallen logs or close to the ground in hollow stumps. In the common brushtail breeding may take place throughout the year, but there are

* School of Zoology and Genetics, University of Melbourne.

Table 1

Analysis of stomach contents of common brushtail and mountain possums.

	Species	
	Common Brushtail	Mountain Possum
Number of stomachs	40	51
Number of food species per stomach		
Mean (S.D.)	1·6 (0·87)	3·3 (1·80)
Range	1-4	1-6
Per cent stomachs with more than one food species	25	92
Per cent stomachs containing understorey species	20	88

peaks of reproductive activity in the autumn and spring (see Pilton and Sharman, 1962). The breeding season of the mountain possum is apparently much more restricted; the young of this species are born between early April and late July.

Estimates of range length in individual brushtail possums inhabiting dry sclerophyll forest made during the present study were consistent with those given by Dunnet (1956, 1964) who estimated the mean range length for males of this species as about 1,000 ft., and that of females as approximately 600 ft., in a more open, partially cleared, woodland/field community. The mean range length estimated from repeated observations of 5 male and 3 female mountain possums in dense wet sclerophyll forest was 370 ft. and 320 ft. respectively. Linearity of range, apparently emphasised by the use of runways following the scour channels on steep slopes, was a conspicuous feature of the movement of the mountain possums.

The mountain possum shows marked tolerance to wet conditions; movement and feeding were generally continued during rain showers and even light snowfalls. The pelage of this species is, in southern Australia, longer and more dense than that of mainland specimens of the common brushtail. On the other hand, as Kean and Pracy (1949) have noted, in discussing the introduced brushtail possum in New Zealand, the species is susceptible to distress or death when trapped in wet conditions, and avoids movement in heavy wet foliage. In Tasmania, where the mountain possum does not occur, the island brushtail *T. vulpecula fuliginosus* (Ogilby), inhabits wet sclerophyll and temperate forest. This subspecies appears to be much more tolerant of damp conditions and to be more terrestrial in habit than the mainland form, *T. v. vulpecula.*

We are grateful to the Fisheries and Wildlife Department, Victoria; the Fauna Protection Panel, N.S.W. and the Stock and Agriculture Department, Queensland, for permission to collect *Trichosurus* in their respective States. The investigation was in part supported by the M.A. Ingram Trust.

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Nesting Behavior of Freshwater Tortoises in Victoria

By John Goode

Three species of freshwater tortoises are known in Victoria. These are *Chelodina longicollis, Chelodina expansa* and *Emydura macquari*. Some difficulty may be experienced in identifying the two long-necked species, *C. longicollis* and *C. expansa* and a key to aid identification will be found in the paper "Freshwater Tortoises in Victoria" in the October 1965 issue of the *Victorian Naturalist*.

Published Records

Barrett (1929) detailed the nesting of *E. macquari* at Lake Boga although investigations at that location by the author of this paper failed to reveal any tortoises nesting early in November 1964. The nest-digging procedure of *C. longicollis* was admirably described by Harrington (1933) who also postulated that, like marine turtles, Australian freshwater tortoises nested mainly by moonlight.

Some indications of the periods of nesting and the number of eggs deposited were published by Krefft (1865) and Waite (1929) but Waite's description of a tortoise digging its nest were discounted by Harrington and have not been confirmed by this author's observations. Waite contended that:

> "the excavation is made by the reptile turning itself round and round and thus throwing out the sand and earth with its feet, a circular hole being thus made".

Unfortunately, no other observer seems to have recorded such an animated "drilling" procedure.

Useful general information may also be found in Worrell (1963). A description of a long-necked tortoise's nesting behaviour is also given by Curtiss (1928) though the location, Upper Albert River, North Queensland is too far north for *Chelodina longicollis* and the tortoise observed was more probably *C. novaeguineae* which is known in that area.

Emydura macquari

Nesting in captivity

What are believed to be the first complete observations of an Australian freshwater tortoise performing the *full* nesting procedure occurred at the author's Frankston home on January 9, 1965. It occurred on a bank adjoining a large pond (L-shaped, 15 ft x 12 x 6 ft. wide ranging in depth from 4 inches to 2 ft. 9 inches) with surrounds as far as possible simulating natural conditions.

The tortoise, a large *E. macquari* captured at Patho, near Gunbower, N. Victoria the previous November, was one of several collected in that area. Until this occasion, captured females had laid eggs in the water of their pond or had come ashore and deposited eggs on the surface of the bank without attempting to excavate a nest.

The weather on January 9 was fine with a temperature of 85°F. (29·5° C.). A slight SE breeze had dropped at 5 p.m. At 7.15 p.m., shortly before dusk, the tortoise was seen digging a nest about 18 inches from the edge of the SE corner of the pond. The moon was three days before the first quarter

and shone at an angle of 75 degrees to the ground.

The nesting site selected was a narrow steep slope of 10 to 15 degrees incline. The tortoise had its head butted against the netting of the enclosure. On the other side of the pond ample flat, sandy soil was available; the bank selected was of clay and sand and was rather wet.

Digging appeared to be slow but methodical: it had begun some time before the tortoise was first observed. First one hind leg was inserted into the hole, there was a pause, then dirt was extracted by the cupped foot. The weight of the back of the tortoise was then taken by this leg and the other inserted to scoop out more soil. The soil extracted was placed in two even piles, each parallel to the sides of the shell (and some behind) and extending no more than a third of the way to the front of the shell.

By 7.45 p.m. quite a lot of soil had been excavated: it was fairly soft following heavy rains ten days before. When the enclosure was entered to take a flash-light photograph, digging ceased but recommenced once the author left the enclosure.

The eggs were evidently deposited in quick succession for it was not long before the tortoise began filling the nest with soil. The operation was complete by 8.30 p.m.

It should be mentioned that when depositing the eggs, the rear edge of the carapace rested almost on the ground beyond the nest hole. Without moving the tortoise, which the author was loth to do, egg deposition could not be seen. It is known, however, that after each egg was deposited, a hind-leg was inserted into the hole to arrange it in position.

The most interesting aspect of the nesting was the filling and concealment of the hole. Hind-legs were extended sideways together until almost at right

Flashlight photograph taken of *E. macquari* digging nest at author's home on January 9, 1965. Note nearside hind-leg just at the final position of depositing soil after lifting it from the partly-excavated nest.

angles to the spine. They faced backwards and then together moved inwards, each completing almost a circle to scoop the earth into the hole. This movement was repeated at short intervals until, one assumed, the earth had reached the top of the hole.

After completing the encircling movement to bring earth back to the hole, the tortoise raised itself on all four legs and then dropped its shell hard on the ground, thus flattening the soil in the filled nest.

After completely filling the nest and disturbing all the area around the nest, the female *E. macquari* returned to the water. There it swam just below the surface, as though in a daze. Usually if a spotlight is cast on any tortoise near the surface, it immediately dives. This tortoise, although followed with a powerful torch, completely ignored the strong beam.

Next morning, although the site was pinpointed, no trace of nesting remained visible. Even a small piece of grass, with roots attached, had been thumped into position with the roots set firmly into the soil. Only a slightly damp patch separated the nest from the surrounding ground.

With a cool summer, the nest was

enclosed with glass. After 80 days it was opened to reveal 14 eggs. Some were addled, others were fresh but showed no development. They may have been infertile, or, more probably, did not receive sufficient heat in so damp a location.

The depth of the nest was determined by the outstretched hind-leg of the tortoise and the flask-shaped hole was dug at an angle so that the eggs were located some eight inches below the plastron of the tortoise and not directly beneath its cloaca.

Eggs

Eggs of *E. macquari* are cylindrical with broadly rounded ends. Like the eggs of all known Australian freshwater tortoises, they have hard, papery shells. Those of *E. macquari* are 1·25 inches (34 mm.) long and 0·9 inches (24 mm.) wide.

Nesting in the wild

Further observations of *E. macquari* nesting were made in their natural location at Patho between November 2 and December 1964. Early nesting occurred on fine humid mornings following rain overnight. Larger numbers of tortoises came ashore as the weather became warmer. Often the ground that they selected was very hard. The average nest was flask-shaped, 3½ inches in diameter at the top and 4½ inches in diameter at the bottom.

When laying the eggs, the tail is held sideways against the back of the body. The eggs seem to be deposited at varying intervals and when they emerge, are covered with mucus which seems to provide a barrier of moisture to which fine dust becomes attached before the nest is refilled.

Nests may be dug at distances of from 5 to 250 yards from the water's edge. Some tortoises, when stopped by a wire-netting fence, do not turn and move parallel to the fence, but stop and nest where they are baulked.

At Patho, nests were raided by foxes and water rats.

Incubation

At the end of January, baby *E. macquari*, obviously just hatched and *en route* from nest to water, were captured. They had shell lengths of 1·25 and 1·125 inches (32·6 and 29·6 mm.) and shell widths of 1·15 and 1·09 inches (30 and 28 mm.). Their shells were soft.

Two of these were received by the author in Melbourne. One died after algae began to grow on its skin as well as its shell. The other, cleansed with diluted copper sulphate solution very carefully applied, survives in an unheated tank kept in the house and fed, when active, on finely scraped lean raw meat and live food.

Position of tail of *E. macquari* when depositing eggs. Tortoise moved forward to enable this to be seen.

Chelodina expansa

Nesting in the wild

Information on the behaviour and habits of this species is still very scarce. The nesting period at Patho in 1965 was between April and May and was possibly connected with the onset of autumn rains which followed the long dry summer experienced this season.

Observations at this time showed

that *C. expansa* excavates its nest using each hind foot alternately, in a manner similar to that of *E. macquari*. One uncompleted nest (the tortoise was captured) was in rock-hard, red clay loam. The depression was about 3 inches wide and about 1½ to 2 inches deep. The dirt extracted was at the rear and the sides of the tortoise's shell. This patch gave the impression of having been moistened. When the tortoise was lifted, it passed a considerable amount of water (estimated at half a pint). The ground where the tortoise was digging was quite dry and very hard. The weather was fine and sunny.

On May 7, 1965 at 4 p.m. another *C. expansa* was found nesting at Patho on a hard track leading into a farm. The soil was similar to that described and the nest was identified by a damp patch. The tortoise then moved to another location, 15 feet away. The second hole was not moistened at the time when it was 4 inches wide and 1½ inches deep. After capture this specimen deposited three eggs in captivity. The tortoise had a shell length of 13½ inches (324 mm.).

E. macquari with nest and eggs at Patho. Tortoise moved forward to enable photograph to be taken.

Female *E. macquari* and juvenile (size at birth).

Eggs

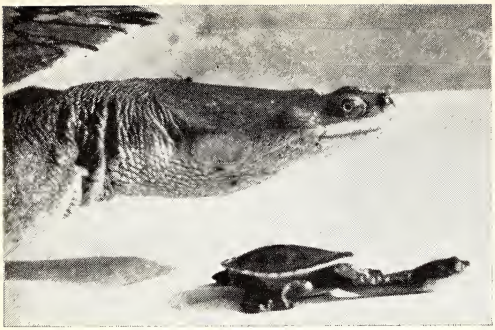
The eggs of *C. expansa* are very similar to those of *E. macquari* but are larger (1·5 inches—38 mm. or more long x 25 mm. maximum diameter) and are shaped like a Rugby football.

Incubation

At Patho, some nests have been fenced and dates of nesting have been recorded in an effort to tabulate the exact period of incubation. The first nesting was observed on April 10, 1965.

At Tocumwal, New South Wales, *C. expansa* were reported to have nested in 1957 between mid-March and mid-April. Eggs, in this location, hatched between mid-September and mid-November the same year.

A newly-hatched *C. expansa* was captured at Patho on December 2, 1964 and forwarded to the author. This is still in his possession and is alive. It was reared firstly on mosquito and similar aquatic larvae and later "weaned" on finely-scraped, raw lean meat. At capture, the baby *C. expansa* had a shell length of 1 7/16 inches (36·8 mm.) and had a head and neck length of 1⅝ inches (41·5 mm.). The neck could not be fully concealed by the overhanging carapace.



Head of *Chelodina expansa* showing contrast in size between female and juvenile (carapace 1/16 inch—1.6 mm. longer than at birth).

Discussion

These observations seem to indicate that temperature and humidity have a far greater relationship to the triggering of nesting in Victorian freshwater tortoises than Harrington (1933) proposed. These tortoises, in the Murray area of N. Victoria, nest in daylight and in darkness and apparently at any hour. It is probable that as the season progresses, outside factors affecting nesting tortoises may have less influence than early in the season.

Differing periods for the nesting of different species raise interesting questions on the requisite nest-temperature required by each species. In the Murray area, ground surface temperatures can reach 140°F. (65·5°C.) at the peak of summer and as low as subzero in the middle of winter.

It would be interesting to discover if, in a cool summer, eggs of *E. macquari* could remain unhatched until the following spring, as has been observed in freshwater tortoises in the United States. It would also be of interest to determine how baby tortoises, scarcely an inch long, can burrow eight inches through the soil and then break through the rock-hard surface.

Summary

The nesting behaviour of the three species of freshwater tortoises in Victoria shows a similar technique and differs mainly in the time of year at which it occurs and in the period of incubation of the eggs. Tabulated findings are given below:

Species	*Nesting period*	*Incubation time* (estimated)	*Approx. no. of eggs*
E. macquari	Early midsummer	3 months	9-18
C. expansa	Autumn	6-7 months	10 or more
C. longicollis	Midsummer	70 days or more	up to 20

Acknowledgement

The author is deeply indebted for the collection and recording of many field observations to Mr. George Dawes, Headmaster, Patho State School, and to Mr. Russell of Patho. He is also grateful to Mr. Charles Tanner, Honorary Herpetologist, National Museum, Melbourne, for observations and other assistance.

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The Fruit of *Eucalyptus preissiana*: a Corrected Interpretation

By L. A. S. Johnson*

In a recent issue of this journal, Miss Jean Galbraith (1965) reported her observations upon the fruit of *Eucalyptus preissiana* Schauer. One might conclude from this account that the fruits of this species differ fundamentally from those of other eucalypts in their mode of dehiscence and in the structures associated therewith. In interpreting apparently unusual structures it is useful to consider them comparatively, in conjunction with those of related taxa. Pryor and Johnson (1962) have shown that *E. preissiana* and the allied *E. megacarpa* F. Muell. do not belong in the *Macrantherae*, to which they were referred by Blakely (1934), but are closely related to species placed by the latter author in the *Renantheroideae* and *Renantherae*. Carr and Carr (1963) have reached a similar conclusion.

It is enlightening to make a careful comparison of the structures of *E. preissiana* with those of *E. megacarpa* and with *Renantheroideae*, such as *E. diversifolia* Bonpl. Such a comparison clearly shows that there is little unusual in the fruit of *E. preissiana* except the exaggerated development of the floral disc which is strongly thickened and lobed, both over the valves of the true capsule (that is, over the sutures of the carpels) and, to a lesser extent, between the valves. This lobing constitutes the "globular gland-like protuberances" which are described by Blakely as *surrounding* the valves. Miss Galbraith's reference to protuberances "between" the valves is a misquotation which has led her to equate them with the so-called "plugs" mentioned below. Similar lobing of the disc occurs in *E. megacarpa* and it can be seen in a slight degree in other related species, such as *E. diversifolia* and *E. pachyloma* Benth.

Miss Galbraith states that "the locules are not closed by triangular valves but by circular plugs", also that the valves are "very short" and "fit into triangular recesses between the locules, acting as wedges to keep the wall of the locule closely pressed against the plugs". This needs correction; unopened fruits of *E. preissiana* quite clearly show normal thin, but broad, triangular valves which close the capsule as they do in all other capsular-fruited Myrtaceae. When the fruit of *E. preissiana* dries, the thick woody tissues of the hypanthium (the so-called calyx-tube) and the disc shrink and the true, partly enclosed, capsule splits loculicidally. The rather delicate valves then gape widely and are often partly eroded away. It is stated that "this leaves the plugs loose in the top, and they soon fall out releasing the seeds". What are these "plugs"? Careful examination shows that in each loculus the "plug" consists simply of the uppermost "sterile seeds", or seminodes, more or less cohering and (because in fact they often *do not* soon fall out) rather weathered and greyish on the exposed surface. These seminodes, like the fertile seeds below them, are attached

* National Herbarium of New South Wales, Royal Botanic Gardens, Sydney.

to the placenta of each loculus in two collateral rows in *E. preissiana* just as they are in *E. megacarpa,* which is well illustrated by Carr and Carr (1963). The topmost ones naturally fall out first, to be folowed by the other seminodes and fertile seeds.

Thus there is nothing very remarkable about *E. preissiana* beyond a certain grotesquerie, such as one finds in quite a sizable minority of Western Australian species of many groups.

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Book Review

"The Mosquitoes of Victoria"
N. V. Dobrotworsky, M.Sc., Ph.D.
[Royal 8vo., cloth, pp. viii, 237, with 3 plates and 86 figures. Published 15 July, 1965 by Melbourne University Press. Price 93s. ($9.30).]

It all depends on the point of view. To many people mosquitoes are just noisome insects that tend to spoil an outdoor barbecue, to some they are nematocerous Diptera with fascinating life-histories and to medical and veterinary epidemiologists they include the vectors of malarial parasites, the transmitters of myxomatosis, fowl-pox and other viruses and the intermediate hosts of various filariid worms.

Until a specialist studies the members of a group of animals or plants occurring in a given area and publishes what, in the last century, was known as a "Conspectus", the non-expert field naturalist, however much he wishes, can take little interest in the group. It is for this reason that many will welcome this monograph on the Mosquitoes of Victoria. Here are to be found illustrated descriptions of the seventy species known to occur in this State. The amateur, in first opening the book near the middle, may think that its terminology is beyond him and it is meant only for the professional entomologist. However, with the help of early sections on the structure of the adult and immature stages, no difficulty should be experienced in mastering the scientific jargon and a new field of discovery will then be opened to any member possessing an F.N.C.V. or other suitable microscope.

In addition to the descriptions of the species, the book contains summaries of what is known about their biology and distribution. The sparsity of records for some species suggests that the collection and identification of mosquitoes from many parts of Victoria will be a useful field of work for years to come.

There is a useful appendix on the collection and preservation of specimens for study. In fact, the author, whilst writing an authoritative scientific work, has gone out of his way to encourage the beginner.

It is to be hoped that with the publication of this book, many people will develop an increased interest in these economically important insects. With a change in viewpoint even troublesome pests can be enjoyed by the field naturalist.

—J. R. Hudson

Out Jungle-Weed!

By J. Ros Garnet

Mr. Jack Wheeler, writing in the *Victorian Naturalist* of December, 1964 (**81** (8): 225-226) mentioned the origin, spread and remarkable build-up in recent times of one of the many pest-plants which now are troubling Victorian naturalists. The villain of the piece once (and apparently incorrectly) labelled *Osteospermum moniliferum* L. is known (correctly) as *Chrysanthemoides monilifera* (L.) T.Norl. and, to most of us, as South African Bone-seed or Jungle-weed.

To the less prejudiced observers it is an attractive shrub of up to about six feet high, but usually three or four feet, with plenty of foliage and, in its flowering season of July to October, with corymbs of large, yellow daisy flowers. The plant is often grown in gardens, but it attains its best development in places where it is not wanted.

Mr. Wheeler mentions its alarming spread in the You Yangs and along the eastern shores of Port Phillip Bay, but one needs to travel no further than two or three miles from the Melbourne G.P.O. to observe large stands of it—in Studley Park and on the road cutting close to Victoria Bridge. In places which once were the habitat of a few surviving native plants, Jungle-weed now flourishes right down to the roadside pavement!

The list of proclaimed noxious weeds, practically everyone of them introduced from abroad, should be a reminder that it does not always pay to let Nature take her own course, and the suggestion is timely that no effort should be spared to suppress Jungle-weed while it is humanly possible to do so. Remember the story of St. John's Wort, of Lantana, of Cape Weed, Skeleton Weed, Paterson's Curse and the rest of them. They were ornamental in the garden, but dreadful and costly pests when they escaped. Stock find this plant edible and so the farmer does not yet worry about it. But so are blackberries edible, and prickly pear, too. The farmers did not worry about them at first. Jungle-weed is no trouble on cultivated land or in grazed areas. But what of it?

The biological balance of a region is not governed exclusively by its cultivated and grazed paddocks. Their well-being is closely linked with the plant and animal life of the adjacent land, the place where insects breed in their multitudes, where the birds that feed upon them dwell, where thrives the kind of plant-life which provides a livelihood for all wildlife. There is little doubt that a farm set in the midst of a sea of Jungle-weed would soon shows signs of deterioration simply because of the abnormality of the environment.

What about the native trees, shrubs and herbs that are being steadily displaced by this pest (and every other pest)? Are they really expendable? For the biologist the answer is, emphatically, no.

The Native Plants Preservation Society and every Field Naturalists Club are now so concerned about the poor prospects for the survival of a considerable number of native plants that, to them, every competitor for ground space is viewed with suspicion.

Jungle-weed at the You Yangs.

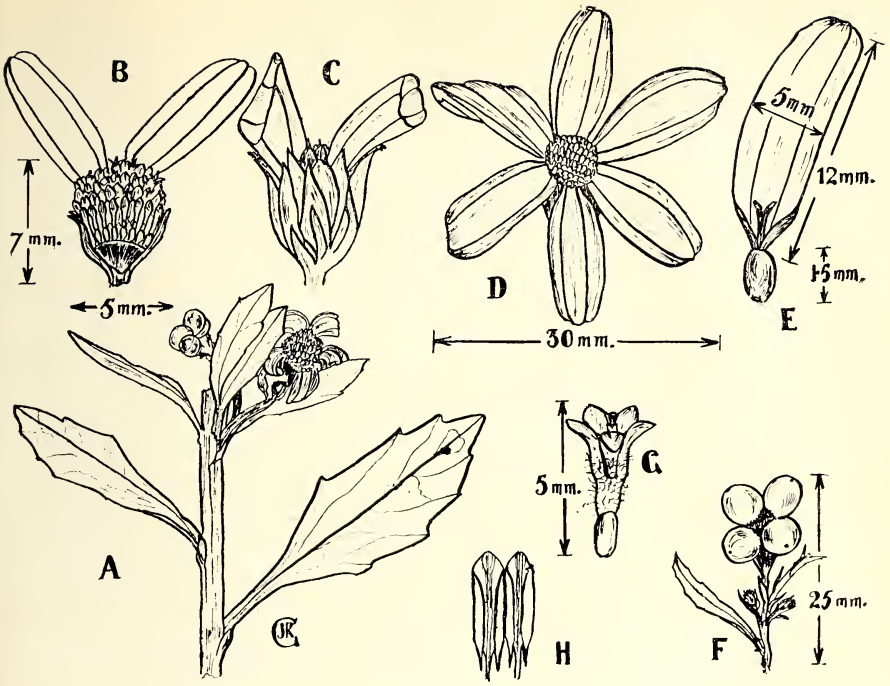
Photo: *Dick Hudson* (Reproduced from our December 1964 issue.)

Jungle-weed, as one of the competitors, has assumed a major role. Its progress in the You Yangs, in Studley Park and on the Mornington Peninsula is a warning of the shape of things to come in other places. Imagine the havoc it would cause were it to become established on, say, Wilson's Promontory. What is there to stop it? At its present rate of distribution it can be expected to reach there within a few years! In the meantime it is moving into every granite and tertiary sand area within reach of its seeds.

Pests are only recognized as pests when their populations reach levels at which the intervention of the individual citizen is useless. They become pests because they adversely affect the whole community, and therefore it is the job of the community as a whole to combat them.

Jungle-weed is now a pest-plant. Intermittent onslaughts by bands of voluntary workers is not going to eradicate it. It is now a job which requires a planned and concerted community effort through the sort of action best undertaken by teams employed and trained for the job. The resources of every relevant Government department, instrumentality and agency should be applied to the task without delay or the taxpayers of the future will be up for huge sums of money to carry out what we choose to call "a control programme"—the sort of programme we are now pursuing with other pests, including the "proclaimed" weeds.

Meanwhile, wherever a plant of Jungle-weed (or Bone-seed) is seen, no matter what its size, pull it out. If allowed to flower and seed it will



A Tip of a branchlet showing alternate leaves and corymbose arrangement of flowers.
B Vertical section of a flower-head showing arrangement of disc-florets and ray-florets.
C Back view of B showing arangements of involucral bracts.
D A single flower-head showing six fertile ray-florets and numerous infertile disc-florets.
E A single ray-floret with its shining, oblong achene.
F Corymb of flower-heads, the uppermost head having four maturing achenes (the "bone-seeds").
G A single disc-floret showing the slightly hairy corolla tube and the infertile achene.
H Two of the five anthers. The tips of the lobes are acute but not "tailed".

quickly take over the landscape. Dissuade anyone, whether private individual or governmental body, from using it in soil conservation work. It is reported to have been deliberately planted on the coastal dunes between Portland and Nelson, in a part of the State where it was previously unknown —planted in the interests of soil conservation. Prickly pear furnished almost perfect ground cover in huge areas of Queensland. The soil there was certainly "conserved" but the price was uncommonly high!

One can only hope that some unforeseeable circumstance—a miracle, perhaps—will prevent the spread of Jungle-weed from the dunes into the adjacent area which we hope to see dedicated as the Lower Glenelg National Park. The appeal to pull it out now should strike a responsive note among Portland's naturalists. The landscape in that district has already suffered from the invasion of other foreign plants, Broom and *Psoralea* among them, but this latest introduction is far more aggressive.

The accompanying photograph will help in its recognition, and, if you are still uncertain, the line drawings will indicate what to look for in trying to identify the plant. It is one of the easiest of the Compositae to identify. It is the only one here with fruits which look like clusters of large pills.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Compensations of the Dry Weather

Mrs. F. Gladstone, of Beechworth, has forwarded the following account of a stroll.

It is such fun walking up a dry streambed looking for crystals or interesting specimens. During March I sauntered up a tributary stream that had ceased to run because of dry weather earlier in the year. Lovely varieties of granite were evident; some pieces were speckled with dark flecks of mica and white felspar, some were banded with quartz, others had a fine pink grain and still others were red, speckled with white quartz. Some quartz crystals were found. There were banks of sand surrounded by flowering Apple-box and flocks of lorikeets were attracted to the blossoms about the creek-bed.

The gully ended in a huge, blackened, granite wall, a waterfall in winter, and on each side of this wall, the slopes of the valley formed rugged escarpments of large granite steps climbing to the tops of the hill. Dusky Wood-swallows were flying, there were little flocks of Eastern Rosellas, Yellow Robins were calling, the Restless Flycatcher (Scissors Grinder) was seen, and there were White-plumed Honeyeaters everywhere. A whole dry tree was jewelled with Rosellas. Other birds noticed were White-browed Babblers and little Jacky Winters. I saw one wallaby.

Echidna Crossing River

Mr. W. H. Sloane wrote from Mount Clear on October 30:

As it is seldom that we have a chance of studying the Echidna in its natural state, the following incident may be of interest.

On Monday, 17th October, 1965, at midday it was bright and sunny at the mouth of the Anglesea River. A strong SE. wind was blowing the sand off the deserted beach, and, the tide being low, the river was running out in a stream fifteen feet wide and about eight inches deep.

Quite unexpectedly appeared a full-grown Echidna, coming from the sand-hummocks which have been fenced and planted with Marram grass on the west side of the entrance. The little animal was travelling east in a deliberate manner, plodding along well up on its short legs, having the appearance of a small dog except for its lumbering gait. It looked to neither left nor right and it was quite unaware that it was being observed. On reaching the water it went straight in without hesitation, and half swimming, half wading, it crossed and continued its journey in a straight line. The opposite bank was steep and rocky, and up this it clambered with the help of its strong claws. It traversed the 100-yard river opening in less than five minutes and was completely indifferent to the water-hazard.

Echidnas are usually seen in dry areas, and this observation may throw new light on their habits.

Orchids near Bairnsdale

Mr. E. V. Barton, Hon. Secretary of the Bairnsdale F.N.C., has submitted this note dated November 1.

Hearing that orchids were numerous in the granite rock area, not far from Bairnsdale, a party from the local F.N.C. investigated with great success a patch of sandy undulating country which had been burnt in the March fires. Quite a number of species were found. There were great patches of *Lyperanthus nigricans* in bloom, proving that this

orchid flowers profusely after a fire. *Caleana major,* the Large Duck-orchid, must also have been stimulated by the fire for there appeared to be thousands of them. In spots large numbers of *Brunonia australis* (Pincushion) nearly covered the ground.

In another area the Purple Diuris (*Diuris punctata*) was, in spite of the dry season, flowering in hundreds.

A Cicada Emerges

By Margery J. Lester

At Kew, cicada nymphs come out of the ground from about mid-November to mid-December. If October has been hot they begin to appear in the early half of that period, but if the weather has been cold and wet no skins are found until the end of November. Once "the season" has started I can usually find one or two fresh skins after each warm dry night. On some nights the numbers increase greatly.

Most of the nymphs I have observed have come out of the ground soon after sunset, before it is really dark. On first crawling out, the insect lies on its back and appears to wash itself. The proboscis can be seen lying along the undersurface of the body between the legs; the creature is wet-looking and it rubs itself all over with its legs—much as anyone might use his hands if he had only a cupful of water to wash in. Of course, it is not likely that this "washing" process is in the interests of hygiene or appearance! Some nymphs omit it altogether and, occasionally, cast skins may be found that are still covered with caked dirt. One that I observed, having carried out the "washing" process more thoroughly than most and righted itself top-side up, then spent more than an hour on the ground near its hole. It collapsed rather drunkenly on one side of the body while the legs on the other side repeatedly stroked down the entire length of the body—like a girl running her hands down a sleek-fitting dress. Then the creature collapsed on the other side while the first side was stroked and stroked and stroked. This action and the "washing" process suggest that both may help to loosen the nymphal skin.

Usually, after "washing" and turning top-side up, the cicada nymph sets off in the direction of the tree-trunk, slowly but without pausing en route. There may be a fence only four feet away while the tree may be eight feet away or more, but it makes for the tree, not for the nearer fence. Is there some guidance via the roots? On three separate occasions I have seen a nymph pass the main swell of the trunk, but each has then turned in a narrowing spiral and found the trunk on the other side. However, if the stakes to my sheeting or other vertical object are reached before the tree, they are promptly climbed. For which reason I often flashed the torch at my shoes and chair legs to make sure I was not receiving unwelcome visitors!

The nymph crawls up the trunk. It may be only a few minutes or more than an hour before it really settles, digging its feet into the bark. The skin splits first high up on the back below

9.16 p.m.

9.35 p.m.

9.28 p.m.

9.50 p.m.

Sequence of pictures of a cicada

the head. Sometimes this initial splitting seems to take considerable effort for the insect can be seen pushing; sometimes it is easy—once it occurred when the nymph was still on the ground, seemingly before it had been able to reach the usual vertical position.

This series of photographs shows the usual pattern of progress. With one exception, all movements are very slow and gradual, almost imperceptible. First the thorax and head emerge, followed by the front-legs and wings, the latter very small and crumpled. The body then falls slowly backward so that the creature is hanging upside-down, held only by the lower part of the body. It hangs quite helplessly and it is easy to think that it is dead, but occasionally there may be a slight movement of the legs.

After 20 to 40 minutes in this upside-down position, the insect slowly pulls itself upwards, takes a firm grip of the nymphal head with its front-legs and pulls out the tail. This is the only movement that can be called

9.59 p.m.

10.20 p.m.

10.08 p.m.

10.35 p.m.

emerging on November 27, 1958.

Photos: *Margery J. Lester*

"vigorous". Sometimes it can be heard as the tail rasps against the nymphal skin.

The cicada is now completely free of the nymphal skin, but remains straddled along it while the wings expand, flatten and finally are folded to what I call the "tent" formation. With only the front-legs holding on to the head of the empty skin, the cicada then hangs freely, being swayed about if there is any wind. About 10 to 20 minutes after "tenting" the wings, the insect walks a few inches further up, where it usually remains for some hours. Two cicadas were in exactly the same position when I looked at them the next morning.

The time intervals shown in this series of photos are typical. Those that I recorded varied from 70 to 90 minutes from the first splitting of the skin to the "tenting" of the wings.

Green Monday, *Cyclochila australasiae*, is the cicada that is so noisily evident in Melbourne suburbs during December. The drumming noise is made by the male only.

The Vegetation of Wyperfeld National Park and a Check List of its Vascular Flora

By J. Ros. Garnet

An F.N.C.V. publication. 15/-, plus postage (5d. on a single copy). 95 + x pages. Illustrating more than one hundred species of wildflowers of the National Park in one beautiful colour frontispiece, twenty-three half-tones and one hundred line drawings. The map of the Park and its immediate environs is the most up-to-date and accurate yet published.

If you have not yet visited Wyperfeld National Park, this booklet will make you want to do so. If you have no special interest in the kind of environment which is your native land, this booklet will arouse your interest. Even if you can't tell one native plant from another, this booklet will soon have you on the road to becoming an expert at recognizing them. If you treasure books on the natural history of Australia, this is one you will want in your library.

The Club, with the assistance of members of the Committee of Management of the Wyperfeld National Park, has published the booklet as a non-profit project as part of its service to promote the natural history of Victoria and the conservation of our native flora and fauna. Every purchaser aids that promotion. Make sure you have a copy while the limited edition is still available.

This is what **Peter Alston** in his "Age" review on 21st July, 1965, had to say about it.

> "The first booklet of its kind relating to any of our great parks, it provides an authoritative historical survey and plant census of the Park for the botanist, plant lover and tourist. Mr. Garnet . . . has set a pattern in this little volume which must surely be taken further. It is a first-class booklet."

J. H. Willis, Senior Botanist at the National Herbarium, Melbourne, writes:

> "I think this is a job magnificently done. The whole thing is well set out, most pleasingly illustrated and looks dignified as well as eminently useful. The line drawings in particular will be a great boon to interested folk planning to visit Wyperfeld."

T. N. R. Lothian, a Commissioner of South Australia's National Park and Wildlife Reserves and Director of the Adelaide Botanic Garden, says:

> "This is a really first-class piece of work. . . . Not only have you compiled a flora which is very well presented from the descriptive and floralistic aspects but, in addition, you have given illustrations, you have given a simple key and, last and most important of all, a detailed plan as well as a district map.
> . . . As you are aware, we have a handbook of our National Parks in South Australia, but your presentation of Wyperfeld makes me envious."

Alex. H. Chisholm, one-time editor of the Melbourne "Argus" and editor of the Australian Encyclopaedia, an author and naturalist of note "found it engaging and informative".

Jean Galbraith, author of "Wildflowers of Victoria" (of which the third edition is now in preparation), writes:

> "It is really excellent and your drawings alone make it valuable to anyone interested in Victorian plants."

If you have a problem of selecting a birthday or Christmas present for someone or if you want to send something peculiarly Australian to an oversea friend, this booklet should solve it.

Members of the Field Naturalists Club of Victoria and members of the Victorian National Parks Association may obtain it at a special concession price by application to the respective honorary secretaries.

The manager of a big Melbourne emporium bookstore says: "The value's not there. It has only a paper cover. We couldn't handle it."

Small Camp-Sites of the Aborigines—Central Western New South Wales

By P. G. Gresser

During the year 1857, Mr. W. H. Suttor travelled, during a good season, across from the Lower Lachlan river on to the Darling River near Tilpa. At that time the country back from the river frontages was unoccupied by the pastoralists. The first part of the journey was across a portion of, as Mr. Suttor expressed it, "the great, almost treeless, level plain". Mr. Suttor wrote an account of this journey, from which the following interesting passage is a quotation: "Our party consisted of four whites and one black. Our camp for the night was on a low sand ridge covered with hopbush scrub. It stands like an island in the level waste and had been visible on the horizon for hours before we reached it. There is a small morass closeby where the wild blacks have scooped out a small hole, which was filled with rain water. We were about 100 miles from anywhere. The wild tribes had been here lately, as we learned from the heaps of grass straw scattered about, from which they had threshed the seeds. The grains are ground between two stones, a primitive pestle and mortar. As the process of trituration is carried on, water is sprinkled on the mass. When the whole is reduced to a thin batter, it is then eaten raw, being thrown into the mouth from the forefinger. As the blacks may still be in the neighbourhood, for more abundant caution, we decided to keep watch. We pitched our tent and made luxuriant beds of the grass straw."

This "small morass closeby" would be a shallow depression on the level plain of but a few inches in depth, and probably no more than thirty yards in diameter. It was obviously shallow, otherwise the aborigines would have had no occasion to scoop a hole in order to concentrate some of the water. Probably the "wild blacks" camped here had observed or had learned of the coming of the white party and had moved away before their arrival. Normally there would be no water whatever here, and the depression would be scarcely discernible. The probability is that now, owing to overstocking of the country, in combination with the rabbit pest, the greater part of the vegetation on and around the low sand ridge has been destroyed, resulting in wind erosion and much of the light surface soil having been blown away. Stone implements of the aborigines, most of them completely worn-out specimens, and probably made from an inferior quartzite in this part of the country, and numerous chips and flakes of stone, which had been brought to the site from elsewhere, will be seen strewn around, the quantity to be seen depending upon the extent of the erosion. Small accumulations of baked clay, "blackfellow's ovens", will also be seen here, probably also the same mill-

stones that were used to grind the grass seeds by the aborigines who happened to be camped here previous to the arrival of W. H. Suttor and party. The aborigines would only camp here when the "small morass" contained water, which may be but rarely, but they had been coming here periodically for probably thousands of years, hence so many traces of their former presence to be found around such meagre water supplies.

The large area of country bounded by the Darling, Bogan, lower Lachlan and Murrumbidgee rivers, comprises two distinct regions. The northern and larger portion is what is known as the Cobar peneplain, an ancient, worn-down land surface of a general level of about 700 feet above sea level, but little above that of the alluvials to the north, west and south. The soil is of a red loam, and where the timber has not been destroyed is clothed with a great variety of trees and shrubs. Throughout the area are small, open treeless spaces, none of which are of any great extent; the rocks, where exposed, are Silurian shales, shaly sandstones, conglomerates and cherts, in places with embedded lavas, invaded by granites and porphyries. Throughout the whole area are scattered ranges and isolated hills, varying in height from 150 to 500 feet, residuals of former mountain ranges. It is a land of no defined drainage. The creeks and gullies that come down from the hills, in most instances, run in a defined channel for but a short distance after rains before the water spreads out and is absorbed by the porous soil.

South of the red soil, timbered Cobar peneplain is a vast, almost treeless, level alluvial plain extending from near Ivanhoe southwards to the Murrumbidgee river. It is of grey soil formation, and is crossed by the lower Lachlan river. Over this plain there is an occasional sand-ridge of slight elevation, clothed with a variety of shrubs and small trees, principally acacias. Also there are depressions in the level land-surface where water will collect after rains, perhaps a few red or river gums (*Eucalyptus camaldulensis*) nearby.

Both these regions were not well watered areas, the few permanent waters on the Cobar peneplain being principally the springs and soaks that are to be found in places in the ranges of hills or adjacent to them. The western part of the Cobar peneplain was formerly portion of the territory of the Wongaibon group of tribes, and the plains to the south were roamed over, during good seasons, by the lower Lachlan and Murrumbidgee tribes. After rains the aborigines would scatter in small groups over the countryside, camping beside gilgai holes, temporary swamps, etc. As the lesser waters dried up they would move to other supplies still lasting, until, during severe droughts, they would congregate, through necessity, around the permanent supplies. If the site is sufficiently wind-eroded to uncover it, traces of the former occupation of the country by the aborigines are to be seen around every small swamp, gilgai holes, small rock holes, in fact, wherever water will accumulate after rains, no matter of how short a duration the supply may be. Flakes and chips of stone foreign to the locality, a few worn-out implements, perhaps a millstone, more often the handstones, and also "blackfellow's ovens", whether of small heaps of stones or of baked clay, depending upon the type of country, may be found.

A gilgai hole situated between Cobar and Condobolin is a typical instance. Here there is but one shallow hole or depression, however, larger than the average gilgai, on an otherwise

level area of country, about four hundred yards away from a low stony ridge. This hole is about twelve feet in diameter and about twelve inches in depth. Its situation is such that it would take a considerable amount of rain to fill it, and when full of water would last only a few weeks. It is near the edge of a small treeless area: elsewhere in the vicinity of the hole the country is thinly timbered with bimbil box (*Eucalyptus populifolia*). Over an area of ten or twelve acres around this intermittent water supply, on every eroded patch of ground, relics of the aborigines are strewn. The predominent implements are worn-out burren adzes, but I also found several Bondi points and also geometrical microliths. The numerous small fragments of stone scattered around are principally of an inferior quartzite, but there are also fragments of black chert, all of which had been brought from a distance, the only other stone anywhere in the vicinity being a coarse sandstone.

This insignificant water supply could never have been anything more than the occasional camping place for a small group during good seasons. So many traces over such a widespread area, in the form of worn-out implements and numerous flakes and chips of imported stone that have been uncovered on the small wind-eroded patches, is accounted for by the fact that the aborigines have been, although only occasionally, camping here over a vast period of time.

Provided the country in the vicinity is eroded and not covered with a coat of grass, around every such meagre water supply in this naturally, but poorly watered, area of country, such traces of the aborigines are to be found. Especially so if the site happens to be near the edge of a small timberless area.

On Musheroo holding, ninety miles or so west from Cobar, and five or six miles north of the Wilcannia road, there is, on level country, a narrow serpentine depression or shallow lagoon about a half a mile in length. The owner of the property informed me that it is only after abnormal rainfall that there is ever any water in it. There may be water here for but a few weeks not oftener than once in ten years. Near one end where, however, the wind-eroded patches were more extensive, much evidence of former aborigine occupation was uncovered, but all around this shallow, generally dry depression the traces are lightly strewn. Small chips and fragments of stone that had been brought from elsewhere to here and occasional definite artefacts, principally worn-out tula or burren adzes, and also fragments of broken and worn-out millstones.

On such sites, however, the evidence of former aborigine occupation is but lightly strewn compared with the quantity to be seen around the springs and other permanent water supplies. What is to be found on the small sites are but the relics left by occasional small groups during good seasons or after heavy rain.

The seeds of various plants ground into a paste, often baked in the ashes, was a staple diet of these aborigines, and the millstones are the most obvious of the relics to be seen. Most of these have now been picked up and taken away, and are to be seen around some of the pastoral homesteads, sometimes as paving stones in pathways, or in the borders around flower beds. The nether millstone is a slab of sandstone, generally about two inches in thickness, and trimmed around to a more or less oval shape. They vary in size, being on the average about eighteen inches in length and ten or twelve inches in

width. The handstone, in general, is a piece of sandstone an inch or so in thickness, and trimmed into a more or less oval shape to a size that can be conveniently held flat in the hand. The stone for their manufacture is obtainable from the scattered low ranges of hills throughout the area. The probability is that when brought to a camp-site the millstones remained there and were not transported around the country by the aborigines during their wanderings from one camp site to another. The largest and heaviest millstone that I have seen *in situ* was close by a small waterless depression near the edge of a small treeless plain about seventy miles east from Wilcannia.

Field Naturalists Club of Victoria

General Meeting—November 8, 1965

After welcoming members and their friends to the November general meeting, the President, Mr. M. K. Houghton, referred to the death of an honorary life member, Dr. Roland Wettenhall, and asked Mr. Hugh Stewart to speak. Mr. Stewart said that the late Dr. Roland Wettenhall had joined the club in 1906, and had died at the age of 83 years on July 21. He had become an honorary life member after 40 years membership. He was a medical practitioner and had served in his professional capacity during the First World War. He had been greatly interested in history, and had been an active member of the Historical Society of which, for a time, he had been president. His son, Dr. Norman Wettenhall, was well known in natural history circles for his interest in ornithology. Dr. Roland Wettenhall had been a wonderful old man. At the President's invitation, the meeting stood in silence as a mark of respect.

The minutes of the October general meeting, having been approved by Council, were taken as read on the motion of Mr. E. S. Hanks, seconded by Mr. F. L. Jeffs.

The Hon. Secretary, Mr. E. H. Coghill, drew attention to the Photoflora 1966 competition, entry forms for which were available on the table. He mentioned an exhibition of wildflower paintings by Celia Rosser to be held at the Leveson Street Gallery, North Melbourne, from November 28 to December 11. He asked for two members who would be prepared to attend a meeting on November 24 on behalf of the Club to discuss ways of maintaining access to river banks, beaches, etc., to see him after the meeting. This matter had been raised at a recent general meeting, and Council considered it important that the Club be represented at the meeting.

Introducing the subject for the evening, the President said that the Geology Group had produced a series of slides and a script on the "Building Stones of Victoria". Mr. R. Hemmy, who was now unfortunately ill, had played a major part in developing this project, primarily intended for use at meetings of country clubs which often had difficulties in obtaining speakers. Mr. Lloyd Williams, a former Vice-President of the F.N.C.V., had kindly undertaken to present the feature on this occasion.

Mr. Williams said that, as he was not a geologist, he would be a "reader" rather than a "speaker": he would have to stick to the script. In spite of this he introduced some interesting comments of his own. The script dealt with the use of basalt from different quarries, sandstones and various granites, both Australian and imported, in the construction and decoration of buildings in Melbourne and other Victorian towns. The slides showed buildings, quarries and close-ups of many beautiful specimens of stones. The whole project had been most carefully compiled and it contained a mass of information that was of interest not only to geologists, but also to those with little or no knowledge of that science.

In thanking Mr. Williams, the President said that the Club had reason to be very proud of Mr. Hemmy and all those who had helped in producing this feature. The proceedings that evening had been "taped" so that Mr. Hemmy could hear the recording in hospital. The audience showed its appreciation by prolonged applause.

The Hon. Excursion Secretary, Miss M. Allender, made several announcements in regard to forthcoming excursions, and the three new members listed on page 211 of the November *Naturalist* were elected on the motion of Mr. Coghill, seconded by Mr. D. E. McInnes. Mr. Coghill made a plea for changes of address to be notified. Each month a number of copies of the *Naturalist* were returned by the post-office because the members had moved and not informed the Club of their new address. After reading the list of forthcoming Group meetings, the President reminded those interested that there would be no meeting of the Entomology and Marine Biology Group in January.

There were a number of exhibits on the table. Mr. D. McInnes had a specimen of decomposed basalt under the

microscope to show augite crystals. He drew attention to copies of the October number of the *Junior Naturalist* produced by the Hawthorn Junior Club.

Referring to the granite quarry at Woolamai Mrs. Woollard mentioned that, some years ago, when landing from a boat at the site, she had seen workmen's tools that had been left there in the granite. Apparently there was a strike and the men went away: the tools remained for many years and might even be there today.

Mrs. M. North mentioned a fruit of the Sausage Tree, *Kigelia aethiopica,* collected in Darwin, which she had placed on the table. With it were a fruit of the Bottle Tree, *Adansonia gregorii*, and the following rock specimens: from Marble Bar, W.A., green asbestos, asbestos in serpentine and white asbestos (Comet mine); from Bindi Bindi, anthropolite asbestos; from Wittenoom, blue and Tiger-eye asbestos; from Yampire Gorge, gold asbestos (decomposed Tiger-eye).

Mr. Berry showed some articles turned from different "walnut" timbers. The first was a bowl fashioned from *Juglans regia* grown in Australia. Widely cultivated in Europe, this tree came originally from Persia. The second article was made of American black walnut, *J. nigra*, a tree indigenous to the eastern United States. The third was formed from African walnut, not a species of *Juglans*, but the W. African *Lovoa klaineana* which has a texture more like mahogany. The fourth specimen was turned from the Australian tree *Eniandra palmerstoni,* which was not a true walnut. The wood of this tree contains silica and is hard on tools.

Mr. Lewis mentioned a granite quarry, 2½-3 miles east of Epping which had furnished stone for buildings in Toorak and near the old Haymarket.

Mr. Blackburn showed some slides, taken during the recovery from a site, by the Maribyrnong River near Keilor, of a human skeleton provisionally estimated to be about 8,000 years old. Associated with the human bones were numerous animal bone-fragments, including a kangaroo tooth, and quartzite flakes.

Mr. Ros Garnet had brought a decorative collection of garden-grown wildflowers. Specimens included Crimson Honey-myrtle, *Melaleuca wilsonii*; Rough Wax-flower, *Eriostemon scaber;* Crimson Bottle-brush, *Callistemon citrinus;* Digger Speedwell, *Veronica perfoliata*; Golden Spray, *Viminaria denudata*; Wombat Berry, *Eustrephus latifolius* and Silky Tea-tree, *Leptospermum myrsinoides*. He drew attention to the quarterly meeting of the National Parks Association to be held on November 24.

Mr. Harrison showed some aboriginal artefacts from Roaring Beach near Port Arthur, Tasmania, and Mr. E. H. Coghill specimens of the Stink-bugs, *Notium depressus*. Mr. Hugh Stewart displayed another spray of Geraldton Wax-flower, *Chamaelaucium uncinatum*.

A number of members referred to the recent swarms of noctuid moths in the Melbourne area. Mr. Ros Garnet said that they were the adults of cutworms, and Mr. Coghill mentioned that the larvae could have lived on the roots of grass and other plants on the many vacant blocks in the city and suburbs. Mrs. Woollard and Mr. Stewart stated that these moths were eaten by aboriginals, and Mr. Woollard reported how, during the daytime, they hid away in cracks and crevices amongst rocks in mountainous areas. Mrs. McInnes said that enormous numbers had been washed up upon a section of beach on the shore of Port Phillip.

The President reported that a recent issue of *Victorian Resources* contained same interesting information on eucalypts and acacias. Mr. J. Baines related the results of his investigations into the origin of the name "Wyperfeld". He had traced a town with essentially the same name in NW. Germany. He thought it a pity that the Park could not be called the "Lowan National Park" or be given a suitable aboriginal name. Mr. Stewart said that at the time that the Park was instituted, the Lands Department had insisted on the name "Wyperfeld" in the face of strong opposition from naturalists who had suggested "Mallee" or "Lowan" as more suitable.

Closing the meeting, the President reported that the January evening would be a Members' Night, and that members willing to contribute should contact Mr. E. S. Hanks.

Microscopical Group—Sept. 15, 1965

Twenty-two members and visitors attended this meeting which was chaired by Mr. E. LeMaistre. Visitors included Mrs. Snell, Mrs. Mapps and Messrs. Setford, Ince and Netherway.

Mr. Woollard reported that the Group's

exhibit at the Nature Show had been most successful; 8-10 microscopes had been used. The "Pond Life Hunt" had worked reasonably well; the juniors seemed to have had a great deal of fun. Mr. Snell confirmed this; he had noticed that people had been very interested.

Mr. E. LeMaistre gave the group a talk on "The Reproductive Process in Pond Life".

Commencing with cell division in the simple algae he then passed on to desmids in which reproduction took place at the sinus or central constriction. The daughter cell grew out at this point of division, gradually acquiring the symmetry of the original cell. Each pair then consisted of the original mother cell and the daughter cell. Conjugation rarely took place. He then discussed reproduction in the filamentous algae: sexual and asexual reproduction in *Paramecium, Daphnia* and *Cyclops.*

The discussion which followed the talk covered very divergent aspects, but was very fruitful.

Exhibits: Cordite sections, crystals of salicin and santonin and some Crustaceae.

Microscopical Group—October 20, 1965

Twenty-five members and visitors attended this meeting, which was chaired by Mr. E. LeMaistre.

The minutes were read and confirmed.

A letter from a person wishing to know what equipment was necessary for slide-making was read. Members instructed the secretary to write back inviting the inquirer to come along to a meeting.

The talk of the previous meeting on "Reproduction" given by Mr. E. Le Maistre, was continued by Mr. P. Genery. He compared the colonies of the single-celled organisms with the multicellular forms of life, and pointed out the fact that worms, such as tape-worms, were really such colonies, each segment containing groups of cells modified to form special organs essential for life.

Finally the social organization of the so-called "Social Insects" such as the bees, wasps and ants was discussed.

Exhibited under the 12 microscopes present were: Diatoms and some crystals, Mr. K. Trotter; desmids stained with safranin, Mr. E. LeMaistre; the superior lip and jaw-parts of *Lepidurus*, Mr. W. Genery; wood-sections, Mr. C. Nance; fairy-shrimp, Mr. J. Daws; brain coral, Mr. Carl Meyen; basalt and a crystal of felspar, Mr. D. McInnes.

Mr. K. Trotter made available to those present samples of a new cellulose gum and some crystals of salicin.

Geology Group—October 6, 1965

Forty-four members and visitors were present, with Mr. Angior in the chair.

The Secretary gave a brief report on the week-end excursion to Maldon on 25/26 September. Twenty-three persons attended and the following areas were visited: Mt. Tarrengower, Oswald's Mine, Carmen's Tunnel, Parkin's Gully for gold washing where colours were obtained, Nuggetty Reef, "Plum-pudding Rocks" Hill and Cairn Curran Reservoir. The Maldon Tourist Association per Messrs. Col. Gibson and Eric George entertained us with pictures of the historical sites and other features on the Saturday night. Specimens of metamorphosed material and other rocks were collected, but no Maldonite found.

A letter was read from the Stawell Field Naturalists Club thanking the Group for loan of the "Building Stones" project, which provided an interesting evening for them. Mr. McInnes informed members of Mr. Hemmy's serious illness and of his progress since his admission to hospital.

Mr. R. T. Mathews, M.Sc., Senior Lecturer in Economic Geology, was the speaker for the evening, his subject being "The Geology of Oil and Gas". The composition of oil and gas was essentially carbon and hydrogen, and although certain other elements were present they were always referred to as Hydrocarbons. A classification could be a gas (methane), a liquid (petrol), through soft and hard solids (vaseline and paraffin), to the bitumens, which are a highly complicated group containing also nitrogen, oxygen and sulphur. Natural gas is mainly methane with some nitrogen, helium and carbon-dioxide.

The origin of oil is still much debated. The range in time has now been extended to the pre-Cambrian, as carbon found in very ancient rocks is now considered to be of organic origin. Subjecting oil to polarized light tests shows it could only be formed from organic matter. Bacteria can produce hydrocarbons metabolically, but only in small amounts,

whilst phyto-plankton can produce them in considerable quantities. Oil is found in all sediments, both ancient and modern, but usually only a few parts per million. Apparently in buried sediments that have turned to shales a physico-chemical process generates oil by some obscure process, but this is still a matter of speculation. Oil is not present in an open space under ground, but occurs around the grains of rocks. Thus a rock has to have a certain texture to constitute a reservoir rock, and to have permeability so that the oil can move through it. A sandstone or limestone of a clean nature with the pores not clogged with muddy material is ideal. The source rock is generally a dark shale containing much organic matter. In sedimentary rocks water and oil are squeezed into the permeable rocks, where the oil migrates up the dip of an anticline on top of the water, and can even form a surface seepage. The speaker then described the various forms of oil-traps which could be found in an anticlinal fold. A dyke, fault, change of structure or even an unconformity as at Moonie constituted effective traps. Sedimentary basins where oil is found were next dealt with in detail. They originated in a sinking area of deposition, often of great thickness, subjected to uplift and lateral pressure. Muddy troughs should be avoided, whilst the shelf and hinge sections were more favourable areas for production. Question time was most interesting, generating much discussion. A vote of thanks to the speaker was moved by Mr. Knight, supported by the chairman.

Botany Group—October 14, 1965

There were nineteen members present, with Mr. Bruce Fuhrer in the chair.

Mr. Swaby gave a most interesting talk on the "Mechanism of Flowers", which he illustrated with coloured slides, showing the various shapes and colouring of flowers, of both the native and garden varieties. He pointed out that both the colouring and design of the whole flower were attractions and aids to the insects whose search for nectar results in the fertilization of the flower. Mr. Swaby said that apparently spots or lines of purple in particular, were very attractive to insects.

An excursion was arranged for October 31, 1965, to the Broadford Sanctuary to help with the weeding.

Marine Biology and Entomology Group—November 1, 1965

Thirteen members attended the meeting, which was chaired by Mr. R. Condron. Apologies were received from Miss M. Allender, Miss M. Butchart, Mrs. M. Harrison, and Master P. Harrison.

Mr. D. McInnes suggested that this Group lead an outing to the seashore, tides being suitable, early next year. This was agreed. The Secretary was asked to ascertain the state of the tides for the first four monthly outings of 1966 and report at the next Group meeting in December.

Miss Dixon reported that she had received letters from Miss Baalam, who is on an overseas tour, and appeared to be enjoying herself very much.

The speaker for the evening was Mr. D. Howick of the Forestry Division of the C.S.I.R.O., his subject being "The Role of Wood-boring Insects in Forest-products Research". Mr. Howick gave a very interesting talk on this subject, illustrated with coloured slides. He laid stress on the preservation of timber, and the biological hazards to which timber is subjected. At the conclusion of his talk many questions were asked, and a vote of thanks was moved by Mr. McInnes.

Exhibits: Mr. D. McInnes showed some beetles, probably of the Scarab family; Mr. E. Coghill, an emerald green moth and a Crusader bug; Mrs. Pinches showed a silk-worm cocoon.

Mr. R. P. Condron showed two moths of the species at the time present in great numbers in Melbourne, and a species of water-beetle which he had picked up on the lawn near the Shrine.

Geology Group—November 3, 1965

Mr. L. Angior occupied the chair, with thirty members and visitors present.

Mr. Dodds gave a report on the fossil-collecting excursion to the Lilydale district on Sunday, October 10, led by Mr. Leigh Windsor. Three different collecting grounds were visited with satisfactory results. Specimens collected included brachiopods, corals, crinoid stems and shells. To round-off the day the toscanite beds along the Montrose Road were inspected, and pieces were taken for making rock-sections. Mr. McInnes advised members of Mr. Dick Hemmy's

condition, and of plans made to record on tape the Building Stones lecture for his benefit.

A letter was read from Mr. Peter Fagg, School of Forestry, Creswick, asking for rock-polishing material, and congratulating the Group for its reports in the *Naturalist*. Mrs. North wrote enclosing information on the geology of Norseman, W.A., supplied by a Mr. Pritchard from that town. A request from Miss Allender, Club Excursion Secretary, for the Group to arrange two Club excursions next year was agreed to, and localities would be considered.

The subject for the evening was "Rock Sections", by Messrs. McInnes, Angior and Sault. Mr. McInnes opened the proceedings by giving a short talk on the preparation of rock sections for the microscope, and referred his listeners to a detailed article in the *Naturalist* for fuller information. It was generally easier to start with igneous material, basalt being the most suitable. The specimen of appropriate size was first rubbed down on a carborundum stone, this being followed by work on glass plates with coarse and fine grinding powders, and frequent washing in clean water. Mounting on a glass slide was done with Lakeside cement, and a cover slip was affixed. Mr. Angior, with the aid of diagrams and models, explained the methods of polarizing light, and how the light vibrations were affected by the crystal lattice. The vibrations and the resulting different colours enabled the respective crystals to be identified, and the method was thus of value in mineralogy. Mr. Sault then dealt with the minerals in rock-sections, using a series of slides prepared by himself, and projected by Mr. Snell with his micro-projector. These slides included sections of granite, basalt, limestone, sandstone dacite, toscanite, limburgite, granodiorite, silicified wood, and stone cemented with limonite.

Exhibits: Basalt from road-cutting near Sunbury showing decomposed material with augite crystals, rock sections under the microscope and polishing powders (Mr. D. McInnes); marbles from Yugoslavia (Mr. L. Bairstow); rutilated quartz, amethyst crystals in a geode from Brazil, quartz containing spangles of mica, ribbonstone or banded jasper, rose quartz, tigers-eye or crocidolite, asbestos replaced by silica (Mr. R. Davidson); tourmaline needles in luxullyanite under microscope (Mr. A. Cobbett); brachiopods and other fossils from Lilydale (Mr. T. Sault); metamorphosed material from Maldon (Mr. L. Angior).

Botany Group—November 11, 1965

Nineteen members present, with Mr. B. Fuhrer in the chair. Ideas for next year's Nature Show were discussed, and a decision was made that "Ferns and Related Plants" be our subject for display.

Mr. Bruce Fuhrer was the speaker for the evening, with "Seaweeds" as his subject. Seaweeds are algae and belong to the Thallophytes. They have no true roots, stems or leaves. They are then divided into three groups: Chlorophyceae (green), Phaeophyceae (brown), and Rhodophyceae (red). Each group has a different way of reproducing. Seaweed aids in the oxygenation and purification of seawater through photosynthesis. Sea animal-life is dependent for its food on seaweeds, ranging from the unicellular algae through to the more complex forms. They are also used as human food in China and Japan. Algin, one of their products, is used in the making of jellies, ice-cream, polishes, fabric fillers, and toothpaste. Iodine is also extracted. As a fertilizer, for its potash content, seaweed is used extensively in many parts of the world, Australia included. Mr. Fuhrer displayed a large number of pressed specimens, and also some coloured slides.

On Sunday, 31st October, three carloads of members journeyed to Broadford Nature Reserve to help remove shell grass. We were quite pleased with the resulting pile of rubbish. We then went to Tallarook, and found many varieties of flowers surrounding the reserve, among them being many fine specimens of Finger flower (*Cheiranthera linearis*) and *Gompholobium*.

AFFILIATED CLUBS

Ouyen District Naturalists Club

The sixth annual meeting of the Ouyen District Naturalists Club was held in the Ouyen State School building on September 15. Mr. G. B. Eggleton was re-elected President for the seventh consecutive term. Mr. Ron Schultz was appointed Vice-President, Mrs. Anne Eggleton is again Secretary/Treasurer, and

Miss Kay Buckly is the newly-appointed librarian. The Club has a credit balance of £25/18/6.

Active membership fluctuates between 20 and 30. Activities during the year just ending consisted of several outings and working-bees on the Hattah Hut project. This project is involving the Club in considerable expenditure. However, several generous donations, both from private individuals and other club sources, have assisted greatly. When completed, the hut will be available to all nature-lovers.

A second Mitchell's Hopping Mouse specimen has reached the Club and a protective fence has been erected about the only known stand of Scented Leek-orchid (*Prasophyllum odoratum*) in the district. The location is in the Kulkyne State Forest, and the Forest Commission carried out the necessary work, following negotiations with the Club.

Prepared evidence, seeking an animal-fenced wildlife reserve within the proposed Millewa Extension Land Development scheme was submitted to the State Development Committee by the president.

Ringwood Field Naturalists Club

This Club's fourth annual report discloses a happy state of progress. Meetings are held regularly and attract groups of 60-80 persons. The Club has also bought its own projector. Excursions are held frequently.

There has been a change of office-bearers. Mr. Rogers is now President, and Mr. Gordon Coutts, of Croydon, is the Hon. Secretary. We wish them success and happiness in their offices.

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

GENERAL MEETINGS

Monday, December 13—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Mr. Graeme George, "New Guinea Animals".
3. Election of Members.

(a) *Ordinary*
Miss J. C. Ayrey, 370 Toorak Road, South Yarra (Interest—Entomology).
Mr. P. H. Bagot, Flat 11, 101 Caroline Street, South Yarra (Interest—Zoology)
Dr. J. H. Coldbeck, 41 Spring Street, Melbourne (Interest—Native Flora and Fauna. Introduced by Dr. Elizabeth Turner.)
Mr. F. Hodges, 112 Atherton Road, Oakley, S.E. 12. (Interest—Gem stones. Introduced by Mr. I. S. Gillespie.)

(b) *Country*
Mr. M. J. C. Baker, Box 91, Bacchus Marsh.
Mrs. H. G. Hilton, "Mungala", Hopetoun, Vic.
Mr. R. B. Hingston, Alberton West P.O., S. Gippsland. (Interest—Birds.)
Miss L. Williams, Dept. of English, University of Sydney, New South Wales.

(c) *Junior*
Des Bunyon, P.O. Meenyan, S. Gippsland. (Interest—Entomology.)

4. General Business.
5. Nature Notes and Exhibits.

Monday, January 13—Members' Night, "General".

GROUP MEETINGS

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

Friday, January 14—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street), at 8 p.m. Mr. Bruce Fuhrer, "Orchids".

Wednesday, January 19—Microscopical Group.

Friday, January 28—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Members' Holiday Exhibits with commentary by Mrs. van Rompaey.

Wednesday, February 2—Geology Group—Members' Night, "Holiday Reminiscences".

Monday, February 7—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Thursday, February 10—Botany Group.

The Microscopical Group does not meet in December, and the Geology, the Entomology and Marine Biology and the Botany Groups do not meet in January.

F.N.C.V. EXCURSIONS

Saturday, December 25, to Monday, January 3—Snowy Mountains, Kosciusko. The coach will leave Flinders Street, opposite the Gas and Fuel Corporation Offices, at 2.45 p.m., or McKenzie's Depot, 53 Barkers Road, Kew, at 2.15 p.m. Bring a picnic tea. The full cost of this excursion should be paid by the December general meeting.

PRELIMINARY NOTICE

September 17 to October 2, 1966—Queensland. There will be an excursion to Heron Island and Lamington National Park if sufficient members are interested. The proposed itinerary is to leave Melbourne by air on Saturday morning for Brisbane and to continue on Sunday by a two-day bus journey to Gladstone, reaching Heron Island on Tuesday, 20th September, for a full week's stay. On Tuesday, 27th September, depart by train for Brisbane and take bus on Wednesday to Binna Burra, remaining there until Sunday, October 2, when the return flight to Melbourne will be made. The inclusive cost should be approximately £110. This trip is planned for a fornight, but, as the return air-ticket may be used at any time, those wishing to prolong their stay in Queensland may do so. Bookings should be made with the Excursion 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, 1965

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Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	50/-	($5.00)
Country Membership (over 20 miles from G.P.O., Melbourne)	40/-	($4.00)
Junior Membership (under 18 years)	25/-	($2.50)
Subscription to the *Victorian Naturalist* (non-members)	40/-	($4.00)

Note: The currency of the present club year and Volume 82 of the *Victorian Naturalist* is from May 1965 to December 1965.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1

THE VICTORIAN NATURALIST

The Magazine of the
FIELD NATURALISTS CLUB OF VICTORIA

in which is incorporated
THE MICROSCOPICAL SOCIETY OF VICTORIA

VOLUME 83

JANUARY to DECEMBER 1966

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3/6

Stand of Messmate Stringybark and Manna Gum—Mt. Cole State Forest.

FORESTS COMMISSION VICTORIA

. . . . . preserving the beauty of our forests for your enjoyment.

Vol. 83, No. 1

F.N.C.V.

January 6, 1966

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

This photograph of the Long-nosed Bandicoot, *Perameles nasuta*, was supplied by the Fisheries and Wildlife Department and was used on the cover of the April 1962 issue of the *Victorian Naturalist*.

Bushfires and Vegetation Regeneration

By G. Ross Cochrane*

This paper will outline the general factors influencing fires, then it will consider the concomitant relationships between fires and vegetation regeneration in dry sclerophyll forest areas. This interpretation of fire-vegetation patterns should increase the understanding of potential fire hazards.

Victorians should need no reminder that their state is one of the world's most fire-hazardous areas. The combination of the long dry summers with high temperatures, highly inflammable vegetation, and strong hot dry winds from the arid interior provide ideal conditions for the occurrence and rapid spread of fires. Annually thousands of acres are burned: in 1960 over one million acres of State Forest were destroyed by fires. The Forests Commission of Victoria alone attends over 600 fires annually (728 in 1960). Other organizations (e.g. Country Fire Authority) attend many other fires. Denudation of catchment areas, loss of forest, of livestock, of homes (550 in 1962), and unfortunately, of human lives (71 in 1939, 51 in 1944, 8 in 1962, and 5 in 1965) from bushfires have become an accepted part of life in Victoria. Much of the tremendous annual loss from fires could be avoided. Research has shown that man, directly or indirectly, causes ninety per cent of all fires, and at least eighty per cent of these result from human carelessness. Partly because fires are phenomena that are all too familiar, many Victorians adopt a strangely fatalistic attitude, accepting their occurrence as a way of life. Indeed, one could criticize the public apathy about bushfires once the actual conflagration has passed. All too soon the damages and dangers are forgotten.

Many factors influence fire action on vegetation. For fire to occur there are three essential requirements: fuel, oxygen, and energy (heat). Luke (1961) discusses these in general terms for Australian conditions. In bushfires, vegetation in its many forms provides the fuel. Air, particularly strong winds, provides the oxygen for combustion of fuel. The climatic pattern (yearly and seasonal) and weather conditions (local and diurnal) provide the initial general heat conditions. Specific heat requirements (intense solar radiation, sparks, naked flame, lightning and so on) are necessary for the initial combustion. Radiant heat from an established fire facilitates combustion of adjacent fuel. As will be demonstrated later, surface relief (the presence or absence of dissection, the pattern of hills, valleys and interfluves) strongly influences the pattern and passage of fires.

Vegetation

Vegetation varies greatly, especially the density of the component species of a plant community and the structure (life-forms, height and layering) of the community. As well as differences in fuel potential of vegetation resulting from marked differences in total biomass, the fuel potential also varies with the amount and quality (or combustibility) of ground fuel.

* University of Auckland.

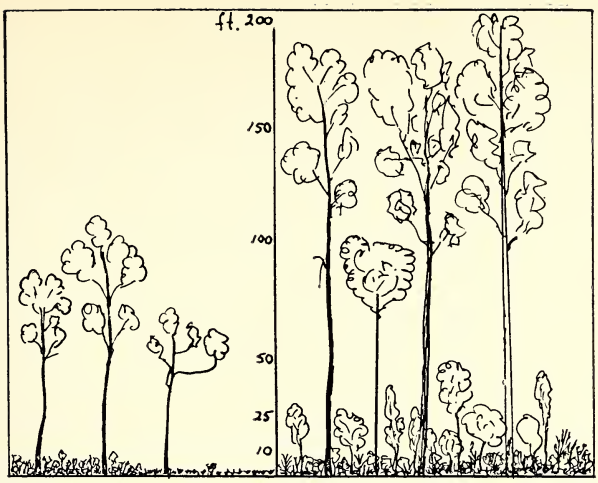

FIG. 1—Profile diagrams of dry sclerophyll forest (left), and wet sclerophyll forest (right).

These lower vegetation layers are important in sclerophyll forest as the density and dryness of such layers frequently bear a close relationship to climatic conditions. The alternation of a wet spring, promoting vigorous growth, and a long dry summer of the "Mediterranean-type" climate of much of forested Victoria results in large accumulations of tinder-dry undergrowth. This carries fire rapidly when set alight. Quality of fuel can vary considerably on individual plants. Thus the explosive combustibility of stringybark leaves due to the presence of volatile oils is in marked contrast to the subdued smouldering of the thick fibrous bark of the same species.

Within the sclerophyll forests of Victoria two broad structural groupings, "dry" sclerophyll and "wet" sclerophyll forest are recognized. Although considerable variations in detail occur, dry sclerophyll forest structure is essentially two-tiered: a tree layer and a lower layer. This latter can be either (a) essentially a herbaceous layer (*Eucalyptus macrorrhyncha, E. baxteri* associations) or (b) a low shrub layer in which dwarf shrub and/or herb secondary layers may be present (*E. obliqua, E. radiata* associations). Wet sclerophyll forests are multi-tiered, usually with two or three tree layers as well as undershrub layers. Fig. 1 shows the broad structural characteristics of representative formations.

It is important to remember that while recognizing broad structural types, there are many minor variations in different associations. For example, *E. elaeophora* is often transitional between dry sclerophyll subtypes "a" and "b"; *E. viminalis* and *E. goniocalyx* can be either wet, dry or intermediate in structural characteristics. These variations can be and are important as fuel characteristics during fires.

Furthermore, aspect, elevation, and soil factors further complicate patterns in the variation of potential fuel for fires.

The age and density of vegetation, particularly the length of time since last fired, logged, or cleared result in important differences. Similarly differences between seral and climax vegetation, especially in the understorey

composition, results in remarkable differences in fuel type, density, and potential combustibility (Cochrane 1963).

Climate

The ramifications between climate, fire and vegetation are manifold. For the purposes of this paper discussion will be confined to a broad consideration of seasonal conditions. Two aspects are important: (1) the pre-fire climate and (2) the post-fire climate. The latter is particularly important for its role in the regeneration processes. Restricting our consideration initially to pre-fire climate as it affects fire—although obviously it must also exert an important influence upon post-fire vegetation regeneration—several factors emerge.

1. *The precipitation pattern*

The precipitation total, its seasonal incidence, its intensity, its form (convective, frontal, orographic), and its type (rain, mist, hail, etc.) obviously influences not only plant growth and soil moisture but also the depth and nature of forest floor litter. Is there a damp ground layer or an accumulation of dry litter? Brief reference has been made already to the climatic regime of wet winters and springs favouring growth followed by a dry summer frequently drying out much of the previous season's growth. Superimposed on this pattern the common alternation of wet and dry years also favours fuel accumulation.

2. *Temperature.*

Temperature is particularly important for the part it plays in evaporation. A high incidence of high temperatures frequently associated with low atmospheric humidity and strong winds from the dry continental interior creates highly hazardous fire conditions. Cochrane *et al.* (1962) demonstrate the correlation between such temperature conditions and outbreaks of forest fires in the Mount Lofty Ranges of South Australia.

A climatic combination of high temperatures, strong winds and low humidity following several months of dry dessicating conditions results in fires becoming completely uncontrollable within minutes of starting. This is particularly disastrous if such a fire has been preceded by an alternation of wet and dry seasons favouring the accumulation of dry ground fuel.

Weather

Weather (the momentary state of the atmosphere) as distinct from climate (the average weather conditions over a period of time) exerts a tremendous influence upon fire. Extreme fire danger occurs on days of strong winds, particularly dessicating northerlies, accompanied by low atmospheric humidity. These factors are often more critical than high temperatures alone. A combination of all three requires very little triggering to start a raging holocaust (e.g. 1955 "Black Sunday" fire in South Australia and 1962 "Black Sunday" in Victoria). Once a fire is under way any strong wind, regardless of temperatures and relative humidity, speeds a fire's progress. Changes in wind direction and velocity are important also. Heavy rain showers or steady rain are often the only means of subduing extensive bushfires (e.g. January 14-17, 1962 fires in Victoria).

Relief

Differences in local climates and soil factors engendered by the surface configuration influence the type of vegetation cover. Variations in height, density, and structure of vegetation

are marked with aspect differences. Grass ground layers with scattered low shrubs, found on northern slopes are often replaced by dense, two-layered scrub over two metres high on adjacent southern slopes. Dominant tree species commonly differ also.

Relief exerts an important effect upon the passage of fire, particularly influencing the speed and direction of fire. An advancing fire front upon reaching dissected country fans out up gullies and races up slopes. Radiant heat plus the bending of flames associated with vigorous convective updraught results in fires sweeping rapidly upwards from shrubs to tree canopy leading to the spread of spotfires and in some cases to swiftly moving and fiercely burning canopy or crown fires. Often the vigorous updraught of fire results in the scrub layer on ridge crests being unburned or merely scorched from radiant heat but the tree canopy completely burned.

Fires burning along gullies cause updraughts and provide their own wind when fires become a conflagration. Gully fire spread is often tangential or even transverse to general wind direction. The severity of damage or heat intensity of a fire is also influenced by slope conditions. Gully flank slopes and head walls often have the lower vegetation layers lightly burned when a fire has raced rapidly upslope. Coppicing from old stocks is common in such cases. On gully floors and on open slopes all the ground fuel is usually burned. The tree canopy is burned or defoliated from the radiant heat resulting from the fire's slower progress but its more severe and more complete burning.

The speed and intensity of fires have important effects upon soil: soil temperatures, soil moisture, and quantity burned of organic soil materials, and of underground parts of plants—root clumps of grasses, sedges or rushes, root stocks, e.g. of *Leptospermum, Acacia, Astroloma*, geophytes, rhizomes of ferns—are all important in subsequent post-fire regeneration patterns. Obviously a close relationship between pre-fire climate, fire temperature and duration, and post-fire climate and subsequent vegetation patterns exists. Quantitative measurements of soil temperatures during fires demonstrate a substantial range in values. In some cases they are clearly related to soil moisture; in some to steepness and regularity of slopes; in others to volume and quantity of ground fuel and to intensity of burning; and in all cases to the time of the fire and preseason conditions.

Vegetation Regeneration

Except in extremely severe fires when all is burned, the general result of fires in sclerophyll forests is (a) defoliation at height, largely through radiant heat, and (b) clean burn at lower levels. Thus tree structure remains but the understorey vegetation is burned and the ground left bare. In less severe fires some undershrubs may be scorched only but not burned, although ground litter (unless extremely wet) is normally all burned.

It can be seen, therefore, that many variables influence the passage of fire through vegetation. Bearing in mind all these variables, let us consider a bare ground area, i.e. a fire-denuded area devoid of understorey species, with the trees defoliated, and trace the factors influencing the regeneration of vegetation.

Apart from the notable exception of *Eucalyptus regnans*, which is normally killed by fire, most sclerophyll forest eucalypts coppice freely following fire. Vigorous regeneration from dormant adventitious buds characterises these trees. Such regrowth varies markedly according to species and to

pre-fire and post-fire climatic conditions. If optimum or good growing conditions prevail, as was the case following the 1962 Victorian bushfires, *E. goniocalyx* and *E. elaeophora* quickly achieve a feathered plume-like appearance with dense growth of short laterals throughout the entire length of the trunk. *E. radiata* produces a similar pattern at a slightly slower rate (Fig. 2). Regrowth on *E. obliqua* is much less dense on the main trunk than for the former species. Regeneration is relatively vigorous along the upper sides of main branches but is slower, shorter, and much less dense than in *E. goniocalyx, E. elaeophora* and *E. radiata*. Regeneration is most sparse and slowest on *E. macrorrhyncha* and *E. baxteri*. Neither branches nor trunks ever become densely clothed with regeneration shoots and branchlets (Fig. 3).

If growing conditions are less favourable regeneration is less vigorous. Thus regeneration following fires in 1959 in the Adelaide Hills was extremely slow. Drought conditions prevailed throughout 1959, South Australia's driest year in over 80 years of records. The degree of regrowth achieved in 18 months was comparable to that of only six months under more normal conditions.

Detailed investigations over a large number of sites both within different tree communities and within the same tree communities demonstrate that canopy influence may be a primary regulating factor in the regeneration pattern of understorey species.

The shade patterns of regenerating eucalypts differ markedly from the mature tree before firing in *E. goniocalyx, E. elaeophora, E. radiata, E. viminalis* and *E. rubida*. Differences are much less marked in *E. macrorrhyncha* and *E. baxteri* while *E. obliqua* occupies an intermediate position. The influence of closely growing densely "plumed" trees growing on slopes is one of an effective vertical shelter or barrier to much insolation. Thus the duration, intensity and quality of insolation received on the ground is governed by the species type, the density, and spacing of the forest dominants.

The relatively ineffectual barrier to insolation afforded by *E. macrorrhyncha* and *E. baxteri* results in the full range of insolation and maximum fluctuations of temperatures to occur on the ground beneath and behind such trees. Exposure is at a maximum for the particular site. Substorey regeneration is essentially herbaceous grasses, *Danthonia* and *Themeda*, with some hardy *Acacia stricta* shrubs.

On immediately adjacent sites if *E. elaeophora* is present the plumed regrowth of these trees results in considerable reduction in amount of sunlight received and regeneration patterns closely follow such variations in insolation. *Acacia myrtifolia* shrubs predominate in areas of maximum shade afforded by *E. elaeophora*. An extremely close parallel between understorey species, density and composition, and insolation factors can be duplicated with the other tree species mentioned. Similarly, insolation variations engendered by tree regeneration patterns are reflected in measurements of temperature, relative humidity and windiness. Abrupt transitions as well as gradual change in understorey regeneration patterns appear to be strongly influenced by tree canopy differences.

Marked differences in understorey structure and composition are often present on different slopes (e.g. north and south slopes) under the same tree dominants, but again these can be related to insolation, temperature and moisture differences. On any particular slope where temperature and moisture are not important variables, the

FIG. 2—Regeneration patterns of *Eucalyptus radiata* (above road) and *E. obliqua* (below road) one year after firing. The dense foliage clothing the trunks of *E. radiata* provides a very effective barrier to insolation reaching the forest floor.

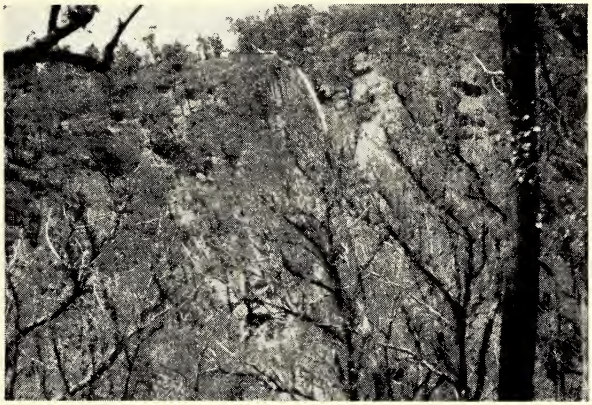

FIG. 3—Regeneration pattern of *Eucalyptus baxteri* one year after firing. The "canopy" provided by these leaves is an ineffectual barrier to sunlight reaching the ground. *E. obliqua* on background slope.

parallel between insolation and understorey regeneration can be repeated on similar slopes.

As apical dominance achieves importance, particularly after three years, and the trees lose their plumed form, insolation patterns more closely approach those of a mature non-modified community. There is a corresponding change in understorey characteristics, though this is much less marked than in the initial understorey regeneration stages. The understorey is now, itself, an important modifier of ground insolation patterns and progress towards the climax community conditions is influenced jointly by tree and shrub canopies.

Thus the type and density of trees, their spacing, height, and the type of slope upon which they grow result in many variations in insolation. These in turn exert important influences upon substorey communities. Nevertheless in a mature climax community that has developed free from fires for a considerable period there is relative uniformity in the shrub vegetation despite a range of light conditions.

In contra-distinction, within pyric seres (fire regeneration communities) variations in understorey characteristics are common. Buffering of environmental conditions which is present in mature communities is at a minimum in early seral communities. Thus the composition, density and nature of understorey species in early years of pyric succession are highly variable. Much of this variety results from insolation. The differences in insolation engendered by an essentially horizontal, relatively open, tree-crown canopy in a mature climax community differ markedly from the largely vertical, often dense trunk canopy of trees resulting from regeneration after fire. Abrupt contrasts, particularly on exposed slopes, reflect the close relationship between understorey and insolation. The period since firing, the stage and regeneration pattern of trees, and particularly their spacing laterally, markedly influence understorey vegetation.

It is known that fire behaviour varies considerably. The age and composition of the vegetation, and the relief, along with a particular set of climatic conditions will influence the speed and severity of burning. This itself influences subsequent regeneration patterns which in turn will again influence fire behaviour if fire occurs at a later date.

An appreciation of the complexities, and an understanding of the interactions present in bushfire regeneration patterns should allow "predictable" fire behaviour to be more readily assessed. Any such progress towards more accurate estimates of vegetation (bushfire fuel) is highly desirable in view of the enormous annual losses due to bushfires in Australia.

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Aborigine Cemeteries and Graves Disturbed Whilst Digging Out Rabbit Burrows

By P. J. Gresser

Major (afterwards Sir) Thomas Mitchell, during the year 1835, on his second journey of exploration followed down the Bogan River and the Darling River to about as far as the present town of Menindie. On the homeward journey he again travelled along the Bogan. Under date of August 28, 1835, Mitchell described and made a sketch of an aboriginal cemetery a few miles from Nyngan Waterhole, the site of the present town of Nyngan. He recorded:

"Several natives came up with Talambe (an Aborigine then accompanying Mitchell and party) in the morning, and they accompanied us on our route. As we passed a burial ground, called by them 'Milmeridien', I rode to examine it, and on reaching the spot, these natives became silent and held down their heads. Nor did their curiosity restrain them from passing on, although I unfolded my sketch book which they had not seen before, and remained there half an

Subscriptions Now Due

The Field Naturalists Club of Victoria is administered by a relatively small number of honorary office-bearers.

The growth of the club and the expansion of its activities, particularly in connexion with the production of the *Victorian Naturalist*, are continually adding to the burden of work.

In accordance with the resolution passed at the March 1965 General Meeting, the current financial year and volume 83 of the *Naturalist* will cover the period January to December 1966. Membership fees and subscriptions to the *Naturalist* are therefore due for renewal on January 1.

If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post, using the form provided on the reverse side of this leaf.

This procedure will save office-bearers' time, and expense, in sending out reminder notices.

PLEASE ATTEND TO THIS MATTER NOW

You may help further by passing the following leaf on to an acquaintance who is not a member of the F.N.C.V. or a subscriber to the *Victorian Naturalist* but who might be interested in either.

NOTES:

1. Membership fees for the year 1966 are as follows:

Ordinary members (persons living within 20 miles of G.P.O., Melbourne)	£2	10	0	($5)
Country members (persons living over 20 miles from G.P.O., Melbourne)	£2	0	0	($4)
Joint ordinary member, per additional person		10	0	($1)
Joint country member, per additional person		7	6	(75c.)
Junior membership (persons under 18 years of age) ..	£1	5	0	($2.50)

(Ordinary, country and junior members receive the *Victorian Naturalist* free of any further charge.)

2. The scheme of supporting membership was introduced so that those who are able and willing to do so might help club finances. You are invited to become a supporting member by making a voluntary addition to the normal annual fee of any sum you choose, from 10/- ($1) upward. Details relating to supporting members and their payments are regarded by the treasurer as confidential, and no distinction or extra privilege is bestowed on the members concerned.

3. Subscription (by non-members) to the *Victorian Naturalist* is £2/-/- ($4) for the year 1966, post free.

(To be removed)

Field Naturalists Club of Victoria

FORM FOR RENEWAL OF MEMBERSHIP OR OF SUBSCRIPTION TO THE "VICTORIAN NATURALIST"

(To be used by existing members or subscribers for payment of fees)

Name(s) .....

Address .....

.....

.....

(Please indicate if there is a joint member)

Mr. A. G. Hooke
Hon. Treasurer, F.N.C.V.
65 William Street,
Melbourne, C.1

Dear Sir,

Please find enclosed the sum of £ : : , to cover annual membership fees subscription to the *Victorian Naturalist* for the year 1966. Please enter this sum as follows:

Membership fees . . . . . £ : : ($)
Supporting membership . . . . . £ : : ($)
Subscription to *Victorian Naturalist* £ : : ($)

Yours faithfully,

.....

Field Naturalists Club of Victoria

AN INVITATION TO PERSONS INTERESTED IN AUSTRALIAN FAUNA, FLORA AND COUNTRYSIDE

If you have not already an affiliation with the F.N.C.V., you may apply to the club either for membership or for regular subscription to the *Victorian Naturalist.*

These are some of the club's activities:

- General meetings each month, with informative, illustrated talks by prominent naturalists. These are held on the second Monday of each month, at the National Herbarium, South Yarra.
- Meetings of study groups comprising those with specialized interests such as geology, botany, microscopy, entomology, native fauna, etc.
- Organized excursions, led by nature experts, to places of interest, both near and far.
- The maintenance of a large lending-library of nature books and magazines.
- The publication monthly of the *Victorian Naturalist,* a well-illustrated nature magazine produced for the general reader as well as the expert. This is issued free to all members.

Membership is available to any person interested in nature; it is not necessary to have any specialized knowledge.

Membership Fees for the year 1966 are:

Ordinary members (living within 20 miles of G.P.O., Melbourne)	£2	10	0	($5)
Country members (living over 20 miles from G.P.O., Melbourne)	£2	0	0	($4)
Junior members (under 18 years of age)	£1	5	0	($2.50)

Non-members may subscribe to the "Victorian Naturalist" for £2/-/- ($4).

If you are interested in either membership of the club or subscription to the *Victorian Naturalist,* please complete the appropriate parts of the form on the reverse side of this leaf and post it to:

Honorary Secretary, F.N.C.V.
National Herbarium
South Yarra, S.E.1
Victoria.

Field Naturalists Club of Victoria
APPLICATION FORM

To be used by new members or subscribers.

(*Cross out parts which are not applicable*)

I wish to subscribe to the *Victorian Naturalist* for 1966. Please post it monthly to the address below.

I wish to apply for Ordinary / Country / Junior membership of the Field Naturalists Club of Victoria.

My full name and address is:

Mr.
Mrs. .....
Miss

.....

.....

I enclose the sum of £ : : ($) in payment of the year's fee.

Date / /1966.

Signature .....

hour, for a purpose of which they could have had no idea. The burying ground was a fairy-like spot, in the midst of a scrub of drooping acacias. It was extensive and laid out in walks, which were narrow and smooth, as if intended only for 'sprites', and they meandered in gracefully curved lines, among the heaps of reddish earth, which contrasted finely with the acacias and dark casuarinae around. Others gilt with moss shot far into the recesses of the bush where slight traces of still more ancient graves, proved the antiquity of these simple but touching records of humanity. With all our art we could do no more for the dead than these poor savages had done."

What are termed sand-hills throughout the Nyngan, Warren and Coonamble districts are entirely different from those of the Darling River region. These are not hills or hillocks at all, but sandy patches, generally of but a few acres in extent and but a few feet higher than the surrounding country, the elevation scarcely discernible. Before the destruction of the timber by ringbarking these slightly elevated areas were more luxuriantly vegetated than the surrounding country which may be of either red or grey soil formation. The trees growing upon them were principally acacias of more than one species. The cemetery described by Mitchell was undoubtedly on one of these sandy areas, and the mention of the dark *Casuarina* trees around indicates that the country adjacent to it was of grey soil formation.

With the primitive appliances available to the Aborigines a grave could be dug much more expeditiously on one of these low ridges than elsewhere. When the country became over-run with rabbits they were also the favoured places for the rabbits to burrow into. Often they became one mass of rabbit burrows. In general, the rabbits did not burrow down deeper than about two feet, but on these sand ridges the burrows went down four feet or more. Around about the year 1910 the landholders throughout the Warren district and elsewhere throughout central New South Wales, after combating the rabbit pest by various other methods without making much impression, undertook large scale digging-out operations. Gangs of men, ten or fifteen in number, were employed in digging out the rabbit burrows with mattock and shovel. I myself was one of such a gang digging out on Raby, down the Macquarie River from Warren, for a few weeks during the year 1914. The procedure was: the ganger, or man in charge of the operations, had a pack of dogs to run down the loose rabbits, or drive them into the burrows, all hollow logs and trees were burnt, every run or branch of the burrow dug out, the trench was left open for a few days before it was filled in and levelled off. During these digging out operations aboriginal graves were occasionally disturbed and the skeleton unearthed, and whole cemeteries were sometimes disturbed. During one occasion, whilst I was on Haddon Rig, out from Warren, eighteen or twenty skeletons were unearthed on one small sand-ridge. All wooden artefacts that may have been buried with the deceased would have long disappeared through the process of decay, but I have not heard of any stone implements coming from the graves in this part of the country. In any case if there were such, those employed in digging out (myself at that time included) would probably pass over them unnoticed. During the short time I was one of the gang digging out on Raby we did not unearth any skeletons, but the ganger, or foreman, who, with his pack of dogs, had been so employed during the previous three or four years on various properties in the district related a

number of instances that had come under his notice, as did also other members of the gang.

The foreman spoke of an instance which came under his notice whilst he was on Gunningbar (also in the Warren district), of several skeletons being unearthed and a large brass buckle, indicating that one of these Aborigines had worn a leather belt. The foreman in charge of the digging out on Raby informed me that he saw to it that any skeleton that happened to be unearthed was put back in the trench before it was filled in, and that this was also the general procedure elsewhere. He also informed me that, although he was reluctant to do it, he was under the necessity of burning more than one log or carved tree with Aborigine carvings on it owing to the fact that they were hollow and therefore a harbour for rabbits.

Aboriginal graves or cemeteries were not disturbed on all of the sandy patches during these digging out operations, only occasionally. No detailed examinations were made of the graves. In the case of the grave in which the brass buckle was found, no search would be made in order to ascertain if there were any buttons associated with it. Whatever may have been noticed in the graves, stone implements, quartz crystals, or such like, was not recorded, and therefore forgotten and unknown.

Book Review

"Frogs of Southern Western Australia"

A. R. Main

[Handbook No. 8, the Western Australian Naturalists' Club, Perth, 1965. 73 pp. Price 6/-]

This book, as Dr. Main states in his preface, "has developed from the earlier Key to the Frogs of South-Western Australia" (Main, 1954, Handbook No. 3, the Western Australia Naturalists' Club, Perth). In the process of development it has expanded from 16 to 73 pages, and become far more than a naturalist's aid to identification, the standard purpose of the 1954 work. The new book includes sections on biology, ecology, physiology, etc., as well as the major section (33 pages) on identification.

The book is divided into three parts: Introductory, Identification, and Biology. The Introductory section gives a brief background sketch of Amphibia in general, and Australian Anura in particular. This is followed by discussions of nomenclatorial problems, and morphological methods and terminology.

Part II (Identification) commences with a series of mostly generic keys to adults, tadpoles and eggs. For all three there are "field" keys (making use of behaviour and/or habitat as key characters); while for adults and tadpoles there are also "morphological" keys. These latter refer to living specimens but in most cases should also suffice for preserved material.

The rest of Part II is devoted to special synopses. For each genus generic characters and species keys (usually to adults and tadpoles) pre-

cede the individual species accounts. Each species is treated under the headings: Description, Type Locality, Range and Biology; the latter category being further divided into Habitat, Call and a life history section in which the degree of detail varies.

Part III deals with the biology of the anuran fauna, and includes sections of Climate and Distribution (with an interesting map relating species density to climate), Specialisation, Life History, Physiology of Dessication (relating the resistance to dessication of 14 species to their habitats), Ecology (referring largely to population studies on a single species, *Crinia insignifera*), Patterns of Speciation, and the Collecting and Preservation of Frogs. The Literature Cited includes 49 references and provides a convenient bibliography.

The book closes with five plates comprising 48 black and white photographs. 36 of these are of frogs and the remainder of tadpoles.

"Frogs of Southern Western Australia" will admirably fulfil its function as an identification handbook. The keys have the virtues of simplicity and almost complete dependence on external characters. But perhaps more important is the fact that Dr. Main has put his broad field experience to full use in compiling his book. So much of Australian herpetology in the past has been based on examination of museum specimens and little more. This work, in contrast, is a mine of information on anuran biology, ecology, physiology and behaviour. For example, descriptions of larvae and life histories are included for 27 of the 36 species treated. This sort of knowledge can come only from detailed field studies, and its value would be hard to overestimate.

Two minor criticisms may be made, both referring to illustration. For none save the genus *Neobatrachus* are there maps showing distribution. Presumably this is deliberate (to keep down production costs), but the provision of even a locality map would assist the reader enormously. Secondly, there are no illustrations of tadpole mouth discs (one of their most valuable diagnostic characters), and many of the photographs of the tadpoles themselves are of rather indifferent quality.

This is a well-produced, attractive book, which will have an importance in Australian herpetology far out of proportion to its rather modest size.

A. A. Martin

Book Review

"Using the Microscope"

A. L. E. Barron

[Published by Chapman and Hall, London. Sterling price £1/16/0]

During the last few years several handbooks on the light microscope have appeared, none of them so good as that under review. It is stated to be a revised version of C. W. Olliver's "Intelligent Use of the Microscope" (2nd ed'n 1951); it is, however, hardly recognizable as such, and it is in every

respect a much more useful and comprehensive work, as we might expect from the author. Mr. Barron is a very expert and experienced microscopist, the founder and editor of *The Microscope* journal nearly 30 years ago. He is now employed at the Royal College of Surgeons of England.

The new book is concerned with the practical management of the microscope in nearly all its many roles, but it also includes the basic optical theory without which the would-be microscopist is like a man groping in a London fog, inevitably failing to get the best out of his instrument. The author presents these theoretical aspects of microscopy in an easily digestible form, with the minimum of those formidable equations which defeat those amateurs, who are not mathematically minded, and deprive them of the pleasure which can be derived from this fascinating study.

There are useful chapters on selecting equipment and on the manipulation of the microscope, on illumination (so fundamentally important), on accessories and special apparatus, on micrometry, projection, and photomicrography—a field in which the author excels. All these chapters are packed with the kind of "tips" which we usually learn only by personal contact with experienced practitioners. The intelligent beginner will find here just the kind of simple, but complete, guidance that he needs, and as he proceeds with his self-education in microscopy, with Mr. Barron's aid, more advanced information will be at hand. There comes a time when we all become curious about the techniques of phase contrast and interference microscopy, even if we are unlikely to use them; their principles are clearly explained in a few pages.

Very properly, only half a dozen lines refer to the electron microscope, to which few naturalists have access. This wonderful tool, invaluable in advanced research, does not replace the light microscope, which will always be indispensable.

Though plane polarization is adequately described, this, like all other handbooks, omits discussion of circular and elliptical polarization, which some microscopists use, but rarely understand. For that we have to turn to text-books on optics, learning the hard way. This very interesting phenomenon *can* be explained intelligibly, and perhaps Mr. Barron will fill this gap in his next edition.

This book is written in simple, unpretentious language, always the best and most scientific, and reading it is therefore pleasant. Reference is facilitated by a good index.

H.A.D.

Field Naturalists Club of Victoria

General Meeting—December 13, 1965

The President, Mr. M. K. Houghton, opened the meeting by welcoming members and friends mentioning in particular Mrs. George, wife of the speaker for the evening, from New Guinea. There was a good attendance.

The Minutes were taken as read on the motion of Mr. E. S. Hanks seconded by Mr. A. J. Swaby.

The Hon. Secretary, Mr. E. H. Coghill, announced that the Annual General Meeting would be held on March 13 and that, because the second Monday in April would be Easter Monday, Council had decided that the April General Meeting be held on Wednesday, April 13. Nominations for Council must be handed in at the January meeting. Mr. Coghill tabled a prospectus of seminars shortly to be held at the University of New England and reported that ANZAAS would meet in Melbourne, January 16-20, 1967.

Introducing the speaker, the President mentioned that Mr. Graeme George had been one of the original members of the F.N.C.V. Fauna Group and for the last three years had been teaching in New Guinea. He had taken his interest in mammals with him and was well qualified to speak on "New Guinea Animals".

Mr. George said that many of the indigenous peoples of New Guinea caught animals for food and kept their skulls in their houses. It was thus possible to collect skulls in quantity. In addition he had purchased some mammals alive and several species had been kept and studied in captivity. Basically the mammal fauna of New Guinea was similar to that of Australia. Some species were common to both countries and many Australian species were represented by related species. Some genera were endemic. Few species had English common names: many had native names but these varied from place to place and it was easier to use the scientific names.

There was a very rich bat fauna. Fruit-bats were well represented and there were four genera of small, long-tongued Blossom Bats and many insectivorous bats, mostly belonging to Australian genera. The wild dogs were similar to the Dingo, feral cats occurred and some pigs descended from domestic ancestors were present. Deer had been introduced and their existence along the southern coast was a cause of anxiety to quarantine authorities. A few wild buffalo were found around the mouth of the Sepik river.

Among the rodents three sub-families of *Muridae* were represented. A number of interesting species occurred. These included the so-called File-tailed rats and three genera of giant rats, the skulls of some of which were common in houses. There were nine genera of water rats. *Crossomys* was very well adapted to life in the water. There was a tendency in the group to a reduction in the number of molar teeth and evidence that some species did not chew their food.

Many marsupials occurred, the largest being a form of the Sandy Wallaby. There were two Paddy-melons and several species of tree kangaroos. Among the Dasyurids there was the New Guinea quoll, three *Antechinus* one *Sminthopsis* and, once, a planigale had been found. Four genera of bandicoots occurred. The possums were well represented, some species being related to, if not identical with, those of northern Australia; but other genera were endemic.

Finally there were two genera of monotremes, one containing the smaller *Tachyglossus* and the other the rain-forest relative, the large *Zaglossus* that had occurred over much of Australia in wetter times.

Mr. George gave an account of the vegetational zones of New Guinea and the effects of vegetation, climate and topography on the distribution of mammal species. He showed a good selection of colour slides of a number of species. At the end he answered a large number of questions which showed the interest that his talk had aroused. The audience showed its appreciation of his talk by applause.

Miss Allender, Excursion Secretary, asked if Members interested in the trip to Queensland next year would let her know as soon as possible. The new Members listed on page 243 of the December *Naturalist* were elected on the motion of Mr. Coghill, seconded by Mr. E. R. Allan.

On the exhibit table were Christmas cards from Mr. David Fleay and the

National Museum of Victoria. Mrs. M. North displayed the tooth of a blue whale, *Sibbaldus musculus*, that had been cut up near Albany and a number of partly opalised bi-valves, fossilised mussels and fossilised scallops from Coober Pedy. Miss Edith Raff showed a garden-grown specimen of the Red Kangaroo-paw and some Sea-Island cotton, kapok and other products grown in the New Hebrides. Mr. A. E. Brooks had brought a specimen of the Dwarf Sugar-gum with this year's flowers and next year's buds. Sand-grains from the beach at Point Addis were shown under a F.N.C.V. microscope.

Under the heading "General Business", the Hon. Treasurer, Mr. A. G. Hooke, reminded members that the present financial year terminated on December 31 and that subscriptions at the new, increased rates would become due in January. The usual form to facilitate payment of subscriptions would be included in the January *Naturalist*.

A request was made for donations to the Nature Conservation Survey in Victoria Fund.

On behalf of Council, Mr. Ros Garnet spoke on the need to amend the constitution of the National Parks Authority so that bodies interested in the conservation of indigenous fauna and flora could have better representation. He described the present constitution and mentioned that the only non-government body represented was the Victorian Ski Association. Stronger representation of natural history interests might result in more attention being paid by the Government to the views of those who wished to conserve our national assets for the enjoyment of future generations. Mr. Ros Garnet moved that "This Meeting approved the principle that bodies such as the F.N.C.V. and the National Parks Association should be granted the right to nominate a person to sit on the National Parks Authority". He said that the new Minister responsible, Mr. Manson, had agreed to hear the views of a deputation. The motion was seconded by Mr. J. Barnes and was supported by Mr. Quirk and Mr. F. L. Jeffs. It was then put by the President and carried by the Meeting.

Mr. Jeffs moved that "The F.N.C.V. ask the Landscape Preservation Council to voice its disapproval to the Govern-

ment at the granting of a licence to build a motel in Wilson's Promontory National Park". The motion was seconded by Mr. A. J. Swaby. After discussion it was passed by the Meeting.

The Meeting was informed that an appeal against the refusal to grant a licence to quarry in the Lilydale area was to be heard by the Minister on December 16 and a Member asked that the F.N.C.V. be represented. The Hon. Secretary said that the views of the F.N.C.V. had been submitted to the local council earlier and that in the course of correspondence, it had been learned that only three bodies would be able to be heard at the appeal: there would, therefore, be no point in sending a representative.

The President wished all Members a Happy Christmas and a Prosperous New Year.

Geology Group—December 1, 1965

Forty members and visitors were present, with Mr. L. Angior in the chair.

Mr. D. McInnes reported on the excursion to Sunbury on November 14, when sixteen members attended. At a new road-cutting just beyond Sunbury newer basalt formations were inspected to study onion weathering, and the somewhat porphyritic nature of the rock. Other deposits evidently of tuff or red decomposed material, were also examined. After lunch the party proceeded to Emu Creek, where common opal was found in the basalt along the banks of the stream. The secretary gave a brief account of the "Building Stones" lecture, which was the syllabus item at the November general meeting. Syllabus items and excursion locations for 1966 were discussed.

The subject for the evening was a lecture of "Petroleum Drilling Techniques and Extraction" by Mr. R. T. Mathews, Senior Lecturer in Economic Geology, Melbourne University. The speaker introduced the subject by explaining the different methods used for drilling.

Percussion was the oldest method, having been used by the Chinese 200 years ago. A chisel-shaped bar was raised and then sharply lowered, to make the hole. This was the cheapest form of drilling, but was slower than the more modern rotary drilling, though still used to locate water for farmers. Rotary drilling had been developed since the turn of the century, and today was the method used for oil work. A high tower was necessary as the drill pipe was in hollow sections, which were progressively screwed together as the hole became deeper. The bits were of various kinds, cooled by a fluid of clay and water, which was pumped down the pipe, and then returned with the cuttings to the surface. The cuttings could be examined under ultra-violet light for traces of oil. Coring was an expensive process, and only undertaken when absolutely necessary. Casing of the bore was explained, but this was mostly undertaken only in the weathered rock-material at the top of the hole. A formation tester could be used in place of the bit, to enable specimens of the rock to be brought to the surface for examination. A series of pictures to illustrate the drills, and how they worked was then shown. The use of graphs and how they were compiled to assess the well's potential, were explained on the blackboard. The lecture closed with many questions, and an interesting discussion.

Exhibits: Garnet in schist and siderite, Thackaringa, N.S.W., wolfram in quartz and quartz crystals, Glen Innes N.S.W., quartz crystal aggregate and fragment of beryl crystal, Torrington N.S.W., rhodonite and galena, Broken Hill, smoky quartz, Elsmore Hill N.S.W. (R. Davidson); collection of material from N.T. and W.A. including various forms of asbestos, serpentine, tiger's eye, jasper, prase, lead sulphide, uranium ore, banded haematite, chalcedony, malachite, azurite, agate, opal, talc, zebra stone, fossil wood, garnet, mica, tourmaline and beryl (Mr. and Mrs. North); fluorite, agate, Beechworth, *Lovenia* and gasteropods from the Tertiary of Aireys Inlet (Mr. R. Box); gasteropods, *Conus, Pectens*, from Jimmys Point, Lakes Entrance (Mr. N. Wigmore); dolerite from Tasmania and brachiopod from Buchan (Mr. A. Scott); augite crystals from basalt of Sunbury under microscope (Mr. D. McInnes)

The meeting concluded with exchange of Christmas greetings, a presentation to Mr. and Mrs. Dodds, and supper kindly arranged and provided by the ladies.

Botany Group—December 9, 1965

Mr. Bruce Fuhrer occupied the chair, and for the final meeting of 1965 we had two speakers and we finished the evening with supper.

The title of Miss Lester's talk was "Rot". She presented this as odd Christmas fare, consisting of a "flummery" and a "meat-course". The "flummery" was a story of an imaginary country with

storm-broken forests where the dead trees were lying dozens of feet thick, because the agents that bring about decomposition were on strike!

The "meat course" dealt with some of the queer non-conformist characteristics of fungi. Miss Lester spoke of the fact that fungi cannot manufacture their food like the green plants do, and that their method of obtaining food makes them effective agents in rotting down organic matter. The unusual structure of the toadstool was explained—it consists merely of compacted hyphae (threads of cells). With diagrams Miss Lester went on to describe how the fungi (the Basidiomycetes in this case) differed from other organisms in their delayed nuclear union of compatible mating cells. She described the life-cycle of the toadstool. To end, we had a return of the "flummery" where the country was again happy because the fungi, etc., were back on the job, the old trees had been disposed of, and fine new ones were growing in their place. This stressed the importance of decomposition and the cycle of elements.

Mr. Marshall was our second speaker. He gave us a talk on the Warrumbungle Ranges of N.S.W. They are situated almost due west of Port Macquarie and are a very interesting part of the country. Mr. Marshall told us that in the ranges, evaporation was 60 ins. a year and that there was very little permanent running water. One good spring that he knew started with a flowing stream, but within seven miles it was just a dry creek-bed.

North of the ranges the maximum rainfall was in the summer and to the south it was in the winter. At the conclusion of his talk Mr. Marshall showed a number of colour slides depicting the rugged nature of the ranges with interesting slab rock-formations and steep canyon-type walls of rock.

Mr. Morrison displayed a spray of native passion vine.

AFFILIATED CLUB

Frankston Field Naturalists Club

Frankston Club has changed its Secretary, Mr. Patrick G. Bulfin having accepted office in the place of Mrs. Bounds, who has retired.

We wish him and his Club success.

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

GENERAL MEETINGS

Monday, January 10—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements, Correspondence.
2. Subject for the Evening: Members' Night, "General".
3. General Business.
4. Nature Notes and Exhibits.

Monday, February 14—"South West Tasmania".

GROUP MEETINGS

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

Friday, January 14—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street), at 8 p.m. Mr. Bruce Fuhrer, "Orchids".

Wednesday, January 19—Microscopical Group.

Friday, January 28—Hawthorn Junior Club—at Hawthorn Town Hall, at 8 p.m. Members' Holiday Exhibits with commentary by Mrs. van Rompaey.

Wednesday, February 2—Geology Group—Members' Night, "Holiday Reminiscences".

Monday, February 7—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Thursday, February 10—Botany Group. Mr. A. Morrison, "Botany of the Burke and Wills Track".

The Microscopical Group does not meet in December, and the Geology, the Entomology and Marine Biology and the Botany Groups do not meet in January.

F.N.C.V. EXCURSIONS

Sunday, January 16—Point Leo. Leaders, Mr. and Mrs Strong. The coach will leave Batman Avenue at 9 a.m. Fare 17/-. Bring two meals.

PRELIMINARY NOTICE

September 17 to October 2, 1966—Queensland. There will be an excursion to Heron Island and Lamington National Park if sufficient members are interested. The proposed itinerary is to leave Melbourne by air on Saturday morning for Brisbane and to continue on Sunday by a two-day bus journey to Gladstone, reaching Heron Island on Tuesday, 20th September, for a full week's stay. On Tuesday, 27th September, depart by train for Brisbane and take bus on Wednesday to Binna Burra, remaining there until Sunday, October 2, when the return flight to Melbourne will be made. The inclusive cost should be approximately $220. This trip is planned for a fortnight, but, as the return air-ticket may be used at any time, those wishing to prolong their stay in Queensland may do so. Bookings should be made with the Excursion 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, 1965

President:

MR. M. K. HOUGHTON
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: MR. E. BYRNE, MR. A. FAIRHALL

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. A. G. HOOKE, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. HUDSON, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MRS. P. E. MATCHES, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: MR. R. R. DODDS, 5 Banchory Street, Essendon (379 4309).

Microscopical: MR. P. GENERY, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

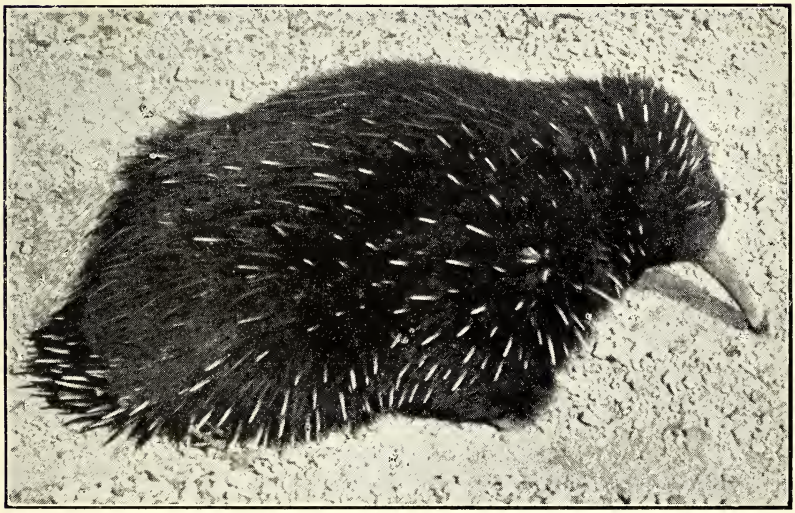
Ordinary Membership	50/-	($5.00)
Country Membership (over 20 miles from G.P.O., Melbourne)	40/-	($4.00)
Junior Membership (under 18 years)	25/-	($2.50)
Subscription to the *Victorian Naturalist* (non-members)	40/-	($4.00)

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1.

The Victorian Naturalist

Vol. 83 (2) February 1966



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Vol. 83, No. 2

F.N.C.V.

February 10, 1966

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

Members who heard Mr. Graeme George speak at the December, 1965, General Meeting may be interested in this photograph of a New Guinea echidna, *Zoglossus*. It was taken by Mr. C. Barrett and appeared in the May 1934 issue of the *Victorian Naturalist*, **51**, 23.

Wanted — An Editor

Since its earliest days the Field Naturalists Club of Victoria has produced regularly the *Victorian Naturalist*. This journal has played an important part in disseminating knowledge on all aspects of Australian natural history and has provided a strong link between members of the Club, many of whom live too far from Melbourne to attend meetings. It has contained many important scientific papers, it has provided opportunities for amateur naturalists to record their observations and their views on conservation and other matters, and it has reported the meetings, excursions and other activities of the Club. As present 1250 copies are printed each month and, of those, about 1000 are despatched at once to members, scientific institutions and libraries.

Owing to the imminent departure from Australia of the present editor it is now necessary to find a new one and a volunteer for the position is required. Doubtless most readers will agree that, if possible, the present scope of the *Naturalist* should be maintained. The regular production of a journal of this type throws a lot of work on the editor and, speaking from experience, we express the opinion that it is not easy to combine this activity with full-time employment. The work could, of course, be shared by two or more members in the form of an Editorial Committee. Unless, however, they lived or worked in the same area, so that frequent consultations were possible, most of the work would still fall on the one individual who would have to accept responsibility for ensuring that copy was submitted on time to the printer and that proofs were collected, corrected and returned without delay. If, however, a member who had retired from full-time employment could be found to occupy the editorial chair, we believe that he or she could devote usefully some of his or her leisure to the task. The work is interesting, often enjoyable and we believe that it is a job worth doing.

The alternative may be to divorce the papers and shorter notes from the reports and diary. This would enable the *Naturalist* to be published, say four times a year. The editor would not need to have everything ready on a given date every month: it would not matter were publication delayed a week or two. Reports of meetings and the diary could be circulated separately to members in the form of a monthly newsletter. This procedure would undoubtedly simplify the work of editing the *Naturalist*. It would also have its dangers, for example as happened recently with one of our contemporaries, the delay in appearance of the journal might extend over several months.

We do not think that this idea would be popular with country members and probably most members would prefer to maintain the present arrangement. However unless someone can be found to undertake the work of producing the *Naturalist* month by month, Council may be forced to make a change.

An editor is required—now.

J.R.H.

STOP PRESS

The Microscopical Group has arranged an excursion to Albert Park Lake, meeting at the south (St. Kilda) end at 2 p.m. on February 12th. All members and friends will be welcome. Bring nets and other appropriate collecting gear.

Some New Distributional Records of Broad-Nosed Bats (*Nycticeius* spp.)

By John L. McKean*

Summary

The ranges of Australian forms of the genus *Nycticeius* are defined and in some cases extended. *N. balstoni balstoni* is recorded for the first time in New South Wales.

I. Introduction

The Australian members of the genus *Nycticeius* (Broad-nosed Bats) have in the past been rather inadequately collected. As a result their distribution is not well defined nor can the taxonomic status of several forms be critically viewed.

The generic name *Nycticeius* is used throughout this paper following Hollister (1918) and Simpson (1945). The characters by which Australian members of this group have been previously separated are not of sufficient significance to warrant their allocation to the genus *Scoteinus*. It is considered, contrary to Tate (1942, 1952) that, although the skull characters of the genotype *Scoteinus emarginatus* are undescribed, this in no way prevents the use of *Nycticeius* for Australian members of the group.

In the course of examining specimens for this paper I found the skull characteristics of *N. greyii* and *N. rueppellii* to be very distinctive and consider them good species. However, the skull characters of the forms *N. orion orion, N. orion aquilo, N. sanborni, N. balstoni balstoni,* and *N. balstoni caprenus* are rather similar and I think they may be only geographical races of the one species *N. balstoni*. I have not examined *N. influatus* and cannot comment on its relationship. To confirm these views on the close relationship of the *N. balstoni* group, specimens are required from areas where the various forms are likely to intergrade. This work is in progress.

II. Distribution

Intensified collecting in the last two years has resulted in the specimens listed in Table 1 being added to the C.S.I.R.O. collections. Identification of the species and subspecies in the table is based on previously published descriptions and on types, topotypes, or near topo-typical material examined.

Localities mentioned in the text are shown in Figure 1.

N. rueppellii

The largest species, *N. rueppellii*, is stated by Troughton (1957) to have been collected at Sydney and at Lithgow, N.S.W. Recently J. H. Calaby (1965) has recorded it from Bonalbo, Tooloom, and Yabbra State Forest, N.S.W.; P. D. Dwyer (Simpson and Hamilton-Smith 1965) has recorded it from Black Fellows Gully, N.S.W., and it is now recorded (Table 1) from Nimbin, N.S.W. These recent records extend its known range, the vicinity of Sydney, to north-eastern New South Wales.

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YABBRA FOREST
TOOLOOM
NIMBIN
BONALBO
BLACK-FELLOWS GULLY
LITHGOW
SYDNEY


DARWIN
HUMPTY DOO
KIMBERLEYS
HORSESHOE BEND
LAVERTON
RIVERTON
RED CLIFFS
GRIFFITH
LINGA LAKE
CARISBROOK


PRAIRIE


TULLY
BOWEN
ROCKHAMPTON
BLACK-FELLOWS GULLY
JENOLAN CAVES
WOMBEYAN CAVES
HUNTERS HILL
SEVEN HILLS


COOKTOWN


PORT ESSINGTON
DARWIN
MALBON
SPEAR CREEK
PENTLAND
ROCKHAMPTON
STUARTS CREEK
SALISBURY DOWNS
TERO CREEK
PARALANA RANGES
LAKE COWAL
GRIFFITH

FIG. 1—Map showing distribution of *Nycticeius* in Australia.

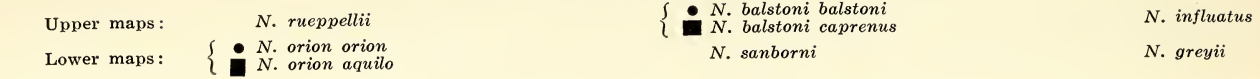

TABLE 1—DETAILS OF RECENTLY COLLECTED *Nycticeius* SPP.

Specimen No.	Form	Sex	Locality	Date	Radius Measurement in mm.
MH 436	*N. rueppellii*	♀	Nimbin, N.S.W.	12. i. 1965	54·0
MH 471	„ „	♀	„ „	20. iv. 1965	50·9
MH 442	*N. balstoni balstoni*	♀	Barrenbox Swamp, Griffith, N.S.W.	18. iii. 1965	36·5
MH 443	„ „ „	?	„ „ „ „	19. iii. 1965	37·5
MH 444	„ „ „	♀	„ „ „ „	19. iii. 1965	34·5
MH 245	*N. balstoni caprenus*	♀	Fogg Dam, Humpty Doo, N.T.	10. ix. 1964	33·2
MH 349	*N. orion orion*	♀	Seven Hills, Sydney, N.S.W.	29. x. 1962	34·6
MH 469	„ „ „	?	Bullio Cave, Wombeyan, N.S.W.	13. iii. 1965	34·5
MH 494	„ „ „	?	„ „ „ „	29. v. 1965	—
MH 307	*N. orion aquilo*	♀	Tully, Qld.	early Sept. 1964	33·7
MT 308	„ „ „	♀	„ „	„ „ „	34·2
MH 309	„ „ „	♀	„ „	„ „ „	32·4
MH 310	„ „ „	♂♀	„ „	„ „ „	32·0
MH 456	*N. greyii*	♀	Toganmain Station, via Darlington Point, N.S.W.	4. v. 1965	28·4
MH 506	„ „	♀	Toganmain Station, via Darlington Point, N.S.W.	6. vi. 1965	31·7
MH 445	„ „	♂	Barrenbox Swamp, Griffith, N.S.W.	17. iii. 1965	30·1
MH 446	„ „	♂	„ „ „ „	17. iii. 1965	30·6
MH 70	„ „	♂	Lake Cowal, N.S.W.	24. i. 1964	30·9
MH 372	„ „	♂	Salisbury Downs, via White Cliffs, N.S.W.	early Dec. 1964	31·2
MH 167	„ „	♂	Tero Creek, N.S.W., via White Cliffs	8. v. 1964	29·9
MH 393	„ „	♂♀	Spear Creek, Mt. Isa, Qld.	20. i. 1964	29·9
MH 394	„ „	♀	„ „ „ „ „	20. i. 1964	30·3

N. balstoni

N. balstoni balstoni was originally described from Laverton in the Kalgoorlie region of Western Australia. A speciment from Riverton, S.A. (Wood-Jones 1925) and specimens from Horseshoe Bend, Finke River, N.T. (Johnson 1964), are referable to the nominate form.

The specimens of *N. b. balstoni* from Griffith, N.S.W. (Table 1) represent the first published record of the species from New South Wales. The species has also been recorded recently from Carisbrook, Linga Lake and Red Cliffs in northern Victoria (R. M. Ryan 1965, pers. comm.) and subfossil remains of a *Nycticeius* sp. have been recorded (Wakefield 1963) from the Grampians in western Victoria, and it is thus apparent that *N. balstoni* has a far more extensive distribution than previously supposed. Although *N. balstoni* has not been recorded in Queensland it seems highly likely that, when more material of *N. influatus* is available, it will be found to be conspecific with *N. balstoni.*

N. balstoni caprenus is restricted to the Kimberleys, W.A., by Troughton (1957), but Johnson (1964) has referred a specimen from Darwin, N.T., to this form. The specimen of *N. b. caprenus* from Humpty Doo, some 30 miles south of Darwin (Table 1), supports this extension of range.

N. influatus

N. influatus is apparently only known from the type locality Prairie, in the Hughenden district, Qld. (Troughton 1957).

N. orion

N. orion orion has been recorded from near Hunters Hill, Sydney, by Troughton (1957) and presumably the same race from Black Fellows Gully in northern New South Wales by P. D. Dwyer (Simpson and Hamilton-Smith 1965). The specimens of *N. orion orion*, from a cave at Wombeyan, N.S.W., would appear most unusual as Australian members of this genus are usually tree and house dwelling (Hamilton-Smith 1964). However, Miss B. Dew (pers. comm.) has on one occasion found a *N. orion orion* with a group of *Miniopterus schreibersii* in the Grand Arch Cave, Jenolan, N.S.W. *N. orion aquilo* is represented in the Australian Museum, Sydney, by specimens from the Rockhampton and Bowen districts of Queensland. The specimens of *N. o. aquilo* from Tully, Qld., extend the range of this form some 200 miles northwards from Bowen. The specimens, although closer to *N. o. aquilo,* approach *N. sanborni* in some respects and it seems likely that further collecting will show that there is a complete cline between *N. orion* and *N. sanborni.*

N. sanborni

N. sanborni is known from various localities in Papua and from the Cooktown district, Queensland (Tate 1952).

N. greyii

N. greyii according to Troughton (1957) has an extensive inland range, approaching nearest to the coast in the Murray region of South Australia, at Darwin in the Northern Territory, and in the Rockhampton area of Queensland and extending into northern New South Wales. The species is also recorded as having been collected at Port Essington, N.T. (the type locality), at Pentland and Malbon in Queensland (Tate 1952), and at Stuart's Creek and the Paralana Ranges in South Australia (Wood-Jones 1925).

The specimens of *N. greyii* from Griffith and Lake Cowal in south-western New South Wales (Table 1)

represent an extension of range. The specimens from Griffith were taken in the area where *N. balstoni* was also collected. As *N. greyii* has now been collected throughout western New South Wales and South Australia, it seems relevant to point out that its apparent absence from northern and western Victoria is probably due to insufficient collecting in that area.

III. Discussion

This discussion must be regarded as tentative as, no doubt, future collecting will show the distribution of most, if not all, of the species discussed to be more extensive than is at present known.

N. rueppellii is confined to the temperate, east coast of New South Wales from Sydney northwards. *N. orion* occurs throughout its entire range.

N. greyii, although not strictly an arid region species, is not known from temperate forest nor from densely forested regions. Over part of its range *N. balstoni balstoni, N. balstoni caprenus,* and *N. orion aquilo* also occur.

The following group contains closely related forms with similar dentition and body and wing proportions and measurements. It seems likely that, if the distribution of these forms overlapped, direct competition for food could result. At present all forms appear allopatric in distribution.

N. balstoni is the arid zone representative of the group with the nominate race in the southern and central portion of its range and the race *caprenus* in the far north and northwest portion. *N. influatus* is only known from central-western Queensland, *N. orion* is the coastal representative with the nominate race extending from the vicinity of Sydney, N.S.W., to north-eastern New South Wales and the northern race *aquilo* from Rockhampton, Qld., to Tully, Qld. *N. sanborni* is known from Cooktown, Qld., and from various localities in Papua.

IV. Acknowledgements

The kindness of P. T. Bailey, L. W. Braithwaite, R. J. Burt, R. K. Carruthers, L. Davis, Miss B. Dew, L. S. Hall, F. J. Milini, and W. Price in collecting specimens of *Nycticeius* for the author is gratefully acknowledged. Dr. H. J. Frith, J. H. Calaby and R. Mark Ryan kindly read and commented on the manuscript and L. S. Hall prepared Figure 1.

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(Manuscript received 29/9/65)

Book Review

"Injuries to Man from Marine Invertebrates in the Australian Region."

Sir J. B. Cleland, C.B.E., M.D., Professor Emeritus, University of Adelaide

and

R. V. Southcott, M.D., D.Sc., D.T.M., Honorary Zoologist, South Australian Museum.

[National Health and Medical Research Council, Special Report Series No. 12. XIII + 282 pp. Commonwealth of Australia, Canberra, 1965.

Price £2 ($4).]

The authors, both recognized authorities in Australia and abroad, have written jointly this monograph. In the preface Prof. Cleland states that it is essentially Dr. Southcott's work. Prof. Cleland's papers have always been of great interest and his series of publications on "Injuries and Diseases of Man attributable to Animals and Plants" (1912-44) are an important source of information. Dr Southcott's contributions to the study of poisonous Coelenterates have gained him an international reputation. It is therefore not surprising that they have written this book, which is an important and valuable contribution to our knowledge of poisonous marine invertebrates. The emphasis is on the medical side and therefore it will be of particular interest to medical practitioners in coastal areas and those engaged in research in animal venoms. Naturalists interested in marine invertebrates will find in this book much valuable information. Much of the still missing information could be collected by field naturalists who are patient and good observers and are interested in these animals. Methods of collecting and handling specimens, the collection of essential information are described in great detail.

The book is well written and edited, the illustrations (particularly the microphotographs) are of very high standard. The appended bibliography covers 15 pages.

The National Health and Medical Research Foundation is to be congratulated for publishing this volume which will be for many years considered as an important review on this subject.

Dr G. H. Kaire

WILDFLOWER SLIDES—PHOTOFLORA 66

The Native Plants Preservation Society reminds you that entries for their photographic competition, Photoflora '66, close on 14th February. Entry forms with full particulars are still available from the Competition Secretary, Miss B. Terrell, 24 Seymour Avenue, Armadale S.E.3. (Tel. 50 2316, evenings.)

Mortality Factors of the Bent-winged Bat

By P. D. Dwyer*

Introduction

This paper reports mortality factors of the bent-winged bat, *Miniopterus schreibersii* (Kuhl), observed during a three-year study of the species (April 1960-September 1963) in north-eastern New South Wales. In addition it attempts to assess the significance of these observations in terms of an estimated annual mortality in one population of the species. An understanding of the significant mortality factors for any species is important to possible understanding of number limitation in that species.

Several bat roosts present in the study area are mentioned below by name. Locality details for these are given on a map in Dwyer (MS in prep.). In summary, Camp Cave, Carrai, Moparrabah, Yessabah, and Willi Willi are limestone caves of the lower Macleay River Valley; Back Creek and Baker's Creek are mine tunnels of the Northern Tablelands; Euglah is a volcanic cave near the summit of Mt. Kaputar (Nandewar Range); Bonalbo is a mine tunnel of the upper Clarence River Valley; while Ashford, Riverton, and Viator are limestone caves of the Northwestern Slopes. Willi Willi and Riverton are breeding caves of *M. schreibersii*.

It should be noted that, although *M. schreibersii* is host to several ectoparasites (mites, ticks and flies), and endoparasites (trematodes, nematodes, etc.), there was no suggestion that these parasites contributed to mortality in the bat.

Results

Predation

Actual, or potential, predation on *M. schreibersii* by several reptiles, birds, and mammals, has been noted on a number of occasions. Not all instances occurred naturally and, in several, the specific identity of the predator was not determined.

Carpet snakes (*Morelia spilotes* (Lacèpéde)) have frequently been observed in the vicinity of roosts. In some cases the snakes have been found at the entrance to the roost (Carrai, Willi Willi, Riverton, and Bonalbo) and on one occasion, at Carrai, a snake was present well within the cave only a few inches from clustered bats. At Willi Willi a snake was observed at the cave entrance during the evening. It was hanging from a ledge in the middle of the flyway, where it would presumably have the greatest chance of capturing bats. Carpet snakes were not seen actually preying on bats but Mr. J. Frazier (pers. comm.) has observed a captive carpet snake picking flying *M. schreibersii* from the air in an aviary. He reported that the entire bat was consumed during feeding.

Grey butcher birds (*Cracticus torquatus* (Latham)) and black-backed magpies (*Gymnorhina tibicen* (Latham)) have been seen chasing bats when these have been released

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outside roosts during the day. On one occasion a large predatory bird, probably a goshawk (*Accipiter* sp.), caught a *M. schreibersii* just after this had been released. Boobook owls (*Ninox boobook* (Latham)) are widespread throughout the study area and have been heard calling in the immediate vicinity of many roosts. At Yassabah (November 1960) a boobook flew to a tree about 50 ft. from the cave entrance immediately after the first bat left the cave in the evening. This boobook was seen several times during the half-hour period of emergence. It was one of a pair that roosted on a limestone ledge, less than 100 yards from the cave entrance, throughout the study period. Only one, small, accumulation of pellets dropped by this pair was found and no bat remains were included. At Baker's Creek a boobook was present in a side tunnel of one of the mines on six of seven visits between June 1961 and April 1962. During this period 10 complete pellets, and fragments representing several others were collected. These included jaws of at least eight *M. schreibersii,* skulls of two *Chalinolobus* (*morio* (Gray)?), remains of at least seven *Rattus* sp., the skeleton of a small bird, a mandible of a small dasyurid, and numerous fragments of large coleopterous and orthopterous insects. It is clear that the *M. schreibersii* remains formed a considerable proportion of this deposit. Wing-bones of the bats were well represented in the pellets, so apparently wings were not discarded when the owl was feeding. Seven of the *M. schreibersii* were obtained in July 1961 when the pellets were first sampled. They were in rather fragmented pellets which were, therefore, probably relatively old. Presumably they were deposited in the previous autumn when bats were known to be quite numerous in the mine. The eighth *M. schreibersii* was in a pellet deposited in early spring after bats had reappeared in the mine following a winter absence.

In summer 1962 a feral cat (*Felis catus* L.) was observed leaving Yessabah (Kempsey Speleological Society, pers. comm.). One banded bat was reported after it had been caught by a cat, and two bats were apparently taken by a cat during evening recording in a hut near Carrai. Domestic dogs have also captured and eaten *M. schreibersii.* In one case the bats were captured while flying within a cave (Angel, pers. comm.). Rats, possibly *R. assimilis* (Gould), have been observed at Carrai, Willi Willi, and Riverton, but predation has never been confirmed.

On July 8, 1961 an animal, apparently a mammal, was disturbed within Carrai at 9 p.m. Several thousand *M. schreibersii* were roosting within the cave and very few of these were flying. Three freshly-killed *M. schreibersii* were found on the floor about 50 ft. from the cave entrance near the place where the animal was first heard. These bats had blood on their heads and the throats of two had been slashed open. Troughton (1957) attributes weasel-like habits to several dasyurids (e.g. *Phascogale tapoatafa* (Meyer)) and it is possible that the disturbed animal was one of the larger dasyurids. Presumably the animal must have climbed the cave-wall to reach the bats.

Between March 1961 and September 1963, consistent predation on *M. schreibersii* by a fox (*Vulpes vulpes* L.) was followed at Yessabah (Dwyer, 1964*a*). Predation was evidenced by wing elements accumulating at particular sites within the cave. Remains of at least 476 *M. schreibersii* were collected during the period indicated above. The data obtained suggested that the fox visited the cave to prey upon *M. schreibersii* more frequently

when bat numbers were high. August and September visits in 1964 did not reveal any deposited wings and presumably bat predation by this fox had ceased before the previous autumn influx of juvenile bats.

A similar deposit of wing-bones to that observed at Yessabah was found a short distance inside Moparrabah in March 1961. At least 35 *M. schreibersii* were represented. The deposit was old and was present on a small rock-platform where the cross-section of the cave reduced to a space of about 4 x 3 ft.

Disease and infection

With the exception of a mass die-off of *M. schreibersii* recorded at Yessabah only one obviously infected individual was observed. This was a male captured at Back Creek on June 16, 1960 and had an infected growth or wound low on the back. Minor infections to the upper or lower forelimb have been noted several times.

The Yessabah die-off was first noticed on August 21, 1960, when 22 (21 female) recently dead *M. schreibersii* were found on the floor of the cave. A "large number" of dead bats was reported from Yessabah on October 29, 1960 (Carter, pers. comm.) and on November 13, 1960 139 *M. schreibersii* carcasses were found. These were in an advanced state of decomposition so that about half were little more than furred skeletons. Most of the bats were on their backs or bellies and had apparently died where they had landed after falling from the roofs. A few were hanging upside-down from low rocks or low on the cave walls. These had apparently crawled some distance after falling from the roof. It was not possible to recognise the sex of these dead bats or to determine the cause of death.

Reproductive deaths

Only one recorded death could be attributed to the stresses of parturition. The female was found on the wall of the Willi Willi breeding cave late in December. A considerable portion of the reproductive ducts and hind gut had been forced through the vulva during parturition.

A recently aborted foetus was found at Carrai on October 21, 1960. In one instance the condition of the pelvis and vulva of an adult female suggested that abortion had occurred. Death of a juvenile female born away from a maternity colony has been previously recorded (Dwyer 1963). Early death of juveniles born at maternity colonies would follow from death of the parent, and juvenile deaths are presumably also indicated by the capture of females, that have recently lactated, away from the maternity colonies before nursing duties should have ceased. One such female was taken at Viator on December 8, 1962.

Juvenile mortality at maternity colonies

Many juveniles die at the maternity colonies from early January onwards. At this time the oldest juveniles are becoming quite active on the roof and fall, or knock others to the ground (Dwyer, 1963). In January 1963 a small stream ran through the Willi Willi breeding cave, beneath the clustered young, and many of the falling young were immediately carried away from the colony. Even if these managed to escape drowning they would be unable to reach the clusters by climbing the walls. Consequently, mortality of juveniles at Willi Willi was probably increased by the presence of this stream. At Willi Willi several accumulations of juvenile *Miniopterus* skeletons were located on the guano, upstream from the clustered young. The

skulls of all of these had been bitten open. Rats were presumably responsible for these deposits, but whether they were actively preying upon juveniles, or were merely scavenging upon fallen and already doomed juveniles was not determined. It is clear, however, that bats are not the only source of food available to the rats, for these are present in the cave even in the months April to August when *M. schreibersii* are absent and relatively few other bats (i.e. *Rhinolophus megaphyllus* (Gray)) are present. At Riverton, mortality resulting from falling young may well be less than at Willi Willi for hazards such as streams, guano mounds, or rough walls, are less evident. Rats living at Riverton have been observed leaving the cave in the evening and presumably frequently feed outside. Certainly no accumulations of juvenile skeletons were found at Riverton.

In the period January 1-15 (1962-63) a sample of 365 bats taken away from the maternity colonies included 11 (3·0 per cent) adult females. By February 1-15, a sample of 367 included 48 (13·1 per cent) adult females. The increase in percentage of adult females presumably reflects mortality of juveniles at the maternity colonies over this interval. Most juveniles would be flying by mid-February and mortality from falling would decrease thereafter. The figures suggest that not less than 10 per cent of the juveniles die at the maternity colonies. It is considered unlikely that the percentage is much higher than this.

Deaths from unknown causes

From time to time dead bats are found and it is not possible to discover the cause of death. Skeletal material representing about 10 *M. schreibersii* was present on a rock ledge at Ashford and a complete skeleton was found on the floor of a mine at Baker's Creek. Recently-dead bats were found on guano at Back Creek (August 1960, two individuals), Camp Cave (March 1961, one individual), and Euglah (May 1962, one juvenile). A dead banded bat was found on the wall of Carrai (July 1961) about six feet above floor level. There was a dense growth of fungus over the head and chest. In late March 1963 a dead female was found hanging from the cave wall at Ashford. The female had recently lactated and it is possible that death was related to the stresses of nursing.

Discussion

The Willi Willi breeding cave appears to serve a population of *M. schreibersii* occupying the drainage areas of the Macleay, Nambucca, and Bellinger Rivers (Dwyer, MS in prep.). This area is less than half the total study area. At Willi Willi more than 10,000 juveniles are born annually. For a numerically stable population the total annual mortality must equal the annual increment of juveniles. There was no suggestion during the study period that major changes were occurring in population size, and consequently, the number of *M. schreibersii* dying each year, in the Macleay region alone, must have been of the order of 10,000. It is striking, therefore, that with the exception of juveniles dying at the maternity colonies less than 700 deaths were accounted for in the entire study area during 41 months of investigation. Even including the estimate of 10 per cent for juvenile mortality at maternity colonies the discrepancy is great. The most generous estimate (doubling the estimate for juvenile mortality at maternity colonies and counting all other dead bats as being from the Macleay region) only accounts for 700 dead bats out of 40,000 deaths (i.e. in 3 years 5 months).

The remains of dead bats were only found at roosting sites. Other evidence for mortality, which was not based on discovering bat remains, also implied death at roosting sites. The most frequent causes of death for which evidence was obtained were due to predation or to juveniles falling from the roofs of breeding caves. It is unlikely that predation could be important except in the vicinity of roosts. This follows because bats would only be accessible to predators such as carpet snakes and mammals at entrances, or inside the roosts, and because it is unlikely that owls could be efficient predators of a high, and fast flying species such as *M. schreibersii*. Only one record of bats being preyed upon while roosting was obtained and, therefore, it is probable that predation would be greatest when large concentrations of bats were leaving or re-entering roosts. Records from more than 50 such flights suggest that, with respect to the total population size, predation is an incidental and not a major cause of death. The total number of juveniles dying at breeding caves is meagre compared with the total annual mortality. With the exception of these juveniles, and a single instance of a mass die-off, very few dead bats were found at roosting sites. It is possible, therefore, that most deaths of *M. schreibersii* occur away from the roosting sites and are due to mortality factors which have not been recognised.

It is suggested here that starvation might be a significant cause of death in *M. schreibersii*. In this bat a very high metabolic rate is maintained during flight while metabolic rate during roosting periods is much lower (Morrison 1959). Therefore, if insufficient food was found during a particular evening flight, death from starvation could occur. Such deaths would occur away from roosts. The failure to lay down sufficient fat reserves before winter might lead to increased searching for food in unfavourable conditions (e.g., mid or late winter) and thus to starvation. It has been estimated that the mortality rate of bats in their first year is greater than that of older bats (Dwyer, MS in prep.). Since these juvenile individuals enter winter weighing less than older bats (Dwyer 1964*b*), their higher mortality rate might be explained in terms of an increased likelihood that they will attempt to feed during winter. In addition juveniles may be less efficient at selecting suitable wintering sites and, thereby, expend more energy either by transferring from roost to roost or by remaining longer in a metabolically less suitable roost. The autumn appearance of many juveniles at a wide range of sites contrasts conspicuously with the regular reformation of adult wintering colonies in this season (Dwyer, MS in prep.) and supports this last suggestion.

Finally, the details supplied for the recovery of one banded bat are consistent with the present suggestion that starvation could be a significant cause of death in *M. schreibersii*. The bat, an adult male, was recovered dead on July 5, 1964. It was found in the morning lying on the concrete floor of a dairy yard. It showed no evidence of having been molested by a potential predator and simply looked "as if it had died with the cold" (Mrs. R. Ford, pers. comm.).

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Dwyer, P. D. (MS in prep.). The population pattern of *Miniopterus schreibersi* (Chiroptera) in north-eastern New South Wales.
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Troughton, E. le G. (1957). Furred Animals of Australia. 6th Ed. 376 pp. (Angus and Robertson: Sydney)

Book Review

"Bird Wonders of Australia"

A. H. CHISHOLM, F.R.Z.S., C.F.A.O.U.

[6th Edition. Angus and Robertson Ltd.,

221 George Street, Sydney.

x + 244 pp. Coloured frontispiece and 64 half-tones.

Price 35/- ($3.50).]

Many bird-watchers in Victoria have never met a Pitta face-to-face in its natural habitat, but its bright colours are familiar to them from the frontispiece and the illustration on the dust cover of Alec Chisholm's "Bird Wonders of Australia". The book first appeared in 1934, the fifth edition was dated 1958 and the proof of the book's popularity is the publication of this sixth edition in 1965.

The new edition contains the same number of pages and the same illustrations as the last, but there have been a number of small changes in the text, the deletion of a sentence or paragraph here and the addition of one or two paragraphs there. Almost all of these changes have been made in Part II and many in the final chapter.

The book contains a wealth of information and is excellent reading. Some naturalists may continue to regret the anonymity of many of the sources; but all will hope that the new edition will succeed, as its predecessors have in the past, in encouraging more Australians to take a greater and more informed interest in the birds around them.

J.R.H.

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield. The 116 species known and described and illustrated by line drawings, and there are 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis. This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK AND A CHECK LIST OF ITS VASCULAR FLORA, by J. Ros Garnet. Coloured frontispiece, 23 half-tones, one hundred line drawings of plants and a map. Price $1.50.

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, S.E.1, Victoria. Payments should include postage (4c on single copy).

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Gellion's Run

Mrs. Ellen Lyndon of Leongatha has sent the following note:

There are not too many large blocks of bush land left on the Gippsland coastal plains today. One of the areas surviving in a more or less natural state is the Gelliondale coalfield, some 6000 acres known as Gellion's Run, extending from the South Gippsland Highway a few miles beyond Hedley to the sea. As the coal will not be needed for many years to come there has been some comment in the local papers on proposals to subdivide the land and lease it in blocks for agricultural purposes. This, of course, will mean the clearing of the bush.

It is a notable area for wildflowers and local naturalists have compiled an imposing list of orchids in their proper seasons. *Boronia dentigera* is one of the choicer shrubs that comes to mind. Such a substantial area would certainly house an interesting fauna. Local conservationists are asking the Shire of Alberton if, should their plans mature, they would consider sparing some of the bush blocks in their present state to provide living space for the wild things that are domiciled there.

Passing that way in mid-November I stopped to look at a magnificent stand of flowering grass-trees. This miniature forest of tall creamy spikes ran for the best part of a mile along the roadside and would be up to a quarter of a mile in depth. A fierce fire last year had caused every plant to send up a flowering spike. Some of the tallest specimens were fifteen feet in height with the mass of tiny flowers occupying the top nine feet of the stem. They ranged in size down to tiny dwarfs. Some were kinked and twisted along the ground and here and there was a looped spike. These looked as if the flowering part had split and formed two perfect branches that joined smoothly again at the top. One plant noticed had one strong lofty spike with seven miniature ones springing from the same base. Smaller herbs were just recovering from the fire so that the stand of *Xanthorrhoea* was pure save for an occasional gum-tree. Bees buzzed everywhere and many honey-eaters had come for the feast. Red Wattlebirds squabbled noisily and pursued each other through the maze. Spinebills and Yellow-winged Honeyeaters worked busily. Yellow-faced Honeyeaters hovered as they fed, wafting up and down the spikes. The bare blackened earth was littered with fallen gum leaves, each leaf perfect but skeletonised and lace-like. Looking for the cause of this I saw that fallen flowerspikes knocked down by cattle or visitors were being eaten away by rather repulsive many-legged larvae, samples of which have been determined by Mr. A. Neboiss, Curator of Insects at the National Museum, as larvae of the coleopterous family *Lagriidae*. This splendid floral display should be worth looking at for weeks to come. The site is a couple of miles past Hedley township near Pearson's Road, which runs through part of Gellion's Run.

A Grange Nursery

The following bird notes have been sent in by Mr. Victor Jacobs, a school teacher living at Narre Warren North. The "Grange" referred to is now a derelict property, but the homestead (1866) was one of the first in the Narre Warren area and is rich in local history.

I had not been near the Grange for some weeks and as I approached a Grey Butcher Bird harshly warned me to stay away. He lost interest as a moth took his attention and after capturing it delivered the insect to his young one who perched nearby in a Long-leaf Box. It was quite a nursery area. A party of Grey-crowned Babblers numbering at least six was busy and noisily foraging high in the gums while the two young members of the

party urged their elders plaintively to bring more delicacies. One adult was working alone in a tree a few yards away —cackling to himself and also feeding himself. Not once did these birds come down to ground level, which is most likely the reason for their survival. It was good to see this species again in the area for it is all of two years since I saw them last, halfway between Dandenong and Narre Warren North beside a dam on the Heatherton Road.

Feeding Birds at Kalorama

Many bird lovers obtain enjoyment by providing food and water regularly for the birds visiting their gardens. The following notes from Miss M. Moon of Kalorama will be of interest particularly to those who live in more urban areas with a different avian population:

My neighbours live on the low side of Mount Dandenong Road and their windows and balcony are high above the ground, facing into eucalypt forest. For years now they have had regular bird visitors each with its special taste in food. Mrs. Taylor keeps a supply ready inside the kitchen casement window. The bird-bath is on the balcony rail nearby and there is a food platform on the window sill.

A Golden Whistler calls loudly at the window and receives meat or cheese, sometimes rejecting the first offering if he fancies the alternative food. A Yellow-faced Honeyeater with long, curved bill and even longer tongue came for sugar. His beak being an obstruction he turned his head sideways and scooped up the sugar with his long tongue. To make feeding easier his hosts made some sugar syrup which they placed in a tin lid on the sill. This proved very popular; but unfortunately ants eventually found it. The syrup tin was then placed in a larger lid containing water. It was several days before the birds accepted this innovation.

When feeding young they brought insects which they dipped into the syrup before flying to the nest. One bird dips bread before taking it to the nest. Now one honeyeater will take syrup from a spoon or from a wide-necked bottle held in the hand: its mate will put its head in, but withdraws in fear before actually getting any syrup.

A Grey Shrike Thrush takes bread and throws it into the bird-bath. When soaked it is eaten. Another Grey Thrush has lost the entire lower part of the beak. For months he has been coming for pellets of cheese or meat which he seems to be able to transfer to the mouth with the aid of the tongue.

Kookaburras come for meat. Honeyeaters, fantails, Yellow Robins and Blue Wrens take cake-crumbs. Honeyeaters and thrush parents bring their fledglings to be fed beside the bird-bath. They drop bread in the water and then fish it out and push it down the babies' throats.

A Golden Whistler, a Yellow Robin and a honeyeater recently gave quite a "circus" performance whilst sitting on the rail among a swarm of flying ants. They darted up and caught ants on the wing, returning to the rail before each fresh attack.

Noisy Feeders

Mr. M. O'Donnell wrote from Greensborough on July 26, 1965.

In some tall gums in our back garden we saw a remarkable spectacle last week-end. A colony of some 20-30 small birds, Striated Pardalotes we think, making a noise like falling raindrops on grass, seemed to be busy eating scale-insects from the underside of gum-leaves. The unusual noise made by the these birds apparently arose from their beak action.

After busily bobbing about, leaning down to peck at leaves, for some 3-4 minutes the flock of birds made off to another tall gum tree some twenty yards distant.

From Neville Cayley's book, *What Bird is That?*, we judged these birds to be Striated Pardalotes. Is this likely to be correct? Is it usual for such birds to concern themselves with pecking at what seemed to be mealy, scale-like growth on the gum leaves?

We have lived here for some 14 years, but we cannot recall having witnessed such a spectacle previously.

There seems no reason to doubt the identification. Both Striated and Spotted Pardalotes are known to feed on scale-insects and Michael Sharland (1958) *Tasmanian Birds,* 3rd Edition p. 135, mentions that the latter makes a considerable noise with the beak pecking the underside of leaves.—J.R.H.

Field Naturalists Club of Victoria

General Meeting—January 10, 1966.

About 100 Members and friends were present when the President, Mr. M. K. Houghton, opened the first meeting of 1966 by his usual speech of welcome. He mentioned Miss V. E. Balaam recently returned from an overseas trip. Members stood in silence in memory of Miss May Burton who had died recently.

Owing to the fact that Council had not met at the end of December the Minutes of the December General Meeting had not been formally approved, but they had been examined by the President and Secretary and on the motion of Mr. Lloyd Williams, seconded by Mr. Morley, they were taken as read, approved by the Meeting and signed.

The Secretary, Mr. E. H. Coghill read letters that he had addressed to the Premier re representation of natural history societies on the National Parks Authority, and to the Landscape Preservation Society, re the building of a motel in Wilson's Promontory National Park, in accordance with the resolutions passed at the December General Meeting. No replies had been received.

The President asked Mr. E. S. Hanks to introduce the speakers for Members' Night—General. The first to come to the microphone was Mr. R. Riordan who showed slides of a lyre-bird nest and of the remains of a *Sarcochilus australis* colony at Kallista, of a singularly immobile spider on a stone near Buxton and of tracks made by insects living under the bark of a blackwood on Mt. Dandenong.

Mr. Morrison then spoke to slides of four of the five species of *Corybas,* Helmet Orchids, known to occur in Victoria. These slides illustrated *C. dilatatus, C. diemenicus, C. fimbriatus* and *C. unguiculatus.* Mr. Morrison mentioned their salient characters and gave notes on their distribution.

Mr. T. E. North followed with pictures of the rock-bar across the mouth of the river at Marble Bar, W. Australia. The slides illustrated the wide varieties of reddish-brown, blue, yellow and other colours that occur in the exposed surfaces of the marble jasper.

Mr. Lloyd Williams showed a number of slides of Grampian wildflowers. He said that although many acres of what used to be wonderful wildflower country had been destroyed by bull-dozers, particularly along the sides of the Pomonal—Halls Gap road, there were still many places where the more beautiful plants could still be found, even if reduced in numbers. Species illustrated were *Xanthorrhoea australis,* a 20 inch high specimen of *Diuris maculata, Euphrasia collina, Tetratheca* sp., *Hibbertia fasciculata, Grevillea alpina, Sprengelia incarnata* still widespread in swampy patches, *Calytrix sullivannii, Bauera sessiliflora* and *Calectasia cyanea.* Mr. Williams concluded with a photograph of a six-foot Black Snake.

Dr. Kaire's contribution dealt with tick paralysis. This condition is caused by a toxin, injected when feeding, by the adult female of the tick *Ixodes holocyclus.* This species occurs now down the east coast of Australia and penetrates into Victoria as far as Lakes Entrance. Black and white slides were shown of the distribution of the tick, its life history and the symptoms shown in a dog as well as close-up photographs of an engorged female.

Miss L. Young showed some colour slides of paintings of Australian native bees by the late Mr. Tarleton Rayment.

Mr. Eric Allan spoke to a series of pictures taken on a visit to Mootwingee Reserve, 70 miles north east of Broken Hill. The area was part of a sandstone ridge with rock pools in the gullies. These pools never seemed to go dry and were used regularly by aborigines in the past. One feature of the reserve was the well-preserved petrographs, several groups of which were illustrated.

Mrs. E. Bennett showed slides taken from a steamer as it passed through Lock 11 near Mildura. There was also a picture of the old Mildura pumping station, now leased by the Sunraysia F.N.C. as a meeting hall, and some slides of local plants.

Finally Miss M. J. Lester showed some pictures of the life history of a gall-wasp that parasitised Cootamundra wattle. The galls, between a pea and a cherry in size, contained, at first, legless, banana-shaped whitish grubs 1/16 of an inch long. Six weeks later they were fatter and the dark head was recognizable. Later still shiny, black pupae 1/8 of an inch could be extracted and from these there emerged eventually the winged adult insect with beaded antennae.

The President thanked Mr. Hanks, the speakers and the projectionist for a most enjoyable session. The Hon. Excursion

Secretary, Miss M. Allender, again asked Members interested in the proposed visit to Queensland in September to contact her.

The President pointed out that all nominations for Officers and Council should be given to Mr. Zirkler and that any business for discussion at the Annual General Meeting in March should be handed to the Hon. Secretary that evening. The President drew particular attention to the fact that a replacement for the Editor was an urgent necessity.

Because Council had not met in December there was no election of Members.

With the permission of the President, Miss May Moon appealed for help from Members for the Save the Dandenongs League in its campaign to replace the Tourist Development Authority's scheme for the summit of Mt. Dandenong by one more favourable to preserving the native beauty of the area. It appeared that the press was now prepared to publish letters condemning the Authority's plan and that various people in authority were beginning to appreciate the strong opposition that the plan had aroused. By writing now to the newspapers and to their parliamentary representatives, Members could exercise a strong influence in favour of the League's proposals.

Mr. Jim Baines drew attention to a warning given by the Fisheries and Wildlife Department, that had been published in that morning's edition of the *Age* newspaper, on the danger of handling the small and pretty octopus, *Hapalochlaena maculosa*, at present common on Victorian beaches. Few people, including writers of authoritative books, seemed to know that these marine animals could produce a severe and rapid paralysis.

Dr. Kaire said that he was very anxious to secure a specimen of the very rare relative of the Red-backed Spider that had been described and named *Latrodectes geometricus* by Koch in 1872. The original specimen was reputed to have come from eastern Victoria. The dorsal aspect was brownish red, but instead of the stripe, brownish lines radiated from the centre to the peiphery. He would be very grateful for any information on this spider.

Mrs. K. Meehan mentioned a talk that she had heard on the wireless on how to control regeneration of eucalypts in pasture land.

The exhibits on the table included a

number brought by Mrs. M. North, a Giant Limpet shell from Albany, coral from Broome, Slug Coral from Darwin, a Cup Sponge and coral washed ashore on Eighty-mile Beach, N.W. Australia, and specimens of smoky quartz from Strathbogie Mts., near Benalla. Mr. Roger Riordan exhibited a case moth found on mistletoe at Highett and Mr. Bob Condron three Junior Wanderer butterflies, *Danaus chrysippus petitia,* bred at Box Hill from larvae on Swan Plant. There was a copy of the *Junior Naturalist* Vol. 1 (3) for December 1965 on the table and under a F.N.C.V. microscope a rock section (diorite or spessartite). Also displayed was the Christmas card sent by His Excellency the Governor, Sir Rohan Delacombe.

Mr. A. J. Swaby had brought some specimens illustrating regeneration of eucalypts, a subject covered in Mr. Ross Cochrane's article in the January *Naturalist.* They showed regeneration of a Candlebark Gum from the lignotuber after replanting: there were 40 shoots from adventitious buds on one specimen and others were tiny plants with small lignotubers such as grew slowly in the forest floor until the canopy was destroyed when they developed rapidly.

Under the item "Nature Notes", Miss J. Woollard mentioned the occurrence of a pair of Little Cuckoo-shrikes in the garden and the President said that Black-faced Cuckoo-shrikes seemed to have been more abundant than usual in Melbourne. Mr. F. L. Jeffs reported that following the plague of moths many suburbs had experienced an invasion of army-worm. In the Springvale area they were so numerous that they were dying of starvation.

Miss M. N. Elder reported seeing a nesting Red-capped Dotterel with two eggs at Shoreham and asked is anyone could tell her the identity of two masses of swarming insects, flies or bees, seen clustering in shallow caves along the beach.

AFFILIATED CLUB

Hawthorn Junior F.N.C.

Barry Cooper, the Excursion Secretary, has submitted the following report on activities since March 1965:

Office Bearers at January 1, 1966

President: Mr. D. E. McInnes.
Secretary: Janet Fitzgerald, 6 North Court, Surrey Hills.
Treasurer: Mrs. M. Harrison.
Excursion Secretary: Barry Cooper.

There is a Publications Committee of six members and a Junior Executive Council of thirteen.

Membership

On January 1 the Club had 102 members. Attendances at monthly meetings have been very good, the highest recently being 115 last November. The Club is grateful to the Hawthorn Council for the free use of the room each month.

Excursions

There have been four excursions during the period, two arranged jointly with the F.N.C.V.

May 8—Marine excursion to Seaholme including an inspection of the marine collection made by our former secretary/treasurer, Mrs. M. Freame.
June 20—With F.N.C.V. to Warrandyte, Yarra Glen and Healesville.
October 2—Geology excursion to Studley Park.
December 5—With F.N.C.V. to Point Addis and Anglesea districts.

Publications

In August the Editor retired and a Publications Committee was formed. A booklet "Preserving Marine Specimens" by one of our members, Leigh Windsor, was produced for the Nature Show in September. In October The *Junior Naturalist* was launched to replace the original newsheet, the *Hawthorn Branch,* in the hope of obtaining a wider circulation for our monthly publication. Paul Gahan was largely responsible for this change.

Nature Show

The Junior Executive Council organized three exhibits for the 1965 Nature Show, Preserving Marine Specimens, Collecting and Studying Pond-life and Gem Cutting.

Library

The Club has made an arrangement with the F.N.C.V. Hon. Librarian, Mr. P. Kelly for obtaining books on loan. A list of suitable books has been prepared and our members can order at one meeting and borrow them at the next.

Preston Juniors

Since the inception of the Preston Junior Club in March 1965, we have tried to give all possible assistance. Preston members receive the *Junior Naturalist* which contains reports on their activities each month.

A FIELD-LIST OF THE BIRDS OF CANBERRA AND DISTRICT

The A.C.T. Branch of the Royal Australasian Ornithologists Union has just published "A Field-List of the Birds of Canberra and District". This attractively printed 16-page pocket-size booklet summarizes present knowledge of the 254 species recorded from the district. For each species it lists the locations and types of habitat and shows diagrammatically the breeding season and the numerical status throughout the year.

Though designed particularly for field use in the Canberra district, the booklet will be a valuable source of information for anyone interested in Australian birds. The graphic method of setting out the occurrence and breeding season of birds is perhaps not well known in Australia; this is another reason why the booklet should be of interest.

Copies may be obtained from Mr. W. H. Oldham, 14 Willcock Place, Curtin, A.C.T. The price is three shillings or 30 cents (posted—3/5 or 35 cents).

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

GENERAL MEETINGS

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

1. Minutes, Reports, Announcements. 2. Correspondence.
3. Subject for the Evening: South West Tasmania, slides and commentary.
4. Election of Members.

(a) *Ordinary*

Mrs. R. C. Bell, 22 Pleasant View Crescent, Glen Waverley (Interest—native trees and shrubs).
Mrs. L. R. Dowel, 150 Gladstone Road, Dandenong (Interests—aquatic plants, mosses and ferns).
Mr. G. C. Love, 4 Wilkinson Street, Reservoir, N.19 (Interests—field geology, selenology).
Mr. and Mrs. W. Rackham (Joint), 3 Sturdee Street, Box Hill, E.11 (Introduced by M. K. Houghton).
Mr. and Mrs. N. M. Taylor, 15 Hopetoun Road, Toorak, S.E.2 (Interest—geology).

(b) *Country*

Mr. L. S. Francis, 1 Rosalind Street, Frindale, S.A.
Mrs. M. E. Heffernan, 61 Coppards Road, Newcomb, Geelong.
Mr. D. H. Jeans, Blackwood Avenue, Warburton.
Mr. E. Jensz, 16 Church Street, Nhill (Interest—entomology).
Mr. L. G. Milne, Box 141, Irymple.

(c) *Junior*

Barry John Cooper, Bath Road, Burwood (Introduced by D. E. McInnes).
Barry Ely, address not known (Interest—microscopy. Introduced by P. Genery).
Daryl L. Hutchins, 29 Morotia Avenue, Ashburton (Interest—reptiles).
David J. Kemp, 34 Jacka Street, North Balwyn, E.9.
Daughn Frances Reilly, Little Yarra Road, Yarra Junction.

5. General Business. 6. Nature Notes and Exhibits.

Monday, March 14—Annual General Meeting. Mr. A. J. Swaby—"Browsing through the Grampians" (slides by Mr. I. F. Morrison).

GROUP MEETINGS

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

Wednesday, February 16—Microscopical Group. Exhibition and discussion of pond-life from Albert Park Lake.

Friday, February 25—Hawthorn Junior Club—at Hawthorn Town Hall at 8 p.m. Mr. W. L. Thompson—"Bees".

Wednesday, March 2—Geology Group.

Thursday, March 3—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.

Monday, March 7—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Thursday, March 10—Botany Group. Mr. A. J. Swaby—"Introduction to Plant Ecology".

Friday, March 11—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street), at 8 p.m.

F.N.C.V. EXCURSION

Sunday, February 20—Mt. Donna Buang. Leader, Mr. R. Condron. Subject, Entomology and general. The coach will leave Batman Avenue at 9 a.m. Fare $1.60, bookings with the Excursion Secretary. Bring two meals.

PRELIMINARY NOTICE

September 17 to October 2, 1966—Queensland. The party will leave Melbourne by air on Saturday, September 17, for Brisbane where it will stay overnight. Sunday it will go by bus for Maryborough via the Glasshouse Mountains and Sunshine Coast and then, on the Monday, proceed to Gladstone. On Tuesday it will depart for Heron Island for a week. On Tuesday 27, it will leave Heron Island and take train to Brisbane and thence by bus to Binna Burra on the Wednesday. There it will remain until Sunday, October 2, when the main party will return to Melbourne. Those wishing to remain longer in Queensland may do so as the return ticket may be used at a later date. The inclusive fare will be approximately $220: a deposit of $30 should be paid to the Excursion Secretary when booking and the balance by August 8.

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, 1965

President:

Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. E. Byrne, Mr. A. Fairhall

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. Hudson, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. R. Dodds, 5 Banchory Street, Essendon (379 4309).

Microscopical: Mr. P. Genery, 7 Rollings Road, Upper Ferntree Gully. (Phone: Ferntree Gully 587.)

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	50/-	($5.00)
Country Membership (over 20 miles from G.P.O., Melbourne)	40/-	($4.00)
Junior Membership (under 18 years)	25/-	($2.50)
Subscription to the *Victorian Naturalist* (non-members)	40/-	($4.00)

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1.

The Victorian Naturalist

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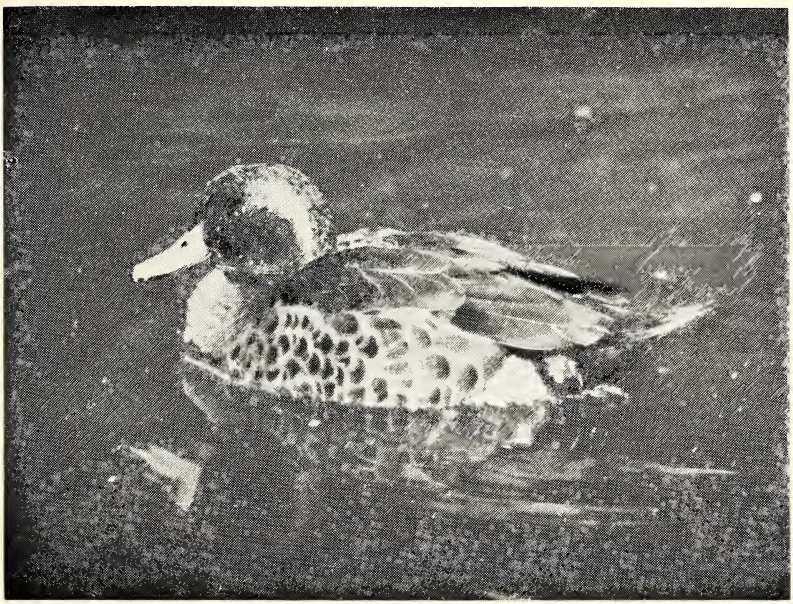

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The Red-wattle Bird, *Anthochaera carunculata*, is resident in the Melbourne area.

Photo: Dick Hudson.

Vol. 83, No. 3

March 10, 1966

The Victorian Naturalist

Editor: J. R. Hudson, B.Sc., M.R.C.V.S.

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Front Cover:

This photograph of a Grey Teal, *Anas gibberifrons*, was taken by Mr. N. A. Wakefield.

Aboriginal Sitting Burial near Swan Reach, Victoria

By Edmund D. Gill*

On the east bank of the Tambo River, about 200 yards from the mouth, Mr. Robert Cunningham of Swan Reach noticed a human skull protruding from the alluvium on 11th October 1965. Mr. Cunningham has a grazing lease in that area. He reported the discovery to the Victoria Police at Bairnsdale, and Detective D. Cadby investigated. As the alluvium was very compact, it was difficult to remove the bones, especially as they were somewhat soft from partial decomposition. Detective Cadby reports that most of the small bones had disappeared or almost so, leaving a brown stain in the sediment. The body had been buried in a sitting position, facing west, with the top of the head about two feet below the surface of the ground. Brough Smyth (1878, pp. 100-106) describes a flexed burial. Active erosion of the bank of the river is occurring at this point, so much so that residents claim that in the past 50 years the bank has receded about two chains. It was this active erosion that revealed the aboriginal burial.

The bones were submitted to Dr. Pilbeam, the Government Pathologist at Sale, who reported that the bones are those of a female aboriginal about 20 years of age, about 5 ft. 4 ins. high, and of slim build. If a radiocarbon analysis were made of some of the bones, the approximate time of burial could be determined.

The Victoria Police are instructed to send aboriginal bones to the National Museum, and this is frequently done, but the excellent report provided by Detective Cadby makes it worthwhile to publish the occurrence at the mouth of the Tambo River. Different modes of aboriginal burial obtained in different parts of Victoria—some sitting, some flexed and lying on the side, and some extended. It has been discovered that in some areas burials were oriented, e.g. Professors S. Sunderland and L. J. Ray (1959) record numerous burials in the Murray River area, and they were all (where determinable) N-S or E-W. It could be that all burials were oriented, and so it is helpful if those who collect such skeletons note the orientation. There is also evidence that burial customs changed with time. If this can be established for a given district, then the type of burial has time signification.

As much more scientific information is needed, the National Museum of Victoria would welcome the co-operation of people in a position to send aboriginal skeletons, especially if details of occurrence are available.

References

Brough Smyth, R. (1878). The aborigines of Victoria. 2 vols. Government printer, Melbourne.

Sunderland, S., and Ray, L. J. (1959). A note on the Murray Black collection of Australian aboriginal skeletons. *Proc. Roy. Soc. Vict.* **71**: 45-48.

* National Museum of Victoria, Melbourne.

Dawn is the best time . . .

By V. Jacobs

During the long school vacation, 1964-1965, our family went on tour in Victoria and interstate. Being a mixed age group with naturally differing tastes, our halts took those differences into account. Some stops for the younger folk, while ideal in many ways for them, provided a dawn chorus not to anyone's taste. Clanking garbage collectors, honking milkmen, raucous breadmen and noisy newsvendors cut through the dawn vigorously.

Other stopping places, especially the one-night stands, were chosen for their remoteness from man and for their natural history possibilities. There, when the leafy pattern made by dawn's light meandered across my eyelids, I rose, dressed and quietly stole out of camp. This was usually about 5 a.m. My equipment consisted of binoculars, notebook and pencil. Thus armed, I would spend a couple of hours observing and then return to camp to boil the billy and brew the tea. While the fragrant odour of the brew percolated through the dreams of the others, Cayley and Leach would be perused for birds seen but not recognized. In this manner many incidents were enjoyed and I thought that my pleasure might be shared by others should they pass that way.

Incident No. 1. December 28, 1964. Location: Beside the Tambo River where it swings away from the Swan Reach to Metung road.

The previous evening we had seen the Red Rock backed by the rippled blue of the waves on which a white-bellied yacht sailed past.

The morning was mild but the wind's direction promised greater heat later. A couple of families of Blue Wrens fossicked noisily in the Tea Tree and a Grey-backed Silvereye *(Zosterops halmaturina)* perched momentarily in the same bush. A Black-faced Cormorant *(Phalacrocorax fuscescens)* remained immobile on a trunk in the river, but a White-faced Heron *(Notophoyx novae-hollandiae)* launched itself hurriedly from a riverside gum as we approached.

Incident No. 2. December 29, 1964. Location: The tall timbers near Boydtown.

On our way to this location we had detoured from the highway to Marlo where the Snowy debouches into the ocean. At Marlo we had been given exact details of the track to the Cabbage Palms along Cabbage Tree Creek. Without this information we should have missed the track completely because the sign was invisible from our side and, even from the other side, it was too small to be seen from a moving car. Perhaps this is all to the good, for the small sign, our mile drive through the almost overgrown track

and the final walk of a few hundred yards will certainly help to hide these unique plants from all but those interested in their preservation. On our way in we were able to approach very close to a Forest Bronzewing Pigeon *(Phaps elegans)*. The visit was well worthwhile for the slender Austral Cabbage Palms *(Livingstonia australis)* reached gracefully to the sky and looked healthily permanent.

Although the evening before had brought rain, that morning, near Boydtown, was clear. The dawn chorus came from high in the trees, so high in fact that I was unable to identify most of the birds glimpsed. A Whip-bird cracked very near and was partly seen through the scrub. Friendly Grey Fantails fluttered near to the car and two Black-faced Cuckoo-shrikes called as they flew through the canopy of timbers.

Incident No. 3. December 30, Location: Tanja, 10 miles from Bega on the Bermagui Road. A wide variety of habitats included a clear, running stream, fairly dense timber, open grazing land and a variety of cover along the road. All this was within a radius of three hundred yards of our bivouac.

At 5.30 a.m. it was quite light and the birds were making themselves heard. As I dressed I heard the calls of Wattle-birds and a Whip-bird from the timber. A pair of Willy Wagtails was foraging on the road while their shy relative the Rufous Fantail darted from the timber after an elusive moth, but, after capturing it, quickly retreated. A White-faced Heron rose from beside the creek and flapped on his unhurried way while a number of Welcome Swallows stayed on to skim the surface of the water whilst collecting their breakfast. Kookaburras, White-backed Magpies and Mudlarks all added their music to the general jubilation. A group of five birds bathed in the creek and then sat fluffed up on a branch to dry. I made notes and later realized that I had made my first sighting of the Yellow-winged Honeyeater. A group of agile, vigorous Orange-winged Sittellas seemed to search every crevice of a gum while, across the road, a flock of Yellow-tailed Thornbills, huddling together in the sun, held a twittering conversation. A pair of Grey-backed Silvereyes worked their way along the marginal trees and the mellow tones of an Olive-backed Oriole increased in volume, but the bird veered off before coming into sight. Bell-birds could be heard faintly towards the south. Fluttering to the road from their secluded perch, a pair of Peaceful Doves worked their way to within eight yards of my feet. All the time that I had been making notes of sights and sounds at least half as many again had eluded my ears or binoculars. A podgy brown-and-white flecked bird, trying hard to compress itself into a horizontal branch, could have been a young cuckoo. A Rufous Whistler called attention to itself and appeared for an instant. A Black-faced Cuckoo-Shrike called distinctly as it flew in a direct line overhead. Some dots in the distance soon resolved themselves into a flock of many hundreds of Spine-tailed Swifts. Scattered at first, they soon closed formation and having apparently found a thermal updraught they spiralled swiftly into the blue sky out of sight. As I returned to camp, having hardly ventured out of view of it, a small bird paused to perch on a branch above the car. It was a Satin Flycatcher.

Tanja will not alter its face in many years and though startling scientific observations may not be made in the space of two hours, I feel sure that any bird-lovers will enjoy a rare treat if they spend some time there.

Field Naturalists Club of Victoria

Eighty-sixth Annual Report
1965

The unusual thing about this Annual Report is that it is not Annual. At last we have taken the plunge and changed the Club's year from May in one year to April the next, to the ordinary calendar year from January to December. This we did by omitting four months from the year just finished, making it as from May to December, members getting only eight months for their "Annual" subscription. At the same time we also increased most subscriptions by $1 each for future years.

Membership

Playing around with subscriptions in this fashion was bound to cause some loss of members, but generally speaking the bulk of the membership remained loyal. The Treasury Department has provided the Secretary with figures calculated on a different basis from last year, so direct comparison is impossible. This year only those actually financial have been included. Last year all those still on the Roll were included whether financial or not.

This year we have 540 ordinary members, 310 country, 43 junior, 24 affiliated clubs and 102 subscribers, a total of 1019. In addition there are sixty members and subscribers who are less than a year in arrears, many of whom have already paid up.

Last year the total on the basis already indicated was 1026.

It is inevitable, in a Club the size of ours, that we should regularly suffer serious losses by death, and this year has been no exception. Amongst senior members whose loss has been recorded during the year, we may mention Dr. Roland Wettenhall and Mr. A. L. Scott.

Wyperfeld Book

During the year the Club, assisted by members of the Wyperfeld Committee of Management, financed the publication of a booklet by our former President, Mr. J. Ros Garnet, on "The Vegetation of Wyperfeld National Park". This venture has been most successful, and should spur us on to further efforts.

Show

The Nature Show in conjunction with the Society for Growing Australian Plants has become an annual event, and appears to fill a need in the life of the community. In addition to arousing interest, especially in native flowers, it brings in a small profit to each Club.

Medallion

The Natural History Medallion for 1964 was awarded to our old friend, Miss W. Waddell, for her efforts as founder and leader of the Native Plants Preservation Society. We had hoped to present the Medallion to Miss Waddell at a Club meeting, but this could not be arranged, and the Medallion was presented at a monthly meeting of the Native Plants Preservation Society.

Parks and Reserves

As usual, most of the energy expended by the Club was in connection with Parks, Reserves, and Wildlife protection generally. If one may generalize, we seem to have reached the position where the ordinary citizen believes in National Parks, but does not quite know what to do with them. Thus any talk of altering the boundaries of a Park like Wilsons Promontory or Mallacoota provokes such protest that such schemes are practically impossible.

On the other hand, it is very difficult to enlist support for the retention of large areas of land in their natural state for future generations. Concrete look-outs on Mt. Dandenong and licensed premises on Wilsons Promontory appeal to a large section of the community, and the task of preserving these areas is extremely difficult. Clearly more education of the public is needed. Good luck to the National Parks Association!

Excursions

Excursions were well attended during the year. In addition to the regular excursions on the third Sunday in each month there were many Group excursions

and two extended excursions, one to the Red Cliffs district in Spring and a Snowy Mountains-Mt. Kosciusko trip between Christmas and New Year. The Red Cliffs excursion was led by the Sunraysia F.N.C., members of which took the party on interesting and varied day-trips including Lake Victoria, Hattah Lakes, Cardross Swamp, Kings Billabong, Gol Gol, and a boat trip on the Murray. There was an overnight stop at Maryborough on the way home where members spent a most enjoyable evening with the Maryborough F.N.C. The Snowy excursion was largely under the control of the Snowy Mountains Authority who provided a guide to travel in the bus while going over the scheme; but Mt. Koscuisko provided more opportunities for the geologists and botanists. Members were delighted to see the white wallabies on the island sanctuary in Lake Eucumbene.

Many of the day excursions were led or joined by members of country clubs including the visit to Mt. Beckworth led by the Ballarat F.N.C., the Labertouche excursion led by Mr. A. Morrison which was joined by several members from country clubs, and Point Addis with Geelong members.

This year an extra bus was chartered on two of the excursions to allow for a combined junior and senior clubs excursion. The first one was to Healesville Sanctuary and the second to Pt. Addis; it is hoped to run more combined excursions in the future.

Library

During the past eight months fourteen new books have been purchased for the library, including the colourful Life Nature Series. A number of donations have also been made including eight of their own publications by C.S.I.R.O., three books on Geology by Mr. R. G. Hemmy and fifteen books on Microscopy by Mr. W. J. Evans.

The accessioning of all books in the library is complete and most books now have the Club's bookplate to facilitate identification. The card index has been started but as this will require the typing of some 3000 cards this will not be completed for about 12 months.

A system of loans to the Hawthorn and Preston Junior Clubs has recently been started and a list of selected books has been distributed to all members from which they can choose books to borrow.

GROUPS

Botany

Mr. Bruce Fuhrer was re-elected Chairman of the Group for the second year. Mrs. Matches was elected Secretary and Miss Allender Programme Steward.

During the year, the speakers at the monthly meetings, which were held on the second Thursday of each month, covered a wide range of botanical subjects and meetings generally were well attended.

Miss Helen Aston spoke on "Aquatic Plants" in February, 32 members and visitors were present. Subsequently, Miss Aston led an excursion to the Burke Road swamps to see these plants growing.

In March, Mr. Alan Morrison spoke on the flora of Central and Western Australia and his beautiful pictures were enjoyed by members.

Mr. J. A. Baines spoke on Australian and New Zealand flora at the April meeting when similarities and differences were compared in a thoughtful address.

Mr. J. Willis's address to the Group in May attracted 47 members and visitors when the subject was "Fungi Around Victoria".

In June, Miss P. Carolan showed pictures of Wilsons Promontory and in July, Miss K. Hall spoke on "The Botanist in the Kitchen".

In September, Mr. Rex Filson spoke on "Lichens" and Mr. A. Swaby dealt with the manner of fertilization of flowers in his talk to the Group in October.

In November, the Chairman of the Group, Mr. Fuhrer, spoke to members on "Seaweeds", and in December, Miss Lester's talk was "Rot", which was presented partly in the form of a fairy tale called "Fungus Fantasy", showing what could happen without fungi and their kin to keep the balance of nature. The practical part of the talk discussed some of the queer non-conformist characteristics of fungi. Mr. Steve Marshall spoke about a trip to the Warrumbungle Ranges. After the business of this meeting, members joined together at supper as is usual at the December meeting.

Other activities of the Group during the year were excursions into wildflower areas which were held each month.

The exhibit at the Nature Show was "The Plant Kingdom".

Fauna Survey

An average of thirteen members has attended the Group meetings of 1965, which were Chaired by Mr. N. A. Wakefield. The Group continues to operate largely as a working group. Members generally follow their individual interests in mammal surveying, and report their results to the rest of the Group at the monthly meetings. By this means, over the five years of its existence, the Group has compiled in its official minutes a considerable list of mammal records for Victoria. These are gradually building up the available information on species whose distribution was formerly almost unknown. Close contact with the Fisheries and Wildlife Department increases the value of the Group's work.

Activities over the last six months have been confined mainly to spotlighting observations, and investigations of the distribution of native rodents in N-W Victoria, due to a delay in the renewal of the Fisheries and Wildlife Department permit which is necessary for the handling of protected species.

In December the Group regretfully accepted the resignation of Mr. Wakefield as Chairman and Leader of the Group. Mr. Wakefield has led the Group since its formation five years ago and has been largely instrumental in its success and the interest and pleasure derived by its members. It is hoped that pressure of work will not prevent Mr. Wakefield continuing as an active member of the Group.

Marine Biology and Entomology

The average attendance at Group Meetings has been slightly above that of the previous year.

We have had three guest speakers and the nights when a guest speaker was not available have been filled in by members giving interesting short talks on various phases of Marine Biology and Entomology.

Exhibits are still an important feature, and members have brought along many interesting specimens, either for identification, or as subjects for short talks.

As this Group embraces two phases of natural history, we endeavour to alternate these as far as guest speakers are concerned. Unfortunately, it is much harder to obtain a speaker for Marine Biology. However, it is hoped that in the forthcoming year, we may be able to obtain at least two speakers on this subject.

Group members worked hard for the September Nature Show and were complimented on their excellent efforts, and we hope to do even better at the Nature Show this year.

Microscopical Group

This period has been one in which there have been excellent attendances; an average of over twenty, and compared with about two years ago when it was repeatedly 16 or 17, we feel that we have made some ground. Twenty-six members and visitors attended the June meeting, at which there was a practical demonstration on slide making. Considering that June is one of the worst months for attendances, it could indicate that this aspect of microscopy is one in which people are particularly interested and the programme should therefore be repeated.

All of the talks were given by members of the group themselves and covered many aspects of microscopy both old and new; they included two on the general biology of reproduction, frozen-section cutting, 8 mm colour photomicrography, books on microscopy and a discussion of the microscope itself.

The group's Nature Show exhibit continues to attract a great deal of interest among the general public.

The F.N.C.V. microscope continues to popularize not only microscopy, but an interest in natural history and no doubt it is a big factor in this increase in attendances.

Geology

The year proved to be one of progress for the Group. Aggregate attendances were up, with new members taking an active interest.

Speakers covered a wide range of subjects, as the Group was fortunate in being able to have the assistance of experts in various fields of geology. Evenings were devoted to the Geology of Broken Hill, Oil location and boring procedures, the Nullarbor Plains Fossil Fish and Vulcanicity. Members were also busy on any discussion nights.

The year saw the completion of a lecture project on The Building Stones of Victoria complete with illustrations, compiled by Mr. R. Hemmy. This project has been used and favourably commented upon, and it is to be hoped, is only the fore-runner of many more. The Group has also helped outside bodies, especially

in the examination of Scouts for their Natural History Badge. A visit was also made to the Rowallan Scout Camp to do field work with the scouts and thus it is hoped to stimulate an interest in the science.

Excursions were arranged to various areas for fossil-collecting, and to study as comprehensive a range as possible of the aspects of geology. Two weekend excursions were undertaken during the year to Colac and Maldon. Contact with local clubs and kindred bodies was most fruitful, members making many happy friendships. Individual members made private visits to country clubs to lecture and enjoy the local hospitality. Many interesting specimens were thus obtained and exhibited at the meetings.

Planning is well in hand for 1966 with emphasis on field work and it is hoped to visit some more of the interesting areas of Victoria. Mr. R. Dodds retired from the secretaryship at the end of the year. The Group is now looking forward to a happy future under the guidance of the incoming secretary, Mr. R. Box.

Report by Miss E. L. Forster, who represented the F.N.C.V. at the 1965 A.N.Z.A.A.S. Conference

A.N.Z.A.A.S. 1965. The 38th Conference of the Australian and New Zealand Association for the Advancement of Science was held in August in Hobart.

My stay in Tasmania lasted for two weeks, every minute of my time being filled. The conference itself was seven days of intensive study, discussions, lectures, and excursions, with numerous social functions fitted in where possible.

It was and evidently always will be quite impossible for any interested delegate to attend all the lectures he or she would like to be at because of the large number given concurrently, there being 16 sections represented.

Conservation. "The care of resources to obtain sustained productivity at a required level of output" was undoubtedly the major topic at the conference, four symposiums being given on one day in the Town Hall on behalf of Sections C, D, F, H, K, L, M & P.

"Geography of Hobart" was a very appropriate opening for Section P delegates and "The Atlas of Tasmania" produced by the Tasmanian Government an excellent book for any teacher of Geography.

Papers of considerable interest to me were Climate, (the earth's most equable climate being Macquarie Island). Oceanography in Australia, (a national programme?—Mr. A. H. Cooper, Hydrographic Office Garden Island N.S.W. had spoken on this topic at the last conference held in Canberra in January 1964.) Land Tenure and Land Use in the South West Pacific and The Ord River region.

Apart from lectures and excursions some of the time was taken up with travel, in particular exploring the North West of the state.

Burnie has developed considerably since the war, and now has a two and a half million pounds, sixteen hundred feet long breakwater to protect its harbour. The port facilities are being extended and the new Empress terminal gives visitors a chance to see for themselves the beauty of such native timbers as The Tasmanian Oak—*Eucalyptus obliqua*—Tasmanian Blackwood—*Acacia melanoxylon* and the very lovely Tasmanian Beech—*Nothofagus cunninghamii*, which when mature and properly dried is a rich red colour.

Highlights for the fortnight were the excursions:

1. Saturday and Sunday August 14th and 15th were taken up with a pre-congress excursion led by Mr. E. Derbyshire to Lake St. Clair to study the glacial erosional forms and deposits in the area. There are 88 terminal moraines extending from the south west of the lake, to beyond the main road. Fog prevented us seeing all the surrounding hills on Sunday but we were able to collect some good samples of varve beds, and the wet Schlerophyll forest with its fine stands of Beech—*Nothofagus cunninghamii* were of particular interest to the New Zealand members of the party.

2. *Engineering Geology Meadow-bank Dam.*

Having always been interested in dams, I spent the afternoon of Monday 16th August with nine engineers at the Meadowbank Dam, driving two of them out to the dam site. It was a "hard hat area" and we were still on the site at 5.30 p.m. when I was due at my section's

cocktail party, but I would not have missed this opportunity for anything, and was the only member who had been to both Warragamba and Catagunya dams during their construction. At Meadowbank the H.E.P. are in the process of building a massive buttress type dam with a concrete-faced rock fill right abutment, to complete the full development of the catchment of the River Derwent. The water behind the dam, will be raised to a new permanent high level thus bringing considerable areas of land within economic reach of irrigation. It is the last dam on the stage-by-stage scheme being only 42 miles from Hobart, and the power station which is incorporated in the dam will have a capacity of 40,000 kilowatts.

3. *Volcanic Centre Sandy Bay.*

It is certainly a great asset to have such a variety of geological formations so close to the centre of the capital. A cone near Blinking Billy Point emitted a thin flow of basanite (specimen available). The basanite contains phenocrysts of iddingsite (after Olivine) in a groundmass containing nepheline.

The volcanic rocks are intruded on the shoreline by veins of opal with chalcedony (specimen available). Another specimen, collected at the water's edge is a fine example of Fenestella.

4. *Geomorphology—Hobart-Oxford.*

An all day trip booked by approximately 20 members, but unfortunately only attended by ten (may-be the tempo of the conference had proved too much for some). Certain aspects of the geomorphology of the Clarence Hills (6 miles east of the Derwent estuary) and the Buckland Basin (45 miles north-east of Hobart on the main Hobart-Oxford road) were demonstrated. At the latter a particularly fine example of river terracing was seen, and the relationship of the terraces and alluvial deposits was noted.

5. *Historic Buildings at Richmond*

The rector of St. Luke's Church of England, showed us over the Church, with its famous wooden ceiling and clock from Old St. Davids. The bridge is the oldest stone bridge still in use in Australia (1823). The Gaol, built in 1825, is now only a show building, but very interesting as one may see the conditions under which prisoners lived over a century ago.

Mushrooms cultivated at "Strathayr" are mainly sold in Hobart, but some are flown to the mainland. Lunch was served at "Carrington" in a barn built by convicts.

6. *Brewing—Cascade Brewery.*

The excursion was limited to 30 and consisted of three parties of ten each. Only three women were present, one being with each group. Proctor barley is used and bin malting was started in 1955, the aim being for full enzyme production in 5 days.

7. *Duck River Butter Factory—Smithton.*

One of the largest butter factories in the southern hemisphere. The product going mainly to the United Kingdom. A subsidiary of the Butter Factory was the Ham and Bacon Factory. Here sheep, calves, bullocks and pigs are slaughtered. The lamb being frozen for Britain. The killing of a bullock and preparing it for human consumption was one of the best physiology lessons I have yet witnessed.

8. *Paper, Pulp, Hardboard and Timber from A.P.P.M. Burnie.*

Most of Australia's fine printing and writing paper is produced at this mill. The timber coming mainly from the hinterland, where Associated Forest Holdings Pty. Ltd. have their own "main road" between Hampshire and Guildford. It was wonderful having the opportunity to go on this road and to see the logs being cut from the forest and loaded onto the transports to be taken to the mill. The company is completely stripping the land in this part of the state, and replanting it with *Pinus radiata* (a) because of the demand for softwoods and (b) because of the rapidity with which this particular softwood matures.

9. *Electrolytic Zinc Coy's, Mine and Ore Treatment Plant.*

Named after Lord Rosebery (Prime Minister of England, when gold was discovered in Rosebery creek in 1893). Zinc is obtained from three mines namely: Rosebery and Primrose (the family name of the Earls of Rosebery) and also from Williamsford. The four mile journey for the ore to Rosebery from Williamsford Mine is by an aerial rope conveyor down a very steep mountain. After crushing, the metal concentrates are railed seventy miles to Burnie by the Emu Bay Railway. This privately owned line is one of the engineering feats of Tasmania and it was a privilege to go from Burnie to Rosebery and back in the manager's Inspection Car.

FIELD NATURALISTS' CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR 8 MONTHS ENDED 31st DECEMBER, 1965

(Figures adjusted to nearest £1)

Year 1964-65	Receipts		
	Subscriptions Received—		
£21	Arrears	£34	
1,741	Current	1,633	
106	Supporting	81	
1,868			£1,748
167	Sale of Victorian Naturalists		147
117	Advertisements in Victorian Naturalist		60
	Interest Received—		
37	Library Fund	1	
33	Bank Account	49	
104	Investment of M. Wright legacy	52	
			102
128	Surplus from Excursions		64
22	Sale of Club badges		11
81	Amount transferred from Building Fund Account for payment of rent		80
2,523			2,212
162	Deficit for the year to 30th April 1965		—
£2,685			£2,212

Year 1964-65	Payments			
	Victorian Naturalist—			
	Printing		£1,285	
	Illustrating	£415		
	Less from Ingram Trust Grant	174		
			241	
	Despatching		86	
£2,275				£1,612
	Working Expenses—			
71	Postage and Telephone		£35	
52	Printing and Stationery		33	
23	Library Expenses		5	
55	General Expenses		18	
25	Rent of room for storage		13	
15	Affiliation Fees, Subscriptions and Donations		58	
2	Preston Junior Naturalists Club Rent		6	
15	Natural History Medallion expenses		11	
	Fauna Group expenses	70		
	Less from Ingram Trust Grant	70		
			—	
71	Typing and clerical assistance		59	
				238
81	Rent of Hall and Library			80
—	Surplus for the 8 months			282
£2,685				£2,212

FIELD NATURALISTS' CLUB OF VICTORIA

BALANCE SHEET AS AT DECEMBER 31, 1965

(Figures adjusted to nearest £1)

Year 1964-65	Liabilities		
£329	Subscriptions paid in advance ..		£134
—	Sundry Creditors		226
132	M. A. Ingram Trust Grant in hand		264
	Special Funds and Accounts—		
1,582	Building Fund	£1,640	
1,624	Publications Fund	2,193	
50	Library Fund	50	
77	Club Improvement Account ..	167	
100	Excursion Account	100	
2,608	Estate Marion Wright legacy ..	2,608	
284	Microscope Project Account ..	379	
			7,137
2,026	Surplus of Assets over Liabilities		2,230
£8,812			£9,991

I report that in my opinion the accompanying Balance Sheet and Accounts 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. Also that the accounting and other records examined by me are properly kept in accordance with the provisions of the Act.

(SGD.) W. P. J. Evans
Hon. Auditor.

16th February, 1966.

Year 1964-65	Assets		
	Current Assets—		
£718	Bank Current A/c and Petty Cash	£1,338	
111	Sundry Debtors	76	
12	Badges on hand, at cost	1	
73	Books on hand for sale at cost	95	
184	Microscope Project Stock, at cost	108	
			£1,618
1,838	Library, Furniture and Equipment, at cost		1,870
	Investment of Funds—		
	Building Fund—		
1,050	Commonwealth Bonds, at cost	1,050	
420	S.E.C. Stock, at par	500	
112	E.S. & A. Bank, No. 2 Account	90	
			1,640
	Publications Fund—		
600	Commonwealth Bonds, at cost	600	
	Stocks valued at cost—		
225	Victorian Ferns	215	
558	Victorian Toadstools	543	
—	Wyperfeld National Park ..	556	
9	Sundry Debtors	36	
232	E.S. & A. Bank, No. 3 Account	243	
			2,193
	Library Fund—		
50	Commonwealth Bonds, at cost		50
2,600	Legacy, Estate Marion Wright— C'wealth Bonds at cost		2,600
20	Cosstick Reserve, Maryborough, at cost		20
£8,812			£9,991

FIELD NATURALISTS' CLUB OF VICTORIA
BUILDING FUND

Amount of Fund at April 30, 1965		£1,582
Interest on Investments and from Bank Account for 8 months		58
Capital gain on Conversion of S.E.C. Loan, July 1965		80
		1,720
Less amount transferred to General Account for payment of rent		80
Amount of Fund at December 31, 1965, as per Balance Sheet		£1,640

PUBLICATIONS FUND

Amount of Fund at April 30, 1965		£1,624
Surplus for period from—		
Ferns of Victoria and Tasmania		7
Victorian Toadstools and Mushrooms		6
Vegetation of Wyperfield National Park		182
Interest on Special Bonds and on Bank Account		19
		1,838
Less Interest paid Wyperfield Book loans		5
Amount of Fund at December 31, 1965, as per Balance Sheet		£1,833

CLUB IMPROVEMENT ACCOUNT

Amount of Account at April 30, 1965		£77
Commission earned on sale of books at Meetings and Shows		37
Donations		4
Surplus from Show September 1965		75
		193
Cost of new books purchased for Library	£7	
Cost of binding periodicals in Library	19	26
Amount of Account at December 31, 1965, as per Balance Sheet		£167

WILDFLOWER SLIDES—PHOTOFLORA '66

Book a date now to see the exhibition slides selected by the judges of Photoflora '66, this year's competition conducted by the Native Plants Preservation Society.

The slides will be shown, with a commentary on the flowers, as follows—

In the greater Melbourne area:

Melbourne—8 p.m.—16th and 17th March—V.A.Y.C. Hall, Gisborne Street, East Melbourne.
Ringwood—8 p.m.—22nd and 23rd March—Lower Town Hall.
Frankston—8 p.m.—24th March—Mechanics' Institute Hall, Nepean Highway.

In country centres:

Geelong—8 p.m.—9th March—Y.W.C.A. Hall, Aberdeen Street.
Mildura—8.15 p.m.—12th March—C.W.A. Hall, Deakin Avenue.
Shepparton—8.30 p.m.—18th March—Civic Centre Theatrette.
Albury, N.S.W.—8 p.m.—19th March—Red Cross Hall, Dean Street.
Morwell—8 p.m.—25th March—Town Hall.
Bairnsdale—8.15 p.m.—26th March—Mechanics' Hall, Service Street.
Ararat—8 p.m.—1st April.
Hamilton—8 p.m.—2nd April—Art Gallery Auditorium.
Admission—Adults: 40 cents, Children: 20 cents.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Death on the Roads

Mr. W. Perry of Eaglehawk has forwarded this very interesting contribution:

I have often noticed the great number of dead Magpies on our roads. Over the last two years, I have made a count of dead Magpies on the roads between Bendigo and Halls Gap (Grampians) on three occasions. When looking at these notes recently, I was staggered to find that the grand total for the three trips amounted to 116 birds. On all three occasions, the count commenced from Kangaroo Flat which is four miles south of Bendigo.

The first trip made was during the first week of November, 1964. On this occasion, the total was 38 Magpies, and the route taken was Kangaroo Flat to Maryborough, Avoca, Ararat and across to Halls Gap via Moyston. Between Avoca and Ararat, 14 dead birds were noted, while from Ararat through Moyston and Pomonal to Halls Gap, 17 more were counted.

The second trip was made in the first week of November, 1965. The route was slightly varied, as on reaching Ararat, the Western Highway was traversed to Stawell, branching off from there to Halls Gap. During this trip, 70 dead Magpies were counted on the roads. Between Maryborough and Avoca the number was 10, while between Avoca and Ararat, a distance of 39 miles, there were 26. From Ararat to Stawell, only 16 miles, there were 16 dead Magpies, an average of one per mile. Only 4 were counted from Stawell to Halls Gap.

During the third trip, made on December 31st, 1965, over the same route as in the previous November, only 8 dead Magpies were noted over the full distance, which is 128 miles.

Magpies spend a great amount of their time on the ground where they appear to obtain much of their food. Why they should be on the roads so often is rather puzzling, as they certainly would obtain little in the way of food from hard sealed roads.

On examining the information gathered in the three trips, it appears that November is a month of great mortality. No doubt, many of the dead birds could have been young inexperienced birds not long out of their nests. A Magpie at any time is slow in taking off from the ground, and if we add inexperience to this, we might well assume that many Magpies in their infancy, are killed on the roads.

The greatest number of deaths occurred between Maryborough and Ararat, while the average of one per mile between Ararat and Stawell calls for comment. The road from Maryborough to Ararat forms part of the Pyrenees Highway. For the whole distance the road is flanked by tall trees, and behind the trees are huge expanses of cleared land, forming the ideal habitat for a large Magpie population. This type of country favors the Magpies, but the highway, plus cars at high speed, spells death for many birds.

Again, between Ararat and Stawell we have the ideal Magpie habitat along the Western Highway. The traffic here would be much more than that on the Pyrenees Highway, and the figures indicate a higher average death-rate.

The comparatively small number of deaths for December might indicate that by this time, the young birds of the previous season still surviving, had gained in experience, and the actual number on the roads would be much less. These notes concern the common Magpie, and most likely would include both the Black-backed and the White-backed species.

All motorists must have noticed the frequency with which dead Magpies

are seen on the roads and the annual mortality from this cause must be high. Counts made during the different months of the year over the same stretch of road could throw more light on the reason for this heavy toll.

J.R.H.

Stinkhorn Fungus

Mrs. Ellen Lyndon writes:

There was found on the Wellington High Plains during the last week in December, a Stinkhorn, almost certainly *Aseroë rubra*. A dry specimen of this strange fungus lay on the mosses of a small bog below the gravelled roadway near Surveyor's Creek.

At first glance it suggested some exotic flower with brown centre and orange petals. The root or base was set in clear jelly and in this was another, an immature specimen, a conical "egg" some two inches high with a papery brown covering. This one was collected and placed on a saucer of damp moss in order to observe the emerging process. By evening the enclosing sac showed several horizontal cracks around the middle. In the morning only the egg-cap lay on the moss. The fungus, which must have unfolded with some force, lay on the grass near the table. It was indeed an exotic growth. The lower half of brown covering still adhered to the base of the stem, a thin-skinned hollow stem the texture and colour of the skin on the back of one's hand, some 3 to 3½ inches in height and just firm enough to support the "flower" parts. Around the gaping hole at the top of the stem lay a wide band of dark brown, oozing matter of the most appalling and putrid smell. Radiating from this were six pairs of pointed curling orange arms. Blowflies and bush-flies flocked to feast upon this delicacy. Incidentally, in the first specimen picked up there were seven pairs of arms. This is a fungus that dries satisfactorily, and the first one of its kind that I have seen.

Field Naturalists Club of Victoria

General Meeting—February 14, 1966

There were few empty seats when the President, Mr. M. K. Houghton, opened the February General Meeting. After welcoming members and friends, the President reported the death of Mrs. Violet Hastings. Although Mrs. Hastings had only joined the Club in 1962, when she came to Australia from Auckland, she had made many friends. She had been interested in botany, particularly in ferns and lichens. Members stood in silent tribute to her memory.

The Minutes of the January meeting were taken as read on the motion of Mr. J. W. H. Strong, seconded by Mrs. Curtis.

The Hon. Secretary, Mr. E. H. Coghill, made a number of announcements. He said that Mr. William Perry had written to him in an effort to trace the address of a Mrs. Paton, but so far as his records went, this lady had never been a member of the F.N.C.V. However if any member had any information he would be glad if he could be contacted. Mr. Coghill tabled the latest syllabus of the Council of Adult Education and detailed the dates of showing Photoflora—1966 slides (see p. 58). He reported the resignation from the Club of Miss Marie Argo, for some years the Club's Hon. Librarian and drew the attention of members to the change in date of the April General Meeting: this would be held on Wednesday, April 13, because the second Monday of the month would be Easter Monday. Mr. Coghill reported that the Premier had replied to his letter on the Club's desire that the National Parks Authority's constitution be revised. The Government considered that the present Authority was functioning smoothly and it would, therefore, not wish to change its constitution: the Premier was sure that proper consideration would be given to any communications addressed to the Authority by the Club. Finally, Mr. Coghill sought information, on behalf of Miss Lorna Banfield of Ararat, on the appearance in the *Naturalist* prior to 1959 of a paragraph on an aboriginal rock-well at Rocky Point near Ararat. Miss Banfield was very anxious to trace this reference and some

member interested in anthropology might remember the note.

The President drew the attention of members to the urgent necessity to find someone to undertake the duties of Hon. Editor. Various members had been approached, but no-one willing to fill this position had been found. He appealed for someone to come forward. The President announced that, in addition, the Hon. Treasurer, Mr. A. G. Hooke, and Assistant Treasurer, Miss Marjorie Butchart, had signified their wish to be relieved of their positions and he would like to hear from volunteers willing to replace them.

The President then introduced the Subject for the Evening. He said that members would be seeing a number of transparencies received from the South-West Committee of Tasmania. These had been supplied with a short commentary on each, but the Club had been fortunate in obtaining a speaker with first-hand knowledge of the area, Mr. Keith McPherson, a past-President and an Honorary Life Member of the Victorian Mountain Tramping Club, to talk to the slides.

Mr. McPherson explained that the South-West Committee had been formed from bodies such as walking clubs and natural history societies interested in conserving the natural beauty of the south-west of Tasmania. It spoke for more than 1000 members of affiliated bodies against unco-ordinated developments in mining, forestry and hydro-electric power which could ruin for ever the unique character of this wilderness area. Proposals to construct dams in the Gordon River valley were a cause of concern; these could cause flooding back to Lake Pedder and ruin one of the most famous of the scenic areas.

The slides showed views of the scenery along the south-coast, Precipitous Bluff, S.W. Cape, Port Davey and Bathurst Harbour. There were pictures taken climbing Mt. Picton with its dolerite capping and views from the summit. The slides illustrating the ascent of Mt. Anne and the aerial dropping of supplies to walkers on the wide, sandy beach of Lake Pedder were most interesting. Other pictures showed Federation Peak first climbed in 1949 by John Bechervaise, Mt. Lot, Mt. Hay, the Arthur Plains, the Huon Plains and the audience was enabled to gain a very good impression of the rugged beauty of the area. There were several slides of indigenous plants.

The talk proved of great interest to the audience and Mr. McPherson was asked many questions dealing with such widely differing aspects as the prevalence and voracity of the local mosquitoes, the distribution of horizontal scrub, existing mining activities and the climate. These were answered with the authority that derives from first-hand experience of a subject.

Thanking Mr. McPherson, the President said that the audience had been taken on a conducted tour of a most beautiful area without having to expend any of the energy that the speaker had had to use in gaining the knowledge that had made such a fine exposition possible.

The new members listed in p. 43 of the February *Naturalist* were elected on the motion of Mr. Coghill seconded by Mr. D. E. McInnes. Mr. Coghill appealed for the new junior member, Barry Ely, to forward his address.

The President congratulated Mr. Lloyd Williams on his retirement.

There were a number of exhibits on the table. Under F.N.C.V. microscopes were waterfleas from Albert Park Lake and zealites from Cape Schank. Mr. McInnes also showed some large ants. Mr. A. J. Swaby had brought a number of plant-specimens; a flowering spray of *Olearia ramulosa* var. *stricta* that is found only in the Grampians; a specimen of either *Solanum aviculare* or *S. laciniatum,* the original *S. aviculare* had been split and he wished to know which the specimen represented; the Smooth Rambutan, *Alectryon subcinereus,* rare in E. Victoria, the specimen had been grown by Mrs. Bayley from a seed taken from a plant presented to a Kew resident many years ago by Baron von Mueller; a fruiting spray of *Billardiera longiflora.* Mr. Swaby asked for specimens of lacewing eggs, larvae, nymphs and adults to be brought to the March meeting. Mrs. M. North displayed some australites and a meteorite from Henbury Craters. There was also on the table a specimen of disintegrating igneous rock from Mt. Ngongongata, Rotorua, New Zealand. Mrs. Bennett showed a stem of *Rapanea variabilis* with small flower buds.

Under the heading "Nature Notes", Mr. D. E. McInnes mentioned the recent excursion of the Microscopical Group to Albert Park Lake. The water was teeming with Entomostraca and there were

great numbers of aquatic larvae of a moth feeding on the notorious weed. Mr. E. R. Allan told how, on one visit, he had seen about 24 bats in the Angel Cave at Cape Schank, a week later when he had taken a torch to attempt an identification, there had been none.

Under "General Business" Mr. Ros Garnet invited members to attend a meeting of the National Parks Association on February 23. There would be a general discussion on National Parks and Mr. Manson, the Minister for State Development, had arranged to attend.

Mr. A. J. H. Fairhall said that he had been depressed to read in the newspapers of the proposal to destroy the cormorants at a Tasmanian lagoon by explosives. He moved that the Hon. Secretary telegraph the Club's protest in the strongest possible terms to the Hydro-electric Commission in Hobart, to Mr. D. K. Gilmore, Secretary of the Tasmanian Fisheries Association in Launceston and to the Secretary of the Animal and Birds Protection Board in Hobart. Mr. Fairhall said that although cormorants certainly took fish, he believed that most of those consumed were non-commercial. He considered that the means to be employed were barbarous, in addition to the birds killed many would be maimed and injured, and he wished to emphasize that other birds and animals would also suffer. The Fauna Protection Council was protesting and he urged members to write to the newspapers and to the Tasmanian premier. Mr. E. S. Hanks seconded the motion. The proposal would lead to the death of other species and would upset the balance of nature. Mr. Ros Garnet spoke in support. He did not see how the project could have a lasting effect: other cormorants would soon move in to occupy the empty area. Mr. Swaby said that he failed to see how one could kill cormorants with explosives without killing the highly sensitive fish in the area. Mr. Taylor referred to the damage done to fish by fishermen. He mentioned seeing 20 dead fish jettisoned and lying on the bed of a Mallacoota lake presumably because, having been caught, they were not wanted. The motion was put and carried *nem. con.*

Geology Group—February 2

Thirty-seven members and vistors were present with Mr. Dodds in the Chair. The

Subject for the Evening was "Holiday Reminiscences" and several members, some with the help of slides, discussed places of geological interest that they had visited during their holidays. These included the unearthing of very large quartz crystals from pegmatites at old workings near Strathbogie by Mr. D. Dangerfield, the large deposits of chromite discovered near Licola visited by Mr. McCay. Mr. and Mrs. North showed slides of the jasper deposits at Marble Bar, an interesting facing of zebra-stone at the Hotel Kununurra and the striated face of the granite dome at Hyden. To conclude the evening, Mr. Sault showed slides of the moraine-blocked lakes of the Kosciusko region. There was much discussion and many questions were asked during the course of the evening.

Exhibits: Mr. Davidson, pebbles of black coal, chalcedony from Reynolds Creek, Queensland; cut and polished fossil wood from Gilgandra, N.S.W.; jasper from Bingara, N.S.W.; basalt with steam cavities infilled with chalcedony. Mr. Dangerfield, chert; large crystals of quartz from Strathbogie; stems of *Lepidodendron* in slate (Carboniferous) from Mansfield. Mrs. North, banded jasper from Marble Bar; lace opal; prase, agate, jasper, amethyst red tigereye, bloodstone, tumbled and polished. Mrs. Skopakou, volcanic glass; jasper; specimens from Emu Creek for identification. Mr. McCay, serpentine, asbestos from Dolodrook Creek. Miss Keady, indurated sandstone from Walhalla; fluorite; yellow jasper. Mr. McInnes, section of diorite from Happy Jacks under the microscope. Mr. Sault, granite gneiss, contorted schist, phyllite and diorite from the Snowy Mountains.

Microscopical Group—November 17, 1965

Twenty-two members and visitors were present at this meeting which was chaired by Mr. D. McInnes, acting on behalf of Mr. E. LeMaistre who was absent through illness. Mr. W. Genery was appointed Acting Secretary as Mr. P. Genery was also absent.

After the Minutes had been read and confirmed, a most interesting talk was given by Mr. Gordon Senator on "The Appraisal of the Microscope".

Mr. Senator traced the development and advancement of the simple microscope of the past up to the precision instrument of today. The lecturer also dealt with the various makers of microscopes on the market today and pointed out that before a person bought one he should get the advice of someone with a thorough knowledge of microscopy.

Owing to the fact that the regular meeting-night would come too close to Christmas, it was decided that none be held in December.

Microscopical Group—January 19, 1966

This was a really well-attended meeting considering it was held during a month when many members were away on vacation. Mr. D. McInnes acted as Chairman as Mr. LeMaistre was away.

There were complaints that the subject for the meetings was being omitted from the journal and the Secretary promised to see that the information was included in the future.

Mr. K. Trotter pointed out that the Group needed some advertising and, to prove his point, described his experiences in attempting to find the group. After some discussion, he moved that a committee be formed to take some action to get our activities published in a newspaper or magazine. The motion was seconded by David Stout and carried by all present.

It was decided that at 2 p.m. on Saturday, February 12, members and all those interested meet at the south end of Albert Park lake in order to make a detailed examination of the aquatic life in the lake. The meeting on the following Wednesday would be devoted to discussion and exhibition of specimens obtained during the excursion. The Secretary was asked to contact the press, T.V. etc. with the view of getting some publicity.

The talk at the March meeting would be on "The Plankton of Barnes Bay, Tasmania," given by P. Genery, and at the April meeting on "Diatom Slide Making", given by Mr. K. Trotter.

The evening was one of great activity as most members had brought along their microscopes and more specimens than they could possibly put under them.

Mr. D. McInnes showed some bryozoans and sea-cucumber or Beche-de-Mer (Holothuroidea) from Corio Bay. This was a specimen of *Leptosynapta* the skin of which contains the remarkable anchors and plates. He also exhibited one of Mr. Barratt's slides of another species showing a differently shaped plate.

Mr. K. Trotter displayed a slide of butterfly scales there being sufficient adhesion between slide and scales to hold

the latter in place without the usual gum cement.

Mr. W. Genery exhibited a slide of some mouth-parts of *Lepidurus.*

Mr. P. Genery showed some marine plankton obtained recently from Tasmania.

Marine Biology and Entomology Group —December 6, 1965

Twenty-five members attended the meeting, which was chaired by Mr. R. Condron.

Apologies were received from Mr. and Mrs. R. Lee.

Mr. E. H. Coghill read a letter which he had received from Pennsylvania University, U.S.A.; stating that they were doing research into certain chemical aspects of star-fish, brittle-stars, and crinoids, and asking for any specimens of the above which we might be able to let them have.

This being a members' night, a good display of exhibits was in evidence and several slides, taken by Mr. and Mrs. Strong over the past few years, on F.N.C.V. outings, were shown.

Exhibits: Mr. Strong showed a small species of sea-star and also a small Holothurian, under a Club microscope.

Mr. M. Harrison showed several shells of the genus *Conus* which he had obtained in Indonesia, the Phillipines, and Fiji. These included: *C. ochroleucus; C. polyglotta, C. magnus raphanus, C. nicobaricus* and *C. ermineus.*

Mr. D. McInnes showed a piece of seaweed covered with a species of hydroid, also some polychaete worms, and species of Bryozoa. Under a microscope Mr. McInnes displayed some dinoflagellates from the intestine of a termite. He explained that these flagellates assisted the digestion processes of termites by helping to break down woody tissue.

Mrs. Pinches showed a large species of Jewel beetle which she had taken from a *Banksia* on the Club outing to Point Addis, and a large species of grasshopper.

Mr. R. Condron displayed a larva of the Lesser Wanderer, *Danaus chrysippus petitia,* which he had taken at Box Hill; the pupa of the Sword-grass brown, *Tisiphone abeona albifascia,* some pupae of the Imperial Blue *Ialmenus evagoras evagoras,* taken at Doncaster, also a case of moths and butterflies bred from pupae.

Marine Biology and Entomology Group —February 7, 1966

Twenty-four members attended the meeting, which was chaired by Mr. R. Condron.

Miss Baalam was welcomed back to the Group after an absence of several months abroad.

Apologies were received from Messrs. Houghton, Lee and Genery and from Miss Dixon.

Mr. McInnes mentioned an outing of the Microscopical Group to the Albert Park Lake for the collection of microscopic fresh-water life and he invited members of this Group to join in. Mr. Condron mentioned the general F.N.C.V. Club outing to be held at Mt. Donna Buang on February 20.

A short discussion took place on Mr. Coghill's suggestion that the name of this group be changed. Mr. Harrison moved that members give the matter further consideration and that further discussion take place at the March meeting. This was carried.

This being a members' night, there was no guest speaker.

Exhibits: Mr. and Mrs. Strong exhibited the tube of a mason worm, and several shells which they had taken from a sandbar near Michaelmas Kay, North Queensland, while on holidays last August.

Mr. McInnes showed a *Daphnia,* taken from the Albert Park Lake, under low microscopic power. Mr. McInnes said this was one of the largest species of water-flea and he thought that its abnormal red colour was probably due to the excessive nitrogen content of the water brought about by the vast quantity of weed in the Lake. He also said that there were very large numbers of aquatic larvae of an unidentified moth. These larvae consumed a great amount of the weed and possibly might help in its control.

Mr. Coghill brought a tomato which he cut in half, to reveal larvae of an unidentified insect.

Mr. Harrison gave a short talk on his trip to Hayman Island where he had collected 102 species of shells and from where he had brought back a stone-fish 11½ inches long. Other finds had been a large bailer shell with an egg mass alongside it, a beautiful specimen of soft coral to which was attached a very minute cowry, a species of mussel, which, when polished, displayed very beautiful colours and several specimens of butterflies, moths, beetles, cicadas and hornets.

Mrs. Lee showed a Saunders' Case-moth which had emerged and died whilst still attached to the pupal case. She presumed that it had battered itself to death. Mrs. Lee also showed a small squid from Mallacoota.

Miss Baalam also showed a Saunders' Case-moth which she had kept for a year, and remarked on its very slow rate of growth.

Mr. Condron had made a trip to the Kiata Little Desert during the Christmas holidays. He had brought back a species of mantis and egg case, some cicadas, and three species of small blue butterflies. He also showed some tiger beetles collected at Dimboola, and some Lesser Wanderer butterflies and Imperial blues, which he had bred from larvae taken at Doncaster. Finally, he displayed a species of Jewel beetle, some click beetles and Azure-blue butterflies taken at Melton.

Botany Group—February 10, 1966

On account of the strike of Public Servants and consequent power restrictions, this meeting was held at Miss Lester's home in South Yarra instead of at the Herbarium.

Conditions not being suitable for Mr. Morrison's talk on "Flora of the Burke & Wills track", it was postponed until the May meeting. In its place Miss Lester and Mr. Fuhrer presented a selection of colour slides. Miss Lester's slides were of Queensland, and the sugar-cane industry in particular. Our first view was of the cane fields from the air, and then—we saw "on the spot" pictures of the growing cane (in flower), its burning prior to being cut, a cane cutter at work, and the load of cut cane on its way to the factory. There were also several pictures of the factory and huge bulk-storage shed containing a mountain of raw sugar. Mr. Fuhrer's slides were of very much enlarged lichens and mosses, in many cases looking like beautiful flowers and palms. There were also pictures of some unusual lizards, flies and other insects and lastly of a rookery of gannets. The assembled company of twenty-one folk thoroughly enjoyed the hastily-arranged programme. Members and friends are asked to state at the next meeting, what potted ferns they have available, or are likely to be to locate for the next Nature Show in September. There are very few ferns and known sources, at the moment, and the Botany Group would very much appreciate any help.

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

GENERAL MEETINGS

Monday, March 14—Annual Meeting. At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes of Annual Meeting of June 14, 1965.
2. Annual Report.
3. Financial Report.
4. Incoming Officers and Council.

   The following have been nominated:

   President: Mr. M. K. Houghton.
   Vice-Presidents: Mr. E. Byrne, Mr. A. J. H. Fairhall and Mr. T. Sault.
   Secretary: Mr. E. H. Coghill.
   Assistant Secretary: Mr. R. Condron.
   Treasurer: Mr. A. G. Hooke. } available until
   Assistant Treasurer: Miss M. Butchart. } September only.
   Editor: Mr. G. M. Ward.
   Assistant Editor: Mr. R. H. J. McQueen.
   Librarian: Mr. P. Kelly.
   Assistant Librarian: Miss M. J. Lester.
   Excursion Secretary: Miss M. Allender.
   Council: Mr. E. R. Allan, Mr. B. Fuhrer, Mr. J. Ros Garnet, Mr. F. L. Jeffs and Mr. A. Lewis.

   An election will be necessary to appoint two Vice-Presidents from the three nominees and also to appoint five members of Council.
5. Appointment of Auditors.
6. Announcements.
7. Subject for the Evening: Mr. A. J. Swaby—"Browsing through the Grampians" (slides by Mr. I. F. Morrison).

8. Election of Members.

(a) *Ordinary*

Mr. J. G. R. Blaker, 18B Tarana Avenue, Glenroy.
Miss J. M. Browning, 16 Lynette Avenue, Beaumaris, S10.
Miss M. Condon, 6 Evandale Road, Malvern.
Mr. R. S. Frankenberg, 14A Glassford Street, Armadale, S.E.3 (Joint with Mrs. Frankenberg).
Mr. P. A. Meyer, 54 Mt. Pleasant Road, Nunawading.
Miss R. Middlebrough, c/o 177 Danks Street, Albert Park, S.C.6.
Mr. G. Setford, 30 Illawarra Road, Hawthorn (Interest—general. Introduced by Mr. J. W. H. Strong).
Mr. G. G. Williams, 49 Aileen Avenue, Caulfield.

(b) *Country*

Mr. Max Howell, Bogong, Victoria (Interest—botany. Introduced by Mr. K. C. Rogers).

9. Nature Notes and Exhibits.

10. General Business.

Wednesday, April 13—Mr. E. Swarbrick—F.N.C.V. Excursion to the Snowy Mountains. Please note that this meeting will be on the Wednesday night.

GROUP MEETINGS

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

Wednesday, March 16—Microscopical Group. Mr. Paul Genery, "Marine Plankton of Barnes Bay".

Friday, March 25—Hawthorn Junior Club—at Hawthorn Town Hall at 8 p.m. Practical demonstration of setting butterflies.

Friday, April 1—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street), at 8 p.m. Speaker Mr. David Woodruff.

Monday, April 4—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Wednesday, April 6—Geology Group.

Thursday, April 7—Fauna Survey Group—at Fisheries and Wildlife Department at 7.45 p.m.

Thursday, April 14—Botany Group. Miss Jean Galbraith—"Carnivorous Plants".

F.N.C.V. EXCURSION

Sunday, March 20—Sorrento. Subject—Marine Biology. The coach leaves Batman Avenue at 9 a.m., fare $1.80. Bring two meals.

PRELIMINARY NOTICE

September 17 to October 2, 1966—Queensland. The party will leave Melbourne by air on Saturday, September 17, for Brisbane where it will stay overnight. Sunday it will go by bus for Maryborough via the Glasshouse Mountains and Sunshine Coast and then, on the Monday, proceed to Gladstone. On Tuesday it will depart for Heron Island for a week. On Tuesday 27, it will leave Heron Island and take train to Brisbane and thence by bus to Binna Burra on the Wednesday. There it will remain until Sunday, October 2, when the main party will return to Melbourne. Those wishing to remain longer in Queensland may do so as the return ticket may be used at a later date. The inclusive fare will be approximately $220: a deposit of $30 should be paid to the Excursion Secretary when booking and the balance by August 8.

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for the year 1966 were due for renewal by January 1. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

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, 1965

President:

Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. E. Byrne, Mr. A. Fairhall

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. J. R. Hudson, 16 Alma Street, Essendon, W.5 (337 8778)

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	50/-	($5.00)
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Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

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Stand of Messmate Stringybark and Manna Gum—Mt. Cole State Forest.

FORESTS COMMISSION VICTORIA

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Vol. 83, No. 4 April 7, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

This photograph of a Brush Turkey chick (*Alectura lathami*) just leaving the mound is taken from an article by David Fleay in the February 1935 *Victorian Naturalist*, **51**, 224.

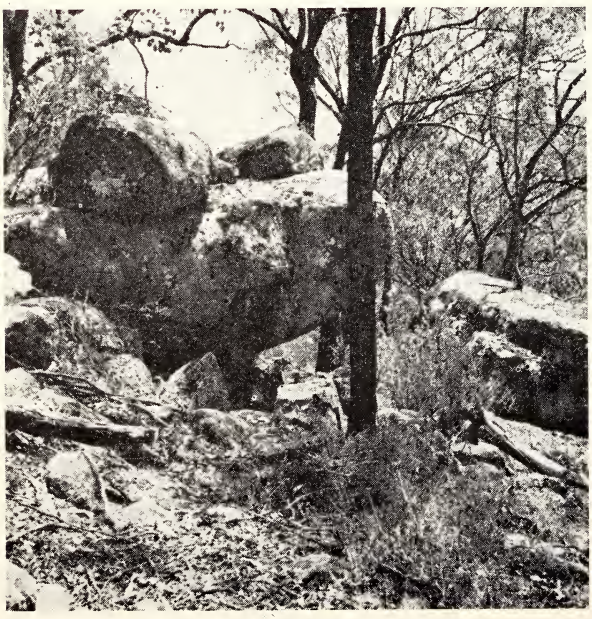
The Rock - Shelter at Mudgegonga

By Aldo Massola

Through the courtesy and the guidance of Mr. Donald Dangerfield, of Benalla, I was able to visit the newly discovered Rock Shelter near Mudgegonga, a small township some ten miles north-east of Myrtleford.

This shelter, the third to be discovered in the north-east of the State, is of the usual type encountered in Victoria; viz. a shallow cave-like recess, open to the light, resulting from the tumbling over of a granite tor, which had been undermined by the weathering away of the hillside. A convenient shelter of this nature would not escape the notice of the aborigines, and would certainly be used by them during inclement weather, since it is commodious enough to accommodate a small party, and has no dark recesses in which malignant spirits would be awaiting the unwary.

The Mudgegonga shelter is approximately 21 feet wide and about 10 feet deep and was caused by the partial toppling over of a tor about 30 feet in diameter. The height at the entrance is now only 5 ft. 6 in., and this height diminishes so rapidly that at only about 5 ft., from the entrance the visitor must drop on all fours, while further in, the ceiling is too low even to sit under. However, in aboriginal times it must have been more spacious, since the present floor level must be at least four to five feet higher than it was then. The raising of the floor was due to the rain washing large quantities of sandy loam down the mountain-side, some of which was trapped by exposed rocks,



General view of Mudgegonga Shelter taken from the west.

Group of dancing figures and bird-tracks.

and so diverted into this shelter. Proof of the raising of the floor is seen in the position of the paintings, the lowest extant figure being only 22 inches from the floor, and yet painted in such a manner as to suggest that the artist must have executed it while standing, or sitting, but facing the rock-wall, a feat which would be altogether impossible now because of the low ceiling.

The paintings on the wall of this shelter are executed in a style very reminiscent of that found in Western New South Wales, and, as such, differ from that of the two other "galleries" so far discovered in north-east Victoria. A number of small men are represented. They range from 3 inches to 8 inches in height and are all painted in white pipe-clay with the exception of one man who is 10 inches high, but rendered in red ochre. There are also renditions of 3 "bird tracks" in white, close to the little men, and a fourth bird track, also in white pipe-clay, is painted on the ceiling, about four feet from the others.

The little men are depicted in the corroboree attitude, with their legs outstretched, bent at the knees, and with their arms raised above their heads. What appear to be prominent sexual organs on the taller men are actually the fringes, or kilts, which, together with head-bands, kangaroo-teeth necklaces, and arm-bands, were always worn while dancing. Many writers, when describing such figures, overlook the fact that the aborigines had their "gala" clothes and ornaments which were worn at such times, and only emphasize the eroticism of the scenes. The paintings in this shelter have been somewhat damaged by bush fires, which have deposited a thick covering of soot on the rock-face of the shelter, and thus probably covered other figures.

The question of what such paintings represent, and why they were painted

at all, naturally comes to our mind. This is a question which has puzzled students of primitive man in every continent, and one which we cannot answer. Since these little men are shown in a dancing attitude it is possible that this was the record of a corroboree; and since bird tracks are also shown we can surmise that the corroboree was connected with a bird-totem. Did it perhaps represent an "act" in the wanderings of the dream-time Ancestor? Why are all the figures painted in white with the exception of one larger figure, which is shown in red? Perhaps, this red figure represents the Ancestor, and he is here shown instituting the first corroboree of this particular bird's totem.

So little is known of the natives of this district that it is also impossible to state why the art-style used in this shelter should differ from that of either of the other two known shelters in the north-east. We do not even know with certainty which particular group of which tribe was the "owner" of this territory, nor do we know who were their allies, or related tribes. It has been written that these were the Ya-itma-thang and that they were allied to all the High Plains' groups, including those on the New South Wales side of the Murray River, and that their enemies were the people of the Plains. However, it has also been recorded that during the Bogong moth season, when the natives in their hundreds assembled on the highest points of the High Plains to feast on the moths, their visitors did include some of the Plains people. To add to the confusion, it has been written that the nearby Ovens Valley was the territory of a group of the Taungurong tribe, who properly belong to the plains of Central Victoria. If this is so, then Mt. Buffalo must be considered as belonging to this latter tribe, and not to the Ya-itma-thang, since this mass is virtually surrounded by plains. A camping site on Mt. Buffalo, now almost completely submerged by the waters of man-made Lake Catani, from which a number of stone tools, including microliths, was collected by the present writer, attests to the fact that the summit of Mt. Buffalo was at least periodically visited. These visits could have coincided with the Bogong moth season. It would thus almost appear that the High Plains and the Plains people each had their own Bogong moth collecting grounds, and that the reports of the Plains natives going to the mountains refers to seasonal visits to Mt. Buffalo and not to points further east, which were certainly in Ya-itma-thang territory.

If this hypothesis is correct it will also clarify another anomaly. When the Faithfull party was massacred on the banks of the Broken River at Benalla in 1838, the attackers were said to have retired with their booty into the mountains. The question that perplexed students was whether the natives of the Plains and those of the High Plains had concluded a temporary alliance in order to attack the white intruders. The suggestion is now put forward that the attackers were Plains aborigines, and that, after their successful raid, they retired into their own mountains, the Mt. Buffalo range.

The Cultural Value of Science

By Edmund D. Gill*

With the extraordinary growth of science in recent decades, the whole community has become aware of it, but tends to think in terms of the *physical benefits* it yields—aeroplanes, wonder drugs, and such like. It is submitted that among citizens in general, among educators, and even among scientists themselves, there is often little appreciation of its *cultural values*. The greatest advantages of science are not its economic uses (great as they are) but the cultural values such as freedom from fear and superstition, the increased understanding of the world we live in, and the great enrichment of experience. These positive results stimulate an attitude of mind which gives confidence and understanding in the developments which occur in the natural world. It also prepares its possessor to approach the problems of human relationships in an analytical but calmer way. This in its turn is essential for human progress both national and international.

For example, a person who has studied biology looks on the world in a new way; his whole attitude to the living world is changed and his new understanding enriches life in many ways, thus making for greater health and happiness. It provides a realistic view of the place of man in the world. Biology can thus assist one to a better understanding of the processes of life and so to a greater sense of confidence.

It is suggested that if more were made of the cultural advantages of science there would be less tendency to set science and the humanities in apposition (the "two cultures" of Professor Snow).

* National Museum of Victoria, Melbourne.

The Identity of Maplestone's Opisthobranchs

By Robert Burn

Charles M. Maplestone contributed many articles on Victorian Polyzoans during the latter part of the last century. Little known and one of his earliest was an article titled "Notes on Victorian Mollusca and their Palates", in which two species of Cephalopoda, one species of Crepipoda and 40 species of Gastropoda were briefly described and with one exception had their radulae figured. To my knowledge, this was Maplestone's only research on Mollusca.

Maplestone tentatively identified some of the species but for the most part could provide only the genus. Each of his species was qualified by a number, evidently corresponding to the sequence of collection and entry in his note books. These numbers are quoted for the species discussed below.

During several years of studying molluscan literature, I have twice noticed references to Maplestone's article; Hedley (1912, p. 160) refers to No. 23, *Philine angasi*, and Iredale (1924, pp. 234, 245) to No. 25, *Patelloida alticostata* and No. 28, *Hipponyx conicus*. The nomenclature used here follows Macpherson and Gabriel's "Marine Shells of Victoria", reference to which will provide figures of the species discussed.

Four of Maplestone's species are opisthobranchs or sea-slugs. None was correctly named. To adjust this discrepancy, each is here correctly identified for future reference and the original figures of the radulae reproduced.

Original citation, p. 52. Radula figured on Plate 27.

"*Bulla* (*oblonga ?*), No. 47".

This is *Bulla botanica* Hedley (1918), the common large bubble-shell of New South Wales, Victoria, Tasmania, South Australia and south Western Australia. The recent Port Phillip Bay Survey carried out by the National Museum of Victoria and the Fisheries and Wildlife Department found living specimens in the deeper and quieter waters of Corio Bay.

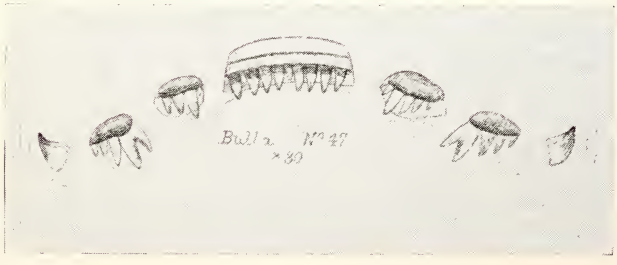


Fig. 1. Complete row of radular teeth of *Bulla botanica*, greatly enlarged.

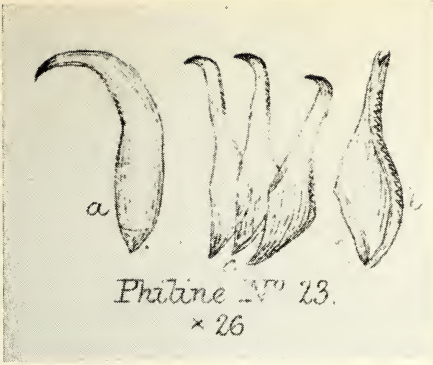


Fig. 2. Radular teeth in different aspects, *Philine angasi*, greatly enlarged.

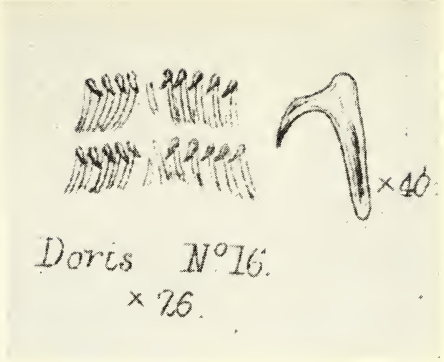


Fig. 3. Inner part of radula and side view of a single tooth of *Ceratosoma brevicaudatum*, greatly enlarged.

Specimens are also found living on the sand flats of Rye and Rosebud.

Original citation, p. 52. Radula figured on Plate 27.

"*Philine* (*aperta ?*), No. 23".

This is *Philine angasi* (Crosse and Fischer, 1865), a common shallow water species extending around southern Australia from southern Queensland to southern Western Australia. It is also the most common opisthobranch living in Port Phillip Bay, abounding in sandy-mud areas both intertidally and in the shallow depths. It burrows just below the surface and feeds on small animals that it encounters. The fragile white transparent shells are often washed up on the beaches in large numbers.

Hedley (1912, p. 160) has already mentioned this reference to *P. angasi*.

Original citation, p. 52. Radula figured on Plate 26.

"*Doris* (*?*) No. 16. Hab., low water on rocks, very rare. Limaciform; tentacles two; simple truncated cones. Gills exuding from end of back. Pink in colour, with dark blue and red spots; only found two specimens, three and four inches respectively. Palate, —.1.—, broad and short. Median very small, straight; laterals hooked; shape shown in side view."

The important diagnostic points of this brief description are contained in limaciform, pink, dark blue and red spots, and three and four inches. Limaciform means shaped like a garden slug, i.e. long, slender and high. The only known Victorian species of this shape which agrees with the above-mentioned colour pattern and dimensions is *Ceratosoma brevicaudatum* Abraham (1877). This species has been described already in this journal (Burn, 1961, vol. 77, p. 316) where it was pointed out that this is the dominant sea-slug of southern Australia.

Maplestone indicated that there was a rhachidian or central tooth in the radula. Later descriptions of the radula for this species and the genus state that there is no rhachidian. Consequently I surmise that the innermost teeth were not properly observed at their original examination. The shape of the teeth is otherwise typical.

It is interesting to note that Maplestone's description of this species was published some four years prior to Abraham's naming of it from preserved material.

Original citation, p. 53.

"*Doris,* No. 19. Hab., low water on rocks; only found two or three specimens, one to two inches long; shape similar to *D. johnstoni;* light orange colour. Palate, a muscular band with a few irregularly-shaped concretions, can hardly be called teeth, distributed thereon without any apparent order."

The reference to *D. johnstoni* (=*Jorunna tormentosa* (Cuvier)) of western Europe shows that the species in question is a flat oval animal with a somewhat furry appearance. The absence of radula and teeth is diagnostic of the *Porostomata* or radular-less *Doridoidean* opisthobranchs, and the flat oval shape and furry appearance strongly suggests the genus *Doriopsilla* Bergh. Light orange colour is the chief characteristic of *Doriopsilla aurea* (Quoy and Gaimard, 1832), a quite common species within Port Phillip Bay (Burn, 1957, p. 21). It is therefore most probable that this identification is correct.

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Review

Your Australian Garden

No. 2 Mintbushes and their Relatives

Published by the David G. Stead Memorial Wildlife Research Foundation of Australia, Price 35c.

This booklet is not simply a guide to the cultivation of *Prostanthera* spp. It contains a key to the genera of the N.O. Labiatae and brief descriptions of the species which are worthy of attention by growers of Australian plants. Some information on natural distribution is also included.

There are more than 70 species of *Prostanthera* and 60 are here listed together with a number of varieties and hybrids. The conditions under which the different species are likely to thrive are mentioned and the information on size of plant, floral colour, etc., will be useful to the gardener. Other genera discussed are *Westringia, Plectranthus, Ocimum, Hemigenia, Hemiandra, Microcrys, Basiliscum, Ajuga, Coleus, Mentha, Teucrium* and *Wixonia.*

This excellent little work also gives hints on propagation by cuttings and seed. Copies may be obtained from the secretary of the Foundation, Box 4840, G.P.O. Sydney.

—J.R.H.

The Regeneration of the River Oak

By P. J. Gresser

The River Oak is one of the largest species of the genus *Casuarina*. It sometimes reaches one hundred feet in height, and in New South Wales grows along the margins of the rivers and larger creeks throughout the mountainous and hilly country to the east and west of the Great Dividing Range. However, it does not occur on the Western Plains.

When the first settlers came to Bathurst, both banks of the Macquarie River were lined with these trees for the full extent of the Bathurst Plains. However, in the immediate vicinity of Bathurst they have long since disappeared for some distance upstream and downstream. They were cut down for firewood and other purposes; but, as an early writer recorded, "not before they had been badly disfigured by the ravages of soldiers and citizens who tore down their branches to provide themselves with cheap and effective brooms".

These trees grew along the banks of all the larger water-courses throughout the district with the exception of Campbell's River. For some unaccountable reason there were never any growing along this river, although they grew along both banks of the Fish River which joins the Campbell and flows through identical terrain.

Because of the lightness, toughness and durability of the timber, it was widely used for the making of bullock yokes and for other purposes where these qualities were essential. The foliage too, was suitable for sheep and cattle fodder, and for this reason was used extensively in times of drought.

Thirty or forty years ago therefore, the indications were that the River Oak was doomed to extinction in the Bathurst District. Very few, if any, young trees were to be seen. A few scattered remnants of the past were all that remained. The cropping of stock and rabbits did not allow the seedlings to establish themselves.

However, during recent years, owing to the control of the rabbit and a succession of good seasons providing ample stock food, young Casuarina trees are to be seen in numbers. Along the banks of the Macquarie River away from the immediate vicinity of Bathurst, and along the margins of the larger watercourses, dense thickets of young trees are to be seen. These are now of sufficient height to be beyond the reach of stock.

Casuarina cunninghamiana is an ideal tree to prevent the erosion of the banks of streams, and unlike the introduced Willow, is not a factor in the siltation of watercourses. Formerly, there were long stretches of deep water in the Macquarie, Fish and Turon Rivers, but now they have become silted up.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Mallee Nesting Records

Mr. H. R. Hobson of Rosebery has sent us this interesting account of his observations.

November, the last month of Spring, has rewarded the observer with some records of the nesting of some endemic Mallee birds.

On November 2, as I approached a familiar mound of the Mallee Fowl, *Leipoa ocellata*, some three miles outside the southern boundary of Wyperfeld National Park, a Spotted Nightjar, *Eurostopodus guttatus,* was flushed and it was seen that the bird had been brooding its single, pale bluish-green coloured egg that was lying on the bare ground among the fallen debris of the nearby small Mallee eucalypts. After marking the site so that it could be found again, I went on to watch *Leipoa* work his mound for perhaps half an hour. When I returned, the nightjar had resumed its former position on the ground, which of course is the usual resting site for the species.

Another visit was made with a friend on November 7 and, although we were only twelve yards away, when asked if a bird could be seen on the ground, he was unable to see the nightjar, until its exact position was explained to him. On this occasion the bird was reluctant to leave the egg and only when we were about six feet away, did it fly off.

When I visited the area on November 12, the egg had hatched. The two empty halves of the shell remained nearby, but I was unable to locate either the nightjar or the chick, although possibly, they were not far away. Most likely hatching occurred shortly after the visit on the 7th. To console myself for having missed the nightjar chick, I proceeded on to watch the Mallee Fowl adjust his mound for the approaching nightfall.

As I sat watching, I failed to notice that a goanna, some four feet long, had approached and climbed to near the top of the mound. The bird had worked his way down the opposite side and it occurred to me that the goanna might make an attack on him, but this did not happen. On reaching the top of the mound, bird and goanna were about two feet apart, but the bird took only a short glance in the reptile's direction and continued to shovel the sand back to the centre of the mound. The goanna watched the bird and the flying sand for about 20 seconds, then it rose up on its legs and trotted rapidly away, evidently convinced that such a worker should not be molested.

In view of recent reports *(Vict. Nat.* **80,** 368; **81,** 80 and 178) on the decline in numbers of the Grey-crowned Babbler, *Pomatostomus temporalis*, in Victoria, my own observations in this species over recent years may be of interest.

Some few years ago, at a Government Reserve of 25 acres of mallee that is situated about midway between Rosebery and the township of Rainbow, and a mile from my home, there was a colony of eight White-browed Babblers, *P. superciliosus*. First I noticed the appearance of one Grey-crowned bird in their company. The following year a second appeared, but there was no nesting. The following spring, 1964, the White-browed species had left the area: whether the Grey-crowned were responsible for their departure is a matter for conjecture, but it seems possible, for prior to the arrival of the Grey-crowned, the White-browed had been there for years. The Grey-crowned nested in 1964, but only one young bird was reared. In 1965 nesting was more successful. Four young were added and there is now a happy family of seven Grey-crowned Babblers.

It would be interesting to know whether other readers have evidence suggesting that the arrival of the larger Grey-crowned Babblers in an area has been followed by the departure of the White-browed species.—J.R.H.

Living Jewels of Lightning Ridge

Mrs. F. Gladstone of Beechworth wrote on her return from a holiday to Lightning Ridge, in the north of New South Wales, that she had found this area absorbingly interesting.

Besides the flashing sparkles of colour from opal-chips, we were enthralled by the brillant beauty of the birds there. Everywhere we went flocks of Crested Pigeons (*Ocyphaps lophotes*) rose up and settled in the mulga and on bushes strange to me with round fruits of dried seeds which seemed to be food for emus.

The pigeons were abundant: they fed on the ground which at first sight appeared dry and barren, but on close examination was seen to have dry plants that had seeded, spread all over it. Flocks of beautiful parrots and silvery galahs also came to feed. The parrots were truly vivid, living jewels. Some were large. There was a two-toned green species with rich red on feathers under the wing that became visible when the birds flew and some Mulga Parrots (*Psephotus varius*), in flight like living rainbows. There were also the Blue-bonnets (*Psephotus haematogaster*), all part of the symphony which makes up Australia's loveliness.

The delicate beauty of the Bourke Parrot (*Neophema bourkii*) in pink, brown and pastel blue was a lovely sight and the Mallee Parrots (*Barnardius barnardi*) were there too, vividly flashing in flocks in and over the box trees.

We heard one bird mimicking a cat wonderfully well and learned with great interest that it was a Spotted Bower-bird (*Chlamydera maculata*) with a patch of lilac-rose at the back of the neck. Clusters of Happy Jacks or Apostle Birds (*Struthidea cinerea*) fed about the ground. There were White-winged Choughs (*Corcorax melanorhamphus*) and the Black-backed Magpies (*Gymnorhina tibicen*) carolling each morning made us feel quite at home; but no kookaburra laughed. We saw Grey and Pied Butcher-birds (*Cracticus torquatus* and *C. nigrogularis*) and huge flocks of graceful White-backed Swallows (*Cheramoeca leucosterna*) enchanting the air. How it enhances the joy of holidays to keep an open eye for the new bird and for the familiar ones in a strange setting! We saw Rufous Whistlers (*Pachycephala rufiventris*) which visit Beechworth in September, build and then go each year in April. Red-capped Robins (*Petroica goodenovii*) were present at Lightning Ridge and Collarenebri too for we observed their red caps several times in our journeys.

Mistletoe-birds (*Dicaeum hirundinaceum*) were brilliant in flight: they led us to find three varieties of flowering mistletoe and Grey-headed Honeyeaters (*Meliphaga keartlandi*) feeding in the nectar of the blossoms. At the opal-fields, groups of eight of more emus were feeding quite serenely even in sight of the miners. The Crested Bell-birds (*Oreoica gutturalis*) were living there happily, feeding on the ground among the spiky thorn-bushes.

I hope that the birds will always feel safe there.

Geologists, of course, would be absorbed in the opal-gouging and the petrified woods, opalised shells, jasper, topaz and orange agates one can find at this most interesting place.

Silver Daisies on Mount Baw Baw

Mr A. E. Brooks has written this note:

Like most Alpine plants, Silver Daisies (*Celmisia longifolia*) have the peak of their flowering season during January. This is certainly true near the summit of Mount Baw Baw in mid-summer, where there is much to interest those who are botanically minded at a time when the ski tow-ropes are idle.

Silver Daisies are common in alpine areas in South Eastern Australia, Tasmania and particularly New Zealand, at altitudes usually above 4,000 feet. Strangly enough, they also grow on Mount William in the Grampians at a lower altitude than this. New Zealand, where there are about 60 species compared with two in Tasmania and a total of three in Australia, must be regarded as the home of Celmisias.

Silver Daisies have very attractive creamy-white flowers up to two inches across, carried on upright silvery-haired stems up to a foot high. The silky leaves, which may be as much as seven inches long and half an inch wide, are in tufts which may form into very large patches. The silky covering is particularly thick underneath the leaves.

Near Baw Baw village, and from there to the summit, Silver Daisies are plentiful, and are an outstanding feature of this, as well as other alpine areas, in mid-summer. Their chief rivals in floral beauty are the colourful Trigger Plants

(*Stylidium graminifolium*) with rich deep pink flowers which grow much more luxuriantly than on the lowlands. They are so abundant that, on their own, they are worth a trip to the 5,130 feet summit of Mount Baw Baw.

Other plants which produce much more richly coloured flowers in apline places include the Blue-bells (*Wahlenbergia* species) and the Billy Buttons (*Craspedia uniflora*) with their orange-coloured flowers.

The numerous Ivy-leaf Violets (*Viola hederacea*) are also sure to attract attention, Yams (*Microseris scapigera*) grow in a luxuriant manner, and the only *Richea* which is not confined to Tasmania (*R. continentis*) is common there.

Candle Richea, which is found in large clumps, has sharply-pointed, stem-clasping leaves. The waxy, creamy-yellow flowers, in spikes three or four inches long, stand upright above the bushes so that they resemble candles. Brown bracts, which cover the flower-clusters, fall as the flowers develop, and the bell of each separate flower also drops off as if to make it easier for insects to do the work of pollination.

Referring again to Celmisias, the Silky Daisy (*C. sericophylla*), a second mainland species, was described by J. H. Willis in the *Victorian Naturalist*, 70(12) for April 1954, as follows:

"This magnificent plant with soft silvery-grey foliage and marguerite-like flower-heads, is one of the most attractive botanical features of the Bogong High Plains where it flowers abundantly during January and February."

The Silky Daisy, unlike the Silver Daisy, is found close to water at altitudes of 5,500 feet or more, and is believed to be limited in habitat to the Bogong High Plains.

The long trip of 117 miles from Melbourne to Mount Baw Baw is well worth the trouble. In the Tanjil Bren area tree-ferns line the road for miles on both sides, and much of the trip is through very pleasant country.

Birds, too, are plentiful. Crimson Rosella in ones and twos were frequently seen and, on one occasion, an adult bird resplendent in red and blue flew off with a young bird in green plumage.

Near the summit a Flame Robin was seen and a Wedge-tailed Eagle passed overhead as he soared down a gully on effortless wings. Australian Pipits were common, but many other birds did not wait long enough to be identified.

I shall look forward with eager anticipation to another trip to Mount Baw Baw when the Silver Daisies are in bloom.

THE AUSTRALASIAN NATIVE ORCHID SOCIETY

The Society will be publishing in the course of the next few weeks "A Review of the Sub-tribe Sarcanthanae in Australia" by A. W. Dockrill, containing descriptions of three new genera, two new species, nine new name combinations, the reduction of several species to synonymy, a list of all present members of the sub-tribe in Australia and New Zealand showing distribution, flowering period etc. and a complete list of excluded species and varieties plus 37 drawings.

WILDLIFE IN AUSTRALIA

The February number of this periodical, which is published by the Wildlife Preservation Society of Queensland, contains much to interest the field naturalist. The National Parks of Victoria, New South Wales and Queensland are discussed briefly in an article by J. K. Jarrott and birds of paradise are described by Richard Schodde. The centre pages illustrate in color the new decimal currency stamps of New Guinea. All but one of these show local butterflies, the exception being a bird of paradise. A. B. Cribb is responsible for an article entitled "Don't Starve in the Bush" and two papers on bush-fires and a number of shorter notes and reviews complete the issue.

This well-illustrated quarterly is obtainable from the Wildlife Preservation Society of Queensland, Box 2030X, Brisbane. The annual subscription is $1.60 within the Australian Commonwealth, $1.90 overseas.

Field Naturalists Club of Victoria

Annual General Meeting—
March 14, 1966

In spite of the Labour Day holiday and Moomba attractions, a large gathering attended the Annual Meeting with Mr. M. K. Houghton in the chair.

The minutes of the Annual Meeting of June 14, 1965 were taken as read and accepted on the motion of Mr W. Woollard and Mr. A. J. Swaby, Mr. E. H. Coghill moved that the annual report published in the March *Naturalist* be adopted and Mr. A. Fairhall seconded the motion which was carried.

As Mr. A. G. Hooke was ill, Mr. W. P. J. Evans, the Club's auditor moved the adoption of the financial statement and balance sheet published in the *Naturalist*. He commended the efficiency and clarity of the statement. In seconding the motion, Mr E. R. Allan emphasised Mr Hooke's great service to the club as treasurer.

In the election of officers for 1966, Mr. E. Byrne having withdrawn from nomination as Vice-President, all the remaining members nominated were elected unopposed.

The President said that Mr. A. G. Hooke could only continue as Treasurer until September and Miss M. Butchart, Assistant Treasurer would only act until September.

Mr Griff Ward's nomination as Editor would still have to come before the Council.

The following are the 1966 office bearers:

President: Mr. M. K. Houghton.
Vice-Presidents: Mr. A. J. H. Fairhall and Mr. T. Sault.
Secretary: Mr. E. H. Coghill.
Assistant Secretary: Mr. R. Condron.
Treasurer: Mr. A. G. Hooke.
Assistant Treasurer: Miss M. Butchart.
Editor: Mr. G. M. Ward.
Assitant Editor: Mr. R. H. J. McQueen.
Librarian: Mr. P. Kelly.
Assistant Librarian: Miss M. J. Lester.
Excursion Secretary: Miss M. Allender.

Council: Mr. E. R. Allan, Mr. B. Fuhrer, Mr. J. Ros Garnet, Mr. F. L. Jeffs, Mr. A. Lewis.

Mr. J. W. H. Strong moved and Mr. W. C. Woollard seconded the motion that Mr. W. P. J. Evans be appointed auditor for 1966. This was carried.

The speaker for the evening was Mr. A. J. Swaby and his subject "Browsing through the Grampians". Mr. Swaby recalled that this Wonderland was first described by Major Mitchell in 1836 and ever since then the wonder grows. There is still much to be found out about the birds and smaller animals and the crustaceans, mosses, liverworts and fungi have hardly been touched. He urged a closer alliance between the surrounding affiliated clubs and the F.N.C.V. so that information could be collected and recorded.

With the aid of a fine map he sketched the geological formations of the surroundings, illustrating the considerable tilting since the Grampians area was raised from the sea. This had led to steep scarps on one side and gentle slopes on the other.

Beautiful colour-slides illustrated the ranges and peaks, the queer rock formations resulting from fracture, caves formed by wind, razor sharp edges and the plain derived from debris washed from mountains.

The Silver Band Falls, McKenzie Falls, Broken Falls, Lake Wartook with its island on which koalas are located, were shown as well as the area of the Bellfield dam near Hall's Gap. A cave in the Victoria Range contained aborigine drawings in red and in a Mt. Zero aborigine shelter there were pictures representing a corroboree which displayed remarkable action.

With the aid of further beautiful colorslides, mostly taken by Mr. Ian Morrison, Mr. Swaby described many native plants, some rare and some found only in the Grampians. It is possible to mention but a few. Amongst the ferns was the very rare Skeleton Fork-fern (*Psilotum nudum*). There were several species of *Pultenea,* the Ribbed Bush-pea (*P. costata*) from Rose's Gap, Thready Bush-pea (*P. lehmanii*) from Chimney Pot Gap, Narrow-leaf Sticky Bush-pea (*P. angustifolia* var. *viscosa*) from the

southern Grampians and Rosy Bush-pea (*P. subalpina*) from Mt. William. At this last site the fine wedge-pea, *Gompholobium minus* var. *grandiflora*, also grew. Amongst others illustrated were a narrow-leaved form of Showy Bossiaea (*B. cinerea* var. *rosmarinifolia*), two narrow-leaved forms, found only in the Grampians, of Olive Grevillea (*G. oleoides*), Raspberry Grevillea (*G. confertifolia*), the well-known *Thryptomene calycina* with its petaloid sepals and examples of *Boronia latipinna*.

Mr. Swaby regretted the depletion of many species, especially the Beard-heath *Leucopogon thymifolius*, which was formerly so plentiful along the Mt. Victory road. Further interesting plants were *Trymalium ramosissimum* with wide leaves and the smaller *T. d'Altonii* and a number of Trigger Plants *Stylidium soboliferum, S. despectum* and *S. calcaratum*. The small hairy *Centrolepis strigosa* and tiny *Aphelia gracilis* were shown. The carnivorous plants were represented by the sundews, *Drosera glandigera, D. pygmaea* and *D. binata*. A remarkable picture portrayed a lacewing fly trapped by its wings on a sundew leaf.

There were many fine pictures of numerous species of orchid found in the Grampians. Animal life was represented by pictures of lizards, clusters of sawfly larvae, a looper caterpillar on *Acaena ovina* and a superb study of a golden-eyed, winged adult insect, the nymph of which is the ant-lion.

In the absence of Mr. Ian Morrison through illness, Mr. Alan Morrison was responsible for the projector.

The President thanked Mr Swaby for his most enjoyable and informative talk. This had been greatly appreciated by the audience who had been privileged to be taken on such a tour of the Wonderland.

Nine new members whose names appeared on page 67 of the March *Naturalist* were elected on the motion of Mr. Curtis and Mr. T. Sault.

The Secretary reported that the protests that he had sent on behalf of the Club to the Premier of Tasmania concerning the destruction of cormorants by blasting had, no doubt in conjunction with similar protests from other bodies, borne fruit. The project had been abandoned. Persistent efforts from this and other clubs had also been effective in having the bounty on wombat scalps removed although, unfortunately these animals were still considered officially to be vermin.

A request from Carey Grammar School for speakers on nature subjects for Tuesday lunch-time meetings was read. Miss Banfield had repeated her request for a reference to the *Naturalist* prior to July 1959 in which an aboriginal well near Ararat was mentioned.

The exhibits included a Maori artifact from New Zealand and a "Match-box" seed brought by Mrs. North. Mr. E. H. Coghill showed a large, handsome sawfly with yellow spots on its thorax caught at Donna Buang and Mr. D. McInnes a caterpillar from which numerous parasitic wasps were emerging.

Geology Group—March 2, 1966

Thirty one members and visitors attended with Mr. McInnes in the Chair. Mr. Davidson reported on an excursion to the Flinders area by about twenty-five members. A visit to the Zealite area proved fruitful. Members collected some very fine specimens mainly gmelenite, analcite and natrolite. A visit was then made to the area near West Head where limestone of Miocene age (Batesfordian) was seen resting on the Older Basalt (Oligocene). Members collected fossils, including brachiapods, bryozoa, spines of sea urchins, and gathered samples to study the foraminifera under the Club Microscope.

The Subject for the evening, Victorian Geology and Minerals, was covered by Mr. Davidson and Mr. Cobbett.

Mr. Davidson began the evening by describing the main physiographic features, notably the Great Dividing Range and drainage systems, the Murray Basin and the Western Basalt Plains. With the aid of a map, he then described the rock types of each area from the Oldest (Cambrian) to the youngest (Pleistocene) and paid special attention to the main axial lines where the oldest rocks outcrop with the younger ones on either flank. Mr. Corbett then spoke of the minerals, their economic value, their occurrence, abundance and usage. He mentioned that Victoria had no large mineralised areas but nevertheless some economic minerals had been won. The most notable, gold was obtained from deep leads, reefs, dykes etc. With the aid of many fine specimens he spoke of each mineral in turn and gave a full account of its present day value.

Exhibits: *Mr. D*angerfield: Quartz crystals showing zoning. Mr. Davidson: zealites, Flinders; chalcedony, agate, vivianite, limonite pebbles, Phillip Island; flint showing foraminifera, Phillip Island. Mr. Hammond: granite from Stranger Rock, Derrinal; granodiorite, Knowsley North; granodiorite, Lancefield.

Mr. Cobett: limonite, Nowa Nowa; common opal, Gelantipy; cassiterite, Beechworth; quartz crystals from Morning Star Mine; garnet, Barnawatha; gypsum, Coode Canal; fluorite, Pine Mountain; chalcopyrite, Heathcote; turquoise, Cheshunt; molybdenum, Everton; galena, asbestos, felspar, barytes, malachite.

Mrs Skopakou: assorted polished pebbles, Emu Creek; zealites, Flinders; polished pebbles of selwynite, Heathcote.

Mr. McInnes: section gmelonite under microscope; fossilised wood, cut and polished.

Mr. Whatmough: sandstone with plant remains (Jurassic), Lorne.

Mr. Sault: bore-core: granite, Arthur's Seat.

Botany Group—March 10, 1966

Eighteen members were present, with Mr. B. Fuhrer in the chair.

Mr. Swaby was guest speaker, and his subject "Plant Ecology". Mr. Swaby explained that there were numerous factors to be taken into account in the study of plant ecology. Not only location and type of soil, but weather pattern, associated plants, and also animals, birds, insects, etc., needed to be noted.

Then one had to consider the health of the plants, and whether their numbers were increasing or otherwise, or whether perhaps introduced species might be taking over. A certain species might be growing in association with certain other species in one particular locality, and perhaps with different ones in another district, and the student had to try to find the reason behind their requirements, such as soil constituents, moisture, shade, temperature etc. Mr. Swaby suggested that, as a group, it might be a good idea to take certain small areas to study, by visiting at intervals to take notes on the numbers and condition of all the species found at that spot. It would not be necessary to make any one place a group project, but individual members could take over separate localities.

Mr. Swaby lastly mentioned the South Australian ninety mile plain (or desert), which in spite of an adequate rainfall, was unable to sustain good plant life owing to the lack of the trace elements copper and zinc in the soil. Since these

have been applied in minute quantities, the complexion of the country has quite altered, and it is now a fertile area used for farming purposes.

It was arranged that the Botany Group should lead an excursion on Sunday, 15th May, to the Warburton district with fungi as the objective.

AFFILIATED CLUBS

Bairnsdale F.N.C.

In a letter, Mr. E. V. Barton, Honorary Secretary of the Bairnsdale F.N.C., reports a successful year of meetings and excursions. Special studies are being made of wattles and ferns, and another part of the Club's periodical, "The Clematis", has been produced. Mr. A. V. McDonald is President.

Benalla F.N.C.

We hear that Mr. R. R. Barber of Wyambi, Benalla is the new Hon. Secretary of this Club.

We wish him success and pleasure in his office.

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

GENERAL MEETINGS

Wednesday, April 13—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements. 2. Correspondence.
3. Subject for the Evening: M. E. Swarbrick, F.N.C.V. Excursion to the Snowy Mountains.
4. Election of Members.
   (a) *Ordinary*
   Miss Audrey Johnson (Interest—Geology).
   Miss Brenda G. Paine, Flat 4, 478 Burke Road, Camberwell (Interest—Botany).
   Alan Edwin Perriman, 46 Hollyrood Street, Hampton, S.7 (Interests—Geology and Marine Biology).
   Miss Melitta Pertinac (Interest—Geology).
   David Rivett (Interest—Geology).
   Mrs. M. Monica Smith, 22 Glenbrook Avenue, East Malvern, S.E.5 (Introduced by Miss M. Butchart).
   (b) *Country*
   Ernst Lortz, Mallacoota.
   (c) *Junior*
   Miss Jennifer Claire Piesse, 43 Sackville Street, Kew.
5. General Business. 6. Nature Notes and Exhibits.

Monday, May 9—Miss V. Parry—"Kookaburras".

GROUP MEETINGS

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

Thursday, April 14—Botany Group. Miss Jean Galbraith—"Carnivorous Plants".
Wednesday, April 20—Microscopical Group. Mrs. K. Trotter—"Instant Slides".
Friday, April 29—Hawthorn Junior Club—at Hawthorn Town Hall at 8 p.m.
Monday, May 2—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms at Parliament House at 8 p.m. Enter through private entrance at south end of House.
Wednesday, May 4—Geology Group. Mr. D. McInnes—"Cherts and Flints".

The Secretary of the Geology Group wishes to bring to the attention of members that a special Members' Night will be held in May to celebrate the 20th anniversary of the formation of the Group. A selection of films will be shown and the Group's activities over the past 20 years will be discussed. Past and present members are cordially invited to attend this Special Meeting on

Thursday, May 5—Fauna Survey Group—at Fisheries and Wildlife Department, at 7.45 p.m.
Thursday, May 12—Mr. A. Morrison—"Flora of the Burke and Wills Track".
Friday, May 13—Preston Junior Club—at the Rechabite Hall, 251 High Street, Preston (just north of Bell Street.)

F.N.C.V. EXCURSION

Sunday, April 17—Sydenham Organ Pipes, Bulla District. Leaders—the Geology Group. The bus will leave Batman Avenue at 9 a.m. Fare $1.50. Bring one meal and a snack.

PRELIMINARY NOTICE

September 17 to October 2, 1966—Queensland. The party will leave Melbourne by air on Saturday, September 17, for Brisbane where it will stay overnight. Sunday it will go by bus for Maryborough via the Glasshouse Mountains and Sunshine Coast and then, on the Monday, proceed to Gladstone. On Tuesday it will depart for Heron Island for a week. On Tuesday 27, it will leave Heron Island and take train to Brisbane and thence by bus to Binna Burra on the Wednesday. There it will remain until Sunday, October 2, when the main party will return to Melbourne. Those wishing to remain longer in Queensland may do so as the return ticket may be used at a later date. The inclusive fare will be approximately $220: a deposit of $30 should be paid to the Excursion Secretary when booking and the balance by August 8. IMPORTANT: Please confirm tentative bookings by April meeting as arrangements must be finalized. Also state if intending to stay longer.

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, 1965

President:
MR. M. K. HOUGHTON
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. A. J. H. FAIRHALL, Mr. T. SAULT

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. A. G. HOOKE, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg, N.22.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MRS. P. E. MATCHES, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: MR. R. BOX, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: MR. P. GENERY, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

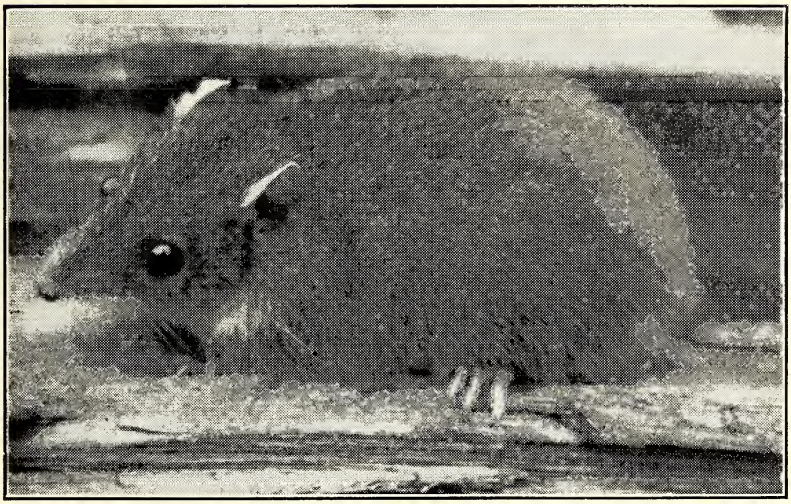
Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1.

The Victorian Naturalist

Vol. 83 (5) May 1966



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Field Naturalists Club of Victoria

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Vol. 83, No. 5 May 5, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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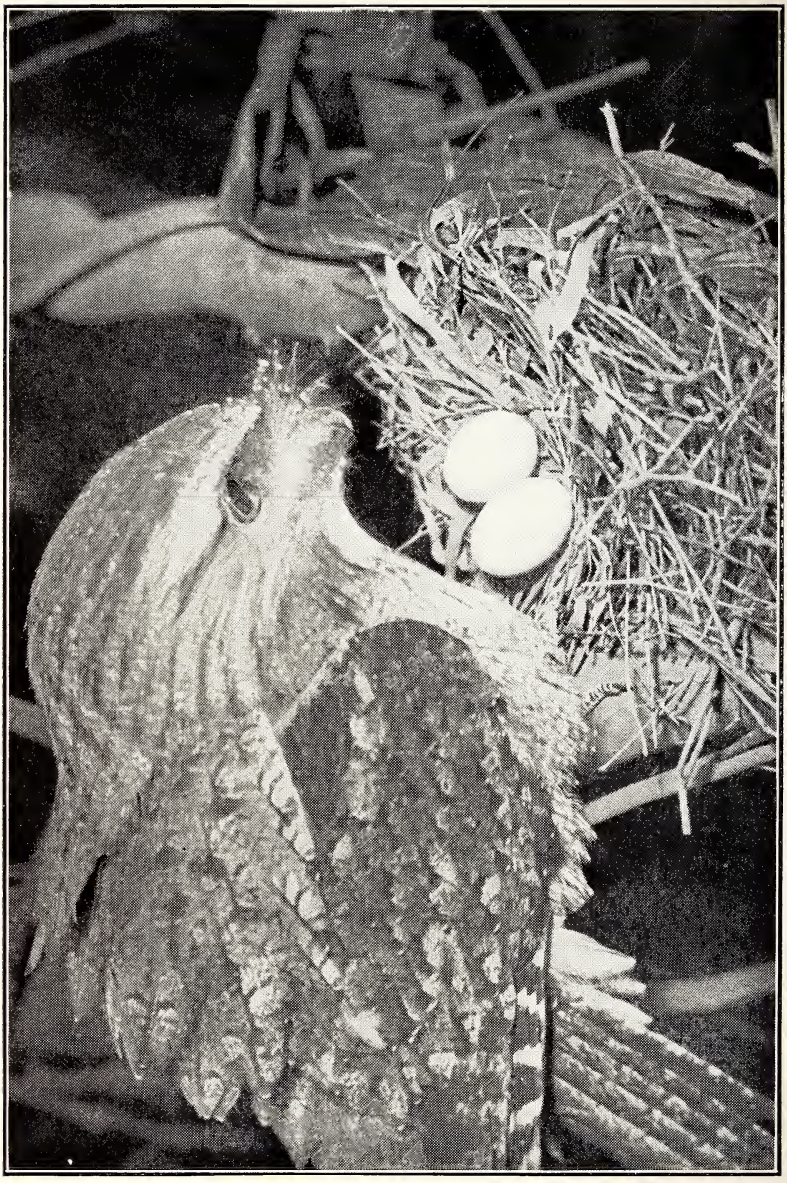


Tawny-shouldered Frogmouth at nest. *Photo*: Late Ronald K. Monro.

Editorial

As your newly appointed editor, I would initially like to thank my immediate predecessor, Mr. J. R. Hudson for his help and guidance so far, and the many other members who have indicated their willingness to help. I shall endeavour to maintain the high standard set by past editors, but to succeed in this endeavour will depend a great deal upon members. After all, the *Naturalist* could not continue in its present form if it were not for the material submitted by the many people from within and without the Club.

However, there must be many members who may be desirous of submitting material, but who feel apprehensive about the matter. If this be the case, I think portion of the editorial to the *Naturalist* of October 1960 may help.

Mr. Norman Wakefield indicated here that the magazine "was to contain material for the education of the unscientific naturalist as well as material of scientific value". Surely from this, we must conclude that every member has the right to contribute to our very worthwhile publication.

With the last four or five issues of the *Naturalist,* it will have been evident that fewer pages have appeared. This has been due only, to a lack of material.

Thirty-two pages were printed previously, and it is a fervent desire that we may again produce this number. I therefore look forward to receiving your enquiries and articles.

In concluding, I am optimistic that the publishing of the *Naturalist* in its present form, can and will be maintained by virtue of the large and keen membership which exists.

Front Cover

This photograph was taken by David Fleay and appeared in the *Naturalist* (49) 1932.

Swainson's Phascogale *Antichinus swainsoni,* sometimes called the Dusky Marsupial Mouse, occurs most commonly in Victoria about the Otway Ranges and Eastern Central mountains. It inhabits the denser floor-vegetation connected with wet sclerophyll forests, and is mainly insectivorous, although it has been reported to take the eggs or young of small birds.

A revision of the *Antichinus* spp. appears in the *Naturalist* of November 1963.

Errata. (*Vict. Nat.* March'66). The cover photograph was described as the Grey Teal *Anas gibberifrons.* It was in fact the Chestnut Teal *Anas castanea.*

Why Does the Female Mosquito Bite?

by W. J. Genery

Every person has been rudely awakened from their sleep during the warm summer nights by that high-pitched piping note which denotes a female mosquito is seeking human blood, which it requires to complete its life cycle.

The common mosquito, or *Culex fatigans* can be found in any stagnant water around the house—this includes tins, containers, spoutings and gutterings, in fact anything that can hold water can maintain the larva of the mosquito during the warm summer months.

The larva, when at rest, floats on the surface of the water with the head directed downwards whilst the tail portion, which is divided into two parts is flush with the surface of the water. When the larva is startled it sinks slowly to the bottom of the water and then, after a short period, it rises again to the surface by means of a quick jerking movement of the tail and resumes its resting.

It has often been asked how the larva can hang head downwards from the surface of the water whilst resting and feeding, when it is heavier than the water. This is because of what is called the surface film of water. This film enables the mosquito to float or remain suspended without any apparent effort. The surface film of water is a contractile force or tension which causes the water at the surface to attain a peculiar state of cohesion; although this film is remarkably thin it can support the weight of objects many times heavier than the water itself; we have all seen the needle floating on the surface film and how once the needle is beneath the surface film it sinks rapidly. The larva uses this film to its advantage and it divides the operations of breathing and feeding between both ends of its body. The head being chitinised is heavier and sinks down whilst the breathing organs, which are in the tail, being lighter, always tend to float up to the surface, and this is the reason why the larva is able to maintain a vertical position when at rest.

The head of the larva is provided with a number of vibratile organs which sweep and beat the water constantly causing currents of water from which particles of food are drawn into the mouth.

Attached to the last segment is the respiratory siphon; which branches upwards, and it is traversed by two air tubes that continue the entire length of the body and supply it with air; at the tip of this tube are five triangular chitinised flaps which can be opened or shut completely by the attached muscles. When the larva is on the surface the flaps open and form a basin with the pointed tips of the flaps adhering to the surface film and not allowing the water to enter into the tube. When the larva sinks below the surface the flaps close and the water cannot flow in, nor the air escape from the tube.

After about four ecdysis or changing the skin, which become imperative as the larva grows larger, pupation commences. During this stage the compound eyes, and the mouth, as well as the wings and legs are com-

pletely formed. The breathing apparatus is changed and the air passages no longer open at the tail end, but toward the head where a pair of trumpet-like appendages are placed. These trumpets are situated so that their openings are at an angle to float on the top of the surface which is again used by the organism in obtaining a supply of air. Water is prevented from entering the air-trumpets by numerous fine hairs which can hold a bubble of air when the pupa submerges again. You may ask why does the breathing apparatus change from the tail openings in the larva to the prothorax in the pupa. The answer is simple; the larva requires to float head downward to feed whilst continuing to breathe through the respiratory tube opening at the tail on the top of the water film. But now, the pupa no longer requires to feed, and when the time comes to leave its pupal covering the mosquito must be in a position to escape from the water, not into it. For this reason the head of the pupa must be uppermost so that when the pupal skin splits along the back of the thorax and the fly emerges extricating its head, wings, legs and body from their tight fitting envelopes, it is above the water and the respiratory organs are the first out.

The mouth of the female mosquito is provided with a complex number of parts to enable the skin to be pierced, and blood to be drawn up. The most important is a long flexible tube split along the upper side; this is the labium and it protects and stiffens the other five long and delicately shaped parts. One pair represent the mandibles and the other the maxillae; the maxillae have saw-like teeth near their tips. The unpaired part is the hypopharynx. As the piercing instruments penetrate into the skin the labium is bent backwards to shorten it without withdrawing its support from the piercing parts. When the blood is being drawn up into the mouth, the oesophagus is dilated to form a sucking bulb. In front of the mouth is a small valve which prevents the escape of the blood from the mouth.

These five instruments and the labium are very different in the male mosquito. If it requires any fluid during its brief span of life it is acquired from the juices of plants and flowers.

There are several theories regarding the reasons why the female mosquito requires mammalian blood. One theory is that the blood is required for the development of the numerous eggs which are deposited by the female during the several weeks of her life, but this theory is weakened by the knowledge that vast numbers of mosquitoes are found in parts of the Arctic circle in Labrador, Siberia and Kerguelen Island and these places are practically without habitation by man or mammal for the mosquito to acquire the blood it needs.

The male mosquito upon its emergence flies off from the water and joins up with a nearby swarm which consists of males only. The swarms can be seen flying around in circles at varying heights from the ground. When a female appears the swarm close around her and the serried movements become faster and faster until a male has fertilized her eggs. The male only lives about one or two weeks but the female lives about twice this period, and during this time the fertilized eggs must be maintained, developed and deposited in various places, where food is readily available for the larvae when they hatch out from the eggs. During the life of the female mosquito much of the energy which has been acquired from the previous stages is quickly utilised in the development of the numerous eggs in a number of suitable places

eggs in a number of suitable places calls for long flights, and this in its turn calls for the utilization of a further amount of the sadly depleted energy, the female now requires a fresh supply of food from a different source. This food must be easily obtained without further wastage of energy, it must be highly concentrated, so it does not occupy much space nor weigh heavily, and above all it must be highly nutritous and easily assimilated. Blood is the answer to this. Many mosquitos feed on man: the skin is easily pierced and a plentiful supply of blood is always available; this blood is rich in proteins and vitamins and contains mineral salts; and all these are required to give the mosquito the extra energy that it requires to fly around until it has found a number of suitable pools or ditches to deposit the eggs so that the larvae upon hatching are assured of a generous supply of food.

The mosquito deposits about two hundred eggs upon the surface of the water or on water plants. It supports its body on the four front legs that rest on the edge of the pool or some floating object on the surface. The eggs are deposited between the hind legs. In some species they are sticky at first and adhere to each other to form a small concave mass not unlike a small boat. The upper end of each egg is pointed whilst the lower end is wider and rounded with a lid attached through which the larva will escape upon hatching. The mosquito at all stages must have an ample supply of air even whilst in the egg and it is essential that the egg raft must always float on the surface with the pointed ends of the eggs uppermost. In this position the rounded ends of the eggs with the lids attached are underneath and in the correct position for the larvae, when hatched to push off the lid and escape directly into the water. The egg-rafts are very common objects in any pool or ditch, but they are very hard to see on account of their size; they are less than a quarter of an inch in length and look like a speck of dust floating on the surface, but they represent fifty or a hundred eggs of an aquatic *Diptera* which has used the surface film of water to obtain the air necessary for its Larval, Pupal, Imago, and Egg stages: perhaps to make that shrill piping note which will rudely awaken some person from their sleep to ponder over again and again —Why does the Female Mosquito Bite?

Olivine in Victorian Volcanic Bombs

By A. W. Beasley*

Extinct but well-preserved volcanoes are common in the Western District of Victoria. Some, such as Tower Hill near Warrnambool, were active in geologically Recent times (within the last 10,000 years). Others are older (Pleistocene or Ice Age), but most of the volcanic hills that dot the countryside are considered by Gill (1963; 1964) to have been formed within the last 15,000 years. They are composed mainly of volcanic ash (fine fragmental material) and scoria (rough, angular pieces of very vesicular basalt) thrown out from the erupting volcano by the explosive action of steam and other gases. The volcanoes erupted with violent explosions, and the cones were formed comparatively quickly. Those cones formed mainly of scoria, such as Mt. Noorat north of Terang, have steep slopes due to the high angle of rest of this type of volcanic ejectamenta. Volcanic hills with low angles of slope are mostly accumulations of volcanic ash which has consolidated into tuff.

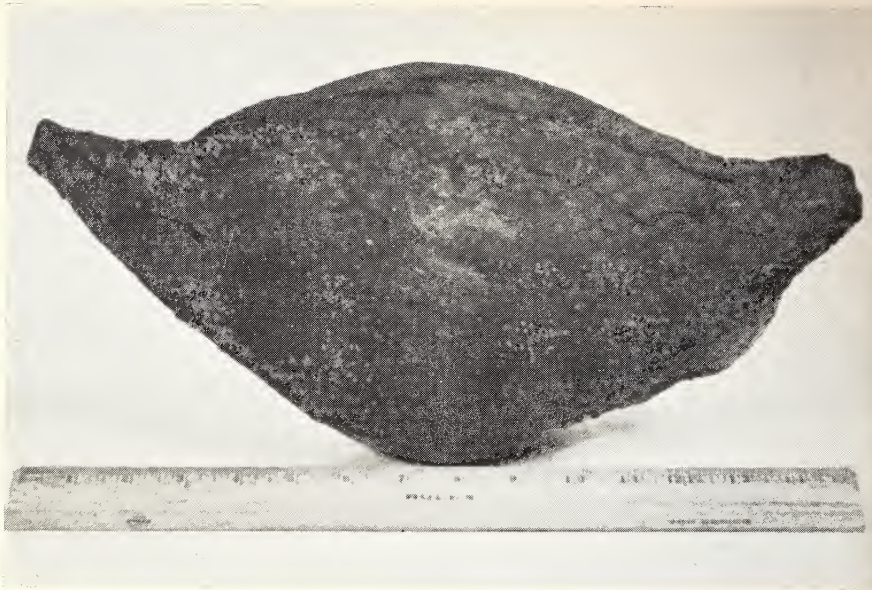
Among the ejectamenta that makes up the volcanic hills, volcanic bombs are sometimes found. They consist of basaltic rock which was thrown out from the crater as blebs of semi-molten lava; these rotated as they flew through the air, taking on a rounded or spindle-shaped form in which they solidified. Most of them fell not very far from the crater, and they are commonly associated with scoria. The volcanic bombs range in size from about ½ inch to more than 3 feet, but usually the maximum dimension is under 1 foot. Most of the bombs contain a nucleus of some material other than basalt, and this may form a large proportion of their mass. Frequently the nucleus or core consists largely of olivine grains.

The rock-forming mineral olivine, so named from its common olive-green colour, is a silicate of magnesium and iron, found generally in small imbedded grains or in granular masses. It can usually be distinguished from other minerals by its glassy lustre, conchoidal fracture, green colour, and granular nature. Olivine is a rather common rock-forming mineral, varying in amount from an accessory to a main constituent of the rock. It occurs principally in the dark-coloured, ferromagnesium-rich igneous rocks such as gabbro, peridotite, and basalt. Dunite is a rock composed almost entirely of olivine.

Clear green olivine is sometimes used as a gemstone under the old name of peridot. Some of the olivine found in volcanic bombs at Mount Shadwell, on which Mortlake is located, has been cut and polished for jewellery purposes. Unfortunately, olivine is not a very hard and durable gemstone, and when exposed to much wear, the cut stone does not keep a good polish or sharp edges. Most of the olivine found in Victorian volcanic bombs is too granular and friable to be used as a gemstone.

Grains of minerals other than olivine are present in small amounts in the nodular bodies that form the

* National Museum of Victoria.



Volcanic bomb from Mt. Anakie, north of Geelong, Victoria. Weight = 34 lb.
Photo: M. J. Mooney.

core of many of the volcanic bombs. These minerals generally include enstatite (pale green), chrome-diopside (emerald green) and spinel (dark brown). Indeed, the so-called olivine cores may more correctly be called peridotite (an olivine-rich igneous rock) inclusions (Green, 1964). These nodular inclusions of peridotite may be up to 2 feet in diameter, but most commonly they range from 4 inches to 8 inches. They are considered to be of deep-seated origin, torn off from peridotite masses below by the rising lava and by explosions, and brought up in a solid state. It would seem that peridotite composed mainly of olivine was ejected from the volcanic craters as solid pieces generally carrying some lava which cooled quickly in the air and solidified. Some of the peridotite inclusions (olivine cores) are extremely well-rounded, presumably from abrasive action within the volcanic vent and from partial melting; others of the peridotite inclusions show plane joint faces in process of rounding. In certain bombs the core can be detached fairly easily from the basaltic covering.

Nodules of peridotite which are not lava-encrusted also occur among the basaltic scoria in Western Victoria. Green (1964) has referred to them as "clean bombs". These ejected bodies are usually less than 9 inches in diameter.

Volcanic bombs with cores composed predominantly of olivine are particularly plentiful in the scoria of Mt. Leura, on the eastern outskirts of Camperdown. They can be collected from a quarry on the northern flanks of the hill (on the southern side of the Princes Highway). Detailed directions for locating this quarry have been given by Symons (1958). The scoria there resembles coke in appearance,

and the quarry walls consist of loosely consolidated black fragments averaging ½ inch to 1 inch in size; the quarried scoria is used for road-making. Some of the olivine has altered to a reddish brown substance called iddingsite.

Volcanic bombs with nuclei in which olivine is not the predominant mineral do occur in the Western District of Victoria. Grayson and Mahony (1910) found that pyroxene predominated in the nucleus of some bombs, and that certain others had nuclei consisting largely of felspar and quartz or of angular pieces of sedimentary rock. Ollier and Joyce (1964, p. 358) have recently stated that the volcanic bombs in the scoria cones of western Victoria "may contain cores of basalt, olivine (peridotite), or the local country rock".

Volcanic bombs with olivine-rich cores are found in Hawaii, Arizona, Germany and other parts of the world (Ross, Foster and Myers, 1954), but those from western Victoria are the best specimens that are found in Australia. They have been eagerly sought by various museums and universities in other Australian states, and good specimens have also been sent overseas. Large numbers have been collected by dealers and private individuals, and they form fascinating exhibits in many a geological display.

Broken volcanic bomb from Mt. Leura, near Camperdown, Victoria, showing the olivine-rich core.

Photo: Author.

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Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

ARACHNID ADAPTATION

With the coming of the months of late summer and early autumn, spiders come under our notice more so than at other times of the year. Sometimes we are aware of them through more intimate contact than we would intend. How many of us at one time or another have come face to face with the large orb-weaver, *Araneus transmarinus,* whose two foot diameter web has been constructed after dusk between two shrubs set on either side of our walk to the front door?

For those of us who have shared in this experience, and whether or not our flesh crept, we cannot have failed to notice the strength and elasticity of the web. What we have partly destroyed by accident, was the end product of approximately one hour of meticulous and painstaking weaving on the part of the spider. Had we not blundered into the web she should have, before the first light of dawn, and in three or four minutes, efficiently removed the whole of the orb with the possible exception of the main suspension line.* She would have then retired for the coming day, concealed effectively on the under side of a branch or within the shelter of leaves of one of the shrubs from which the web was suspended.

Araneus transmarinus at rest in web.

It was however, while preparing to photograph *A. transmarinus* that I came across another spider which gave rise to this article. This was a smaller orb-weaver than the former; about one and a half centimetres in body length. It belonged I think to the *Argiopidae* group of orb-weavers, the same one to which the St. Andrew's Cross spider *Argiope aetherea* belongs. Unlike *A. transmarinus* this species remained both day and night at the centre of the hub except on being unduly disturbed, when it climbed swiftly to a concealed retreat near the periphery of the web. It also retained the web until it had reached such a tattered condition as to be no longer capable of fulfilling its function as a snare.

With the construction of a new web, a stabilamentum† was exhibited, extending only above and below the hub for a distance of about three centimetres in each direction. The four arms of a cross, as is constructed by *Argiope aetherea,* were never shown during my observations.

* An account of this particular spider is given in the *Naturalist* (80), p. 371.

† This is a narrow ribbon of finely woven silk, zig-zagging between a pair of pairs of radials at the centre of the orb.

Ventral view of "Six-legged" spider belonging to Argiope species.

Up until now, a normal course of events had taken place, but three evenings later a different picture presented itself—the web was fairly tattered and almost in need of replacement; the spider was at home in the centre of the orb, head downwards; but instead of eight legs arranged in extended pairs, only three pairs were visible. On closer inspection it was clear that the left pair of forelegs (viewed ventrally) had been lost, leaving only the two coxae.

How this unfortunate accident had happened I am unable to say, but all the symmetry which we associate with spider and orb had been disturbed. My immediate thought was whether web spinning would be possible with this handicap. After all, imagine our own plight with the loss of a quarter of our total number of limbs. I wondered the same thing about the spider; so with the web in poor condition as was mentioned, I removed one of the supporting strands gently from its anchorage and left things to "her".

The following morning provided my answer—a web, complete and intricate, had been constructed by the six-legged spider. This apparently casual adaptation surprised me, and I continued to keep this spider under observation for the next fortnight, during which she spun her web with no apparent difficulty, but perhaps a little more slowly. It was interesting to note also, that during this period only the lower limb of the stabilamentum was woven, giving rise to the supposition that due to the loss of legs an upper limb was unable to be spun. This however is uncertain. Perhaps some other reader may supply an answer?

—G.M.W.

Notice to Contributors

Material for publication should be typed, preferably on foolscap-sized plain paper, *double-spaced,* with plenty of margin on the left side. Abbreviations should not be used, and there should be no underlining of headings or other items in the manuscript.

In general, contributors should familiarize themselves with the format used in the *Naturalist* (in writing dates and figures, use of quotation marks, indication of references, etc.). Manuscripts conforming to this pattern need very little editorial attention and can therefore be put into the printers' hands immediately.

Occurrence of the Smooth Toadfish* *Sphaeroides glaber* (Freminville) in Fresh Water

by R. H. Parrish†

Smooth Toadfish *Sphaeroides glaber*

* The toadfishes or puffers, of the family Tetraodonidae, are among the most poisonous of all marine animals as they contain a powerful toxin which, if ingested, may produce rapid and violent death. These fish should never be eaten or fed to any domestic animal. Cooking does not destroy the toxin.

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† Fisheries and Wildlife Department, Victoria, now at University of Oregon, U.S.A.

During the course of a programme to determine the Victorian distribution of the genus *Retropinna,* a large number of smooth toadfish, *Sphaeroides glaber* (Freminville) was taken in the Lang Lang River at the South Gippsland Highway. This locality is approximately 2½ miles from Westernport Bay and above normal tidal influence.

The toadfish were taken with a portable electric shocker on January 15th, 1964. The surface temperature of the river was 69° F and the air temperature was 74° F at 4.15 p.m.

Seven of the toadfish were placed in a live-can and transported to the Fisheries and Wildlife Department in Melbourne. They were held in freshwater aquaria for four days. All seven died on the fourth day. A further 19 specimens were preserved in 5 per cent formalin.

Scott (1962) gives the distribution of *Sphaeroides glaber* as Western Australia, South Australia, Victoria, New South Wales and Tasmania. Several other members of the family TETRAODONIDAE are found in freshwater.

Munro (1955) mentions that *Monotretus cutcutia* (Hamilton-Buchanan) lives in freshwater and that *Chelondon fluviatilis* (Hamilton-Buchanan) ascends coastal rivers and lagoons. Whitley (1960) lists *Aphanacanthus hamiltoni* (Richardson) as living in freshwater in Victoria.

This is the first record for *S. glaber* in freshwater but it is not an unexpected occurrence in view of the ability of other members of the family to acclimatize to freshwater.

The species is easily identified by the absence of spines on the body and the presence of dark bands across the back at the base of the dorsal fin, between the pectoral fins and between the eyes. Scott (1962) remarks that this is the commonest toadfish in shallow water in South Australia.

The peculiar beak like dentition which is common to the Sub-Order TETRAODONIDAE represents a marked adaptation for crushing the hard shelled prey, chiefly molluscs, upon which they feed. The flesh of the fish themselves is poisonous.

Members of this family have the capacity of blowing themselves into a spherical shape by distending a large sac, connected with the gullet, either with air or water. When filled with air, they will float upside down at the water surface. It was noted that none of the individuals inflated when removed from the water by the electric shocker: however, they seemed active when returned to the water.

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URGENT REMINDER

Members are reminded that subscriptions for the present year were due on 1st January. The name of any member who has not paid the current subscription by 30th June will be removed from the mailing list for the *Victorian Naturalist* until such time as the subscription has been paid.

VICTORIAN ORCHIDS — No. 7

by C. E. Gray

BEARD ORCHIDS

These orchids are widespread favourites because of the bushy beard-like growth on the labellum, which is the outstanding feature. The generic name, Calochilus, is made up of two Greek words, Kalos, meaning beautiful, and kheilos, meaning lip.

The labellum indicates the species to which a particular specimen belongs. Near Melbourne, the two species illustrated, *Calochilus robertsonii* (Brown Beard) and *Calochilus paludosis* (Red Beard) are the most easily found, as they grow in many of the less dense bushland areas. The pictures show clearly the difference in the tongue; Brown Beard with the thick purplish beard covering almost the entire tongue, and only the smallest bare tip hidden underneath; while Red Beard has quite a long strap-like tip on which no beard grows. The hairs are more reddish, longer, and not so tightly packed together.

Another difference between these two species is that the former has two beady glands at the base of the column, but the latter has not. Both have a long, narrow, fleshy leaf which is channelled, and bluish green in colour. Look for these orchids in the late spring and early summer. *C. robertsonii* is found in many places throughout the State, but *C. paludosis* only from southern districts and the Grampians.

No. 1. *Calochilus robertsonii*

Photo: Author.

The previous writers are unable to continue.

Fortunately for readers, Mr. and Mrs. King were able to persuade a friend, Miss C. E. Gray, to take the series over.

The editors express their thanks for this co-operation which ensures the continuance of a popular feature.

—R.H.J. McQ.

Photo: Author.

No. 2. *Calochilus paludosis*

A third *Calochilus* ranges over most of Victoria from the far North-west to the South-eastern coast, from sea level to the lower alpine areas. This is *Calochilus campestris* or Copper-beard. Although so widespread it is not a common orchid. The leaf is blue-green, strap-like, and channelled as with the previous two. The flower however, is easily distinguishable, as it has two smooth plates at the base of the labellum, with a dense beard on the remaining section to the tip.

Calochilus imberbis, which is illustrated here, is one of our rare beards, and actually the labellum is not bearded at all. The arrangement of the floral segments is that of this genus. For many years it had been recorded from very few light forest areas in the central region only, Rushworth being the original locality. More recently several plants have been found in South Gippsland, so it may be in other places still awaiting discovery.

The remaining members of the genus are also rare in our State—*Calochilus saprophyticus* (leafless beard) may be mistaken for *C. campestris,* but it has no leaf, only several large bracts up the stem: *C. richae* (semi-beard orchid) with a purple pimply (not hairy) labellum, collected from near Rushworth in 1928: *C. grandiflorus,* with very large golden flowers, reported some years ago in the North-east, but only verified in this State last year when a specimen was found and identified by Mr. J. H. Willis.

Photo: W. H. King.

No. 3. *Calochilus imberbis*

Some Additions to Australian Stylidiaceae

by Rica Erickson and J. H. Willis

Summary

In this paper one species of *Levenhookia,* two species and one variety of *Stylidium* are described as new, while another tropical species of *Stylidium* is recorded as new to Queensland.

Levenhookia chippendalei Erickson & Willis *spec. nov.*

Planta multiramulosa Sect. *Coleostylis* inserenda, habitu et inflorescentia racemosa *L. preissii* (Sond.) F. Muell. similis sed species posterior pedicellos florigeros perbreves etiam corollae tubos longos habet; speciei novae flores propior *L. stipitatam* F. Muell. cuius cucullus labelli differt acumine perbrevius atque ad basin auriculis duabus obtusis latisque [Tab. 2, fig. 7-10].

HOLOTYPE: 39 miles south of Hooker's Creek (and ± 230 miles west of Banka Banka), Northern Territory, common in lateritic area of red sand—*G. Chippendale,* 12 July 1956 (Herb NT no. 2260). ISOTYPES at NSW, CANB, MEL, PERTH & Herb. Rica Erickson.

Plant glandular-hairy, 8-18 cm. tall, the stem much branched from near base, the branches bearing long racemes of flowers. *Leaves* near the base of plant few, oblanceolate, up to 2 cm. long, becoming sparse, narrower and shorter towards the inflorescence; floral bracts linear, about 5 mm. long. *Inflorescences* racemose, bearing numerous blooms on filiform, glandular-hairy pedicels 1·5-2 cm. long. Calyx globose, densely glandular-hairy, 1-2 mm. wide; the lobes also glandular-hairy, narrow, pointed, spreading, about twice as long as tube. *Corolla* pink, the petals ± 4-5 mm. long, much exceeding calyx-lobes, their roundish laminae on long claws of equal length, the tube shorter than calyx. *Labellum* on a long hinge, hood-like, dark reddish with two yellow projecting appendages at base of hood and a very long sensitive point at the apex. *Column* slender, erect, with long fine stigma projecting forwards like a hairy brush (sheath of column not discernible in dried material). *Mature capsule* globular, 3-4 mm. diam. *Seeds* ovoid-ellipsoid, ± 0·6 mm. long.

The new species belongs to the section *Coleostylis* and resembles *L. preissii* both in habit and racemose inflorescences. The latter, however, has flowers on very short pedicels and long tubes to the corollas. Flowers of the new species are closer to *L. stipitata,* but the labellum of the latter is shortly pointed at its apex and bears two blunt, broad flaps at the base of the hood. *L. chippendalei* is named after its discoverer, Mr. George Chippendale of the Animal Industry Branch at Alice Springs, and founder of the important Northern Territory Herbarium, who wrote (*in lit.* 9/10/1963): "I have not collected this species again, despite going through similar country". No other species of *Levenhookia* has ever been recorded for the Northern Territory, or for tropical parts of Australia.

Stylidium coroniforme Erickson & Willis *spec. nov.*

in subgenere *Nitrangio* Endl., ob ovarium perelongatum (in loculo uno sterile) scapum pyramidate racemosum atque folia conspicue albo-marginata valde distincta; corolla eadem *S. dichotomi* DC. similis, sed species posterior faucem nudam et stigma pulviniforme exhibet [Tab. 1, fig. 1-8].

HOLOTYPE: Wongan Hills, ± 4 miles N.W. of Wongan Hills township, Western Australia, growing with *Dryandra comosa* on shallow sandy soil over ironstone rock—*Rica Erickson,* 17 Sept. 1963 (MEL). ISOTYPE at PERTH.

Plant perennial, stocky, closely branching, with several loose rosettes of leaves, the scapes curving outwards in a circle around the dense cluster of rosettes. *Leaves* 3-4 cm. long, grey-green, linear, becoming wider in the upper third and ending in a white point at the apex, conspicuously white-margined and with a prominent white rib down the back. *Scapes* ± 16 cm. tall, dark coloured, rather stout, smooth below the glandular-hairy pyramidal raceme (to 12 cm. long); flowers almost sessile, with floral bracts ± 5 mm. long, the paired bracteoles a little shorter, all linear and placed together at the base of the calyx. *Calyx* 2 cm. long, glandular-hairy, linear, somewhat twisted, sterile in one loculus of the connate ovary; the lobes much shorter than tube, free and blunt. *Corolla* ± 6 mm. long, creamy pink, with red spots at the throat and dark red lines on the outer surface of the petals, the tube about as long as calyx lobes; petals ± oval, nearly equal in size, paired laterally; throat appendages 2, erect, fine and hair-like; labellum oval or a little pointed, without appendages; column very long, anthers fringed with white glands; stigma projecting, finger-like. Mature capsule and seeds not seen.

The new species belongs to the subgenus *Nitrangium* Endl. and is distinctive for its very long ovary (sterile in one loculus), its racemose scape and conspicuously marginate leaves—as in the short-fruited *S. limbatum,* but with even thicker border. The corolla resembles that of *S. dichotomum* which, however, has a bare throat and cushion-like stigma. It is not known from any other locality than that of the type, on Wongan Hills. The epithet *coroniforme* is in reference to the attractively crown-like arrangement of inflorescences, encircling each cluster of rosettes.

Stylidium fluminense Erickson & Willis *spec. nov.*

subgeneris *Alsinoidis* Mildbraed ad *S. javanicum* van Slooten proxime accedens, sed differt sic: foliis angustioribus (lanceolatis vel rhomboideis), corolla tricolore, labello glandulifero, paribus petalorum secus margines exteriores curvatis ad medium late dilatatis atque perlate divaricatis (ad angulum 180°) [Tab. 2, fig. 1-6].

Plate 1.

Stylidium coroniforme spec. nov.—1. Habit; 2. Anthers; 3. Labellum; 4. Flower; 5. Cross-section of calyx; 6. Portion of a longitudinal section of calyx; 7. Back of leaf, showing white rib and margins; 8. Section of leaf.

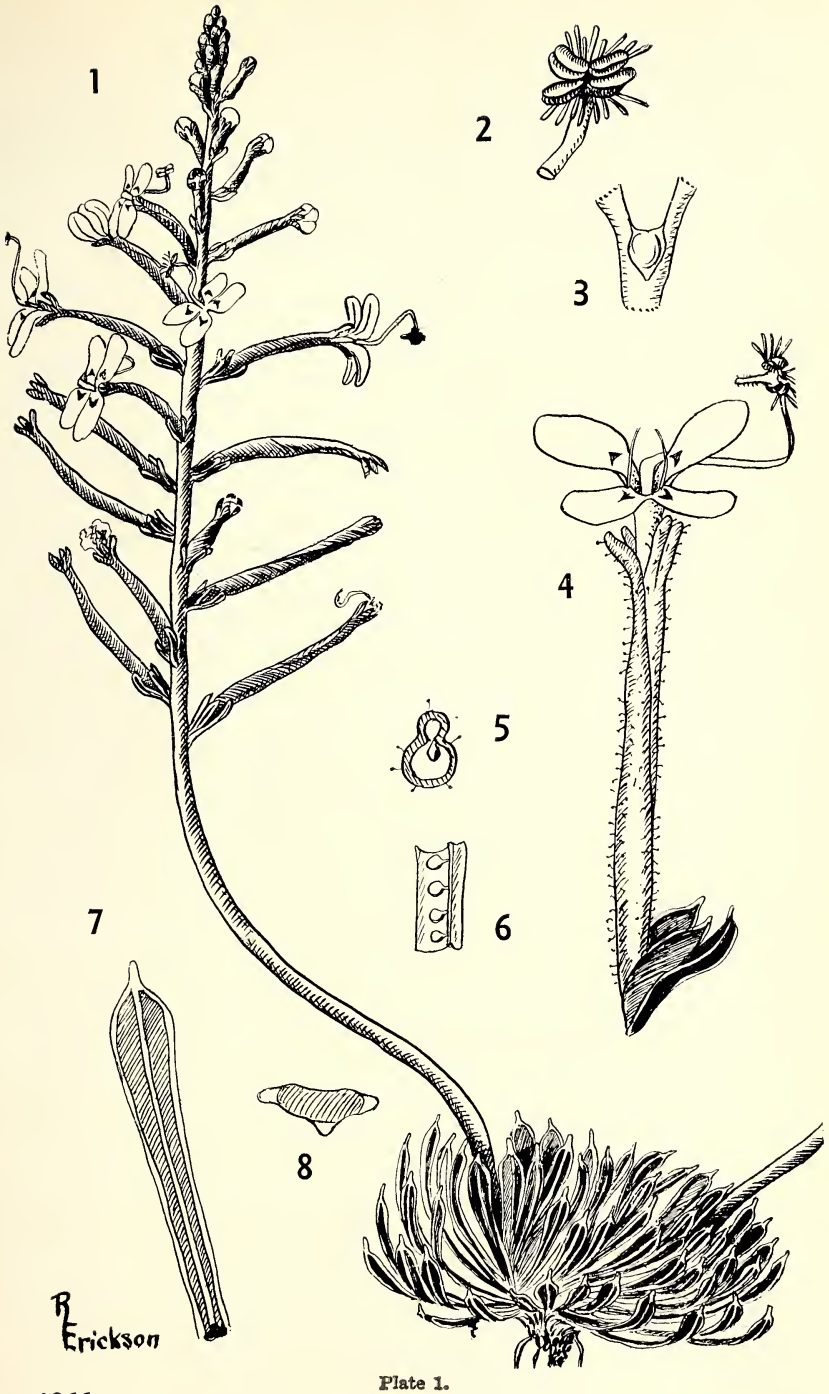


Plate 1.

HOLOTYPE: Dales Gorge, Hamersley Range, N.W. Western Australia, in crevices of rock steps and pavements in the running water of a creek flowing through the gorge—*Rica Erickson*, 3 July 1958 (MEL). ISOTYPES at MEL, PERTH, PERTHU, K & Herb. Rica Erickson.

Other collections examined: *ibidem—W. Meston*, July 1956 (MEL); *ibidem—A. C. Beauglehole* n. 11496, 14 Aug. 1965 (MEL, PERTH, NSW, Herb. A. C. Beauglehole) [noted also by A. C. B. as abundant at Circular Pool, an "off-shoot" of Dales Gorge]; near Exmouth Gulf, N.W. West. Aust.—*W. D. Cusack*, 1895 (MEL).

Plant slender, delicate, smooth, 10-40 cm. tall, with several leafy stems rising from a common rootstock and branching towards the summit. *Leaves* membranous, smooth, sessile, lanceolate to narrowly rhomboid or even ± oblanceolate, usually less than 1 cm. long and half as broad, scattered along the stem, increasing in size from base and then becoming smaller and narrower, grading into leaf-like bracts in opposite pairs on the inflorescence. *Inflorescences* slender, simple or branching, with flowers alternating at each pair of leaves or bracts. *Calyx* linear, 1-1·5 cm. long (including ovary), smooth; the lobes narrow and pointed, very much shorter than tube, bearing a few sparse hairs, two lobes united almost to apex. *Corolla* comparatively large and showy, 1 cm. wide or more, pale outside, bright rose-pink inside, with dark marks near the throat which is yellow, the tube shorter than calyx lobes; petals pointed, paired laterally, each pair united for more than half their length and 6-8 mm. long; throat bare; labellum ± triangular, without appendages. *Column* shorter than petals, 5-6 mm. long; stigma developing within the bud. *Capsule* linear, to 2 cm. long. *Seeds* very numerous in two rows, 0·1-0·2 mm. long.

The new species is in the subgenus *Alsinoides* Mildbraed and lies close to *S. javanicum* van Slooten, but it differs from that Indonesian species in the much narrower (lanceolate to rhomboid) leaves, tricolorous corolla, glandular labellum, and in the pairs of petals being curved along their outer margins, broadly dilated at the middle portion and very widely divergent (at 180°, as in a "bow-tie"). *S. fluminense* has been named from its riparian habitat, unusual in this genus. The only known occurrences are both in the North West regional district of Western Australia, some 270 miles apart, and it is anticipated that this trigger-plant will be found eventually in other parts of tropical Western Australia—probably in gorges of the Kimberleys.

Stylidium diuroides Lindl.

var. **albo-lilacinum** Erickson & Willis *var. nov.*

a forma typica speciei differt: statura minore, foliis brevibus sparsim glanduligeris atque petalis albidis vel dilute lilacinis extrinsecus a linea purpurea ornatis.

Plate 2.

Stylidium fluminense spec. nov.—1. Habit; 2. Calyx; 3. Stigma in the bud; 4. Old stigma; 5. Labellum; 6. Corolla.

Levenhookia chippendalei spec. nov.—7. Habit; 8. Column, showing empty anthers and one stigma; 9. Calyx; 10. Labellum.

Plate 2.

HOLOTYPE: West of Mogumber, Western Australia, on coastal sand plain—*Rica Erickson,* 26 Sept. 1963 (MEL). ISOTYPES at PERTH, PERTHU, K & Herb. Rica Erickson.

The new variety is smaller than *S. diuroides* var. *diuroides,* has short sparsely glandular-hairy leaves and pale lilac or whitish flowers (yellow in the typical form).

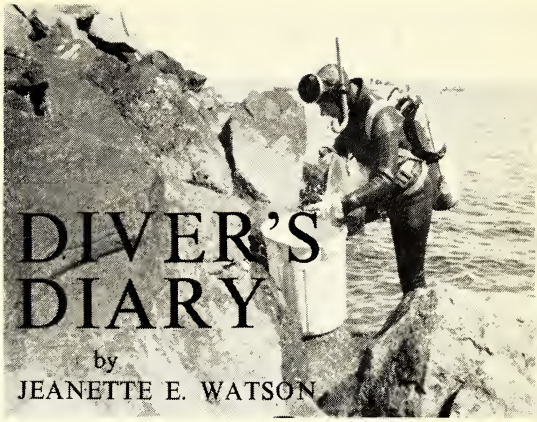
Stylidium quadrifurcatum Erickson & Willis in *Vict. Nat. 73:* 5 (May 1956).

QUEENSLAND—Tate & Lynd Rivers (± 50 miles W.S.W. of Chillagoe), *leg.* W. E. Armit n. 556, ± 1877 (MEL).

The above-cited, old collection was found recently among undetermined sheets of *Stylidiaceae* in Melbourne Herbarium. Since the only previous records had been from Pine Creek (the type) and near McKinley River in the Northern Territory, this Queensland occurrence extends the known range easterly by about 800 miles. *S. quadrifurcatum* does not seem to have been noted again during the past 60 years but, as a small ephemeral of inundated ground, it may be expected to occur at other places over a vast area of monsoon country in northern Australia.

No. 1
The Art
of the
Diver

This is the first of a series of bi-monthly articles



The number of youthful heads over the bin increases rapidly, the fascination of the contents acting like a magnet. Parents hovering in the background are drawn into the circle by delighted squeals. As small hands emerge from the bin, holding dripping and often squirming specimens, mothers register reactions ranging from enthusiasm for nature study, to downright horror at the ravages of salt water on Sunday best clothes. Occasionally, a plump matron of dark southern looks, obviously with an eye to a new and cheap culinary delicacy, enquires of the unappetising contents of the bin—"Can you eat them?".

I sit a little way apart on the jetty, streaming water and divesting myself of heavy diving gear, quietly enjoying the scene, until inevitably curiosity prompts a first question, then another, and then the usual impromptu lesson on marine biology begins.

In the course of collecting work, one does a great deal of diving from convenient piers and jetties, often at weekends; the repetition of the above scene is so common that one comes to accept it, and indeed, misses the gathering audience on the rare occasions when there are few people about. My own sense of wonder at the beauty and fascination of marine life has never dimmed; on the contrary, it increases with years of diving; small wonder then, that these strange creatures from the other world only a few feet away, create so much interest for the layman.

For the first time in his history, man can now examine in comparative freedom, the shallower parts of the continental shelf, seeing the inhabitants vibrant with colour, in their own world, and observing for the span of his air supply at least, the ecological factors governing the lives of each species.

During the second world war, two types of self contained underwater breathing apparatus were invented. One, the closed circuit Oxygen Rebreather system, was used extensively in underwater warfare, as it left no tell-tale bubbles on the surface. It is very dangerous to use however, as pure oxygen is poisonous to the human body at depths greater than thirty-three feet, and is thus not favoured for normal diving practice. At the same time, Commander Jacques Cousteau, in France, secretly perfected the prototype of his now famous 'AquaLung', which works on an open

circuit system, using compressed air from a cylinder carried on the diver's back. With this unit, the diver may descend to depths of two hundred feet, and return safely, providing certain rules for decompression are strictly adhered to during ascent.

Full diving gear consists of a wet suit of neoprene sponge rubber, firmly covering the body from head to feet. This does not, as is popularly supposed, keep the wearer dry, but simply reduces the flow of cold water over the body to a bearable level, so maintaining bodily heat. Face mask, with snorkel for surface swimming (compressed air is expensive, and therefore not to be wasted on the surface) flippers for balance and propulsion, knife, for emergencies and gloves for protection against cuts and stings, are next donned. The air tank is strapped on the back; lead weights, to counteract the buoyancy of the body and wet suit, are fastened about the waist on a special quick release belt which can be undone with the flick of a finger in case of emergency, and the diver is ready for the water.

The uses to which SCUBA gear can be put, fall into three main categories—salvage and professional diving, research, and sports diving. All but a few of the thousands of proficient Australian divers put their equipment to the latter use, in the pursuit of deep sea spear fishing. A few have seen the tremendous possibilities of first hand observation and collecting, and have become the first of a new race of underwater naturalists.

Collecting live, and often, very mobile specimens under water, is an acquired art, rather more difficult than catching butterflies on land, the pursued here being in its own element, whereas the pursuer is not. One develops a certain amount of cunning, a knowledge of the mentality of fishes, and the ability to hold one's breath, as a stream of bubbles invariably puts timid creatures to flight. It is in the collection of sessile forms, and sampling of populations, such as the commensal fauna to be found in a sponge, that the diver comes into his own. A complete colony can be quickly enclosed in a strong plastic bag, the end sealed by a rubber band, and the prize brought to the surface without the loss of a single specimen.

To the land bound collector, the biologic flotsam and jetsam of the sea shore becomes the foundation on which he builds his picture of submarine life. However, the beach is the site of a death assemblage bearing little resemblance to the life in the nearby waters from which it is derived. Molluscs, because of their more robust construction, survive the journey to the shore, there to become the dominant element, whereas, in actual fact, they are often only a minor constituent of the original fauna. Other forms, such as Bryozoa, and Gorgonia which may be exceedingly prolific, rarely survive, arriving at the shore in a microscopically fragmented condition. The diver, equipped to enter the submarine world, is able to see, compare, and interpret these profound differences in life and death assemblages, and thus draw meaningful conclusions to a problem which has been little more than guessed at in the past.

As on land, each locality in the sea has its own individual characteristics of geology, geomorphology, and biota, each dependent on the other. The sea also has its seasons, marked by the rise and fall of temperature of the water, bringing its own particular form of blooming, and breeding. In future articles, I will write of this life as I find it in the sublittoral zone of ocean, bay and estuary, along the shoreline of Victoria.

Field Naturalists Club of Victoria

General Meeting—April 13, 1966

The president, Mr. M. K. Houghton, opened the April General Meeting, and after welcoming members and guests, informed those present of a recent operation performed on Mr. H. C. Stewart and of a possible second.

Members were disturbed by this news.

It was moved and seconded that the minutes of the March meeting be taken as read.

The President introduced Mr. E. Swarbreck, who gave an informative and witty account of the F.N.C.V. Christmas excursion to the Snowy Mountains Hydro-Electric Scheme. He emphasized the immensity of the scheme which was first suggested about seventy years ago.

Thirty-six members left Melbourne at 3.00 p.m. on Christmas afternoon to arrive for tea at Rosedale. The night stopover was at Orbost where they arrived at about 10 o'clock. The following morning saw them leaving for Cooma, the stepping-off place for the tour of the scheme.

Mr. Swarbreck commented that although the area is set aside primarily for an engineering project, it contains some of the finest scenic attractions in Australia. Soil conservation of the disturbed areas is importantly regarded, and replanting is done quickly by the Authority.

A series of well chosen photographs depicted all the forms of work being done in the area, from the "Fluid Mechanics" Laboratories to the specially built equipment to cope with the immense cartage problems connected with the scheme.

He also mentioned that the time spent "on tour" left very little time for the study of natural history. However, among a selection of colour slides taken at various places on the trip, there appeared various wildflowers which included Isotoma, Goatsbeard plant, Alpine Dahlia, a species of Stylidium, and Native Celery.

Photographs of a species of Crane-fly, a Marble-backed Lizard, and an albino and black wallaby side by side taken on Hallstrom Island, added to the natural history field.

A visit to Kosciusko State Park was made, but at the wrong time for wildflowers.

In "Nature Notes" Mr. D. E. McInnes mentioned the unusually large number of Brittle Stars to be found on a recent excursion to Black Rock foreshore. At least half a dozen appeared under every rock lifted. Mr. Baines spoke of an exhibit of his, a sample from the Irish Strawberry tree, and expanded on the history and difficulties of the classification of allied species.

Under "General Business" Mr. Baines commented that it was a great pity that more space in the daily papers was not devoted to the recipients of the Natural History Medallion and its purpose. In particular he mentioned the small amount of space devoted to Mr. R. Wheeler the winner of the 1965 award.

Botany Group Meeting—April 14, 1966

Twenty-five members were present, with Mr. F. Zirkler in the chair.

We had the pleasure of a talk by Miss Jean Galbraith, who spoke on "Carnivorous Plants". We were told that there are three Australian groups of them:

i Drosera or Sundew.
ii Utricularia or Fairies Aprons.
iii Cephalotus or W.A. Pitcher plants.

The Drosera has rounded leaves, covered in rows of red gland tipped hairs. The glands hold a sticky substance which attracts insects. The hairs are stimulated by touch, and when an insect lands, a hair curls over, and the adjoining hairs are also affected, until eventually, all the hairs are curled over the insect, which is gradually drawn to the centre of the leaf containing the digestive enzyme. Digestion takes up to five days, and when completed, the hairs uncurl again in readiness for more prey. The Fairies Aprons grow in wet places, and have different leaves above water from those below. Those above being rather elongated oval in shape, and those beneath water being somewhat like small kidney shaped bladders, 20 per cent filled with water. There is a door at the concave side, with two gland tipped bristles guarding the opening. When the insect touches one of the bristles, it opens the door, and the insect is swept in with the water that rushes in to fill the remaining 80 per cent space. As digestion proceeds, the water gradually returns to the 20 per cent level.

The Pitcher Plants are different again and their leaves resemble small lidded-pitchers, holding a small amount of water, fortified with peptin. This plant needs additional acid to enable it to digest its animal food, and as ants are its main diet, the formic acid from their bodies, provides this ingredient.

At the conclusion of the talk, slides of various carnivorous plants were shown, and a potted specimen of a Pitcher plant was on view.

On Sunday 3rd April, thirteen members visited the Warburton District to map out a route for the General Excursion in May, when fungi will be studied. There is a large assortment to be found in the district.

Fauna Survey Group—Mammal Reports —November 1965

1. **Platypus** *Ornithorhynchus anatinus.*
   Barwon River between Winchelsea and Inverleigh, 27th Nov. 12 animals, ranging from half to full grown, observed by Mr. A. Howard.
2. **Eastern Water-rat** *Hydromys chrysogaster.*
   Barwon River, 27th Nov. 4 animals seen in the locality described above, by Mr. A. Howard.
3. **Red-necked Wallaby** *Wallabia rufogrisea.*
   Northern fringe of the Little Desert, near Kaniva, 20-21st Nov. 7 animals, one with pouched young, seen while spotlighting, by Mr. N. A. Wakefield.
4. At Woori Yallock on 6th Nov. During spotlighting observations by Mr. W. King. One **Yellow-bellied Glider** *Petaurus australis* observed licking the solid gum on a wattle *Acacia mearnsii* and removing the loose bark and biting the under-bark of *Eucalyptus ovata.* One **Greater Glider** *Schoinobates volans* was seen in the same tree.

   On the Upper Thompson River near Noojee on 13th Nov. One **Bobuck** *Trichosurus caninus* with young, 3 **Swamp Wallabies** *Wallabia bicolor,* 2 **Ringtail Possums** *Pseudocheirus lanuginosus,* 3 **Yellow-bellied Gliders** *Petauris australis,* and 2 **Leadbeaters Possums** *Gymnobelideus leadbeateri,* were seen during spotlighting operations by Mr. W. King.

December 1965—January 1966

1. **Echidna** *Tachyglossus aculeatus.*
   Dimboola, 4th Jan. One animal on road, half a mile out of town, Mr. A. Howard.

2. **Feathertail Glider** *Acrobates pygmaeus.*
   Tanjil Bren, 15th Jan. One animal seen on ground. Mr. W. King.

3. **Red-necked Wallaby** *Wallabia rufogrisea.*
   Gorae, 30th Dec. Large numbers in forest behind town, seen during the day in the rain. Mr. W. King.

4. **Grey Kangaroo** *Macropus major.*
   Tawonga Gap, 18th Jan. One animal, seen on road 2 miles on Bright side of Gap. Mr. R. Frankenberg.

Geology Group Meeting—April 6th.

31 members and visitors attended with Mr. Dodds in the chair. Mr. McInnes reported that Mr. Hemmy's project on Building Stones of Victoria was now moving around country Clubs, having been shown at Ararat, and now at Ballarat. The subject for the evening was a talk on "Flints and Cherts" by Mr. McInnes. He began by stating that much has to be learnt regarding the origin of flints and cherts, the remainder being vague on the matter. He mentioned the high silica content, 95 to 99 per cent of flints and cherts, the remainder being impurities such as corundum, pyrites, magnetite, calcite, and haematite which give variations in colour. He said the origin appeared to begin on land where, from the world's rivers, some 319 million tons of silica are carried in solution to the sea each year and as the sea contains only one per cent silica it seems that chemical inter-action causes precipitation as soon as it reaches the sea.

He stated that the small particles of silica probably form a gel which slowly crystalizes. He mentioned that cherts seem to form in volcanic tuffs from siliceous precipitations. He also mentioned one way to differentiate between flints and cherts is to examine the fracture. Flints have a conchoidal fracture and cherts a straight fracture. He said flints were confined to calcareous rocks and in Victoria were found mainly along the coastline where they have been eroded from Miocene deposits. They have not been found east of Wilsons Promontory. Cherts on the other hand are plentiful around the Heathcote area.

Exhibits

Miss Harvey. Pink tourmaline crystal, Mozambique. Aboriginal Grinding Stone from Cambrian (Nullagine Series) W.A.

Mr. Davidson. Selection of jaspers from Victoria, N.S.W., S.A., W.A., and N.T. cherts from Western Australia and Heathcote.

Mr. McInnes. Quartz crystal showing zoning. Sections of flint and chalcedony under microscope.

Mrs. North per *Mr. Angior.* Asbestos, Yampi Gorge and host rock blue slate.

Mr. Dodds. Sandstone containing fossils (Silurian) Heathcote.

Mrs. Costermans. Sea Urchin replaced by silica.

Mr. Dangerfield. Tourmaline and felspar (Bethanga), Moss Agate (Phrase), Norseman, W.A.

Microscopical Group Meetings—January to March 1966

January

This was a reasonably well attended meeting, especially considering that this was the month when many members were away on vacation. As Mr. LeMaistre was absent, Mr. D. McInnes acted on his behalf.

There were complaints that the subjects for the meeting were being omitted from the journal, and the secretary promised to have this seen to in the future.

It was decided that on Saturday February 12th at 2 p.m. members and all those interested meet at the South end of Albert Lake and make a full scale examination of all Aquatic life in these waters. The meeting on the following Wednesday would then be devoted to an examination and discussion of specimens obtained during the excursion. The secretary was asked to contact the press, T.V., etc., with the idea of informing the public of the Group's activities.

The evening was a members' night, and a number brought along more specimens than it was possible to exhibit under the microscopes available.

Mr. D. McInnes showed some bryzoans and sea-cucumbers or bêche-de-mer (*Holothuroidea*) from Como Bay. This was the *Leptosynaptera* whose skin contains the remarkable anchors and plates. He also exhibited a slide belong to Mr. Barratt, of another species showing different shaped plates.

Mr. K. Trotter displayed a slide of butterfly scales in which there was enough adhesion between slide and scale to hold them in place without the usual gum or cement.

Mr. W. Genery exhibited some mouth parts of the crustaceae, *Lepidurus.*

Mr. P. Genery showed some marine plankton recently obtained from Barnes Bay, Tasmania.

February

Twenty-seven members and visitors attended this meeting which was chaired by Mr. E. LeMaistre.

Mr. McInnes gave a report of the Albert Park Lake excursion at which there were some 40 members and visitors in attendance: it was a good day and many interesting specimens were obtained. He described the condition of the water-weeds and the various forms of life present. Mr. W. Genery then outlined the history of the attempts to rid the lake of its offending Canadian Pond-Weed and the way in which each separate attempt affected the general ecology of the lake.

The evening was devoted to an exhibition of specimens obtained at the lake the previous Saturday: an outstanding array of 27 microscopes were in use at the bench. The exhibits were so numerous that it is difficult to list all; they included:

Large species of *Daphnia;* Mr. D. McInnes.

Living *Zoothanium* on a *Dytiscid* beetle larva; Mr. J. Strong. Radula of snail; Mr. K. Trotter. Jewel-Beetle; Mr. W. Woollard. *Hydra;* Mr. W. Genery. Sea-Urchin spines; Mr. D. McInnes. *Paediastrum;* Mr. E. LeMaistre.

Mr. E. LeMaistre spoke about the activities of this group from June 1954, when, as chairman of the Microscopical Society of Victoria, the society became affiliated with the F.N.C.V., and he became chairman of the newly formed group, thus being the last chairman of the parent body and first chairman of the present group. Unfortunately because of urgent and pressing responsibilities he asked that he be relieved of his post.

Because of Mr. LeMaistre's resignation, Mr. D. McInnes nominated Mr. J. Daws for the vacancy. The motion was seconded and carried unanimously.

It was decided that it be put on record, that the Microscopical Group appreciated beyond measure the good work that Mr. E. LeMaistre has put into this and the original society; indeed, for Microscopy in general. While understanding the necessity for him to vacate his post as chairman, a post which he had held for approximately 10 years, (with a gap of some years while he was in residence overseas) nevertheless all present felt deep regret that he should find this decision necessary.

March

Seventeen members and visitors attended this meeting which was chaired by Mr. J. Daws.

Mr. W. Genery complained that someone at a recent meeting had racked his microscope up too far and done some damage to it; therefore it was decided that in future those looking through other members' microscopes use the fine focus only and thus reduce this type of mishap to a minimum.

Mr. P. Genery gave as the subject for the evening a report on the congress held at Miena, Tas. by thet Australian Society of Limnology.

He commenced by explaining that limnology was a term which covered every aspect of inland waters; all forms of life, plant and animal; its chemistry and physics. During the congress which was held at Miena, on the shore of the picturesque Great Lake, many papers were read on such varied and interesting subjects as lamprey population, the evolution of Tasmanian lakes, and the ecology and plankton of these lakes.

Finally, the Jindivine Project was discussed. This was an attempt by the society to study this area comprehensively. The idea of this project was to study changes in local ecology brought about by the filling of the dam.

He went on to explain that those who attended, were guests of the Inland Fisheries Department of Tasmania and were treated to a most delightful tour of sightseeing where at all times all were welcome to collect specimens at will.

Nine microscopes were on display showing various exhibits including some live paranaspides from the Great Lake.

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

GENERAL MEETINGS

Monday, May 9—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: Miss V. Parry—"Kookaburras".
4. Election of Members.
   (a) *Ordinary*
   Miss Dulcie Helen Conway, 2 Parlington Street, Canterbury. (Interests—Botany and Marine Biology). (Introduced by M. Houghton).
   Luther B. Gallant, 454 Bell Street, Pascoe Vale South. W.7. (Interest—Microscopy).
   Stanley Edward J. Mayhew, Flat 10, 25 Foam Street, Elwood.
   John A. Moore, 18 Banool Court, Frankston.
   Mrs. Agnes Hope North, c/- N. Bingham, 69 Hawksburn Road, South Yarra.
   Mrs. E. Ostergaard, 46 Wellington Street, St. Kilda.
   Ian Duncan Reid, 39 Hillside Parade, Glen Iris, S.E.6. (Interest—Geology).
   C. R. Taylor, 114 Cole Street, Gardenvale.
   (b) *Country*
   Mr. and Mrs. John Edward Cummings, c/- S.E.C., Bridge Street, Benalla. (Interest—Geology).
5. General Business.
6. Nature Notes and Exhibits.

Monday, June 13—R. Riordan—"Northern California".

Monday, July 11—Presentation of Medallion to Mr. R. Wheeler and talk by him on "Bird Wonders of Australia".

GROUP MEETINGS

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

Wednesday, May 4—Geology Group. 20th Anniversary night.

Thursday, May 12—Botany Group. "Flora of the Burke and Wills Track" by Mr. H. A. Morrison.

Friday, May 13—Preston Juniors.

Wednesday, May 18—Microscopical Group.

Friday, May 27—Junior meeting at 8 p.m. at Hawthorn Town Hall.—Mr. R. Davidson: "Gemstones".

Wednesday, June 1—Geology Group.

Monday, June 6—Marine Biology and Entomology Group. This group meets at 8 p.m. in Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of House.

Thursday, June 9—Botany Group. Members night.

F.N.C.V. EXCURSIONS

Sunday, May 15—Warburton District. Subject: Fungi. Leaders: Botany Group. The coach will leave Batman Avenue at 9 a.m., fare $1.50. Bring one meal and a snack.

Preliminary Notice.

September 17 to October 2,—Queensland. Details of this excursion have appeared in previous Naturalists. Members going are reminded that deposits should have been paid by now and the balance is due by August 8.

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, 1966

President:
Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, N.22.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membershipj (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

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Cover picture

Yes, it can happen !

And just to prove it, here are two more of the same frogs in a dispute over a meal. More frequently of course, things are reversed—the frog is on the inside of the snake.

The frogs shown in these pictures are members of the Tree-frog family, or the *Hylidae*. Commonly they are referred to as the Green and Golden Frog or Golden Tree Frog, *Hyla aurea*.

Although a member of the Tree-frog group, it rarely moves above ground level; normally it is found at the margins of small creeks or swamps, and during the last few months of the year, maybe heard calling, with distended vocal sac, from the water surface. (A description of this frog appears in the *Naturalist* (**79**) pp. 296-298).

Vol. 83 (6) June 9, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Editorial

Features of the Future?

For sometime, as a reader, I felt that our junior members were perhaps being a little neglected.

Certainly, we have encouraged the Hawthorn Juniors, who are now producing their own News-sheets; and are fostering the fairly recent group at Preston, but there must be many youngsters from country and city who would probably welcome some attention from within the pages of the *Naturalist*.

One large suburban library, I know, holds copies of the *Naturalist* in both its general and childrens' section. This may be the case in other libraries, and if it is, then certainly I would suggest that some space in our magazine should be devoted towards the school-age members of our Club.

It is for this reason that I hope an elementary section is possible, for inclusion in the future. This may also appeal to some older members.

Two other features which are being contemplated, are a section dealing with techniques of nature photography, and a new series on Microscopy.

Before organizing these features however, I would like to receive reader's opinions, and welcome the enquiry of any member who may like to help in the compiling of these articles if they prove acceptable.

G. M. Ward

Wanted—

Access to an area of coastal heath land which was burnt last year, and near which there are stands of coastal tea tree, *Leptospermum laevigatum*.

Anyone who is able to help in this matter may contact Prof. J. S. Turner or Miss J. Burrell, at the School of Botany, University of Melbourne.

Notes on Aboriginal Antiquities of the Colac District

ALDO MASSOLA. ‡

The Background

Lake Colac (Native = Coram) a permanent sheet of fresh water roughly 8 miles by 4 miles in extent, was obviously of great importance to the natives. Although, as far as can be ascertained, and with the possible exception of eels, the lake had no fish; it must have been the drinking place of innumerable mobs of kangaroos and other game. The thick growth of reeds which surrounded it must also have been ideal for water birds of all descriptions; all these animals in turn, affording unlimited supplies of food for the natives.

The lake is the centre of what has always been a most interesting terrain. To the north are the Stony Rises (Warrac-Barrun-Ah = large stone field) an area of broken undulating country fairly thickly covered with bare basalt rocks of all sizes. These fields of rocks are intersected by abundant water holes and swampy grounds, and no doubt were the habitat of a rich native fauna. They also formed ideal hiding places for the natives. For our purposes the northern area may be terminated at the Warrion Hills (Coirwrook = Brolga or Native Companion), a small range of volcanic origin, which runs approximately east to west, and from where a bird's eye view of the whole district can be obtained.

To the west of the lake there are more Stony Rises, and then Lake Corangamite (Coraing = Diamond Snake), an expanse of water covering approximately 81 square miles, and about three times as salty as the sea.

To the south the land rises at first abruptly (Elliminyt), and then gently, until the heavily timbered, rugged, and often precipitous Otway Ranges are reached.

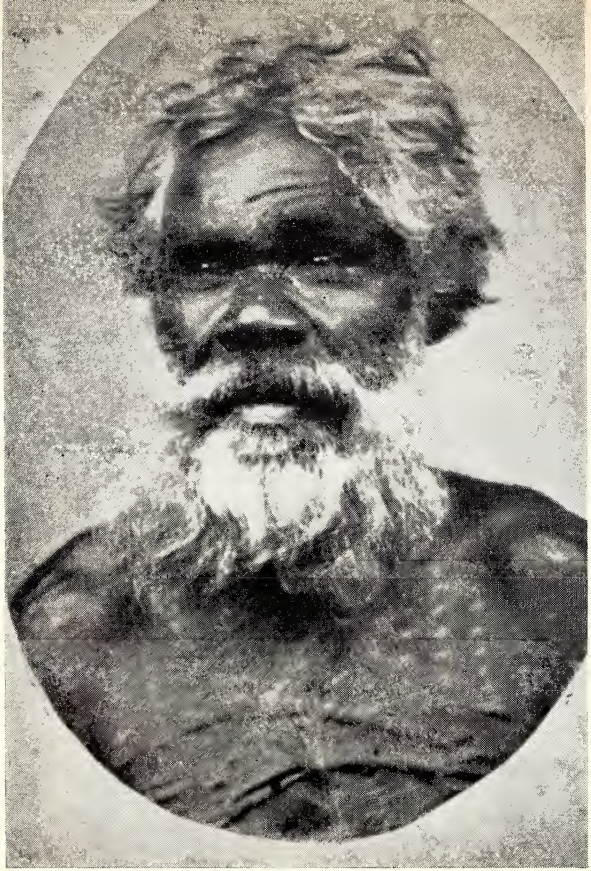
To the east there is undulating country of volcanic origin containing a number of shallow lakes and swamps. The principal hills in that direction are Mt. Gellibrand (Walar-Walar, Hollow Logs), and Mt. Hesse (Mookatook).

Early Contacts

The two low hills referred to, which, like all hills in the Western District, have been elevated to the rank of "Mount", were named after two prominent men of early Melbourne. Gellibrand was a prime mover in the Batman venture, and was the Attorney General for the Colony of Van Diemen's Land. Hesse was a distinguished lawyer of Hobart Town. The two men had landed at Point Henry, near Geelong, in February, 1837, and resolved to make their way to the infant settlement of Melbourne on horseback, in order to explore the country on the way. They had with them a guide. However, after crossing the Barwon River they became lost, and in spite of the guide's insistence that they should retrace their steps, they apparently continued in a westerly direction. Upon the guide's further remonstrating they dismissed him, and he returned to Geelong. Nothing further was ever heard of Gellibrand and Hesse, although their tracks were soon after followed to near Birregurra (Native = Kangaroo Camp).

In April, 1837, a search party, financed by Mrs. Gellibrand and consisting of 14 people, set out to find the two men. The party included two Geelong natives (one of whom was Beruke, later known as Gellibrand),

‡ P.O. Box 7, Montrose, Victoria.



One of the Geelong natives called Beruke, later known as Gellibrand, who acted as one of two guides.

who were employed as guides, and while on the march towards Birregurra it was overtaken by a body of Geelong natives, all fully armed and prepared for war. Their intention, they said, was to avenge the deaths of Gellibrand and Hesse, and they accused a tribe living upon a lake, at a place they called Colac, of having murdered the two men.

In reality it appears that the Geelong and the Colac natives had been at war for a considerable time, and that the Geelong tribe took this opportunity to raid their enemies.

The party soon reached Lake Colac (Native = Coram), the existence of which was thus accidentally revealed to the White Man. It is interesting to note that Colac, or Kolak, meaning Sandy Place, was not the native name for the lake, but that of the locality where the tribe was then camped, probably at Ross's Point. When the party arrived, the Colac natives took refuge in the thickets of reeds then surrounding the lake. Nevertheless, two of them, a man and a woman, (some accounts state a man and a child) were found by the Geelong blacks, speared, and portions of their bodies eaten.

Apparently satisfied with their success and probably fearing retribution, the natives could not be induced to continue the search for the missing men, and decided to go back to Geelong. The white men comprising the search party also decided to return to Geelong, since, they said, to enter

the reeds would have been madness, as many of the hostile natives were concealed in them, and the party would then be within easy reach of their spears. The search was thus abandoned.

Although the Colac tribe was officially credited with the murder of Gellibrand and Hesse, no proof was ever found. The horses of the two travellers were never again seen, nor were their weapons, nor any article of their clothing ever discovered.

Upon their return the members of the search party stated that they did not in any way molest the Colac natives; but the natives had another tale to tell. According to them they were attacked without provocation by a party of whites, and many of them were shot. As a result of this shooting they were greatly weakened, and unable to defend themselves from hostile tribes, who set upon them to revenge past defeats. In this way they were quickly reduced in numbers, and when, later in that year (1837), Hugh Murray first settled in the Colac district, the tribe numbered less than forty.

The Last of the Tribes

By all accounts Hugh Murray was sympathetically disposed towards the natives, and did everything in his power to befriend them. The latter, however, continued suspicious of the white man's intentions for at least 18 months, and persisted in raiding Murray's, and later settlers' folds, and driving their sheep off into the Stony Rises to feast upon them. Nevertheless, they made no attacks upon any of the shepherds or hut keepers.

About this time, in August 1839, the Wesleyan Missionary Society began a Mission Station (Buntingdale, Native = Nerron, meaning bread or flour) at Birregurra, and the Reverends Francis Tuckfield and Benjamin Hurst were placed in charge. The site for the Station was chosen with care, and this locality was preferred because it was at the junction of the territory of three, or perhaps four tribes. It was a holding of 640 acres, about 4½ miles along the present Birregurra-Forrest Road, and lay between that road and the Barwon River, with an additional area on the other side of the river.

It so happened that the very reason for its choice, bordering on several tribes, was one of the causes of its failure. By the beginning of December 1839 the Coladjins (Colac tribe) became openly resentful, because the Missionaries were welcoming their enemies, the Woodowro (Geelong tribe). On the 16th of December the Jarcoorts (from the west of Lake Corangamite) arrived, and much to the Missionaries' chagrin, the ensuing quarrels were only settled by a general corroboree followed by an exchange of wives. Next, the tribe living upon the Leigh River arrived, and this meant more trouble. At last the remnants of the Coladjins left the Station and put themselves under the protection of Hugh Murray, on Lake Colac. The Reverend Tuckfield then decided to attach himself solely to these people, and endeavoured, with every means at his disposal, to make them return to Buntingdale. His success was of short duration. The Bulloker tribe, (from Lake Buloke) arrived in strength in 1840, bent on killing a Coladjin who, their Medicine Man declared, had caused the death by magic of one of their principal headmen. Tuckfield intervened, and tried to pacify the tribesmen. But the disturbances did not cease until the accused Coladjin was speared. A corroboree was then held, wives were exchanged, and the Bullokers departed. This, virtually, was the end of the Mission Station. The Coladjins again

left, and resumed their wandering life, only to succumb to diseases and debauchery introduced by the white man. Some died of natural causes, a few were killed in inter-tribal wars, others were assassinated by Europeans. It is believed that in the space of one year between forty and fifty natives died in the district through eating sheep carcasses which the settlers had poisoned to combat dingoes and eagle-hawks. It is also suspected that poisoned flour was given them, but this was never proved. The continuity of the tribes, however, was stopped by the fall in births. Tuckfield wrote that in 1841 there were only two pure aboriginal children under 12 months of age within 40 miles of the Mission Station. "No children were born but half-castes", he wrote, "and these, with one exception, were immediately destroyed."

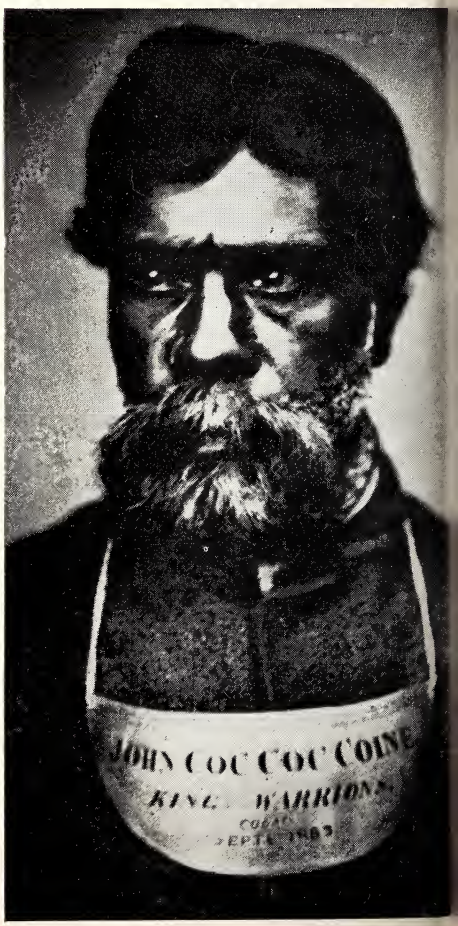
Buntingdale, though abandoned by the natives, continued to officially exist until November, 1851, although it had been completely destroyed by the bushfires of the 6th February 1851, Black Thursday, when most of Victoria was ablaze. All that remains to-day of that experiment is the Mission bell, which still calls the local children to Sunday School from the porch of the Birregurra Church of England. The property known as "Mission Banks" now occupies most of the old site, but the adjacent holding, known by the old name of "Buntingdale" was not part of the Mission Station.

In the meantime the natives continued to die out. In 1856 the Coladjin tribe was believed to number only ten men, five women, and one child. In 1860 there were supposed to be eighteen males and thirteen or fourteen females in the entire district. These figures include half-castes.

Then, in 1871, the Government decided to provide a permanent home for the wandering remnants of the local tribes. With this end in view 40 acres of land was set aside for their use at Elliminyt, and a brick house from near the hospital was shifted to the site. It is reported, however, that the natives would not make use of the house, except as a windbreak, preferring to erect their miamias on its leeward side.

About this time Coc-coc-coine, an intelligent and upright native, who was always referred to by the whites as "King of the Warrions", because

Coc-coc-coine
"King of the Warrions"



his main camp was situated there, died. He habitually wore a brass plate, suitably inscribed with his name and title which had been presented to him in 1867 by John Calvert, a landowner.

By 1879 it became obvious that the natives, who, in any case, were fast disappearing, would never settle at the Elliminyt Station. On the 23rd of December of that year half the area of the reserve, viz. 20 acres, was let out at a nominal rent to R. Sharpe, a half-caste, the other 20 acres being held as a temporary Reserve for the use of the remaining aborigines.

At this time (1879) the only full-blooded Colac native left was Gellibrand. This individual was so named because he was born at Mt. Gellibrand, and must not be confused with the Geelong native of that name, who was a guide in the search for the lost travellers. In his younger days the Colac Gellibrand was fierce and warlike, and a rival of Coc-coc-coine for leadership. They fought a duel, which Gellibrand lost. He died of old age soon after 1879 (exact year not known), and left three widows, the youngest of whom, Alice, a half-caste from Lake Buloke, later married another half-caste, one William Murray.

In 1883 the last full-blood of the district, Wombeetch Puyuun, or Camperdown George, died. In 1888 only a handful of half-castes was alive, including John Coc-coc-coine (Junior), William Murray and his wife Alice, Jim Crowe and his wife Mary. Jim Crowe's father (half-caste) came from the Wimmera, and his mother was a half-caste from Camperdown.

In 1889 the 20 acres then comprising the Elliminyt Reserve were let to Jim Crowe on the same basis as the 20 acres which were then still held by R. Sharpe. The two families held their respective lots until 23rd June 1948 when the Lands Department relinquished the Reserve and the land was then sold. The only persons of native blood in Colac to-day are descendants of the Crowe family.

The Aboriginal Antiquities of the District

The aborigines of the district passed silently away, and with the death of Wombeetch Puyuun in 1883, became extinct. A memorial over this man's grave in the Camperdown Cemetery, some weapons and stone axes, an occasional skeleton dug up on the banks of the lake or in the Stony Rises, and a few old peoples' reminiscences, was all that was left of a once numerous and proud tribe.

However, in later years, and with renewed interest in the people who occupied this country before us, several interesting discoveries have been made. Most of these finds are due to members of the Anthropological section of the Colac Field Naturalists,

Camperdown George

who, under the indefatigable Donald Burns, literally left "no stone unturned" in their investigations.

The list of their achievements is quite impressive. A camp site was excavated at Bleak House from which a number of stone tools, including microliths, was recovered. A poignant discovery was made at this site. The excavators came upon a native oven, a pit lined with fire-scorched stones, which contained the complete skeleton of a kangaroo with a stone spear-head still protruding from its ribs. It would appear that the hunters had to flee from their cooking dinner because of the approach of enemies. We can only surmise the worst as they did not return to it. Another excavation was undertaken at Ross's Point on Lake Colac, which, unfortunately, proved negative. Sand blows at Irrewarra; at Corunum; at Mingawalla and at Foxhow; camp sites on Barongarook Creek at the edge of the town; on the site of the racecourse south of Colac; at Gerangamete; on the Kaanlang Road; and at various points along the south shores of the lake, were all carefully examined, evidence of occupation collected, and copious notes made.

Not content with the plains, the naturalists penetrated into the Otway forests, which, according to the old settlers, no aborigine ever visited. The results were a number of camp sites discovered, such as at Irrewilippe, at Barongarook West and at Chapple Vale, culminating with the finds at Gellibrand. These were a quarry from which the natives obtained fine grained dolerite blanks and, near by, grinding rocks upon which the blanks were ground into axes. One of the grinding rocks is ornamented by the only example of rock carving so far found in Victoria. (See *Vict. Nat.* 79 (3): 66-69, 1962). A fairly large camp site was also discovered in the vicinity of the grinding rocks and close to it a quartzite quarry. The Gellibrand finds prove conclusively that in spite of what the old settlers thought, the Otways were occupied by the natives. The finding of a number of stone axes and choppers on the middens along the shores of Cape Otway, which were apparently made from the dolerite quarried at Gellibrand, also suggests that there must have been contact between the coastal natives and the inland tribes.

To be sure, an interesting discovery had been made in the Otway Ranges as far back as 1912. In that year the late A. E. Pearce, of Lardner's Track, Beech Forest, found three aboriginal skulls and a dried human hand lying close together on a recess in a limestone cave, about two miles down stream from the junction of the Olangalah Creek with the Gellibrand River. There were no other bones present. The hand, he stated, was on a very friable piece of rush matting.

These relics were handed to the Colac Police, but, unfortunately, their present whereabouts are not known. However, this discovery is full of interesting possibilities. The dried hand, for instance, is the only one to ever have been mentioned outside Gippsland, while the depositing of skulls suggests some kind of a "Sanctum".

According to the distinguished archaelogist D. A. Casey, who visited this cave, now known as "Skull Cave", in March 1935, it could only be approached from the water side, by crossing the Gellibrand River by means of a few boulders, and then up a nearly vertical rockface. Casey believes that the floor of the cave is occasionally swept by floodwaters, since, upon it, he reported, there was no deposit of any kind.

Don Burns does not agree with him. He visited the cave during 1962, and claims that it is much easier to get to it by descending from the top of the

Native oven or Mirnyong, Colac (arrows denote area) Photo: *Author*
(Note—difficulty was found in photographing due to trampling of area by cattle.)

gorge. He stated that there was at least 8 inches of soil on the floor and that, in any case, the cave is too high up the cliff-face for the floodwaters to reach it. No sign of occupancy was found by either investigator, but, according to Burns, Pearce claimed that he had gone back to the cave on subsequent occasions, and that he had raked the floor and found some stone axes.

The difficulty of access fits in well with the possible sanctity of the cave.

Mr. W. Stevenson, now a resident of Colac, but once living on a property not far from Skull Cave, has in his possession a water-worn pebble curiously like an axe-head (and no doubt used as such by the natives) which he found on the flats by the banks of the river, about a mile upstream from the cave. He also stated that before cultivation started there were several native ovens, or mirnyongs, on those flats.

Mirnyongs or Native Ovens

Mirnyong (variously spelt) is an aboriginal word signifying "finger" but it is also applied to the finger-like roots of several species of grasses, such as the dandelion and the bulrush. Since these roots were the staple diet of the aborigines, and immense quantities of them were collected and cooked by the women, the fires at which they were roasted also came to be known by the same term. However, it must not be forgotten that "mirnyong" was not the name by which the finger, or the root, or the fire-place, was known to all Victorian tribes; Brough Smyth, for instance, gives Goorung for the Werribee people, Tallum for the Fiery Creek tribes, Bolap, on the Lower Avoca River and Moornung at Mount Emu. Mirnyong appears to have been the name used by the Worunjerri, or Melbourne tribe, and was adopted by the white man as a general term for native ovens.

At one time mirnyongs were a common feature of the landscape of Victoria. They appear to have been most numerous near water, preferably slightly within the margin of timbered areas. The locality in which to build a mirnyong must have been chosen by the natives with an eye to safety,

since they nearly always occur upon elevated ground, from which the approach of enemies could be detected. The belt of timber no doubt served as a shelter from prevailing winds, as well as supplying the fuel for the fires.

Mirnyongs, which, it is believed, were confined to Central and Western Victoria and South Western New South Wales, have been reported by old settlers as being numerous along the Plenty River, the Darebin and the Merri Creeks near Melbourne, on the Murray River, and from numerous localities in the Western District and on Cape Otway. The present writer has investigated several in Central Victoria, near Shepparton, on the banks of the Waranga Basin, along the Goulburn River at Nagambie and Seymour, at Maryborough and other localities. Most of these were almost unrecognizable, their former extent only being shown by a much darker patch of soil in the paddocks. Most appear to have been smallish; less than 40 feet in diameter. Old records mention several over 100 feet in diameter. The farmers are mostly responsible for their disappearance. They ploughed them in, both to get rid of ideal burrowing places for the rabbits, and in order to manure their land, since mirnyongs are composed of burnt clay, a little soil, and quantities of charcoal and ashes from burnt wood and animal bones. In places this mixture feels greasy to the touch, possibly because of the animal fats which would have been absorbed by the soil when the aborigines were cooking game.

Mirnyongs could have originated in the aborigines' predilection for returning to the same camps during their seasonal movements. The natives had strict camping regulations, by which families had a stipulated place in relation to each other. The mia-mia or shelter would thus be erected in the same position as when the locality was last visited; and the cooking fires lit at the same fireplaces. Over the years the ashes in these fireplaces increased enormously in bulk, and became heaps connecting the separate fireplaces of all the families, who continued to cook on their prescribed side of the central heap.

When digging these mounds the seeker is generally disappointed since very little is found in them except an occasional scorched bone, the original fire stones, marking the position of the fireplaces, or, in stoneless country, the now fired clay which the natives used in lieu of stone. Occasionally, however, a human skeleton is dug out. It may appear surprising to find a burial in the midst of the home-fires, as it were. But these skeletons can be explained as being the remains of people buried there during the time of the first occupation of the country by the white colonists. The tribes, greatly decimated and living in constant fear of attack, were fleeing from place to place. There was no time to dispose of the dead in the age-old manner; the mirnyong heaps, which could no longer be used because of the then existing conditions, were found to be convenient places for quick disposal. This was because they could be dug with ease and rapidity.

The Dean's Creek Site

One of the most interesting finds of the Colac Field Naturalists was the Dean's Creek Site.

Dean's Creek, an inconsiderable and broken creek, mostly choked by reeds and often only a series of swampy waterholes, rises on the high ground at Barongarook West and threads a devious 6 mile northerly course towards Lake Colac. On its way it crosses the Princes Highway at Colac West, and then meanders through a grazing property for about ¾ of a mile

The Ring at Colac Photo: *Author*

before emptying its waters into the south-west corner of the lake.

It is with this last short stretch that we are concerned. Along the Creek's west bank there are three small mirnyongs, the first of which, about 200 yards north of the Princes Highway, is the best preserved. Even now* it is seventeen paces in diameter, and rises some 2 feet above the general level of the surrounding soil; this is in spite of the burrowing of rabbits, and the trampling down by the cattle feeding upon this paddock. The other two mirnyongs, which are north of this one, have suffered much more, and their former extent of about thirty-six feet can only be ascertained by the blackness of the soil.

The three mirnyongs, nevertheless, were only marginal to a huge one which once existed on the top of a low rise (about 15 feet above the level of the surrounding country) immediately to the west of, and about 50 feet from the creek. Unfortunately, this large mirnyong was ploughed over and flattened out many years ago, but even now hundreds of yards of characteristic dark soil denote its former extent. Part of this area has been absorbed by a Drive-in Theatre, and a paling fence erected across it, yet an uninterrupted view of several miles of countryside, and a full view of the lake can still be seen from it.

Dean's Creek was a logical place for a native camp: plenty of drinking water from the lake, the creek, and from a spring which existed close to what is now the Princes Highway; within easy reach of plenty of food in the form of game and edible roots; an elevated position from which the plains and the lake could be scanned for the arrival of either friend or enemy; and it had just enough savannah-type vegetation to provide windbreaks and fuel for the fires. Nor must we forget the thick growth of reeds on the creek and lake, in which the entire tribe could hide if need arose, as when the Gellibrand search party arrived. This site, then, had everything, and was, no doubt, one of the main Coladjin camps.

However, it is not the logic of the choice of this spot for a camp, nor the presence of the mirnyongs, which

* This mirnyong was bull-dozed out of existence in March 1966, by the Country Roads Board while widening and cleaning Dean's Creek to stop it from flooding the Highway.

renders it so important to us, since, as already stated, native ovens were common throughout most of Victoria, many other beautifully situated camps being known; but this site is important for another reason.

About 400 yards from the Princes Highway, and about 50 yards north of the third small mirnyong, Dean's Creek takes a definite easterly turn, only to resume its northerly course about fifty yards further on. On the flat along the left bank of this fifty yard stretch, and about twenty feet from the creek, a section of a ring-shaped earth-mound is visible. By this remaining portion, (about a third of a complete circle), it is possible to reconstruct the structure. It was a circular space of ground, with a diameter of about fifty feet, enclosed by a mound, the existing third of which is about five feet wide. It is impossible to estimate the original height of the mound.

The missing section of the mound has been flattened out by cattle trampling upon it. The ground inside the mound has also suffered from the cattle; they have cut it up with their hooves, and somewhat kneaded it. Upon close examination it is seen that the soil is heavily impregnated with ashes and bits of charcoal, and contains many lumps of calcinated earth, part of which, presumably, was once a surface crust. No evidence of this burning is visible outside the mound.

In the north-east of the State these ring-mounds were referred to by the early writers as "guanga", and for the want of the local name this term will be used in describing their functions.

The Function of the Guanga

The actual construction of, and the function to which the guanga was put is as follows:

When there were enough youths to be initiated into the privileges and duties of manhood, messengers were sent out to all the friendly groups, and these were invited to attend and to bring their own youths for initiation. A suitable piece of flat ground was selected by the home group near their main encampment, and upon it a circular space was cleared of all timber and grass; the soil scraped off the surface of the space in levelling it was used to make a low mound around its outer margin. The result was a flat circular space enclosed in a raised ring.

When the visitors arrived they were received by the assembled people at the guanga: the local men forming a ring around it, with the women and children on the outside of the men. The male visitors walked into the guanga in single file, and marched around and around until they were all within it in a spiral formation, with the youths of their group who were to be initiated in the centre. Their women and children stood outside. Next the visiting men inside the guanga called out the names of the topographical features of their own country; then the names of the animals and plants upon it; and, finally, the names of the genitals of both sexes. In other words, they boasted about all the good things their country contained. With each name the visitors pointed towards their own territory with their weapons, and stamped their feet. This ceremony over, the men dispersed and mingled with the local group, while the women prepared the camps in their prescribed place.

This procedure was repeated each time another group arrived, the intermediate days being leisurely spent in fishing and hunting; but a corroboree was held each night.

When all the groups had arrived a final corroboree was held, and that night a huge fire was made in the

guanga. The next morning the ceremonies of initiation commenced, and the youths to be initiated were painted, and dressed in a head-band, waist belt, "apron" of fringe, and possum-fur arm-bands. At this stage each mother secured a few fringes from her boy's apron. The boys were then taken into the guanga and made to stand, with their heads bowed, upon the hot ashes of the large fire which had been burning all night. The women and children were next herded together a little distance from the guanga, made to lie down, and covered with bushes and rugs, to prevent them seeing the next act of the initation.

A number of men, each carrying a bough, then surrounded the guanga, and holding the boughs over the boys' heads formed a thick leafy canopy over them. Other men began shovelling the hot ashes and cinders from the guanga over the boys' heads, while the bough-carrying men tried to shield them. The boys jumped about on the hot ashes endeavouring to evade the falling coals.

When the ashes had all been scattered in this way, the boys, each with his head covered by a rug, were marched off to a pre-selected spot in the bush, where the initiation ceremony was continued.

In the meantime the mothers and female relatives of the boys collected the dispersed ashes into a heap in the guanga. Each mother decorated a spear with the fringes she had removed from her boy's apron, and stood the spear in the heap of ashes on the side facing her own country. When all the spears were thus stood the women danced around and around outside the guanga.

When the dance was over the women dispersed, and the guanga was not again used during this particular ceremony, but could be used for a similar ceremony at a later date.

Discussion

It is remarkable that this guanga, a flimsy structure of banked-up earth, has withstood the vicissitudes of the years, with the attendant periodical flooding and the constant trampling by cattle. The importance of this find cannot be minimized. Not only is it the only one known to have survived, and, therefore, of great value to students of aboriginal lore, but it also proves that the ring-shaped mound was used in the Western District. The implications now are that both the ring mound and the elongated, boomerang, or dumb-bell shaped stone enclosures were used in the same areas. This is demonstrated by the find of the stone arrangement at Carisbrook, near Maryborough (See *Vict. Nat.* 80 (6) : 177-180, 1963) which is within the area in which the guanga was reported to be used, and the stone arrangement at Lake Wongan, near Streathem (see *Vict. Nat.* 54 (9) : 130-133, 1938) not so far away from the guanga under discussion.

There is no question that the piling-up of an earth-mound around the guanga was a deliberate act on the part of these people. It is true that there are no stones in the immediate vicinity of Dean's Creek camp, but rocks are plentiful in the district. They could easily have been carried to the site if such an important enclosure was to be rock-circled, or the groups could have assembled, and held the ceremony, at one of the camps in the Stony Rises. The fact that they did not is proof that what they wanted was an earth mound.

The present owner of the land, Mr. Ken Alexander, stated that when his father purchased the property in 1928, the ring was pointed out to him by the previous owner as having been made by the aborigines, and that there was a tradition in the family that the ring was ceremonially important. No

grass grew on, or in the ring until about 15 years ago, and even now the grass that grows there is distinctly of a different colour from the surrounding field. This colour variation is especially noticeable in the change of seasons.

This dearth of grass inside the ring was no doubt due to the repeated baking by the fires and the stamping of the natives, which would have formed a crust on the surface of the enclosure.

The reason for the breaking up of the ring is the distinct aggrading of the creek, resulting in the rising of the creek's banks. The land in the immediate vicinity of the creek thus became subject to flooding, and the cattle, treading upon wet soil, kneaded the mud deposited by the flood with the calcinated surface of the ring, and flattened out the encircling mound. The grass has now taken hold, and it is only a question of time before the ring will completely disappear.

We are indeed fortunate in being able to actually look upon such a ring, and to measure it, since this class of relic, by its very nature, is easily destroyed. Although it has long been known that these ring-shaped mounds were used during initiation ceremonies by the tribes of North-east and Central Victoria, no actual example of one has ever been reported, and this one is the only one known to exist in Victoria.

Acknowledgements

I wish to congratulate the members of the Colac Field Naturalists Club for unearthing so many interesting relics of the people formerly inhabiting the district. My thanks are due to the Colac Shire Secretary for allowing me to reproduce the portrait of Coc-coccoine which hangs in the Shire Hall. I also wish to thank Mr. Ken Alexander for allowing me to photograph and measure the guanga on his property, and for information given. My special thanks are offered to Don Burns, who, often at great personal inconvenience, has been my guide whenever I visited the district, and has placed his notes and knowledge at my disposal.

Some Notes on Sparrows

By Dick Hudson

Anyone who reads the letters in the daily newspapers soon appreciates that it is unusual for two people to have the same opinion about anything. It is not surprising, therefore, that whereas the English countryman sees the sparrow as a pest, perhaps second only to the rat, the Cockney inhabitant of the brick-and-mortar jungle regards him with considerable affection. The average Australian, no native himself, thinks of him as an unwelcome immigrant. Most bird-watchers, when they see one through the glasses, say "Only a sparrow" and seek another object to study; but during four years of travelling in Asia, which necessitated spending much leisure time in towns, the writer was frequently reduced to watching sparrows or mynahs or nothing. An abnormal interest in sparrows was thus aroused and, as usually happens, the more one learns, the more one wishes to know.

In the Melbourne suburbs two species of sparrow, neither indigenous to Australia occur. These species are the House-Sparrow, *Passer domesticus* (Linn.), and the Tree-Sparrow, *Passer montanus* (Linn.). Whilst the reason that led the Swedish father of animal and plant nomenclature, Carl von Linné, to apply the adjective *domesticus* to the former is obvious, the significance of *montanus* for the latter is not apparent. Although in autumn, House-Sparrows flock in the hedgerows of England, as they do in those parts of mainland Australia and Tasmania where such things exist, breeding is usually associated with human habitations. Tree-Sparrows are not as common in English gardens as they are in Melbourne suburbs: their preference is for old trees by roadsides and in orchards and the writer has only encountered them on one occasion, in a row of pollarded trees on the Guildford sewage farm. However, according to Witherby *et al.* (1952), in parts of Scandinavia the Tree-Sparrow haunts houses like the House-Sparrow. In view of what we find in parts of Asia and in Australia, this is of interest.

The sexes of the House-Sparrow are distinct. The male (Fig. 1) has a grey top to his head, rich brown sides to the crown, a black throat and greyish-white cheeks and underparts. Above he is mostly brown streaked with black except for the lower back and rump which are grey. The female (Fig. 2) is a dull brown colour above and greyish-brown below. She has a fairly distinct fulvous stripe above and behind the eye and other markings that it is less important to remember. The sexes of the Tree-Sparrow cannot be distinguished by the plumage: both resemble generally the male House-Sparrow. The species (Fig. 3) differs, however, in having no grey top to the head: the warm brown of the House-Sparrow's sides to the crown is replaced by chestnut and this extends over the forehead, poll and nape. In addition there is a prominent black spot on each cheek and the lower back and rump are brown instead of grey. Seen together on the bird-table the Tree-Sparrow appears a little smaller and of lighter build than its congener and it usually assumes a more horizontal pose.

Whilst travelling in West and East Pakistan and in India, House-Sparrows were almost always to be seen in the towns and villages visited. According to Whistler (1949) there are two sub-species in the sub-continent. *P. d. griseigularis* is a large, brightly-

Fig. 1—Male House-Sparrow. The extent of the black bib varies. When a bird has recently moulted the black feathers have white tips, but the tips become abraded with wear and the black area then becomes larger.

Fig. 2—Female House-Sparrow. The pale line over the eyes is an important field-mark.

Fig. 3—Tree-Sparrow. The narrow black throat and black spot in the ear coverts are clearly shown.

Sparrows photographed at Essendon. *Photos*: Dick Hudson.

coloured form, that breeds in the Himalayas at 5,000-15,000 feet, and appears in large numbers in the plains of north-western India in winter and has only once been encountered by the writer, in New Delhi in January 1957. *P. d. indicus* Jardine and Selby, which is smaller and duller, is resident throughout Pakistan, India and Ceylon at the lower altitudes and was the form usually seen.

In Burma it is possible to find House-Sparrows in most built-up parts of Rangoon, near the fire-station in Sule Pagoda road for example, and, very occasionally one may be identified in a suburban garden where, however, they are greatly outnumbered by Tree-Sparrows, *P. montanus malaccensis* Dubois. In the towns and villages of Thailand and the other countries east of Burma, the House-Sparrow was never seen. Everywhere there were sparrows, but they were all Tree-Sparrows. Before the advent of the air-conditioner ruined life in Bangkok, the hotels and houses were designed to obtain the maximum benefit of every puff of wind and the Tree-Sparrows took full advantage of the openings in the walls to pass freely in and out. They nested in the roofs and ate the discarded household scraps. So too, throughout Thailand, Laos, Cambodia and Vietnam, up to Tokyo and down to Singapore, the sparrow associating with human dwellings in towns and villages is the Tree-Sparrow.

In Australia the House-Sparrow, introduced into Victoria a little over 100 years ago (Cayley, 1959) has spread very widely. In Victoria the species occurs all along the coast from Mallacoota to Nelson and in all inland centres of human population. The birds are common in Adelaide, Clare, Port Pirie and Port Augusta and have extended north along the railway at least as far as Leigh Creek. Although we have looked for them, we have not seen them in Alice Springs or in Darwin. Along the east coast we have met them as far north as Rockhampton; but we have not found them in Mackay, Townsville or Cairns. According to the *World Bird Day, District Bird Lists 1958-61,* they are common in many Queensland centres within a triangle with its apex at Yeppoon, on the coast about thirty miles above Rockhampton, and its base on the New South Wales border between Warwick and Coolangatta. They have not been very successful in penetrating westwards into Queensland although they have been reported from Roma and we saw some on Longreach airport in 1965. None were found in Mt. Isa in 1960; but a few were present in the gardens around the Shire Hall in July 1965. Mrs. F. Trezise (1964) reported a single male at Chillagoe, north of Atherton, but it stayed for a short time only and there appear to be no other records of sparrows so far north. Policemen with guns are perhaps not the greatest obstacle that they encounter beyond the Nullarbor for Serventy and Whittell (1962) state that Western Australia is still free. In Tasmania they are as widely distributed as they are in Victoria.

The Tree-Sparrow has proved a less aggressive coloniser and the writer has seen it only in Melbourne suburbs and in Werribee. "J.R.W." (1962) recorded seeing it in Ballarat in December, 1960. According to Sharland (1958) it was introduced into Tasmania some years ago but died out. Incidentally Sharland says that the Tree-Sparrow has no black throat; but this, of course, is incorrect.

In Africa the House-Sparrow occurs naturally in Egypt. It is common in Cairo and the writer has seen it also at Khartoum in the Sudan. It has been introduced into some ports, such as

Mombasa, on the east Coast and into South Africa, where it is common in large towns like Pretoria. It has never appeared in Nairobi, where conditions might be considered to be more suited to it than those at the coast and the railway journey up from Mombasa would be as comfortable and perhaps less tiring than that from Port Augusta to Kalgoorlie. In February, 1964, they were observed at the airport on the island of Mauritius.

Never having visited America, we have no first-hand knowledge of its sparrows. According to the books, the House-Sparrow spread widely after its introduction into the United States and it is still extending its range. The indigenous "sparrows" of the States would be called "buntings" in England and are not represented in Australia.

The Tree- and House-Sparrows, although the best known, are not the only species of the genus *Passer*. Others have been encountered in streets, parks and gardens in various parts of the world. In Rome, for example, the bird-watching tourist may be puzzled by a sparrow the male of which has a brown poll like that of a Tree-Sparrow, but a wife like a female House-Sparrow. This is the Italian Sparrow, *Passer italiae*.

In Bangkok gardens one may be fortunate and see the handsome male Pegu Sparrow, *Passer flaveolus* Blyth, with a black mask and narrow bib, a brown poll, a rufous area behind the eye and a bright yellow patch over the ear covers and reaching below the eye to the bib. The female is a rather uninteresting bird faintly washed with yellow below. Outside the breeding season this species, too, forms flocks and, in Thailand, such flocks have been seen moving about the grass and savannah country from the latter part of November to the middle of February.

Some years ago, when we lived in Kenya, we saw occasionally in our Kabete garden, eight miles from Nairobi, the peculiar Parrot-billed Sparrow, *P. griseus gongonensis,* a rather unexciting bird except for its bill. We never found this bird building under the eaves of houses, but more recently on a visit to Muguga, about ten miles further from Nairobi at an altitude of over 7,000 feet, a pair of the Kenya Rufous Sparrow, *P. rufocinctus,* was seen collecting grass-bents and taking them up to the eaves of an outbuilding. The male has a grey crown, a black chin and a light chestnut arc behind the eye; the female is paler and duller. In the suburban gardens of Johannesburg still another sparrow is common. This is the fine, large Cape Sparrow, *P. m. melanurus.* The male has a black poll, face and chin, the latter almost severed from the black bib by a broken white line, and there is a conspicuous bright chestnut patch on the upper part of the wing. The female has a prominent, broad, pale fulvous mark above and behind the eye. Other species of *Passer* occur in South Africa, but the writer has not encountered them.

To return to the House-Sparrow, whether one likes or detests them, one has to admire their enterprise and their ability to adapt to so wide a range of habitats. There must be few species of birds that, once introduced, have been able to spread so rapidly in so many different lands. Of their enterprise there can be no doubt. Although they feed their young on insects, most of the family *Ploceidae,* to which the sparrows belong, are essentially seed-eaters and the adults live on the caryopses of grasses. The House-Sparrow seems to be omnivorous. They love removing the last scraps of meat and fat from discarded chop-bones, they enjoy many soft fruits and, when they can, they will steal the honey put out for honey-eaters. We have watched them behaving like flycatchers, hawking flying ants in the air and they have been reported in England by Brown (1959) snapping up tiny frogs as they emerged from the water. Those who are prepared to take advantage of everything the Fates provide usually progress in the world.

Doubtless the colonising success of the House-Sparrow is partly due to its readiness to associate with man. It is problematical whether it would have become established in Australia had not man created an environment similar to that to which it was accustomed in Europe. It is easy to blame the sparrows for driving indigenous birds out of our suburbs, farmyards and arable lands. It would probably be more just to blame ourselves for establishing a habitat more suited to sparrows than to most indigenous species of birds.

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Geological History in a Lava Vesicle

By Edmund D. Gill*.

* Assistant Director Nat. Museum of Victoria.

In 1957 the Melbourne and Metropolitan Board of Works carried out extensive excavations in the western suburbs of Melbourne in connection with the Brooklyn Tank Sewer. Manhole M6 is located near the Spotswood Railway Station, about 220 feet east of Hall Street and 300 feet south of Hudson Road. A shaft 10 ft. 6 in. in diameter penetrated:

0–45 ft.	Solid bluish basalt.
45–60	Black basalt.
60–65	Sloping contact (60 ft. on N. side and 65 ft. on S. side) between the black basalt above and highly vesicular basalt below, along with some clay and siliceous sand (i.e. an old land surface).
65–90	Vesicular basalt.
90–105	Basalt with vesicles, tachylytic in places, and with light greenish clay.
105+	Light grey siliceous sand, tending to be coarse.

The top of the shaft was 48.8 ft. above M.M.B.W. datum for low sea level, and so about half of the section is above present sea level and half below. The basalt flows are Pleistocene in age. Two flows and probably three are present. The presence of the shaft was drawn to my attention by Mr. Blackburn. Through the kind assistance of the foreman I was able to descend the shaft and examine the section. This had to be done rapidly, but two observations of geological interest were made.

Three Phases of Deposition

The first lava flow over the ancient land surface was a thick flow of basalt with a high gas/lava ratio — a pahoehoe flow that solidified leaving numerous gas vesicles. A soil formed on the surface of this flow and sandy materials from elsewhere were washed in because there is no free silica in basalt and the sand was waterworn. The top of the flow was eroded as is shown by the steep slope on the surface (*c.* 22°). A flow of solid basalt of similar thickness later flowed over this eroded surface. The gas/lava ratio was lower, and so there were correspondingly fewer vesicles, judging by the section observed.

The interest of the vesicles in the lower flow is that many had deposits in them, and figure 1 illustrates a vesicle in which three successive phases of deposition could be clearly recognized. In this single vesicle there is a stratigraphy and a geological history. One does not normally look in lava vesicles for stratigraphy, but the succession shown there is as follows:

1. *Red clay* was deposited in the lower quarter of the vesicle in extremely fine laminations, too fine to measure with the unaided eye. This clay could not have formed in the vesicle because the sides of the vesicle were not decomposed and also, there was an excess of it. The clay must have been transported from a soil above the flow. The remarkably fine laminations suggest that the clay filtered through in very small quantities (therefore through extremely fine apertures) over

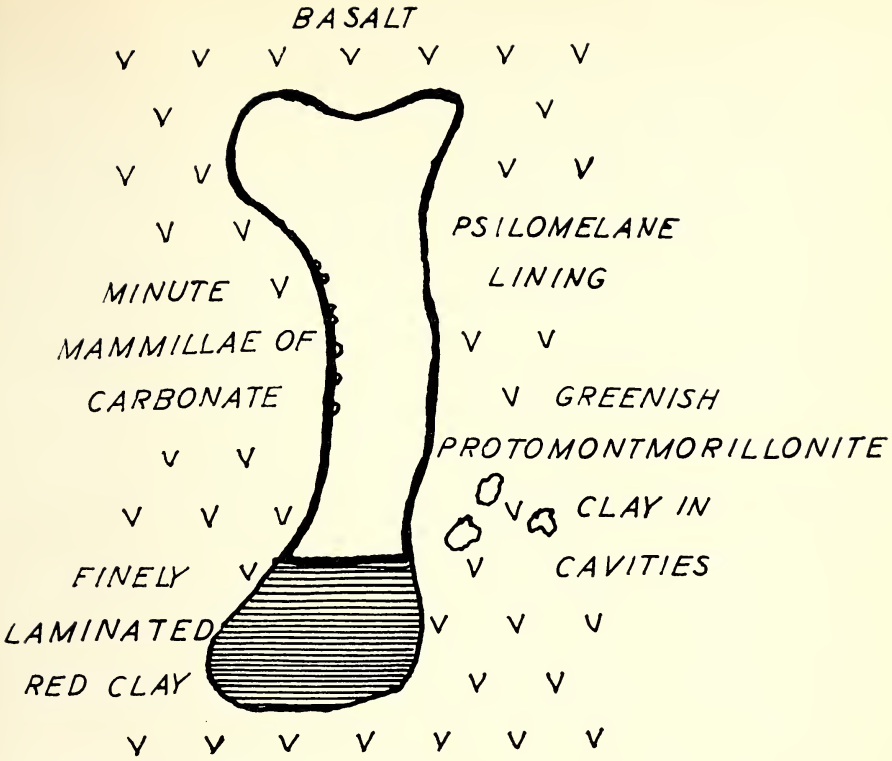

Fig. 1

an appreciable period of time. Because the laminae are laid down horizontally and perfectly parallel, they must have been deposited in water. The clay can be pictured as seeping in with slow-moving water and very gradually settling. Many vesicles had clay in them but none was full. Some event must have cut off the supply or the process. Perhaps the emplacement of the second flow of basalt achieved this.

2. *Psilomelane.* The next phase was the deposition of psilomelane, not only over the clay laminae, but also all round the remainder of the vesicle (fig. 1). This hydrated oxide of manganese was no doubt derived from the weathering of the basalt. If the second flow or pair of flows had been emplaced, it was probably from their weathering that the psilomelane came. If so, this period must have been some time after the flows solidified because the weathering of basalt is not rapid, as can be seen from Holocene basalts in Victoria. There were minute amounts of psilomelane also in the laminated clay.

3. *Carbonate.* The third phase was deposition of minute mamillae of secondary carbonate. It was later than the psilomelane deposition because the carbonate is on top of the psilomelane. The carbonate is pure white and so apparently psilomelane deposition had ceased, at that place anyway. It is surprising that psilomelane preceded the carbonate because during weathering the carbonates are usually the first minerals to be freed.

Tectonics and Eustasy

There is no sign of pillow structures in the lava flows, and they appear to be normal terrestrial flows. Their present occurrence in part below sea level may be due to flexing of the area into the Port Phillip Sunkland, to the extrusion of the flows during a time of eustatic low sea level when Port Phillip was dry or partly so, or the explanation may be that both factors operated.

Green Clay

The other geological observation was that in the same basalt flow which held the vesicle described above there occurred a light greenish clay. It was in small vesicles at the same level as the vesicles with red clay (Fig. 1), but it occurred more plentifully in the lower part of the flow. As the environmental conditions appeared to be those of chemical reduction, it was thought that possibly the green clay was nontronite which upon exposure to the air would oxidize to a sulphur-yellow colour. This did not happen, so a sample was submitted to Mr. A. J. Gaskin of C.S.I.R.O. Chemical Laboratories who determined it as proto-montmorillonite, i.e. montmorillonite in a very primitive stage of crystallization. This is the main component of the black clay so common on the basalt plains which swells on wetting and cracks on drying. It has often been noticed that in the zone of weathering of the basalt under the soil there is often a pale coloured clay, and it may be the same one determined from the Spotswood shaft.

Book Review

"Aboriginal Words of Australia"

Compiled by A. W. REED, illustrated by E. H. PAPPS (Published by A. H. & A. W. Reed, Wellington and Sydney. 144 pages. Price in Australia: $1.60.).

The New Zealand publishing house of Reed's has for many years included numerous natural history titles among its publications. These have dealt primarily with the Dominion's own environment, but now that the firm is established in Australia (143-5 York Street, Sydney) attention is being directed in their publications to this country.

In 1961 A. W. Reed published "Maori Place Names and their Meanings", a book that contained a mass of ethnological information yet was compact and concise. A similar format has been adopted for his dictionary of Australian aboriginal words, which have been arranged alphabetically, first English-Aboriginal, then Aboriginal-English. The latter only was the arrangement in most of the earlier collections (as in Tyrrell, Endacott, Justine Kenyon, Sugden and McCarthy), Ingamells' being the only attempt in popular works at an English-Aboriginal vocabulary, which was far less comprehensive than that in the book under review.

While all previous books have included aboriginal words for birds, animals, insects, trees and flowers, none contains such representative lists as appear in Reed's dictionary. These are grouped in their aboriginal alphabetical order under the headings: Animals, Birds, Fish and Crustaceans, Insects, Plants, Reptiles, Shellfish, Snakes (listed separately from other reptiles), Trees, Weapons and Tools, as well as appearing in their correct place as individual words. This feature makes the book of greater interest to naturalists and enables comparisons to be made.

If the part of Australia where the word was used, is known; it is indicated by a series of index numbers (superior figures), standing for the various states, Central Australia and Northern Territory. Where the origin is unknown, or the use was widespread no such number is given.

This book is excellent for its purpose as a popular handbook, but there is a need for a really comprehensive work by scholars with precise linguistic training. This work would abolish the confused traditional orthography of aboriginal words, which appear in many guises with indiscriminate use of c- or ck or k, oo or u, i or ai, gi- or ji-, re-, ri- or ry-, and so on. This work would give, in the interests of accuracy and definiteness, the scientific names of each plant or animal to which a particular aboriginal word was attached; in many cases the same word was used for several similar species, even sometimes to species unrelated but having some common use or association in the native's mind.

It is somewhat surprising to find *jabiru* included. This is the common name of Australia's only stork, *Xenorhynchus asiaticus* (Black-necked Stork), but the word was never in any aboriginal language; like *jacana* (*Irediparra gallinacea*), the Lotus-bird or Lily-trotter, and *jacaranda,* this word came from Brazil through Portuguese from the language of the Tupi-Guarani Indians of South America. Our jabiru and jacana are Asian-Australian species distinct from their Brazilian namesakes, while our jacaranda is the Argentine species rather than that of Brazil.

The book, which is illustrated by sixty natural history line drawings with aboriginal captions, is strongly recommended to all those naturalists interested in our darker fellow-citizens and that means, I hope, all of us.

J. A. BAINES

RECORD REVIEW

"Australian Bird Calls"

Recorded by Frank Cusack and Redvers J. Eddy.
Processed and distributed by W&G Distributing Company, Pty. Ltd.
Record No. WG-B-2493—Speed $33\frac{1}{3}$ r.p.m.
Price $5.25, available all record shops.

Most of us at sometime or other when out in the bush or countryside have heard some particularly pleasant or distinctive sound and have said, "I wonder what bird that is." Here now is an easy and pleasant way of learning to identify at least some of the bird calls to be heard in Victoria. This record contains the calls of 30 different species, all being recorded in Victoria except five which were recorded in the Northern Territory.

The birds whose calls are recorded are:—

Kookaburra, Magpie, Spur-winged Plover, Musk Lorikeet, Rufous Songlark, Reed Warbler, Bell-Miner, Eastern Whipbird, Red Lory, Superb Lyrebird, Gilbert Whistler, Galah, Port Lincoln Parrot, Spiny Cheeked Honeyeater, Silver-backed Butcher Bird, Grey Shrike Thrush, Willy Wagtail, Grey Fantail, White Throated Tree-creeper, Pallid Cuckoo, Fantailed Cuckoo, Rufous Whistler, Hooded Robin, Striated Pardalote, Golden Whistler, Western Warbler, White-winged Chough, Red Wattlebird, Olive-backed Oriole and Crested Bellbird.

The recordings are clear and mostly free of background noises, and a reasonable length of time is devoted to most calls. The commentary and the details given on the cover are excellent and informative. On the cover is a striking colour photograph of the Superb Lyrebird by Graham Pizzey.

To anyone interested in bird calls and to those who would like to have a pleasing reminder of days spent in the bush, this record is recommended.

ERIC ALLAN

Members' Preview:

Members shall be given the chance of listening to at least part of this recording before the June General Meeting begins.

Mr. Eric Allan will be playing the recording in the corridor outside the main assembly hall, from approximately 7.30 p.m. to 8.00 p.m. Intending buyers should take advantage of this preview.

AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Thirty-ninth Congress, Melbourne
16-20 January, 1967

L. Mann,
Organising Secretary
Tel. 34-0484 (Ext. 432)

Congress Office, ANZAAS
C/- University of Melbourne
Parkville, N2, Victoria.

Enrolments should be made as early as possible, with enrolment forms and further information being obtainable through Mr. L. Mann.

Section Programmes include:—Geology, Anthropology, Zoology, Botany.

Field Naturalsts Club of Victoria

General Meeting—May 9, 1966

The President, Mr. M. K. Houghton, opened the May General Meeting, and along with members and guests, was happy to be able to personally welcome back Mr. H. C. Stewart after his recent visit to hospital.

A period of silence was observed due to the death of a past old member, Mr. Greenwood.

The minutes of the April Meeting were taken as read with the moving and seconding of the motion being by Messrs. Hanks and Woollard.

An announcement was made that at the General Meeting set down for July 11, the presentation of the National History Medallion to Mr. W. R. Wheeler, would be made by Mr. E. S. Hanks.

The President then introduced the guest speaker to upwards of 130 people. Miss V. Parry, working under a Research Scholarship at Monash University, addressed the group on the subject of "Kookaburras", which is to be submitted by her as a thesis for the degree of M.Sc.

In her home state of California, U.S.A., she became so intrigued by the behaviour of the kookaburras kept at San Diego Zoo, that it seemed the natural subject for her thesis.

She firstly hinted at the evolutionary curiosity which the kookaburra is, when compared with its kingfisher relatives. Its weak feet, large bill, and strong set of neck muscles for dashing to death its food, tend to make it not a typical forest dweller.

The area under study by Miss Parry is in the Belgrave district and covers about half a square mile in which there are thirty-three Kookaburras including twelve chicks. The tagging and trapping methods employed in this case are new to most of us, and very simple and effective. The trap consists essentially of a small circular clap-net connected to the break-back section of an ordinary rat-trap. A bait, connected to the release catch of the rat-trap, is placed in such a position so as to entice the bird into the appropriate place for the net to drop over it without harm.

Due to the Kookaburra's small legs and feet, normal tagging is not satisfactory, therefore the method used by Miss Parry involved the use of coloured plastic wing tags fastened through a harmless incision in an insensitive part of the wing. This hinders the bird in no way whatsoever. Different colour combinations enable dispersal records and the like to be kept, and Miss Parry has found that the Kookaburra is a territorial bird occupying four or so acres; and when we hear a group "laughing" during the day, it usually denotes that the territory is being defended.

A breeding pair remain mated and nest once per year, and also tolerate related birds, "aunts", to help defend territories and incubate. This social system also occurs with the Blue Wren.

Eggs are laid at one-day intervals during September and October, with between 2 and 4 to a clutch, and all members incubate with the female contributing 50% of the time, the male and "aunt" 30%, and unattended 20%. Egg mortality approximately is 20%.

Miss Parry found that one bird may make up to forty trips to the nest in an eight hour day whilst feeding of young is in progress, and the first hatched chick is favourite for feeding even when indicating its need out of turn. The mortality rate among fledglings is about 25%.

The Kookaburra registers fright reactions with the passage of birds of prey, and takes on an attitude resembling the frogmouth position. Also small passerines register fright reactions to the kookaburra, indicating that probably they prey on these smaller birds.

The speaker stated that kookaburras *do* eat snakes, and in surprising quantity; but they do *not* drop the snake to kill it. The snake is grabbed behind the head, bashed against a branch until dead, and finally run through the beak to crush the bones from one end to the other. The snake is dropped only by accident.

It was found during study that possums and Greater Gliders were predatory on the eggs of kookaburras, and that these invaders were driven away fiercely from the region of the nest.

This has been a very brief summary of a most comprehensive and interesting lecture that prompted numerous questions which were asked freely of Miss Parry, who answered them with both knowledge and humour.

Miss Parry was thanked appropriately, first by the President, and then by general applause.

In "Nature Notes" Mr. Ros Garnet commented upon a small group of seagulls "at play" in an upward current of air, being joined by others from afar to eventually form a group of 100 or so, all taking advantage of this free flight from Nature.

Some interesting slides shown by Mrs. Lee on "The Birth of a Crocodile" added to the evening's enjoyment. A number of exhibits were shown including some fungi from Kallista; volcanic bombs showing olivine cores, from Camperdown; a rock in which calcite was replacing crinoid stems; and a frond of the Lobed Fan-fern *Gleichenia lobata,* from Beenak.

Under "General Business" notice was given that in future, the Preston Juniors would meet on the first Friday of the month.

From Tasmania came the news that about 1,000,000 acres was to be set aside as a sanctuary within the area of the South-west and partly on Maria Island.

The President announced that Mr. Coghill would not be present at the June Meeting as his wife and he were leaving for a holiday.

We wish them both well.

URGENT REMINDER

Members are reminded that subscriptions for the present year were due on 1st January. The name of any member who has not paid the current subscription by 30th June will be removed from the mailing list for the *Victorian Naturalist* until such time as the subscription has been paid.

Botany Group Meeting—May 12, 1966.

Thirty-two members and visitors were present with Mr. B. Fuhrer in the chair. Mr. H. A. Morrison gave a most interesting talk on a trip along the Burke and Wills exploration track from Balranald to Coopers Creek, and back to where both Wills and later Burke died. He told us quite a lot about the explorers, and of their battle with the inhospitable country through which they travelled. This was adequately shown by the numerous colour slides viewed. In spite of the arid nature of the country, there were some really lovely flowers to be seen, among them being several varieties of Eremophila, and acacias, and also daisies. Some of the daisy species looked more like balls of cotton wool than flowers, and were most unusual. A great deal of the country traversed appeared to consist of red sand and rocks, and there was a scarcity of water. On Sunday first of May, seventeen of our members spent the day at Warrandyte, looking for orchids. During the morning Mrs. North led us, and after lunch we moved to a different part of Warrandyte, when Mr. Rotherham took over, leading us through some quite interesting bushland to the river bank. It was rather early for most orchids, although a few Parsons Bands (*Eriochilus cucullatus*), Tall Greenhoods (*Pterostylis longifolia*), Tiny Greenhood (*Pterostylis parviflora*) and Tiny Leek Orchid (*Prasophyllum despectans*) were located. Nevertheless there were plenty of other plants and trees to be found. There were quite a number of Eucalypts, among them being, Red Box, Red Stringy Bark, Peppermints, and the Manna Gum. We also found some Ghost fungus and Coral fungus, the latter being rather spectacular with its quaint coral formation and bright colouring. There were two varieties of Green Correa, Apple Berry, and Cranberry Heath, to mention just a few. On the river banks were numerous Prostantheras, which are said to have appeared only since the big bush fires a few years ago.

Geology Group Meeting—May 4th

39 members and visitors attended with Mr. Dodds in the chair. This meeting marked the occasion of the 20th Anniversary of the Geology Group. Mr. Dodds gave a brief talk on the History of the Group. He said the Group was formed in 1946 through the energies of several geologically minded Naturalists, notably Mr. S. Coliver and Mr. A. Baker. Their efforts and enthusiasm raised interest in Geology, and with the support of many knowledgeable members, notably Miss L. Neale, Mr. H. Preston, Mr. A. Frostick and Mr. A. Scott, lifted the group to the standard it enjoys today. He said the group is fortunate in having two such knowledgeable members as Mr. Davidson and Mr. Cobbett to guide the group at the present time. He said the future of the group seemed bright. The average present day attendance seemed to justify that.

The subject for the evening was a selection of films on loan from the State Film Centre. These included films on erosion and deposition of land surfaces, the forming of oil through migration and concentration of hydrocarbons and the trapping of oil in various geological structures, and also a travel film on Central Australia showing many geological features. Mr. North was thanked for his services as projectionist.

Exhibits:

Mr. Davidson—Gold in quartz, chalcopyrite, crystals of iron pyrites. Molybdenum in quartz, Glen Innes. Glacial Pebbles of chert and chalcedony N.S.W.; smokey quartz, Elsmere Hill N.S.W.; sapphires and zircons, Toombullup Vic.; Carnelian Pebbles, Bellata N.S.W.; Potch opal, Lightning Ridge; petrified wood, N.S.W.
Mr. Dangerfield—Fossilized wood, Gilgandra N.S.W.; agates, Springhurst Vic.
Mr. North—Tooday facing stone, Perth. Mica schist (pre Cambrian), W.A.
Miss Keady—Potch opal, Coober Pedy; emeralds, topaz and rubies.
Mrs. Skopakou—Volcanic Bomb with Olivine Core, Mt. Leura.

Marine Biology and Entomology Group Meetings March to April, 1966

Mr. R. Condron chaired the March Meeting which was attended by 19 members. Mr. Lublin was welcomed back after 19 months abroad.

Apologies were received from Mr. P. Genery and Mr. and Mrs. E. Coghill.

Further discussion took place regarding a suggestion by Mr. E. Coghill for an alteration of the Group name. Members decided that it was not practicable to

alter the name, and it would therefore remain as at present.

Mr. D. McInnes asked the guest speaker, Mr. H. B. Wilson, if he knew of any aquatic larvae of *lepidoptera* other than those recently found in the Albert Park Lake. Mr. Wilson suggested contacting the Vermin and Noxious Weeds Department for information, and notifying them of the recent findings at Albert Park Lake.

The guest speaker for the evening was Mr. H. B. Wilson, Senior Entomologist of the Burnley Horticultural Gardens, who was introduced by the Group Chairman, Mr. R. Condron. Mr. Wilson's subject was "Termites", Mr. Wilson astonished members by giving a most interesting and detailed talk on this subject without reference to any notes. At the conclusion of his talk many questions were asked, and a note of thanks was moved by Mr. D. McInnes.

Exhibits:—

Mrs. Strong reported seeing a specimen of the Wanderer butterfly *Danaus Plexippus* flying in Parliament House gardens on Saturday 5th March.

Mr. McInnes showed specimens of larvae which had been parasitized. The eggs of the parasite were seen to be on the outside of the larvae. These hatched into small grubs, and then apparently pupated and emerged into small wasps.

Mrs. Z. Lee showed a McLeay swallowtail butterfly taken at Mt. Donna Buang.

Mr. R. Condron displayed a shell collection from the Cape Grafton-Hope Island area which had been loaned to him by a friend. He also showed a large moth of the *Hepialidae* family taken at Doncaster, and other species of Hepialidae taken at Box Hill.

April, 1966

21 members were present at the meeting which was chaired by Mr. R. Condron.

Apologies were received from Mr. M. Houghton, Mr. R. Lee, and Mrs. E. Coghill.

A short discussion took place re exhibits for the September Nature Show. Mr. P. Genery suggested a display showing how insects, birds etc. are associated with, and affected by the spraying of pesticides which is disturbing the balance of nature. Further discussion re exhibits for the Nature Show is to take place at subsequent meetings.

Speaker for the evening was Mr. P. Genery, his subject being "The Marine Plankton of Barnes Bay, Tasmania". Mr. Genery gave a very interesting talk on how he collected plankton with a tow-net; and described the difficulties and pitfalls to be avoided by users of this type of gear. He described the method of preservation of the "take" and the difficulty of keeping specimens alive. Mr. Genery showed several beautifully mounted microscope slides of several different types of plankton under microscopic low and medium power, including a marine "Water Bear" which members of the Group interested in marine biology, had never heard of. At the conclusion of the talk Mr. Genery was asked many questions, and Miss Baalam moved a vote of thanks.

Exhibits:—

Mrs. Lee showed some very fine colour transparencies of the Sirex Wasp, and the life cycle of the Imperial Blue Butterfly; the latter she had photographed with the assistance of Mr. R. Condron.

Miss Janet Haywood showed some eggs of a species of lacewing.

Miss Harkess showed a very fine specimen of a helmet shell.

Miss Vanessa Gough showed the nest of a species of wasp.

Mr. McInnes reported that he had counted 751 wasps which had emerged from a larva which had been parasitized.

Mr. Condron showed four Wanderer Butterflies which he had bred out from eggs.

Speakers for Future Meetings

6th June. Dr. Ian Hiscock, Senior Lecturer, Dept. of Zoology, Monash University. *Subject:* "Stinging Jellyfish".
4th July. Mr. J. Barnes, Quarantine Officer, Dept. of Agriculture. *Subject:* "Further Observations on Quarantine".
1st August. Dr. Ian Baillie, Lecturer, Dept. of Zoology, Monash University. *Subject:* "Zooplankton".

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

GENERAL MEETINGS

Monday, June 13—At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Northern California"—R. Riordan.
4. Election of Members.

(a) *Ordinary:*
Hans Beste, 442 Middleborough Road, Blackburn.
Miss E. Butler, Flat 11, 84 Campbell Road, Hawthorn E.
Miss Lefteria Papas, Cottage 4 Gresswell Sanitorium, Mont Park (Interest: Botany) (Introduced by Jill Cullimore).
Mr. and Mrs. J. H. Richards, 121 Albion Road, Box Hill E.11.
Peter Walsh, 14 Missouri Av., Gardenvale S.4 (Interest: Botany).

(b) *Junior:*
Paul S. A. Gahan, 4 Cromwell Road, South Yarra. Age 17 years. (Introduced by D. McInnes).
John Horan, 69 Dallas Drive, Broadmeadows. Age 14 years. (Interest: Entomology.)
Bruce John Sibson, P.O. Box 121, Kaniva, Victoria. Age 14 years. (Interest: Fauna.)
Andrew Robin St. George Summons, Marling Park, Ruffy Wayside, via Euroa (Interest: Ornothology.)

5. General Business.
6. Nature Notes and Exhibits.

Monday, July 11—"Wonder Birds of Australia"—R. Wheeler.
Presentation of Medallion to Mr. R. Wheeler.

Monday, August 8—"Entomology"—H. B. Wilson.

GROUP MEETINGS

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

Wednesday, June 15—Microscopical Group. Gadjet Night.
Friday, June 24—Hawthorn Junior Club—at Hawthorn Town Hall, 8 p.m. Life History of Gum Emperor Moth—Mr. F. Collet.
Friday, July 1—Preston Junior Club.
Monday, July 4—Entomology and Marine Biology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at South end of House.
Wednesday, July 6—Geology Group—Members Night.
Thursday, July 14—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, June 19—Old Sydney Road. Subject—Geology; leader, Mr. R. Dodds. The coach will leave Batman Avenue at 9 a.m. Fare—$1.30. Bring one meal and snack.
September 17 to October 2, 1966—Queensland. Details of this excursion were published in previous issues of *The Naturalist*. There is one vacancy on the trip. Members are reminded that the balance of cost should be paid by August 8.
NOTE: Anyone who is willing to lead an excursion should contact the Excursion Secretary, Miss M. Allender.

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, 1966

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Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1.

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Short-nosed Bandicoots, *Isoodon obesulus* Photo: *The late P. C. Morrison*

This little animal was much persecuted in the past because of a misunderstanding due to its habit of burrowing. It is not for vegetables that it burrows, but mainly for insects and larvae. It was very common in the past very close to Melbourne, but now can only occasionally be seen in the few isolated sections of bushland in the outer suburbs and coastal regions.

The cover picture is of the Barn Owl, *Tyto alba*; also very common around Melbourne in the past. This photograph was taken by David Fleay and shows the defensive attitude.

Editorial

With the recent introduction of the book, "The Great Extermination", edited by Professor A. J. Marshall, there appears some hope that added impetus may be given to the wheels of that part of our legislative machinery dealing with conservation and preservation of wildlife, and that some positive plan may be forthcoming to right some of our past wrongs—let us hope so.

Whilst on this topic, I am prompted to mention another factor which is, and has been, for some time, taking toll of some of the smaller members of our native fauna. This, which was often mentioned by the late Crosbie Morrison, has become most evident to me over the past few years while carrying out fauna surveys at night in the nearer east and north-eastern forests.

I refer to the domestic cat (mentioned briefly in the above book), which has been set loose in surprising numbers to roam and hunt at will in our bushland. Normally, those who release these cats, or kittens as the case may be, are quite reasonable and rationally-minded people; but it is quite irrational to suppose that our smaller bush animals, all of them more or less primitive types, would be any match for the modern efficient cat. Yet this is the supposition which these people are unconsciously accepting.

Certainly, the effect of the cat on native animals cannot compare in numbers with the wholesale slaughter of kangaroos, but none-the-less it is a contributory cause to the diminishing number of various members of our fauna.

It would be better therefore, if those who find it necessary to dispose of cats or kittens, did so through the services of a qualified veterinary surgeon, and not at the expense of our smaller bushland animals.

G. M. Ward.

The Spotted Bower-bird, one of those members of our fauna which has to compete against the domestic cat.

Vol. 83, No. 7 July 7, 1966

The Victorian Naturalist

Editor: G. M. WARD

Assistant Editor: R. H. J. MCQUEEN, B.Sc., Dip.Ed.

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Once in the Suburbs

By G. M. Ward

(A brief description of the fauna of Melbourne and Suburbs during the periods 1870 to 1930.)

Note: The following article lays no claim to being a comprehensive record of all suburban fauna during these years. Although an amount of research has been done, and only confirmed reports of species have been mentioned, it is by no means complete. Neither is it suggested that the fauna described occurred only in the mentioned areas; nor that some species do not still occur occasionally in certain areas today. It is also realized that certain isolated sections of bushland still remain in some suburbs and each retains its varied native fauna. However, the purpose of this article is to give some indication of the loss around Melbourne generally, that has been brought about in the space of a lifetime due perhaps to lack of understanding among the public of our animals and their needs; or perhaps through sheer unconcern for their welfare. Whichever it may be, let us not continue along the same track and destroy what little is left in the suburbs.

The stimulus behind the writing of this article, oddly enough, is a road. A road which has been in use for a lifetime. A road which now, during each week-end carries thousands of cars boot to bonnet from the northern suburbs of Melbourne, through Doncaster to the hills beyond.

I was on this road one Sunday in the later part of 1965, and in the midst of one of those dreadful slow-moving ribbons of vehicles, which for the moment had become stationary. My thoughts drifted away from the present, and back to a time some twenty-odd years ago. It was a time when, during school-term holidays, we set out on our bicycles along this road on the first section of our usual holiday trip into the "country". The "country" incidentally, was around East Doncaster and Templestowe.

The road in those days was, for some distance, a typical country road of gravel, bordered on either side with small acacias and eucalypts supplying the necessary cover for the smaller ground-plants, and screening from immediate view, the as yet untouched rolling grassland and scattered belts of timber away to the north and south.

It was a pleasant trip, especially when we were able to stir ourselves from bed at "piccaninny dawn", and ride off into the pink glow of the rising sun with the fresh, frosty air of a May morning at first stinging our hands and faces, but then, when the blood had adjusted itself, making them tingle with warmth. Nor were there too many worries about traffic, as the car had not yet monopolised the roadway.

At one particular corner we always stopped, for here was a small country bake-house where we bought sufficient freshly-baked bread to sustain us for the day. I was to pass this corner very

soon, but no longer stands that little building with all its palate tempting aromas of the past; instead we find an expanse of concrete with the necessary buildings and equipment to keep these present-day streams of cars moving.

A blast on the horn from the driver of the car behind soon brought my thoughts back from the past, and we moved on.

It was not until later, with time to reflect, that I fully realized the enormous change which had taken place in this area within such a comparatively short time. This led me to contemplate the change which had taken place over a lifetime within the area of 10 miles radius around Melbourne.

With this in mind, I began to accumulate as many authentic facts as I could about the fauna of this area over the period from 1870 to 1930. This proved to be a more difficult task than I had at first thought, due largely to the fact that comprehensive reports of particular species were rather scarce. Generalizations seemed to be the order of the day as far as amateur naturalists were concerned. However, although still incomplete, the following gives some idea of what has happened in the suburbs in the name of "progress".

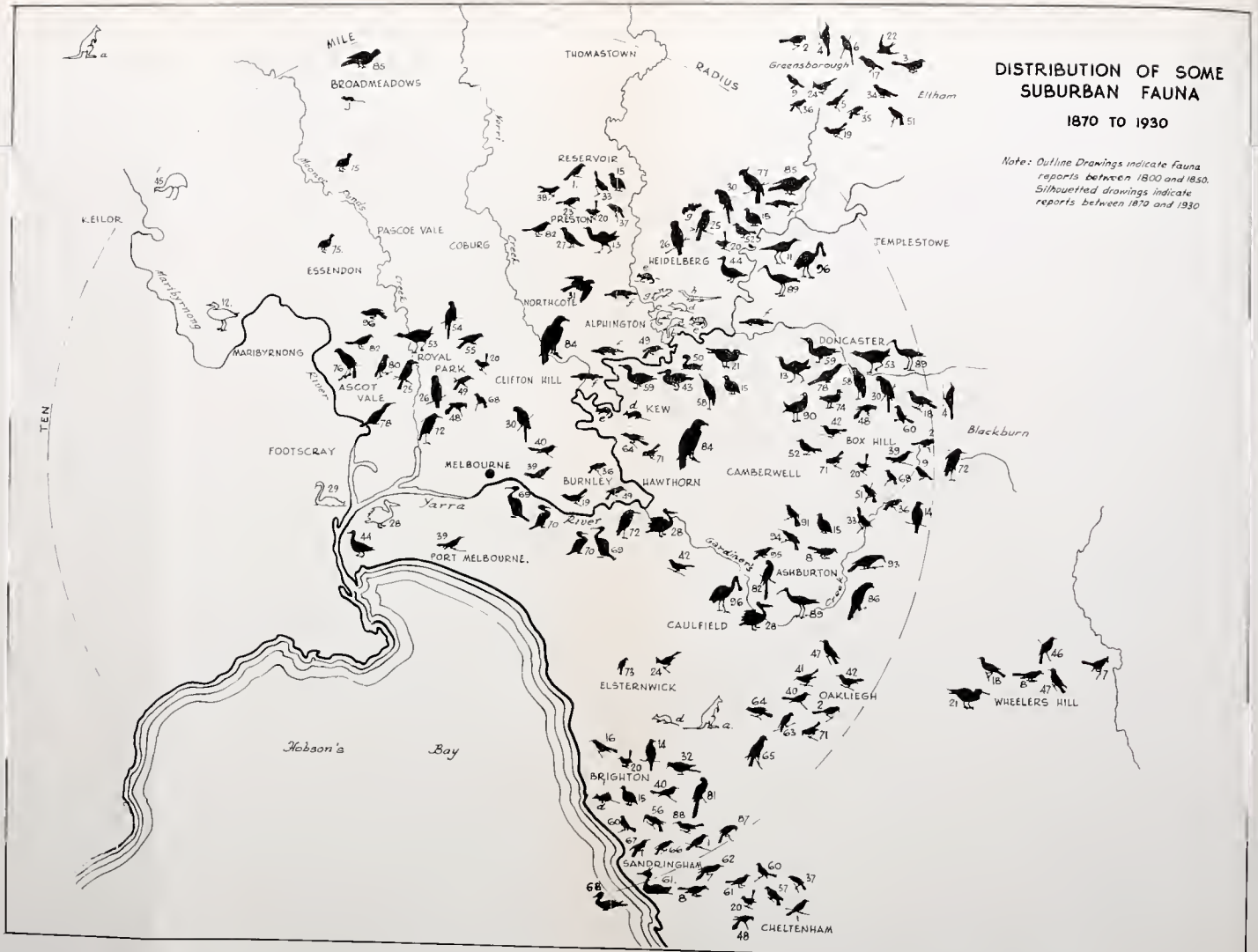
Wildfowl gathering on the Yarra river between Princes Bridge and the Botanical Gardens; Bitterns, Teal, Mallard, Snipe, and Quail on the flats of the same river at Kew and Heidelberg. Rolling grassland and belts of timber stretching away from the city.

These were some of the common sights in the mid 1870's, but even then there were hints of the future fate of our native fauna surrounding Melbourne. In addition to the mentioned birds, others such as the Bustard, Whistling Tree-duck, Shoveller and Native Companion were being displayed on the hooks of the City game-sellers.

No doubt most of these game-birds, along with the Bittern, Heron and Kingfisher, which were arrayed on the tables of the taxidermists, fell to the guns of the "sportsmen-cum-naturalists" of the district. One old identity who made no excuses for this, lived in a small hut on the bank of the Yarra somewhere between Kew Mental Hospital and the mouth of the Darebin Creek. Bob Stuart was his name, and like many others of the day, he regarded himself as a keen naturalist. This however did not prevent him using gun and traps with considerable skill, and he boasted of the great number of platypus to be found anywhere above Dight's Falls as well as in the Darebin and Merri Creeks. In fact he apparently made a fairly good living through the sale of skins which the furriers were eager to obtain.

By 1880 however, a group of influential people had fostered sufficient public interest to propose the formation of a Natural History Society, and on June 14th of that year, the first ordinary meeting of the Field Naturalist Club of Victoria was held in the Town Hall. Among those present on that night were people with such names as Dr. Lucas who was elected to the Chair, Mr. F. G. Bernard of Kew, Mr. Kershaw, Professor McCoy as president and the Rev. Halley as one of the vice presidents.

At this meeting, one of the important items was the arrangement an excursion to Brighton on the following Saturday. Full of enthusiasm, the twenty members waited at Flinders Street Station for the 1.10 p.m. express steam train which would take them to this part of the suburban countryside.


DISTRIBUTION OF SOME SUBURBAN FAUNA
1870 TO 1930
Note: Outline Drawings indicate fauna reports between 1800 and 1850. Silhouetted drawings indicate reports between 1870 and 1930
MILE
BROADMEADOWS
THOMASTOWN
RADIUS
Greensborough
Eltham
RESERVOIR
PRESTON
KEILOR
PASCOE VALE
COBURG
ESSENDON
HEIDELBERG
TEMPLESTOWE
NORTHCOTE
ALPHINGTON
DONCASTER
MARIBYRNONG
ROYAL PARK
ASCOT VALE
CLIFTON HILL
KEW
BOX HILL
Blackburn
FOOTSCRAY
MELBOURNE
BURNLEY
HAWTHORN
CAMBERWELL
Yarra River
PORT MELBOURNE
ASHBURTON
CAULFIELD
ELSTERNWICK
OAKLEIGH
WHEELERS HILL
Hobson's Bay
BRIGHTON
SANDRINGHAM
CHELTENHAM

a.

TION OF SOME
BAN FAUNA

70 TO 1930

rawings indicate fauna
between 1800 and 1850.
ed drawings indicate
between 1870 and 1930.

KEILOR

TEN

77

KEY TO ACCOMPANYING CHART

For the purpose of standardizing vernacular names appearing in this article, N. W. Cayley's "What Bird is That" was selected.

Plate reference and appropriate number follow each name.

1. White-browed Scrub Wren, xxiv. 2.
2. Brown Thornbill, xvi, 18.
3. White-browed Babbler, xviii, 7.
4. White-throated Tree-creeper, xvii, 10.
5. Rainbow-bird, xi, 14.
6. Budgerygah, xxii, 17.
7. Eastern Whip-bird, iv, 22.
8. Ground Thrush, vii, 16.
9. Red-browed Finch, xxviii, 5.
10. Barn Owl, v, 1.
11. Stone-curlew, ix, 12.
12. Pied Goose, i, 1.
13. Banded Landrail, xxxi, 8.
14. Bronzewing Pigeon, xiii, 13.
15. Stubble-quail, xxvii, 17.
16. White-plumed Honeyeater, xiv, 13.
17. White-naped Honeyeater, xv, 16.
18. White-eared Honeyeater, xxiv, 17.
19. White-browed Wood-swallow, xi, 17.
20. Blue Wren, xxvi, 1.
21. Australian Snipe, xxxi, 13.
22. Fairy Martin, xxvii, 6.
23. Yellow-tailed Thornbill, xix, 13.
24. Eastern Shrike-tit, x, 11.
25. Laughing Kookaburra, ix, 9.
26. Boobook Owl, v, 12.
27. Ground-lark, xxvii, 11.
28. Pelican, i, 2.
29. Black Swan, i, 8.
30. Eastern Rosella, xxi, 9.
31. Peregrine Falcon, xxix, 5.
32. Diamond-dove, xiii, 2.
33. Reed-warbler, xxviii, 23.
34. Speckled-warbler, xiv, 21.
35. Pardalotes, Red Tipped, xvi, 25.
    Spotted, xvi, 22.
36. Diamond Sparrow, xxviii, 9.
37. Little Grass-bird, xxviii, 21.
38. White-fronted chat, xix, 16.
39. Black-eared cuckoo, xi, 7.
40. Fantailed Cuckoo, x, 22.
41. Horsfield Bronze Cuckoo, x, 25.
42. Golden Bronze Cuckoo, x, 28.
43. Pink-eared Duck, xxxiii, 10.
44. Black Duck, xxxiii, 15.
45. Emu, i, 9.
46. Rufous Whistler, xi, 1.
47. Golden Whistler, iv, 18.
48. Grey Fantail, x, 19.
49. Sacred Kingfisher, xi, 10.
50. Little Grebe, xxxi, 16.
51. Golden-headed Fantail-warbler, xxviii, 20.
52. Horsfield Bush-lark, xxvii, 10.
54. Crimson Rosella, xxi, 16.
55. Olive-backed Oriole, iii, 6.
56. White-bearded Honeyeater, xxiv, 12.
57. Dusky Wood-swallow, xxvii, 2.
58. Brown Bittern, xxxiii, 23.
59. Chestnut Teal, xxxiii, 3.
60. Southern Yellow Robin, x, 4.
61. Crested Grebe, xxxii, 8.
62. Little Wattle-bird, xxiv, 19.
63. Flame Robin, xix, 5.
64. Noisy Miner, xii, 5.
65. Brown Hawk, xxix, 7.
66. Little Cuckoo-shrike, ix, 3.
67. Black-faced Cuckoo-shrike, ix, 1.
68. Australian Gannet, xxxvi, 20.
69. White-breasted Cormorant, xxxii, 24.
70. Little Pied Cormorant, xxxii, 26.
71. Striated Thornbill, xvi, 12.
72. Nankeen Night-heron, xxxiii, 19.
73. Rose Robin, xix, 4.
74. Spur-winged Plover, xxxi, 24.
75. Plain Wanderer, xxvii, 18.
76. Little Falcon, xxix, 3.
77. White Cockatoo, xx, 11.
78. Black Cormorant, xxxii, 22.
79. Blue-winged Parrot, xxii, 1.
80. Dollar-bird, xi, 13.
81. Ringneck Parrot, xxi, 18.
82. Spiny-cheeked Honeyeater, xii, 2.
83. Gang-gang Cockatoo, xx, 13.
84. Wedge-tailed Eagle, xxx, 9.
85. Galah, xx, 8.
86. Tawny Frogmouth, v, 10.
87. Tawny-crowned Honeyeater, xxiv, 15.
88. Cape Barren Goose, i, 4.
89. Straw-necked Ibis, xxxii, 12.
90. Crake, Spotted, xxxi, 3.
    Crake, Little, xxxi, 4.
91. Rufous Fantail, iv, 3.
92. Cockatiel, xxi, 8.
93. Regent Honeyeater, xiv, 16.
94. Eastern Spinebill, xv, 14.
95. Grey-backed Silver-eye, xv, 2.
96. Yellow-billed Spoonbill, xxxii, 14.

Mammals and Reptiles

a. Kangaroo, Wallaby
b. Glider Possums
c. Possums
d. Bandicoots
e. Eastern Native Cat
f. Platypus
g. Bats
h. Goanna, Lizards

Among the encounters of that memorable afternoon, aside from the flora and insects, were such birds as Quail, Honeyeaters of various types, Blue Wrens, Bronzewing Pigeons and Peaceful Doves. Of the animals, the Longnosed Bandicoot was almost certain to have been present, for Dudley Le Soueff wrote of the abundance in the immediate vicinity of Melbourne of this much persecuted little animal. Incidentally, he also mentioned that the Koala was plentiful in the ranges about Whittlesea to the north of Melbourne.

In this same year of 1880, it was a a common sight for visitors to the area surrounding the Zoological Gardens to see a group of Nankeen Night-herons roosting in the upper branches of a clump of gum-trees. At dusk they could be seen to fly off and wing their way towards the West Melbourne swamp to carry out their nocturnal foraging; and then, with the coming of daylight, they returned to their roosting place. For five years this happy situation continued, and then, as so often happens now, the trees were removed — and with them went the herons.*

The departure of the herons was sudden. But for the parrot family things were a little different; although the end result has been similar, it has just taken a little longer. In the immediate vicinity of Melbourne and suburbs parrots were abundant at this time. How many of us have ever seen the Orange-bellied Grass Parrot, Ground Parrot, Red-backed Parrot, or Cockatiel†—yet these were once in the suburbs. Add to these the Musk Lorikeet, Swift Parrot, Rainbow Lorikeet, Crimson Rosella, Eastern Rosella, and we have an impressive list—a list against which the present one would look most insignificant. Some of these parrots mentioned would no doubt be seen as excursion parties set off for outer suburban areas. One such trip may have been to Ferntree Gully via Glenferrie Road, Princes Highway, and Ferntree Gully Road. Those of us who have travelled this way recently would scarcely imagine that just seventy years ago, the trip would have been described like this—

"The horse's hooves rang out merrily as we drove along Glenferrie Road across the broad vale and over the creek (Gardiner's) dividing Hawthorn from Malvern, and then on past the sandy wastes of Caulfield and through the township of Oakleigh to the rather barren land that lay beyond". This is almost fantasy as we compare it with the same journey today.

As the party passed through Caulfield, the entomologists among them would have certainly called for a stopover, for this area was a wonderful collecting ground for all manner of insects.

Between the years of 1885 and 1890, excursions began to form an important segment of the Club's activities. Groups of twenty or so members gathered on Flinders Street station of a Saturday morning, awaiting the arrival of the steam train which would take them to areas as "far afield" as Brighton and Oakleigh. Already, mention has been made of the numerous birds of Brighton, and at Oakleigh the position was similar with the addition of Flame-breasted Robins, the Harmonious Thrush, Brown Hawk, Noisy Miner, and Little Grass-bird. To the north of Melbourne, from Heidelberg, came reports of White-fronted Chats, Blue Wrens, Red-browed Finches, Yellow-tailed Thornbills, and the nesting each summer of the White-browed Wood Swallows.

* They still frequent the trees around the lake in the Botanic gardens.

† Cockatiel occurred 12 months ago at Maribyrnong and may still be seen in outer eastern suburbs.

These last, nested in the Cypress pines which grew in a disused Pioneers' Cemetery, which, although now the site of a contemporary home, remains by and large in its former state with regard to the tree population. Unfortunately the Wood-swallows are no longer visitors, but it still remains as a gathering place for a few of our more adaptable or pugnacious birds such as the Grey Butcher-bird, Little and Red Wattle-bird, and White-plumed Honeyeater.

In the City itself in the 1890's, an evening stroll across Princes Bridge would be rewarded, not by the present sight of a noisy sputtering helicopter hovering overhead, but by flocks of Litte Pied, and White-breasted Cormorants settling to their roosting places near the boat sheds at the side of the river. At Royal Park, the list of birds breeding during 1891 was indeed impressive. It included the Australian Coot, Crimson Rosella, Sacred Kingfisher, Blue Wren, Oriole and Yellow tailed Thornbill. It is unlikely that any of these are breeding there today.

By 1897, a few of the more experienced ornithologists had begun to produce notes and survey lists on the birds of certain districts. Some of these were remote from Melbourne but one survey carried out by Mr. Robert Hall, was of the birds of Box Hill district which lies to the east some 9 miles from Melbourne. This area contained some attractive bushland, and it was not only naturalists that enjoyed it; for it was here that the first group of Australian landscape-painters camped, including Tom Roberts and Charles McCubbin.

However, while no definite boundaries were mentioned by Mr. Hall for his survey, I suspect that it covered a fairly extensive area; perhaps extending towards Blackburn in the east and Caulfield in the south. In all, 113 species were mentioned, 70 of which were migratory, 43 being indigenous; whilst 53 per cent of the total actually bred within the district. A list of the birds arranged in Mr. Hall's own form, contained 10 species of warbler (including the Emu Wren); 14 species of Honeyeater; 5 species of lark (including White-fronted Chat); several finches; treecreepers and sittellas; 4 species of cuckoo; 3 species of quail; the Spur-winged and Stone Plover; and at least 14 species of marsh and water-birds.

Another favourite spot for the bird-lover was Richmond Park in Burnley, at a distance of only 4 miles east of Melbourne.

Here, during the years 1895 to 1898, no less than 83 species of birds were observed, and included amongst them were various members of the diurnal birds of prey, 3 types of kingfisher, Night Herons, wood-swallows and Pelicans.

(For details of the species from the above two areas, the relevant volume of *Victorian Naturalist* can be found in the references at the conclusion of this article).

Closer to Melbourne, in fact in the Fitzroy Gardens, Blue Wrens and kingfishers were "at home", while Eastern Rosellas were content to feed and reside in and among the oak trees; and at Toorak a sighting of the Bee-eater or Rainbow-bird was reported.

As the 19th century drew towards its close, many indigenous animals and some birds had been driven to remoter parts. Some, like the Magpie Goose, Brolga, and Bustard had all but disappeared from the State. But there still remained a great deal of bird-life and some animals within the 10-mile limit. To the north-west, at Moonee Ponds, Ascot Vale, and Essendon, there still resided the Little and Peregrine Falcons, the Dollar-bird, and Plain Wanderer. But more often than not, when these were met with, they were

shot; and by the turn of the Century, through this type of "sportsmanship" and other happenings, the segregation of those birds and animals that stayed within the closer suburbs of Melbourne and those that moved away, was becoming quite apparent.

From 1900 to 1905 the drift continued, although the Boobook Owl could still be seen within the grounds of the University and the Barn Owl was very common all around Melbourne, and in addition some of the smaller birds like wrens were still content to keep to the safety of some of the larger private gardens at Ripponlea and Malvern.

The Botanical and Fitzroy Gardens of course still supplied perfect sanctuary for a number of birds. But by and large, many came no closer than the outer suburbs of this 10 mile circle, which still presented a semi-rural type of landscape. Although even here, safety was not assured, for from Eltham came the boastful report that a Little Lorikeet, Purple-crowned Lorikeet, and a Musk Lorikeet were shot all in the same tree.

The overall picture of natural history however was not completely black, because those naturalists interested in pond-life could still roam among the secluded ox-bow lakes and backwaters of the Yarra River at Heidelberg. Here was a great source of pond-life together with some of the water-birds such as spoonbills, pelicans, ibis and duck. Only now in 1965, are these areas being churned over by the blade of the bulldozer, with the result that only the occasional ibis or heron now visit the small untouched areas around these particular spots.

I wonder how many of us realize that at Broadmeadows in 1903, the small marsupial mouse (*Sminthopsis murina*) made its home. Nowadays,

From this ←

Part of Heidelberg, photographed in 1930 Photo: *R. Cerutty*

This change took only six months

An area no more than 8 miles from Melbourne Photo: *Author*

this little chap is well outside this ten-mile radius.

To the south-east of Melbourne, at Caulfield, in the areas surrounding the creeks, spoonbills and ibis waded and probed for food in the swampy sections. For the time being, they were unmolested, but this state was not to last much longer. Swamps were being reclaimed and drained, to banish for all time the water-fowl from these suburbs; and already, during an excursion to Sandringham in 1908, mention was made of the spread of building operations. Ebden's Paddock was the only portion of the district remaining in its natural state. But this was not an isolated case; all around Melbourne the spreading tentacles of the "subdivisional octopus" were efficiently destroying the strongholds of our native fauna. This was a far greater menace than firearms had ever been.

to this → in 25 years.

The same part photographed in 1955

The movement was perhaps retarded slightly in some directions, but never did it, or has it ever stopped. With some intelligent thought, I am sure that the uncontrolled spread could have been guided into some form of reasonable pattern, for there were still areas fairly close to Melbourne where some natural countryside existed. Even at Hawthorn the Striated Thornbill, the Noisy Miner, and Wedgetailed Eagle were still plentiful. In fact an eagle with wing span of 7 ft. 6 in. was shot in this area.

White-browed Scrub-wrens; White-bearded, Tawny-crowned, and White-plumed Honeyeaters; Grey Fantails; Yellow Robins and Ground Thrushes all were quite common still in Ebden's Paddock at Sandringham.

At East Malvern in 1910, the Golden Bronze Cuckoo could still be heard uttering its series of mournful single notes; while the Spiny-cheeked Honeyeater still found all it required in Preston. So one can see from this that there were places which perhaps could have been reserved without much effort. But in addition to the population spread, introduced birds were also having an effect; for it was reported from Eltham that whereas it had once been so full of indigenous birds, it was now becoming more and more the home of sparrows, starling, mynahs and goldfinches. Black Rock on the other hand, about the same distance from Melbourne as Eltham, but lying to the south, was more fortunate. There, the Brown Thornbill, Scrub Wren, Yellow Robin, and Tawny Frogmouth, were all resident; with the Australian Gannet and Crested Grebe frequenting the coastline.

At about this same time, a group of people interested in the botanical welfare of the suburbs, became aware of a fine old Red Gum standing near the intersection of two main roads at

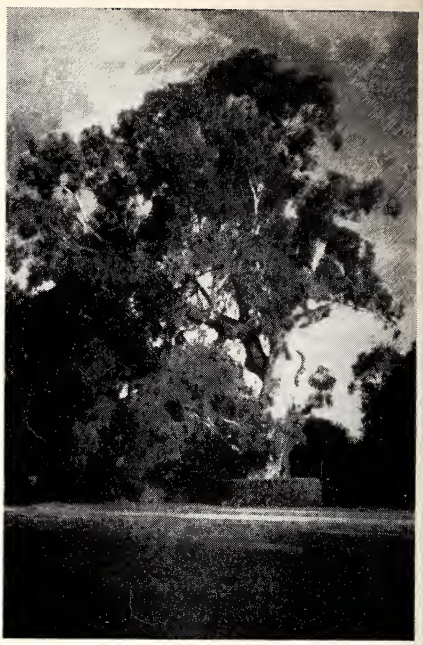


Photo: *Author*

"The fine old sentinel"

Ivanhoe. It was estimated then that the tree had stood there guarding the passage of time for 500 years. An approach was made to the then Shire Council of Heidelberg to have a protective fence erected around it, which apparently was done. Later however, an even better arrangement was forthcoming, for at the same spot today the fine old sentinel stands, casting its shade over other smaller trees and shrubs which form the basis of a small but attractive public park.

In the following years of 1911 and 1912, the microscopists continued their happy activities on the secluded and tranquil backwaters of the Yarra near the bridge at Bulleen, while those interested in geological phenomena found solace to the east of Melbourne at Burwood and to the north at Royal Park and Coburg. At Coburg, along the banks of the Merri Creek, numerous artefacts and other indications of

aboriginal activities of the past were quite common. Another popular excursion at this time, beginning with a tram-ride to the Toorak terminus, was the walk to Richmond Park and Hawthorn during which a stop might be made at the intersection of Toorak and Glenferrie Roads to take in the view of the "beautiful stretch of hills and dales away to Glenferrie and Hawthorn". If the walk was continued a little further and on to Studley Park, those partaking were rewarded by the fact that here was an area of natural bushland close to Melbourne where sanctuary was maintained for both fauna and flora. Here, among the many indigenous plants and trees, it was quite normal to find the Reed Warbler; Masked, White-browed, and Dusky Wood-swallows; Rufous Whistler; Sacred Kingfisher and many others; together with the Bandicoot and spotted Native Cat.

Strangely but fortunately, this area was left untouched as subdivisions encircled it, and remains today as one of the few natural settings close to Melbourne. Although I venture to say that it has not been allowed to retain its silvan atmosphere of the past and thus has lost some of the more timid birds, while the native cats have been removed from the scene through the action of the gun and more recently by their inability to assess the dangers connected with the increase of cars and roads. Although I think the last of the little animals succumbed to the car in 1940 or thereabouts.

With continual comment being made about the spread of population losing to us forever the habitats of flora and fauna, the ensuing years of 1913, 14, and 15 still retained in some suburbs, some suitable for both, but these were becoming more restricted. Preston was one place where in parts, conditions suitable for the welfare of a variety of birds still prevailed. Up to a dozen native species resided in the semi-open grasslands lying between the main street of the City and the Darebin Creek away to the east. In the crop-paddocks bordering the creek, the Stubble Quail was plentiful, and nests and eggs of the Banded Land-Rail were frequently stumbled upon by the Saturday afternoon rambler. The Reed Warbler and Little Grass-bird were a constant stimulus to the ingenuity of those two well known pioneer photographers of birds, R. T. Littlejohns and S. A. Lawrence who wandered over this area during many weekends. The Ground Lark and Brown Thornbill were common in the area, together with the White-browed Scrub-Wren, which made its way quietly and unobstrusively through the undergrowth of the creek bank, to be seen only by the patient observer. The furze brushes which appeared in clumps scattered over the area, were the nesting sites for the White-fronted Chat; Yellow-tailed Thornbill; Buff-tailed Thornbill and Blue Wrens; while the Wedge-tailed Eagle glided effortlessly on broad wings to follow the twisting courses of the Darebin and Merri Creeks in search of the unfortunate animals that formed it prey.

Unfortunately, Preston offers nothing of the like today.

With the passing of the war-years, the 1920's presented no great change in the past lackadaisical approach towards the preservation of suburban fauna. The sighting of a native bird within the inner suburbs was now almost worthy of a newspaper report. The subdivisional sprawl was accelerating, and only in the outer suburbs such as Heidelberg, Springvale, Doncaster and similar places, was there any hope of an intelligent approach to the provision of suitable reserves.

The native animals had not been completely banished from the outer suburbs, either, for it was only recently that I learnt from an uncle of mine that in 1925 at Ivanhoe, the Spotted Native Cat still frequented the area bordering the Darebin Creek. In fact he told me that he had destroyed five in one night due to their assault on the inmates of his chicken coop. (This particular uncle by the way, has since been "struck" from the list of "favourite uncles"). No doubt some other of these marsupials suffered a similar fate in other suburbs due to their unwitting trespassing. The platypus too, had apparently been seen on occasions in this region of the Darebin Creek.

In 1926, some of the larger private gardens about Ripponlea still retained the Blue Wren, as did the short thick scrub along the banks of Gardiner's Creek. Also at Malvern, a private garden had frequent visits from the Rufous Fantail, Crimson Rosella, Little Wattle-bird, Silver-eye, Blue Wren and Eastern Spinebill. The following year brought report from Ashburton of Regent Honeyeaters, Tawny Frog-mouths, and Boobook Owls; while Elsternwick and several other suburbs had received visits from the Eastern Shrike-tit.

In the year 1927, Eltham was still fairly well populated with native birds although as mentioned earlier it was not now up to its former standard. But by covering a reasonable area one might, in a summer day's ramble, finish with a list containing the White-winged Chough, Olive-backed Oriole, White-winged Triller, Black-faced Cuckoo Shrike, Jacky Winter, Rufous Whistler, Golden Whistler, White-browed Wood Swallow, White-fronted Heron, and Orange-winged Sittella. Certainly this would seem fairly encouraging, but Eltham could not really be regarded as one of the closer suburbs of Melbourne. But the fact remains that these birds were there, and but for the existence of Eltham Park, even the few on this list that remain today, would have been forced to remoter parts.

With the close of the 1920's came a few encouraging reports that Bandicoots were still frequenting the areas of coastal scrub around Sandringham, Black Rock, and Beaumaris, but such reports were the exceptions rather than the rule. In the Fitzroy Gardens, three pair of Sacred Kingfishers were valiantly defending their former rights and nesting. Similar things were happening in other isolated areas of the suburbs, as indeed they still are,* but they gave no promise of a return to former times. The 1930's in fact brought with them not only the financial depression, but very likely climaxed the depression of mind of the naturalists. Because from here the story of the suburbs becomes of less interest to the nature lover and more interest to the land speculator. From these years until the present the march of the subdivider has been relentless, and as some of the accompanying pictures show, it is not slackening.

This then, is an outline of part of the natural history situation as it was once in the suburbs. It presents an interesting picture, in the earlier years, full of highlight and colour, but with the passage of time duller and less appealing. However, not yet is it completely without some character. There are still areas such as Studley Park, Wattle Park, Churchill National Park and Blackburn Lake Reserve. However the last mentioned of these is even now about to suffer, for a fair portion of it is reserved for the building of an extension to one of our suburban Grammar Schools.

* Silver-eyes and Eastern Spinebills may still be seen in parts of Essendon with occasional visits from the Rufous Fantail and Eastern Shrike-tit.

← *"Another of our reserves is about to suffer"* →

Part of a suburban Reserve, 10 miles from Melbourne. Photos: *Author*

It seems to me therefore, that before these last remnants are banished, some authoritative body must act promptly and positively; because with our current tempo of "progress", the present picture will not fade gradually, but will be torn away completely and decisively.

Acknowledgments:

In compiling this article I must thank all those people who have helped in any way. Their number prevents me from listing them, but they will know to whom I refer if perchance they read this. Among them are my father and Mr. C. Hart, two older residents of Heidelberg, whose memory of the area helped considerably.

G.M.W.

Note: Present-day reports of native fauna from within this ten-mile radius would be appreciated by the editor. They should include a correct identification, together with a statement of whether the fauna breeds within the area, is semi-permanent, or only an occasional visitor.

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AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Yellow-winged Honeyeaters

Mr. A. Sheldon of Lilydale makes this contribution and a query.

Do Yellow-winged Honeyeaters migrate? I am prompted to ask this question after returning from several weeks in the Cann River-Mallacoota Inlet area.

Around Tamboon, the Thurra and at Cape Everard, Coast and Silver Banksias were in full bloom and thronged with chirping Yellow-winged Honeyeaters and Wattle-birds. The banksias were apparently flowering all along the coast and a tremendous number of honeyeaters were noted throughout.

At about 8 a.m. on April 18, I was attracted by a flock of these birds—probably exceeding 100, flying over the main street of Mallacoota. They were above tree level and headed south-west. This was followed by flock after flock, some up to 200 birds. In the later flocks, an odd Wattle-bird was noticed and the last flocks of about 30 birds were nearly half wattle-birds. I watched for about 15 minutes and many hundreds of birds passed.

The Yellow-winged Honeyeater *Meliornis novae-hollandiae* usually occurs in large flocks which spend much of their time in the coastal heathlands. However, the flocks are to some degree migratory, moving into open forest country when the eucalypts start flowering. The date of this observation coincides with the time that many eucalypts come into bloom and this may explain the mass movements. Comments from other readers would be most welcome.

R. H. J. McQ.

Rare Bird?

Mr. Victor Jacobs of Narre Warren North writes:

During Easter we stopped for lunch on the roadside between Stawell and Landsborough. While waiting for the billy to boil, I caught a glimpse of a pale-grey medium sized bird as it landed in a gum tree. Being used to the mobility of the Black-faced Cuckoo-Shrike *Coracina novae-hollandiae*, and its habit of calling in flight, I noted the silence of this bird and the fact that it had either flown again, silently, or was making an unusually long stay in the tree. We went to look and the bird was still there.

The definite black bands across the face at eye level, separating the pale greys of crown and throat indicated that it was a Little Cuckoo-Shrike *C. robusta*. The tail and primaries were black, edged with white—a truly handsome bird.

Perched near the top of the tree it used a peculiar swivelling action of its neck to search for food, which it caught by craning, stretching and jumping with a fluttering action. The swivelling action allowed the bird to keep us under observation all the time, but it did not seem nervous of our presence. It was still in the same tree when we left five minutes later. This was our first sighting of a bird which Leach in his *An Australian Bird Book (Ed. 9)* records as rare. Have many readers seen this bird? Is it still rare?

Easy Pickin'?

This contribution is from Ellis Tucker of Brit Brit via Coleraine and refers to an earlier "brush".

On reading "Death on the Roads", *Vic. Nat.*, **83** (3), March 1966, I agree with W. Perry that magpie mortality is very high on country roads.

Mr. Perry wonders why the birds frequent the roads and suggests: "They would obtain little in the way of food from sealed roads". This, I think, is quite wrong, as I believe roads, and roadsides, have become a major source of food supply to the magpies. An immense number of insects—grasshoppers, crickets, moths, and other small creatures—worms, frogs and lizards are killed both day and night. Add to these, mice, rab-

bits and possums, which, if not eaten fresh, soon become a breeding ground for flies, and it must be realized that enough free food to feed many magpies is left scattered on any well-used country road every day.

By the number of juveniles I see sitting at the roadsides while the older birds fossick along its surface, I believe it is the first feeding ground to which the overworked parents introduce their brood.

Further, on free food, the sparrows of our town have also found an easy source of supply—the radiator grilles of cars coming in from the country roads. I have a number of times seen, when a motor has been started, a small flock of birds flutter out through the grille where they have been feeding on insects—free, minced and hot!

Freshwater Tortoises at Sale

This note has been sent in by a regular contributor to these columns—Mrs. Ellen Lyndon of Leongatha.

To a traveller on the Princes Highway with an hour to spare, one of the most rewarding spots for nature lovers is surely Lake Gutheridge in the fair city of Sale. One may watch the water-birds at close quarters and although there are no beaches or mud-flats to attract the waders, a nice variety of swimmers and divers find a good living in the lake's shallow weedy waters. I shared my lunch, one day in early February, with a very mixed company which included several round fluffy black balls that were young Coots. Perhaps the most handsome bird present was the Crested Grebe.

The back road round the south side of the lake is built on a causeway that separates the waters of the lake from the string of reed-choked lagoons that line the bed of Flooding Creek. The largest of these creek pools is a secluded reach of clear water bordered with Swamp Tea-tree. Sundry old fences and logs provide ideal idling places for the waterfowl. A wilderness of old sheds, machinery and dense weeds on the farther bank doubtless furnishes many hidden nesting places.

As I descended the road bank to the water's edge there were several loud "plops" as if some form of animal life hastily took to the water. Eddies on the surface and the quaking of rushes indicated quite substantial bodies cruising away. I sat down to await developments, entertained in the meantime by a family of four Chestnut Teal and their parents. Presently a rounded back and a pointed reptilian head broke the surface, then another and another and I saw the creek was well populated with Freshwater Tortoises all struggling for landing places. Sluggish and helpless though these creatures may be on land they are extremely mobile in the water and soon every available roosting place was occupied by one or more tortoises, all craning their long necks after the manner of certain water-loving skinks. They were very nervous and easily startled and any movement on shore caused them to hurl themselves backwards, sideways or even upside down into the sanctuary of the water. In the weeds over by the far bank I counted over a dozen heads with large prominent eyes and orange-tinted throats. There were as many more around my immediate vicinity. They appeared to me to be less than full adult size, perhaps only three parts grown.

In my childhood days along the morasses of the Latrobe River, near Lake Wellington, tortoises were the most familiar of wild things. In the spring we would often come across them laying their soft-shelled eggs into the holes they had made in the earth, generally well above flood-line. Although these caches were always carefully levelled off and plastered over with mud, the crows (I should say ravens but everyone knew them as crows in those days) nearly always found them and dug them out. Some years the ground outside the tea-tree belt along the morass would be littered with the dry curled white egg shells. Never bebore, however, do I recall seeing a water-hole full of lively tortoises, at least, not in Victoria.

From John Goode's interesting paper *Vic. Nat.*, (**82**), (October 1965.) I find this long-necked tortoise will be *Chelodina longicollis,* one of the three species of Victorian tortoises in the family Chelidae. I can only regret now that proper notes were not kept of the many tortoises seen or handled. I can certainly appreciate the paragraph which mentions *C. longicollis* emitting a pungent fluid. We early learned to be careful when handling a large tortoise, for they certainly did "emit". We knew nothing then of glands in the leg. About seven years ago a tortoise was picked up in Sale and liberated here on our Tarwin property. It was something of a novelty in this district and was

several times collected and returned to us from neighboring farms. During some fifteen years browsing in the field of natural history hereabouts I have never met with another one.

An Aberrant Orchid

The details of this remarkable find have been sent to us from Mrs. B. Strange of Ballarat.

For the Creswick F.N.C. excursion in November 1965, it was decided to keep to the immediate environs of Creswick, and this led to a real find.

After we had found much of interest in several areas, one member, Miss Jones, offered to show us where she had found a white "Beardie" the previous week, so off we went.

The plant, which some of us thought might be a form of *Calochilus robertsonii,* still had a flower on it and further searching brought more plants to light. In an area of about a quarter acre of fairly heavily timbered country with grass and tussocks but no undergrowth, we discovered seventeen plants in bloom.

The reply from the Herbarium, following the sending of a specimen gave us all a kick—quote—"You were right in thinking it was *Calochilus robertsonii.* There is a note in the *Victorian Naturalist,* **69**: 131, 1953 which mentions the occurence of white *C. robertsonii* near Macedon but we do not know of any others."

A search produced the desired copy and a small article by W. L. Williams in which he says, "On November 16th 1952, I collected an albino form of *C. robertsonii* at the eastern end of the Macedon Range. The beard is a glistening white, although the hairs near the tip are greenish at their bases. The glands on the column wings are also silvery white except that they carry a faint spot of mauve at the tip. The other segments of the flower are a clear shade of pale green. About a dozen normal specimens were in flower."

The foregoing description applies to the blooms found near Creswick, but we did not see one normal specimen.

Marsupial-Mouse in the Otways

This interesting and unusual nature-note is from Mr. P. N. Homan of Reservoir.

On January 2 this year, my family visited the Erskine Falls—about five miles behind Lorne in the Otway Ranges.

Some of the family were walking back from the falls when they found what they thought was a baby possum which had fallen from its nest. The animal was picked up and carried along the track until I was met. I knew as soon as I saw the animal that it was a marsupial-mouse, but did not know which species. Following is a description:—

The body length from nose to tail base was approximately four inches and the tail a little longer. The tail was smooth and curled at the tip. The general body colour was dark brown and the fur was soft. Near the nose and on the feet, the fur was darker in colour. The under-surface was almost white. The snout was tapered and the ears were short.

The animal was found curled up, asleep, in the grass beside the tourist track, about a half-mile from the "tea-rooms". I first saw it curled up asleep in my mother's hand, and in an attempt to transfer the tiny mammal to my hand, it escaped. It was very fast and we had no chance of recapturing it.

The country around Erskine Falls is heavy mountain forest with tree-ferns and bracken, not unlike that of Sherbrooke Forest. There are many small streams in the area.

From the description of the habitat and of the animal itself, it is almost certain that this was a specimen of the Dusky Marsupial-Mouse *Antechinus swainsonii.* See the cover illustration, *Vict. Nat.,* **83**, May, 1966. The only inconsistency is that, normally, the tail-length is conspicuously shorter than that of the body.

The species is nocturnal, sleeping during the day. It is most unusual to find an individual so exposed during this time. Little is known of the nesting habits of this species, but it is thought to build a well-hidden home close to ground level in hollow-logs or tree butts.

The taxonomy of this genus has long been subject to confusion and only recently has a revision of the group been attempted, see *Vict. Nat.,* **80**, November, 1963.

R. H. J. McQ.

No. 1

The Water Flea

By E. LeMaistre

This is the first of a series which aims at providing an introduction to the fascinating microscopic world. We hope it proves interesting to both junior and senior members alike.

In this series, it is intended to examine only that which falls within the limits of use of the F.N.C.V. Microscope. For those readers who are not familiar with this instrument, it was introduced in 1963 by members of the Microscopical Group after a discussion concerning the adverse effect of cheap microscopes which were being sold to the general public.

More information can be obtained from the *Naturalist* (**80**) pp. 136, 322.

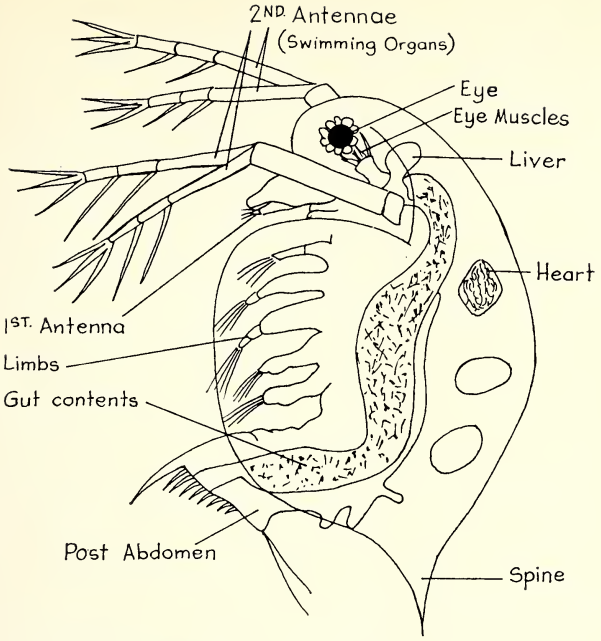
Some eyes in nature can only see movement, and would be quite useless in motionless surroundings. Whilst this does not apply to the human eye, nevertheless movement is quickly registered and, in fact, attracts the attention of our senses immediately. Small wonder then, when we dip a microscopist's collecting net into a lake or lagoon and then hold the bottle up to the light it is more than probable that the first thing to catch our eye will be the movement of the "Water Fleas" as they move through the water with a peculiar jerky motion.

So let us study one of these little creatures, and find how interesting it is when we know something about its anatomy. It is not very difficult to pick up a water flea with a pipette, put it on a 3″ by 1″ microscope slide in a little water and cover with a cover glass. The animal can then be studied under a low power microscope and its various organs identified with the aid of the accompanying diagram.

Of particular interest is the fact that the heart, in the region of the "back collar stud," can be seen rhythmically pulsating at about 150 beats per minute. The water flea does not have a complicated system of arteries and veins but instead, the heart, which looks like a sac with a slit in it, circulates the blood throughout the general body cavity. With somewhat higher magnification it is possible to see the blood cells and follow their course round part of the body.

It is not uncommon to see a water flea with either eggs or young in the brood pouch, which is situated on the dorsal side of the female (see diagram), from which they emerge as miniatures of the adults.

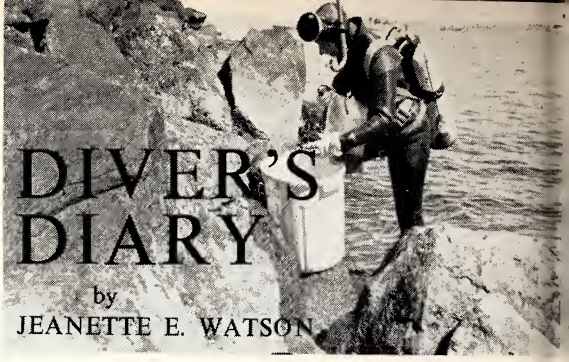
The water fleas belong to the Crustacea, a branch of that vast part of the animal Kingdom, the *Arthropoda*—meaning jointed limbs.



A COMMON WATER-FLEA (Daphnia)
ACTUAL SIZE 2 mm. approx..

No. 2

Cape Woolamai



DIVER'S DIARY

by JEANETTE E. WATSON

This is the second of a series of bi-monthly articles

A day of glorious late autumn sunshine, the boat rising to the long green ocean swell. It is just after low water, and the tide beginning to run, when we drop anchor near a rock breaking the surface about two hundred yards off the foaming cliff base.

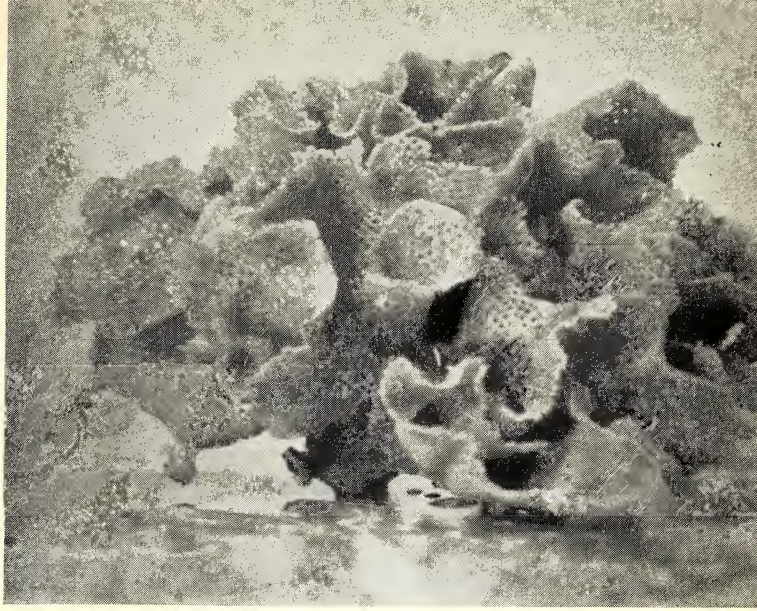
The first diver hurdles over the side, hitting the water with a splash; hastening the dampened departure of a spectator to the further end of the boat. I follow next, anticipating, as every diver does, that moment as the water closes over the world of air above in a curtain of crackling bubbles. Below is a seemingly limitless deepening green, with no dimension other than the ceiling of silvery reflected light, shimmering with the passage of the waves above.

A short swim down the anchor rope, until, at thirty five feet a clean ripple marked sandy bottom suddenly looms up. Visibility is not good, about fifteen feet, fogged by sand grains dancing in the water with the incoming tide, but good enough to see a small ray shake itself lazily off the bottom where it had been dozing, and swim (or should one say fly?) slowly away. Ahead is the anchor wedged in a crevice, the last few feet of rope and chain snaking over the bottom in rhythm with the movement of the boat above.

The rock of Cape Woolamai is a coarse-grained red granite of post Silurian age. Being extremely resistant to erosion, it now stands out as a large headland with cliffs up to three hundred feet high facing the waters of Bass Strait, and in places plunging to nearly two hundred feet below sea level. The Cape is an excellent example of a Tombolo, originally being an off-shore island, but now connected to the land mass of Phillip Island by a tie bar of wind and wave deposited sands.

The rock is a small peak, forty feet in diameter at the base, entirely surrounded by sand, and rising in castle-like ramparts to the surface. Submarine erosion of granites tends to produce clean cut vertical rock surfaces; joint cracks are enlarged by the mechanical abrasive action of sand grains suspended in surging water, resulting in an angularity of form quite unlike that seen in subaerial weathering of this rock, when exfoliation plates, and large rounded tors develop.

The rock is deeply cleft through the centre, thick growths of brown algae sheltering the opening. Crevices always harbour interesting forms of life which shun direct light, so I wriggle head and shoulders in to get a better view. The next surge picks me up, tank clanging on rock, pushing me back into open water, but not before there is time to note the great variety of fish life—several large bream with a yellow splash on the underlip, trumpeter, and several



Hornera foliacea

Actual size

Photo: *J. G. Talent*

species of parrot fish, including a large Bluenose sitting up on his tail, cheekily regarding the antics of this black and yellow intruder.

In the stable, temperate environment of the sea, the profusion of life is such that it is difficult to know how, and where to begin describing it. The systematist takes refuge in lengthy faunal lists and taxonomic detail, which, though vital to scientific understanding, convey no inkling of the riotous spectrum of muted mauves and blues, flaunting reds and yellows, orange and browns, which the diving naturalist is privileged to see in the wealth of life before him.

A thick growth of the brown kelp *Phyllospora* crowns the few horizontal surfaces of the rock, its fronds and elliptical floats streaming and whipping in the surge. Small herring-like fish dart among the holdfasts, their copper and green mottlings and rapid sliding movements making them indistinguishable from the golden brown of the kelp.

On the vertical walls of the rock, near the bottom, are numerous bright yellow and green vase-shaped sponges swaying on flexible stalks in the current: other smaller, drabber, but perhaps better adapted sponges have an outer coating of sand grains picked up from the water, and cemented on to the outer epidermal cell layer. Other residents, where a foothold can be gained, are small colonies of the lacy pink bryozoa *Hornera foliacea,* solidly constructed to withstand turbulence, but nevertheless, well tucked away amongst other growth: a few flower-like sebellid worms *Sabellastarte* sp., rippling yellow gill plumes withdrawing into the tube at the lightest touch, and numerous ascidians *Herdmania inomus,* delicate pink siphons flaring open to the water. Least beautiful, straining stiffly on flexible stalks are clumps of another ascidian, the ugly dark red, and certainly misnamed "sea tulip" *Pyura pachydermatina.*

In a sheltered hollow, I find a ballet of thumb-length transparent golden fish, enormous unwinking black eyes a quarter the size of their bodies. I watch fascinated, for a while, then slowly extend a hand towards them.

Photo: *R. Bricker*

Sabellid Worm, show gill plume
Depth 30 ft. x ¼.

Instantly the dance dissolves in chaos, the performers flee, graceful tails vanishing into the nearest refuge.

Tucked safely in clefts on the landward, and thus more sheltered side, are small orange and yellow fan shaped Gorgonia. These are octocorals, and are among the few marine invertebrates which lose neither colour nor form when removed from the water, and are thus highly prized trophies among divers. A garden of tiny pink anemones grows on an exposed surface. Among them are several hydroids, the flower shaped pink *Tubularia gracilis,* and two species of the feathery world-ranging genus *Aglaophenia.* Also present are the more delicate bryozoa *Retepora avicularis,* and delicate ostrich feather tufts of *Scuticella margaritacea** masquerading as seaweed. Thick tufts of the red alga *Plocamium* sp. hide a convoluted pale pink sponge of gritty texture, beside which rests, in brilliant contrast, the orange sea star *Petricia vernicina.*

* I am indebted to Professor G. A. Brown, of Australian National University, Canberra, for identifications of Bryozoa.

Molluscs are not evident; undoubtedly there are many small species hidden in algae and crevices, but the diver does not see them in passing. A few of the "abalone" *Notohaliotis ruber* lie wedged at the base of a cleft, and a recently dead shell of the pelecypod *Barbatia pistachia* lies on the sand near the crumbling test of the heart urchin *Echinocardium cordatum.* Resplendent in yellow splashed with blue, a small nudibranch, *Tambja verconis* browses, blue gills swaying, in an algal meadow. One wonders if the principle of warning colouration applies in the sea as it does on land—surely this is the only possible explanation for such brilliance.

In glowing brown feathery silhouette against the green of water, the arms of a large crinoid protrude from a small crevice. Response to a gentle tug is the casting off of two arms and a tighter clinging to the safety of its

Scuticella margaritacea, x ⅓
Photo: *J. R. Watt*

anchorage. Considerable excavation amongst sponge, and probing, and the fragile animal is at last free in my hands. It is a fine specimen of the feather star *Comanthus trichoptera,* a species relict from the Jurassic period, still fairly common in southern Australian waters, and measuring a foot across the extended arms; one of the most fascinating of all living marine invertebrates.

After an hour submerged, the air supply in the tank is down to the last few minutes' reserve, and a trickle at the back of my neck is becoming insistently colder. A last gathering of specimens into already well filled collecting bags, a kick of the flippers and swift glide upward through lightening waters above, a short swim in the lifting swell to the boat, and the dive for the day is over.

Field Naturalists Club of Victoria

General Meeting—13 June, 1966

The President, Mr. M. K. Houghton, opened the June General Meeting with only some seventy members present.

Mr. Hanks moved and Mr. Fairhall seconded the motion that the minutes of the May meeting be taken as read.

Mr. R. Riordan delivered a most absorbing and interesting address, well illustrated by admirable colour slides, on his stay in North California. This part of America lies roughly at the same latitude as Melbourne, but the climate is rather different, ranging from 90°F in summer to 20°F in winter. San Francisco however, enjoys a more stable climate because of the deflection of storms by the dense cold air over the waters which lie off the mountainous headland. For this reason there are no series of high and low pressure areas to give rise to great climatic changes.

Among the marvellous colour slides shown were views of the Golden Gate Bridge, the Bay Bridge, the "infamous" Alcatraz Island and of the wall of fog which rolls over the mountain peaks like a waterfall, and then, before reaching the areas below, evaporates and disappears.

A glorious stand of *Eucalyptus globulus,* the Tasmanian Blue-gum, was shown along with a large number of other types of coastal vegetation, which we regard as garden plants. These included lupins, various lily species, and the Californian poppy. An interesting tree shown was the American "Buckeye", which is deciduous in that it loses its leaves in summer and retains them in winter. Some of the fauna included Ground Squirrels, Seals, and the Sandpipers. Other types of the area not shown were bears, racoons, deer, and skunks, which include a number of rabid animals. Quarantine regulations are therefore very stringent.

Mr. Riordan then guided us on a "tour" through some of the resorts and National Park of the area including Josemite National Park, Mount Shasta, of 14,000 feet, Squaw Valley Ski area on the Sierra-Nevada Range, and through the 120°F temperatures of Death Valley. He drew attention to the remarkable diversity in landscape—from snow-capped peaks to desert plains in half a turn of a circle.

An interesting fact on National Parks was that greater than 4% of the area of California was devoted to these, while Victoria has less than 0.3%.

At the conclusion of the address, the President thanked Mr. Riordan and was sorry that so many members had missed one of the most absorbing and informative lectures which he had heard.

In "Nature Notes" Mr. A. J. Fairhall made comment of the idyllic and beautiful area which is set aside as the burial ground for aboriginals of the Warrnambool district. He realised this when, attending a conference recently for the Welfare of Aboriginals. He felt that it was most fitting for the nature-lovers of the past, who enjoyed our bushland long before our club was formed.

A letter from Mr. Miller of St. Kilda, who is in his 90's was read by the President and it is reproduced herewith:

In the Age of 21st May 1966 there was published an article on the Corroboree Tree at the St. Kilda Junction, reporting the saving of the tree from extinction for all time from the axe. I

would like to mention that a few years ago the Park Trust of those days would have cut the tree down on account of the dropping of its branches, as they thought these might injure someone. I knew the old tree, as when a small boy I played under it with my sisters and brothers. When I heard of the old tree going I brought the matter to the knowledge of the following—the Field Naturalists' Club of Victoria, the Bird Observers' Club, the Royal Historical Society, St. Kilda Council and Trustees of the Park to have the tree saved for all time. There was a brass plate fixed on the tree, and it said—"Under this tree the aborigines held their Corroborees".

My father had a business in the fifties of last century at St. Kilda Junction not far from the old tree and had dealings with the aborigines, especially two; "King Billie" and "Queen Mary", as they were known to the people of St. Kilda. My father told me many times how the aborigines used to come to the kitchen door for "tucker", and never went away empty-handed. They would go to the park to eat the food. There used to be a cab rank there, and the "cabbie" used to give "Queen Mary" a few pence now and again to have a drink. One day, she imbibed a little too much, and "King Billie" saw her and put her in the horse trough, saying; "Why not be a good girl like I be"!

I was born in 1875, in a shop, not more than 300 yards from the old tree; and this shop is still in my possession, left by my father. I am still in good health, but sorry that I cannot come to the meetings at night.

With best wishes to yourself and all members of the F.N.C.V., and any members of other societies,

Yours sincerely,

V. H. MILLER

Note—Mr. Miller is hopeful of attending the July meeting, and we sincerely hope that he is able to.

Ed.

Botany Group Meeting—9th June, 1966

Seventeen members were present with Mr. B. Fuhrer as chairman. The evening took the form of a "members' night", with short talks by five members. Mrs. Salau spoke on the "Fertilization of Figs"; Mr. Keinecke had "Shelter Trees and Shrubs" as his subject, while Mr. Baines chose "Stinging Trees" for his talk. Miss Pearce spoke on "Geographical Botany", and Mrs. North had "Bottle Trees and Termite Mounds" with coloured slides to show us.

Mrs. Salau told us that figs have been known for at least 2000 years, and were first heard of in Southern Arabia on to the countries around the Mediterranean, and are now world wide in tropical and sub-tropical countries. There are three known varieties. The fertilization process takes three generations of figs to mature the seed. The fig itself contains the flowers, and each generation has a different flower formation. In the first there are male flowers and gall flowers; the latter being sterile female flowers. A certain species of wasp for each type of fig is needed to aid in the fertilization, and in the first fig generation, the male wasp enters an aperture at the end of the fig and mates with a female wasp. He then dies and is absorbed by the fig's juices. The female wasp lays her eggs in the gall flowers, and when a young female is hatched and emerges from the fig, she has to pass the pollen laden male flowers, and so, laden with pollen, she carries on to the second generation of fig, containing normal female flowers, and no male flowers, thus pollinating the flowers, from which seeds then mature. The third generation contains only gall flowers, and it is there that the wasp hibernates until the cycle begins all over again. Figs also need cross pollinating by the wild fig or Caprifig, which is used with the Smyrna fig of commerce. Our own home grown figs are always unfertilized, and therefore not long keeping, and lack the nutty flavour of the dried figs we buy.

Mr. Kleinecke spoke of the method of planting a good shelter belt, and displayed samples of several good varieties of trees and shrubs that could be utilized to advantage. He said that windbreaks should be planted every 1,200 ft in open country. Needle Hakea is a good shrub to plant around a water hole as stock will not eat it, and it provides shelter for lambs etc. River Red Gums and *Eucalyptus radiata,* also Peppermints could be planted in paddocks, as they don't dry out the soil, and also can be cut back and used for fodder in bad times.

Miss Pearce under the heading of "Geographical Botany" gave an interesting talk about the late Mr. Francis Kingdon Ward, whom she met some

years back. She told of how he spent his life travelling to such places as Burma, India, China, Assam and Tibet. After each journey he would write a book on the botany of the place visited, then off on another excursion.

Mr. Baines had for his subject "Stinging Trees". These trees grow mostly in Queensland, but do venture further south. There are three species in Australia. They are really tree nettles, and the stinging hairs which are hollow tubes of silica have glands at the base containing formic and ascetic acids. These acids are 100 times more potent than the ordinary stinging nettle; so beware!

Mrs. North displayed colour slides of Bottle trees and Termite mounds in Northern Australia, and told us that the Bottle tree never grows more than 100 miles from the coast. The termites have an organised social life, with a King and Queen, soldiers, workers and juveniles. The mounds are made from waste food, after passing through successive ant alimentary canals. The mounds are very hard and durable.

Fauna Survey Group Meeting—June, 1966

CHANGE OF GROUP NAME.

At the May meeting of the Fauna Survey Group it was decided by majority vote of members present that the name of the group should be changed to the Mammal Survey Group.

Although originally called the Fauna Survey Group at its formation in 1960, the main interest of the group has always been in the mammals of Victoria, although many members have also been keenly interested in other animal groups. The group feels therefore that the new name more accurately describes its activities, and identifies it more closely with its main interest for publication and publicity purposes.

FUTURE ACTIVITIES

The Mammal Survey Group has now received a permit from the Fisheries and Wildlife Department which enables members to handle protected mammals during group surveys.

The group is about to commence a general survey of the mammals occurring in an area of forest at Darlimurla, in Gippsland, at the request of the Darlimurla Flora and Fauna Protection Society. This promises to be an interesting survey, with sufficient variety to provide valuable experience in general survey techniques for group members. It is expected that up to 12 weekend trips will be made to Darlimurla by groups of members over the next year for spotlighting and live-trapping in the study area.

Geology Group Meeting—June, 1966

26 members and visitors attended with Mr. Angior taking the Chair in the absence of Mr. Dodds. The subject for the evening was an address by Mr. T. A. Darragh, Curator of Fossils, National Museum of Victoria. He began by describing the various types of fossilization and gave examples of each. The first type mentioned was the preservation of *original soft parts*. This, he explained, is where the original fleshy parts and soft tissues are preserved. e.g., a woolly mammoth found in a frozen state in Siberia, a seal, 9000 years old, found in a similar state in the Antarctic. More common examples are insects preserved in Amber. The next types covered were *original hard parts,* which are secreted by animals. Examples of these are shellfish, foraminifera, corals and diatoms. In some of these examples the secretion is internal and others external. In the next type, *altered hard parts,* the speaker explained that the original mineral of the fossil has been replaced by another with no alteration to the fossil structure. Some examples he gave were silicified wood, cellulose replaced by silica and in some ammonites, calcium carbonate replaced by pyrite. Another type of fossilization was *impressions*. Examples of this type were tracks of dinosaurs, trilobites and also worm burrows, which the speaker pointed out was often useful for finding the bedding planes of the rock. The last type of fossilization to be explained was *casts and moulds* which the speaker said was probably the most common. He said that in this type of fossilization both cast and mould are necessary for positive identification of the fossil. The speaker then went on to describe the occurrences of fossils. He said they were not found in Igneous rocks except very rarely in basalt and only in Metamorphic rocks where the alteration has been slight. Sedimentary rocks are therefore the main source of fossils. The speaker ended his talk by giving many hints on the extracting of fossils from rocks, clay etc., and was thanked by a very appreciative audience.

Exhibits:

Miss Pertinac. Opal, Andamooka; black patch opal, Lightning Ridge; shale containing Glossopteris leaves, Lake Macquarie, N.S.W.; ammonites and brachiapods, N.S.W.; fossil wood, Frankston; wolfram, Yarra-Glen.

Mr. Davidson. Fossil Echinoid, Torquay; opalized wood, Tas.; sapphires and zircons, Toombullup, Vic.; zeolites, Flinders; mica crystal, and blue vitriol.

Mrs. Salau. Dendrites, Lilydale; thunder-egg, Qld.

Mrs. Skopakou. Iceland spar and natrolite.

Mr. Hayes. Analcite and gmelinite, Flinders.

Mr. Hammond. Granite, Heathcote; basalt, Mt. Misery and Sydenham West; dacite, Mt. Macedon.

Mr. Angior. A specimen of alabaster sent by Mr. Bairstowe from Middle East.

Mr. Box. Pegmatite, Rheola; quartz crystals, Rheola; Agate, Qld.; agurite.

Marine Biology and Entomology Group Meetings May and June, 1966

2 May—19 members attended the meeting, which was chaired by Mr. R. Condron.

Further discussion took place about the September Nature Show exhibits, and the suggested Group display showing the effects of pesticide spraying on insects. Mr. A. Neboiss, our guest speaker for the evening, suggested contacting the Agricultural Department and Forest Commission for information on this subject, and Mr. Paul Genery offered to do this.

The secretary mentioned that there were some good low-tides in November and December, and that perhaps later in the year arrangements could be made for an outing to fit in with these.

Speaker for the evening was Mr. A. Neboiss, curator of insects, at the National Museum. Mr. Neboiss apologised for not being able to give a talk on the Stone Fly as originally intended, and explained that his film on this subject was at present on loan. He therefore addressed the Group on a collecting trip he had made to the South West corner of Tasmania, which he described as a country of rain and wind, unchanged since Abel Tasman's day. Members took keen interest in the route taken by Mr. Neboiss and his companions, which was so amply illustrated with excellent colour transparencies. At the conclusion Mr. Neboiss was asked many questions and a vote of thanks was moved by Mr. P. Genery.

Exhibits:

Mr. P. Genery showed the rat-tailed maggot, *Erystalis tenax,* under low microscopic power. He gave a short talk on this aquatic larva, explaining how its tail was like a snorkel through which it took in air. He said that the larva was able to expand or contract its tail according to the depth of water it inhaled. This maggot was the larva of a species of Drone fly.

Mr. D. McInnes showed under low microscopic power two terebella tube worms which he had collected from the beach, also some seaweed on which were two different species of Bryozoa.

Mr. R. Condron showed two butterflies; an Imperial white, and a Wood white.

Mrs. Z. Lee showed a moth of the *Hepialidae* family which she had obtained at Wyperfeld.

6 June—The meeting was chaired by Mr. R. Condron, 18 members being in attendance.

Apologies were received from Mrs. Pinches, and Mr. and Mrs. Coghill.

Mr. Paul Genery reported having contacted Mr. H. B. Wilson, Senior Entomologist of the Burnley Horticultural Gardens re help in connection with the pesticide display for the forthcoming September Nature Show. As the use of pesticides is such a contentious subject, Mr. Wilson suggested contacting the Fisheries and Wildlife Dept. Mr. Genery did this, he found that they were in conference. Mr. Genery is to report back to the Group at the July meeting, on what progress has been made in this matter.

Mr. D. McInnes reported good progress by the Hawthorn Juniors on the displays for the September Nature Show.

Mr. R. Condron then introduced Dr. Ian Hiscock, guest speaker for the evening, whose subject was "Stinging Jellyfish". Dr. Hiscock's talk proved of great interest to members. He spoke at length of the many deaths caused in Queensland among people who had been stung while swimming; death in some cases, coming in 6 minutes. Special reference was made to the "Sea Wasp", *Chironex*

fleckeri, which has proved the most deadly species in Australia. Dr. Hiscock showed several slides and used the blackboard to give scientific names and descriptions. He said that persons severely stung looked as if they had been thrashed with barbed wire. A lot of scientific work had been done and as far as he could ascertain, a toxin had been isolated, but, as yet, not identified. At the conclusion of his talk Dr. Hiscock was asked many questions, and a vote of thanks was moved by Mr. M. Houghton. Dr. Hiscock kindly agreed to speak to the Group again next year.

Exhibits:

Miss White showed a gall from a species of eucalypt.

Mr. McInnes showed a species of green flagellate under the microscope.

Mr. Strong showed, under microscopic power, two slides of radulae, one from a species of limpet, and one from a siphon shell. Mr. Strong pointed out that although the siphon shell could be mistaken for a limpet, the totally different anatomy of the radula showed that the two species were unrelated.

Mr. P. Genery displayed microscopically a slide of a hydra showing its nematocysts, or stinging cells.

Naturalists' Identification Sticker

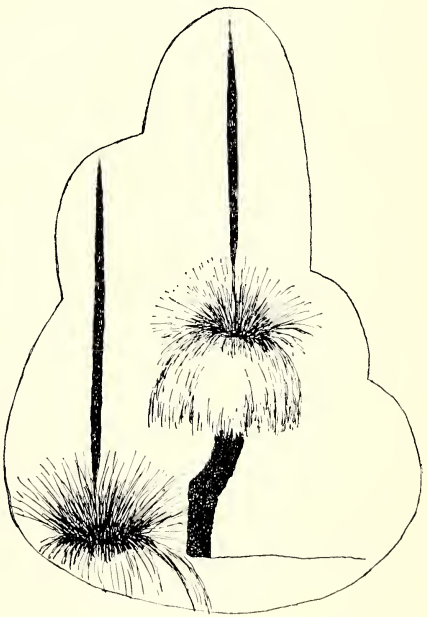
The Latrobe Valley Field Naturalists Club has arranged for the production of an easily recognisable transfer for fixing to car windows. An illustration appears at right, and the Club's title may be added in the space at lower right.

These transfers will be available throughout Australia, so that any Naturalist travelling interstate will be readily recognised by fellow naturalists.

The price of the transfer will be 20c, and the minimum number of 20 per order is required. The Club's name may be printed at no extra cost for orders of more than 100.

To aid the workability of the scheme, it is asked that only Clubs (not individuals) apply for orders. The address is:—

Miss Betty Kemp,
C/- Yallourn Guest House,
Office Place
Yallourn. Vic.



Country Club Notes

HAMILTON FIELD NATURALISTS CLUB

Annual Report 1964/65

The Club has completed another successful year. Membership has been maintained and our financial position has improved. While we have not been able to secure many guest speakers from outside the club, those we have been able to get, with club members, have presented a varied and interesting selection of subjects at our meetings.

Dealing with birds, we had a highlight in the talk and slides by Ian McCallum and Robert Pink of Casterton, on their expedition with collectors from the British Museum, to North Queensland.

Mr. Claude Austin spoke on the necessity to reserve more areas for the preservation of wild life and bird life in particular.

Officers of the Soil Conservation Authority showed slides and spoke on many aspects of the work of the Authority.

Mr. Geoff Stephens presented a detailed talk on the classification of insects.

Miss Susan Tucker showed slides and spoke on the life and artefacts of the natives of the Gulf District of Papua.

Another interesting talk and slide show was given by Miss Pedrina on the life of the sea shore.

With several travel talks and collections of members' slides this kept our meetings both interesting and instructive. Also a good collection of varied specimens on show each night helped considerably to widen the general knowledge of members.

We have been very pleased to see an increase in numbers on practically all the Club's excursions. They have been thoroughly enjoyed by all participating, and quite a wide variety of country and subjects have been covered.

Places visited included the Billywing, Victoria Point, Brown Creek, and Bullawin Road; all in the Grampians, as well as other areas closer to Hamilton.

The Club was well represented at both meetings of the Western Victoria Field Naturalists Clubs Association held during the year at Horsham and Portland. Moves were made by our Club through the Association for the protection of the aboriginal paintings in the Victoria Range, and for the protection of wombats and wedge-tailed eagles. This Club will be acting as host club to the Annual Meeting of the Association in October.

The Club has accomplished a greater amount of practical work in the past year.

Several members have paid many visits to the 18 acre Reserve at Wannon collecting and pressing specimens. About 112 species in flower have so far been collected. When naming has been completed these should include a number of new records for the district.

Our thanks are due to Mr. Cliff Beauglehole for his assistance over a weekend in carrying out a plant survey of the Brown Creek area in the Victoria Range. Our club is hoping that this area can be preserved as a flora and fauna reserve.

Other members are working on collections and photography of orchids, pea-flowered shrubs and sea-weeds.

Some members have assisted Clubs in other areas, namely tree planting at Tower Hill, and excavation work in McEachern's Death-trap Cave. Our Secretary has done a considerable amount of work in exploring aboriginal camp sites around Buckley's Swamp.

In the course of excursions a long sought volcano, which gave rise to the tuff bed on the Muddy Creek has been located at Yulecart. This is yet to be officially confirmed.

During the year we congratulated Murray Gunn on becoming an Officially Licensed Bird Bander. Since then he has banded over 1600 birds of approximately 80 species which we consider a very good effort.

E. M. TUCKER,
President.

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

GENERAL MEEINGS

Monday, July 11—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Wonder Birds of Australia"—R. Wheeler, and Presentation of Natural History Medallion.
4. Election of New Members.

   (a) *Ordinary:*
   Mr. W. R. Archer, Flat 4, 77 Orrong Grove, Nth. Caulfield (Interest: Geology).
   Miss Barbara Fitzgibbon, 39 Cole Street, Williamstown (Interest: Entomology).
   Dr. C. G. Jago, 61 Kooyong Road, Armadale.
   Mrs. E. Kotmel, 57 Victoria Avenue, Albert Park (Interest: Botany).
   Mr. and Mrs. G. Morris (Joint), 19 Sunshine Avenue, Mitcham.

   (b) *Junior:*
   Christine Linda Morris (10 yrs.) 19 Sunshine Avenue, Mitcham.
5. General Business.
6. Nature Notes and Exhibits.

Monday, August 8—"Entomology"—H. B. Wilson.

Monday, September 12—J. H. Willis.

GROUP MEETINGS

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

Thursday, July 14—Botany Group.

Wednesday, July 20—Microscopical Group.

Friday, July 29—Junior meeting at 8 p.m. at Hawthorn Town Hall "Hawks and Eagles"—Mr. Roger Cowley.

Monday, August 1—Entomology and Marine Biology Group. This group meets at Parliament House in Mr. Strong's rooms at 8 p.m. Enter through private entrance at South end of House.

Wednesday, August 3—Geology Group. Guest speaker, Mr. Marsden of Melbourne University.

Thursday, August 4—Mammal Survey Group, at Fisheries and Wild Life Dept. Library, Flinders Street Extension, at 7.45 p.m.

Friday, August 5—Junior meeting at Rechabite Hall, Preston.

F.N.C.V. EXCURSIONS

Sunday, July 17—Kinglake. Leader: Mr. D. McInnes. The coach will leave Batman Avenue at 9 a.m. Fare $1.40. Bookings with Excursion Secretary. Bring one meal and a snack.

September 17 to October 2, 1966—Queensland. Details of this excursion have appeared in earlier issues of the Naturalist. Members are reminded that the balance of the cost should be paid by August 8.

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, 1966

President:
Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg N22.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

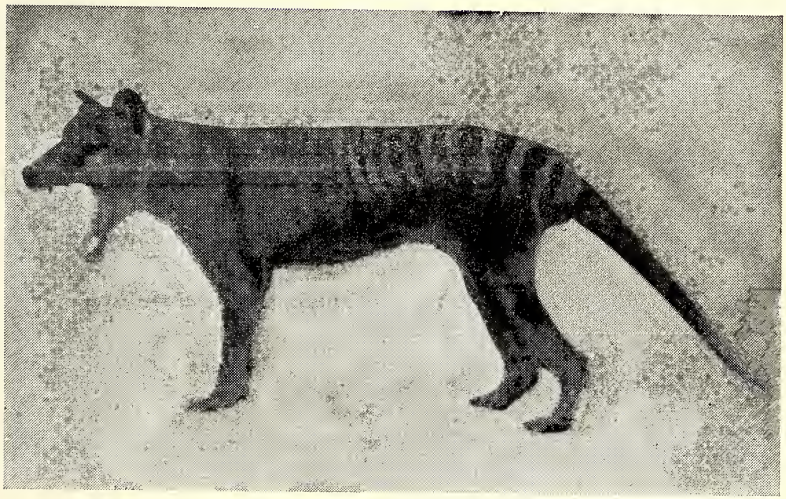
Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

Brown, Prior, Anderson Pty. Ltd., 430 Little Bourke Street, Melbourne, C.1.

The Victorian Naturalist

Vol. 83 (8) August 1966



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35 cents

The 1966 Wildflower and Nature Show

On Monday, Tuesday and Wednesday, 5th, 6th and 7th September, the Lower Melbourne Town Hall will again be the site of this popular annual exhibition.

It will be prepared and staged by the Society for Growing Australian Plants, and by the Field Natualists' Club of Victoria, and will be open daily from 10 a.m. to 10 p.m.

Increased lighting will show to much better advantage the garden grown native flowers arranged by the S.G.A.P. As these will come from all states in Australia, there will be an amazing variety chosen from herbs, shrubs and trees. A display of flowers from the Maranoa Gardens, Balwyn, will demonstrate the many "natives" that are "at home" in the Melbourne environment. Any queries about the growing and availability of the plants shown may be discussed at an Information Centre set up in a convenient spot.

The F.N.C.V. section of the Exhibition covers a particularly wide variety of natural history subjects, both theoretical and practical.

One practical demonstration will be that of gem polishing by the Hawthorn Junior F.N.C.

The preparation of microscope slides, with such subjects as butterfly wings and scales will be another activity. These slides will be for sale at a nominal price.

The methods used in the Preservation of Insects will also be featured.

A shell collection will be exhibited, and some individual members of the "Juniors" will show natural history Projects which they have prepared.

This year the main exhibit will take the form of a model of a landscape, with two vertical sections showing sedimentary strata, and igneous and metamorphic rock formations. A collection of rocks will illustrate these, while fossils from all geological eras will portray some of the life present during the deposition of the various strata.

A time scale will illustrate these eras, compare their lengths, and give some information of the evolution of life therein.

Ferns, always popular and interesting, will be the subject of another large exhibit.

Another subject of special interest will be the "Tagging of Butterflies".

Aquatic larvae may be seen in special tanks.

Another exhibit will pose some of the queries raised by the use of Pesticides.

A number of F.N.C.V. microscopes will be set up to demonstrate subjects shown with top lighting, bright field and ground illumination, and to illustrate the use of polarized light.

A well staged exhibit of live and preserved spiders will be an attraction, while there will be a variety of live snakes and lizards on show—in glass cases!

The Bird Observers' Club has graciously accepted an invitation to stage an exhibit showing some aspects of bird study and observation.

Books and journals dealing with Natural History subjects may be purchased at a Publications Stand, where information relevant to the F.N.C.V. may also be obtained.

The National Film Centre has made available a selection of suitable films that will be shown *free* at frequent intervals.

At the August General Meeting of this Club, rosters will be distributed on which it is hoped all members, who are free to assist at the Show, will fill in as many hours as possible. There are a number of routine duties, such as ticket-selling and collecting at the door, and *all* exhibits have to be supervised *all* of the time.

The "setting up" of the Show on Sunday, September 4th, needs the help of as many members as possible. It may be hard work but it's fun, so please be there.

Also at the General Meeting, leaflets, window cards and car stickers will be available for distribution. Please make your Show known as widely as possible.

The admission fee will be 25c for adults and 5c for children.

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F.N.C.V.

August 8, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover:
This picture is of the last captive specimen of an animal that has been in and out of the news since the 1930s. This photograph was taken at the Hobart Zoo in 1933, and since then numerous unsuccessful attempts have been made to locate the Tasmanian Tiger, *Thylacynus cynocephalus*, in the wild south-west of Tasmania. Even last month, we heard of the latest attempt; and from reports, it seems to be progressing well. Photograph by David Fleay.

Letter to the Editor

Aboriginal Antiquities of Colac District

By Aldo Massola

A Correction, and further details:

It is regretted that the photograph of the Aboriginal on page 126 of the June issue of the *Victorian Naturalist* was wrongly captioned. It should have read "Gellibrand, last of the Colac Tribe". This man was the native born at, and called after, Mt. Gellibrand, as explained on page 129.

The Geelong Gellibrand had quite a different story. He was born not far from Geelong, and named Ber-uke, or kangaroo-rat, because one of these animals ran through the mia-mia in which his mother was confined. As related on page 125, he was one of two guides for the party who set out to look for Gellibrand and Hesse. Thereafter he was known to the Whites as "Gellibrand". When Captain Dana formed his famous Native Police Corps in January 1842, Gellibrand enlisted, and served with distinction in several parts of the then Port Phillip District of New South Wales, and was made a corporal. However, like most of his fellow troopers, he developed a liking for strong drink. Having been sent to Melbourne with the Government's dray for provisions for the Narre Warren Native Police Barracks, he drank to such excess that he died, and was buried by his companions near the South Yarra Pound.

On page 130, mention was made of the discovery of a kangaroo with a stone spear-head protruding from its ribs, made during the Bleak House Excavation of the Colac Field Naturalists' Club. A am indebted to Mr. E. Perkins, now of Healesville, for sending me the following particulars:

At about a trowel's depth from the surface Mrs. Gaylard, of Colac, a member of the party, struck a bone which proved to be the skull of an herbivore. Further excavation revealed another similar skull, and most of two backbones with attached ribs. Not enough of the limbs were present to enable members of the party to recognize the remains as either kangaroo or sheep, and they were never positively identified, although local farmers pronounced them as being sheep. The stone spear-head was found in the ribs of one of the skeletons.

Whatever animals they were, it is clear that they had been left in the oven by the natives, who never came back to eat their meal. It they were sheep, we can only surmise that they had been taken from the squatters, and that it was a punitive expedition that disturbed the banquet.

Notes on Some Victorian Aboriginal Names for Plants and Animals

by L. A. Hercus *

Three related languages of the Victorian type were remembered by isolated informants, some of whom are now deceased. These languages were Wembawemba of the Kerang and Moulamein districts (here sometimes abbreviated to WW), Djadjala or Wergaia of the Lake Hindmarsh and Lake Albacutya area (abbreviated to Dj), and Madimadi from the area between the Murray and the Lachlan, mainly around the Balranald district of NSW (abbreviated to Ma). Fragments of other languages of the Victorian type were recorded. The system of transcription used here is the phonemic system in the form adopted by Dr. A. Capell (Sydney); whenever the actual or phonetic rendering differs markedly, this has been noted in brackets. *ŋ* is pronounced like the final *ng* of 'sing', *j* like *y* in 'yes', *dj* approximates to the pronunciation of *j* in 'jump', and *ḍ* is a retroflex sound, not unlike the *rd* in the American pronunciation of 'garden'.

It is a well known fact that the aborigines were so deeply conscious of the details of their environment that they did not use general terms as much as specialized terms for names of plants and animals. As pointed out by T. G. H. Strehlow for Aranda[1], this does not mean that aboriginal languages lacked general terms altogether, but these general terms are of much less importance than in the European languages. This can be shown to be true of the Victorian languages also, but the information given to us by the last speakers is naturally less than the wealth of material provided by Aranda. As in Aranda, for instance, there was no general term for 'lizard' in the Victorian languages, only specific terms: a Djadjala informant who was once asked about this point said 'I don't know what you call a lizard, but a blue-tongue you call *walab,* a gecko you call *bib-ŋadja,* a frilly-neck is *gen,* the tiny little drop-tails, (i.e. the common grass skinks) are *djalewudjub;* the lizard, a bit bigger, that will inject poison into your foot (species uncertain) you call *ŋurgen-ŋurgen -djine* (*ŋ*urken-*ŋ*urken djine); and the thick medium size lizard (probably White's skink) is a *dundel.*' Investigators last century did not generally take heed of this state of affairs, and repeatedly mistook specific terms for general terms; this applies particularly to parts of the valuable compilation of Brough Smyth and to Curr's work. For instance WW *gunwil,* Dj *gunmil* 'black snake' could sometimes be used as a general term for 'snake', but the Gippsland word *duruŋ* meant 'brown snake', yet both *gunwil* and *duruŋ* are repeatedly listed as 'snake'. When asked for the name of a fish, an informant would probably first give the name of the fish most common or important in his area, and this has led to the word for 'Murray cod', Dj, WW *bandjil* being translated as 'fish' by Curr in some places, and 'blackfish' is made out to mean 'fish' in others. It is obvious that no valid conclusions about differences and similarities between the Victorian languages can be based on this kind of material, as it is not even the same item of vocabulary that is being compared.

* Department of Anthropology, University of Adelaide. These notes are based on research carried out for the Australian Institute of Aboriginal Studies, Canberra.

Classification

The classification of living things appears to have varied a little between the different aboriginal languages. The absence of general terms for 'lizard' and 'tortoise' is widespread in Australia; there is a general term for 'snake' in some languages and not in others. In Aranda, as shown in T. G. H. Strehlow's work, and in the South Australian languages to the south and south-east of Aranda (Arabana, Wo*ŋ*-ga*ŋ*uru), there are general terms for 'bird', but they are associated with flying (e.g. Arabana *baja* 'wings', 'bird'), and they therefore exclude flightless birds like the emu and the plains turkey. In Wembawemba on the other hand, the classification happens to be more like the European one, and a bird can be called *widen-wil* or 'feather-creature', and this therefore includes the emu and the plains turkey. As for fish, Madimadi has a collective term applying to fish only, *mirmbul.* Wembawemba has a term *jowir* which usually means 'edible fish', but it is occasionally used in a wider sense to include edible animals as well. The cognate Djadjala word *jaui* means simply 'meat'.

No general terms for 'plant' were noted by us in Victoria, though these are not absent in some South Australian languages, where they are associated with verbs meaning 'to grow in the ground'. The Djadjala word *galg* (galk) 'stick', 'scrub' can be used to describe all trees and shrubs, whereas in Wembawemba the word *biel* (piel) 'red-gum tree' was used as a general word for 'tree' as well as for 'stick'.

Names for Separate Species

Of particular interest is the naming of separate species in aboriginal languages. This was obviously not done on the lines of the Linnaean system, but on the basis of observation and convenience. For instance, the writer has no idea how many species of leeches are to be found in northern Victoria, but the Wembawemba recognised only *man* (ma:n) '(small) land leech' and *bilidj* (pilitj) '(big) water leech'; only one kind of mosquito *liri,* and one kind of scorpion *widegama,* But a number of edible grubs were recognised; these were classified according to their habitat, and not from the appearance of the adult insect. Thus the Djadjala spoke of *ŋabul-ŋabul,* 'a grub from black box trees', *gar* 'a gum-tree grub', *biel-gar* 'a grub from red-gum trees' and *meg* 'a large white ground-grub'. In other areas there were special names also for grubs from wattles, e.g. Woiwuru *graingrum.* This mainly utilitarian attitude prevails also in the naming of plants. In both Wembawemba and Djadjala one word, *boedj* (WW poetj) covers nearly all species of grass, but there was a special word, WW *buren* (puren), for a species of native panicum with edible seeds, Dj *widji* means 'a species of grass used for making baskets', and *walurg* is 'porcupine grass' which warrants a special term on account of its nuisance value.

Ducks are another very clear example of how economic importance leads to a very clear distinction being made between the various species. Although there was no general word for 'duck', the Djadjala were able to name the black duck *ŋeri,* the wood duck *walaŋ,* the blue-winged shoveler *wud-jug,* the freckled duck *ŋalŋal,* the mountain duck *bidjaŋgal,* the musk duck *djulwil* or *ŋanjewil,* the pink-eared duck *diwel-diwel,* and the grey teal *bener;* and the hardhead was (WW) *djared.* Sometimes the clear separation between the species imposed itself not on utilitarian grounds, but by distinctiveness. This applies for instance in the case of the parrots, where the names of a large number

of species were recorded. In the case of the owls, where there was no economic significance, nor brilliance, mythical associations and fears underlined the differences between the species: in Djadjala the barn-owl was *gaḍug;* the boobook owl was *wugwug.* The tawny frogmouth, *djinedjinedj,* had many stories associated with it and its call was feared; the powerful owl was *wiṛimal,* and the best-known was the owlet-nightjar *djeradedjgurg,* which was sacred to the women.

The Djadjala informants distinguished between the two different kinds of Sittella, the black-capped (*neositta pileata*) *binj-binj,* and the orange-winged (*neositta chrysoptera*) *gurbin-guleḍ.* But on the whole, there was much less attention paid to the really small birds, and the Djadjala almost certainly classed together various species of thornbill and the weebill as *munemug* and *djubidjubi,* and we were unable to record the names of the field-wrens. This was only partially due to the fact that the informants had forgotten much. Even with a well-preserved language like the South Australian Arabana, two outstanding informants, who had a practically complete vocabulary, did not seem particularly interested in small inconspicuous birds like the grass-wrens and almost certainly classed several species together.

Special Names for Immature Specimens

Particularly interesting were the names of the tortoises. In the languages recorded there are four different words for 'tortoise', but there are only three species of tortoise in Victoria. The difference between these species has recently been described by J. Goode.[2]

Short-neck tortoise, *Emydure macquari*: WW *njim,* Ma *n̲imi,* Dj *bilwilarnjed* 'creature shelters-between'.

Long-neck tortoise, *Chelodina longicollis,* also called 'stinking turtle': WW *durmimum,* Ma *duimimum,* Dj *durmimum* or *buiber. durmimum* means 'turned up bottom' and this name is explained by the v-shaped opening in the shell at the back (see the illustration by J. Goode[2]).

Long-neck tortoise (large), *Chelodina expansa,* WW *woṛeŋel,* Ma *wuraŋu.*

There is another word, Dj *djib,* Ma *djibidjibi,* which could not be adequately identified from the descriptions given. It was the name of a long-neck tortoise, and may have designated small specimens of the ordinary long-neck or 'stinking' tortoise. The latter alternative would be the most likely, as it would appear from J. Goode's work that *Chelodina expansa* does not extend into Djadjala territory and no Djadjala name has been recorded for the adult *Chelodina expansa.* This means that Djadjala in fact had three names for the common long-neck tortoise: *buiber* was the ordinary word, *durmimum* a kind of nick-name, and *djib* was used for the very young ones. There are other examples where a difference in size, within the same species, was indicated by special names, particularly when this was of economic importance, e.g. WW *bandjil* 'Murray cod', *gurumerug* 'a huge Murray cod'.

Compound Names

The specific names of plants and animals are on the whole ordinary nouns, but sometimes they are descriptive compounds, consisting of two nouns, or a noun combined with a verbal participle (generally the past). Rarely, in the case of birds these names are onomatopœic forms, imitative of the call of the bird. These compound names are almost like nicknames, and in a few cases, one single species may have two names, one or-

dinary name and one nick-name, as in the case of the common long-neck tortoise in Djadjala, or for instance the red wattle-bird, Dj. *jaŋgag,* which could also be called *wurinj-gundug* 'red-hot-coal throat'. These nick-names may have been among the more transient sections of the vocabulary: they seem to vary more between the closely related languages than the rest of the vocabulary. Sometimes one language has kept the nick-name only, while the ordinary unanalysable name has remained in the others: WW *djuruŋ-wil* 'tall creature' i.e. 'emu', Dj *gauir,* Ma *garemi.* These compound names are interesting for their descriptive value; some are very obvious, some subtle, but they are always apt and based on careful observation. Very obvious for instance are WW *liblib-wil* 'spike-spike creature', i.e. 'Murray crayfish', Dj *biar-galg* 'sweet-drink tree' *banksia ornata, buigen-gira* 'falling (among) foliage' i.e. 'greenie'; others are Dj *big-burberug* 'muddy-head' and WW *ŋadaŋ-wil* 'yabbie-creature' both of which refer to the nankeen night-heron, *djiren-mula* 'split-hip' or 'torn-hip' is the black-tailed waterhen. But, striking as they are, these compound names constitute only a small proportion of the specific names of plants and animals in the Victorian languages; these names are usually ordinary nouns and are not further analysable.

These notes are meant only to give an indication of one of the minor problems of interest found in aboriginal languages. Quite apart from the all-important differences in grammatical structure, the languages varied in regard to what particular species of plants and animals were important or distinctive enough to be assigned a special name, and as to how these names were classified. But unfortunately the necessary information has now disappeared in many areas, particularly in Victoria.

References

[1] T. G. H. Strehlow, *Aranda Phonetics and Grammar.* The Oceania Monographs, no. 7 (Sydney), pp. 64 ff.

[2] J. Goode, 'Freshwater Tortoises in Victoria', *The Victorian Naturalist,* Vol. **82** (6), (October 1965), p. 169.

Excursion to Wilson's Promontory in "Voluta"

By David C. Howlett.

This is the second article written by David Howlett on his excursions to Wilson's Promontory. His first appeared in the *Naturalist* (**81**) pp. 202-205.

11th Dec. 1965.

Barom. 1017mb

Wind—fresh southerly winds for most of the day easing off in the late afternoon.

General report: Started to load general stores and to prepare the "Voluta" for an excursion to Wilson's Promontory.

12th Dec. 1965.

Barom. 1011mb

Wind—fresh nor-easterlies, later backing to the north and easing off.

General report: I did further preparation for the excursion, but due to adverse weather report decided against leaving this evening for the Promontory.

14th Dec. 1965.

Barom. 1007mb

Wind—light to fresh sou-westerlies all day with a light swell.

General report: I loaded the petrol, ice, and perishable food on to the "Voluta" and as the weather conditions looked to be favourable for a fast run to the Promontory, I left Flinders at 3.30 p.m. with the intention of travelling all night. The wind freshened soon after leaving Flinders. I stopped at Seal Rocks long enough to leave fresh bread with those studying the seals. I had to decline an invitation to go ashore on account of the worsening weather. I decided to go to Cape Woolamai, arriving there at 7.15 p.m.

My intention of travelling with a south-westerly wind and the risks associated with it, was because prior to leaving, spells of fresh easterly winds followed the westerlies, and I had no hope of motoring against them.

15th Dec. 1965.

Barom. 1005-1010mb.

Wind—fresh to strong sou-westerlies all day with a moderate south-west swell.

General report: I spent the day anchored at Cape Woolamai due to the adverse weather. I collected a number of molluscs on the reef at low tide.

16th Dec. 1965.

Barom. 1012-1017mb.

Wind—fresh sou-westerlies all day with a moderate south-west swell.

General report: I spent the day anchored at Cape Woolamai.

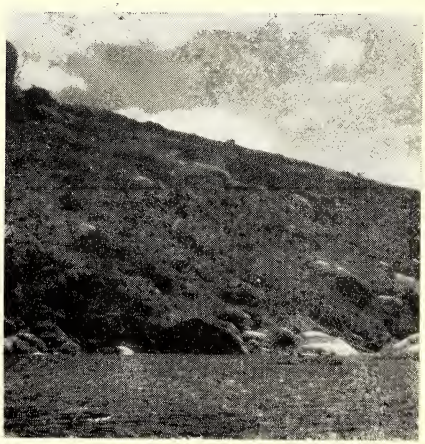


Photo: *Author*

Part of the Promontory Coastline with "Voluta" at anchor.

17th Dec. 1965.
Barom. 1014-1017mb.
Wind—light sou-westerlies early in the morning, with occasional rain squalls; later freshening to become strong with frequent rain squalls. Light south-west swell with an occasional swell from the south-east.

General report: I left Cape Woolamai at 4.25 a.m. with the weather forecasts of the previous day indicating fine settled weather. I ignored the early squalls thinking that it was a prelude to a fine day.

I was hit by a severe rain squall when south-west of Cape Patterson; during the squall I headed slowly out to sea, reefing the mainsail in the process; a very difficult job when alone, as the boat soon swings off coarse when the tiller is left alone. After the squall passed I continued on my way with the mainsail reefed and the engine going slow. Shortly after continuing on my way the sea became rough with large white waves everywhere, which were made more apparent when the sun shone on them.

With no prospect of the weather improving I continued on my way rather than to ride out the squalls. When the boat was hit by a large wave, which was quite often, the boat would lay over to such an extent that the deck rail which is normally 26 inches above water, was completely buried in the sea. Also, despite the deep draught of the boat, I could not stop a certain amount of slewing into the waves.

Passing Cape Liptrap another problem presented itself in that at this time of the year there are numerous craypots in the area, probably exceeding one hundred and twenty. To avoid the floats being pulled under by the strong tides the fishermen have two large floats on the end of the lines about 40 ft. apart, with the line floating on the sea. My problem was that the tide was holding the floats across the wind, and that I could not see them until I was almost on top of them due to the heavy seas and the mainsail blocking visibility on one side of the mast. Also with the heavy sea and mainsail hard out on one side, I could steer only a few degrees off course with safety. If I had fouled one of the lines with my propellor, a large wave may have swamped me before I could cut the line clear. I arrived at Waratah Bay anchorage at 1.05 p.m. and after having dinner with my friends on the "May Anne" I spent the rest of the afternoon fishing.

18th Dec. 1965.
Barom. 1017-1013mb.
Wind—fresh easterlies all day with the swell gradually easing off due to the effect of the wind.

General report: As it was too rough for me to motor to the shelter of Wilson's Promontory, I was advised to leave Waratah Bay and to shelter on the west side of Cape Liptrap. I was feeling very miserable from the effects of the day before and from the swell which was still rather high, until the 59 ft. cray boat "Kyeema" came along and I was able to recover on it.

19th Dec. 1965.
Barom. 1013-1010mb.
Wind—strong nor-easterlies all day with a light swell.

General report: I spent the day resting and sheltering on the west side of Cape Liptrap. The fishermen in the area had told me that this area is notorious for strong easterly winds.

20th Dec. 1965.
Barom. 1009-1006mb.
Wind—strong nor-easterlies all day with a light swell.

General report: I spent the day resting and sheltering on the west side of Cape Liptrap.

21st Dec. 1965.

Barom. 1003mb.

Wind—strong nor-easterlies during the previous night fading away at 8.30 a.m.; light easterlies for the rest of the day with a light swell.

General report: I left Cape Liptrap and went to Waratah Bay in preparation for a change to follow strong northerly winds which were officially forecast. After reaching Waratah Bay I decided to go to the Glennie Isles, leaving Waratah Bay at 9.45 a.m. and arriving at Gt. Glennie Is. at 1.15 p.m. Before leaving Waratah Bay I tried to recover the traps that I set before going to Cape Liptrap. I was unable to recover them as they were fouled with weed. I made 3 traps for shells out of fruit cases which proved to be quite successful in capturing good specimens of *Xenogalea pyrum*, containing hermit crabs.

After reaching Gt. Glennie Is., I had two reasonably successful hauls with the dredge of 20 fathoms of water to the east of the island.

22nd Dec. 1965.

Barom. 1004mb.

Wind—flat calm all day with a very light swell.

General report: The weather forecast was for very strong winds. The conditions were ideal for dredging. I was able to get only one specimen of *Umbilia hesitata* in the area worked on the previous excursion. I dredged at various places to the east of the Group with very little success.

23rd Dec. 1965.

Barom. 1002mb.

Wind—flat calm all day with the swell starting to build up from the west; conditions very hot.

General report: I started to dredge to the east of the anchorage at Gt. Glennie Is. with Rodondo Is. covered by Ansar Is.; then I moved in an easterly direction until Rodondo Is. was east of Ansar Is., after which I criss-crossed an area out from Norman Bay. I started to dredge in the area at 7.00 a.m. and continued until 12.30 p.m.

I then went to Norman Is. starting at the southern end of the island and heading for the anchorage at Gt. Glennie Is. I had two long hauls in the area before stopping at 3.00 p.m. due to exhaustion.

The first haul at Norman Is. resulted in a number of *Tucetilla flabellatus* and three specimens of *Eucrassatella kingicola* being taken. The first haul of the day resulted in a large specimen of *Umbilia hesitata* and a specimen of *Xenogalea pyrum* taken alive.

24th Dec. 1965.

Barom. 1004-1009mb.

Wind—light westerlies all day, flat calm at sunset.

General report: I dredged close inshore north of the anchorage and to the east of the anchorage at Gt. Glennie Is. Dredging ceased when I became too tired to work effectively.

25th Dec. 1965.

Barom. 1008-1006mb.

Wind—light to fresh sou-westerlies all day with a light swell.

General report: Only a few poor quality shells taken in the traps; conditions suitable for dredging close inshore on the eastern side of Gt. Glennie Is. With little dredging done, I spent the day resting. The average size of the *Spondylus tenelus* taken was much larger than those taken on the previous excursion, and even in the smaller specimens the shell was thicker in every respect.

26th Dec. 1965.

Barom. 1007mb.

Wind—fresh sou-westerlies all day with a light swell.

General report: I lost one trap through unknown causes; two good specimens of *Cassis* taken in the traps; I spent the day resting.

27th Dec. 1965.

Barom. 1006-1000mb.

Wind—light variable winds all day with the swell easing off.

General report: I dredged at various places to the east of the Group with little success. I stopped dredging at 1.30 p.m. and prepared for the trip home. I lost another trap. I left for home at 11.00 p.m. after having two hours' sleep.

28th Dec. 1965.

Barom. 999-989mb.

Wind—light variable easterlies for most of the day with a light southerly swell. A force 6-7 sou-easterly in the afternoon which gradually eased off.

General report: There was no warning on the radio the previous day about the possibility of strong winds. A warning was issued during the day which was too late for me. I passed Cape Liptrap at 3.00 a.m., Cape Woolamai at 10.00 a.m., and Grant Pt. at noon. I stopped at Grant Pt. and fished until the wind became stronger. Whilst at Grant Pt., I broke the bowsprit while jibing the mainsail in the strong wind. After securing the sail and rigging I proceeded to Flinders under power but still prepared to hoist the sail in case of engine failure.

In conclusion, the trip described could well be my last, as the shells that I have been taking do not justify the risks involved. I am now in the process of building a 17 ft. bondwood boat to do work of a similar nature in the waters of the Nuyts Archipelago, which lies in the Great Australian Bight off Ceduna in South-Australia. I originally started to dredge in those waters with considerable success before moving to Victoria.

Details of "Voluta": length 20 ft., beam 7 ft. 3 in., normal draught aft 3 ft. 8 in., sail area 250 sq. ft., engine 12 h.p. Simplex. It is decked-in apart from a small open cockpit aft which is not self draining.

A list of molluscs taken in the waters to the east of the Glennie Group of Islands. 11-28 Dec. 1965.

a = Adult, j = Juvenile, d = Dead.

Spondylus tenelus Reeve, 81a.
Myachoma anamiodes Stuchbury, 1a.
Pecten alba Tate, 2aj.
Chlamys asperrimus Lamarck, 21a.
Mesopeplum caroli Iredale, 3a.
Placamen placida Philippi, 2 1a.
Eucrassatella kingicola Lamarck, 3a, 3d.
Tucetilla flabellatus Tenison Woods, 30a.
Limopsis tenisoni Tenison Woods, 3a.
Neotrigonia margaritacea Lamarck, 1a.
Umbilia hesitata Iredale, 4a.
Ellatrivia merces Iredale, 7a.
Notocypraea piperita Gray, 1a.
Notocypraea angustata, Gmelin, 1a.
Alectrion particeps Hedley, 1a.
Xenogalea pyrum Lamarck, 1a, 13d.
Astelle subcarinatum Swainson, 13a.
Pterynotus triformis Reeve, 9a.
Torvamurex denudatus Perry, 3a, 3d.
Alocospira marginata Lamarck, 1d.
Lyria mitraeformis Lamarck, 1d.
Negyrina subdistorta Lamarck, 4a.
Callanaitis disjecta Perry, single valves only.
Venericardia rosulenta Tate, 1d.
Gregariella barbatus Reeve, 1a.
Amygdalum beddomei Iredale, 1a (damaged).
Barbatia pistachia Lamarck, 4aj.
Sigapatella calyptraeformis Lamarck, 1aj.
Tugali cicatricosa A. Adams, 1a.
Hemitoma subemarginata Blainville, 1a.
Bellastraea kesteveni Iredale, 4a.
Cosmetalepas concatenatus Crosse & Fischer, 3a.
Zelippistes blainvilleanus Petit, 1a.
Cabestana waterhousi A. Adams & Angas, 1d.
Fubria tenuicostatum Lamarck, 1d.
Fusus novae-hollandiae Reeve, 2d.
Amorena undulata Lamarck, 3d.
Argobuccinum bassi Angas, 2a.

ERRATA

Some unfortunate errors occurred in one of the articles appearing in the *Victorian Naturalist* of last month.

They appeared on the chart facing p. 159, and in the Key on p. 159.

No. 96 near Essendon should read—64

No. 68 near Clifton Hill and Box Hill should read—23

No. 82 near Ashburton should read—54

No. 61 near Cheltenham should read—27

Key to Chart.

No. 88 should read Yellow-winged Honeyeater not Cape Barren Goose; although this bird was a rare visitor to this area prior to 1850.

j near Broadmeadows, is the Marsupial Mouse *Sminthopsis murina*, and should be added to the key.

(This page may be removed without damage to other articles, and figures are printed in type to coincide closely with those on the chart so that they may be pasted in position if desired.)

A New Painted Rock Shelter in the Victoria Range

By J. M. Agar

On the Western slopes of the Victoria Range in the Grampians, painted rock shelters seem to occur in relation to creek systems. Those along the Deep Creek or Billywing (*Victorian Naturalist,* Sept. 1958) and the Cultivation Creek (*Victorian Naturalist,* Oct. 1964) have been documented. The next creek in a northerly direction is the Red Rock Creek, but no shelters have yet been reported from its vicinity.

Attention was drawn to this area because of the confusion which has been noted in reports relating to a free-standing boulder which is variously described as Glenisla Rock, Blackfellow Rock, or Red Rock. Descriptions referring to a painted rock shelter under all of these names differ somewhat, but discussions with both Mr. Ian McCann and Mr. Ellis Tucker suggested that they all referred to the same shelter. This opinion, expressed by such well-known authorities, had to be respected, but on the other hand, on the Forestry Commission map of the Grampians, Red Rock and Blackfellow Rock are shown as separate entities some two miles apart. In view of this it seemed reasonable to try to clear up any lingering doubts by searching the Red Rock area.

My wife and I visited this area on 13th March 1966, and found that Red Rock is a large rock mass with two red scars on its Northern end, which presumably give it its name. It is fronted by the usual tumbled heaps of bounders found in this area, and the dense scrub around it is characteristic of that found on the lower slopes of the Victoria Range, and in fact of the Grampians in general. After spending the whole morning examining countless rocks and boulders along Red Rock Creek, and nearly abandoning the search several times, we finally came across an overhanging rock face, some 200 feet in length. This faces south-west, and glimpses of a splendid view over the plains of the Western district are obtained from this shelter.

At ground level in the centre of this rock face is a slab of rock about 25 feet in length and 4 feet in height, which has obviously been split off the main mass of rock and is separated from it by a space of about 2 feet.

This slab has a triangular cross-section, and the sharp top of the rock is polished in a manner similar to that of the rock in the floor of the Camp of the Emu's Foot; but in the Red Rock shelter the stone has an even higher gloss. The inner surface of the rock slab is covered with a yellow pigment which is probably produced by algae, and which comes off freely on the hand. With spittle it can be mixed into a yellow paint which appears to be identical with that used in some of the paintings in the Cave of Fishes.

On the wall of the rock face just above the level of the top of this separate slab of rock are three groups of paintings, executed in red ochre, and now very much faded by exposure to the weather. To the north is a diamond with a vertical diagonal stripe, about six inches in length, and beside this are two lizards vertically above each other, each 15 inches long, similar to a painting in the Camp of the Emu's Foot. The central group of drawings consists of a rather smudged figure of a dancing man, with two sets of emu tracks beneath him. The

RED ROCK CREEK SHELTER
Showing the polished rock at the foot of the painted rock face.

Photo: *Author*

tracks are two inches long and six inches apart, with the bird travelling vertically upwards. Further to the south, almost exactly over the centre of the polished slab of rock, is a typical lizard about a foot in length, and as clear and bright as any I have seen in the Grampians.

This new find appears to be particularly significant. Firstly, it is of no use as a shelter from the weather, as it faces directly into the south-west, as was forcibly demonstrated when the area was re-visited in the company of Mr. Ellis Tucker and his family. A cold south-west wind was blowing, with squalls of driving rain, and a bleaker spot could hardly be imagined. It is no wonder that the paintings are badly weathered, and it is astonishing that the main painting of the lizard retains its brilliance.

The exposed position of the rock face supports the opinion that the significance of the find lies in the slab of rock on the ground. Very little imagination is required to see in this rock the recumbent figure of a man. Unlike the rock in the floor of the shelter at the Camp of the Emu's Foot, it is quite unsuitable for use as a seat, as it has a sharp upper edge, and its polish has probably been attained by the rubbing of innumerable hands along the top of the rock. This would suggest that the rock had some sacred significance, and it may represent the recumbent body of a revered ancestor. The aborigines may have obtained some merit or strength by rubbing their hands along the rock and then over their bodies. If the aborigines made pilgrimages to this area for this purpose, it would be natural for them to paint totemic symbols on the wall of the rock face, and to emphasize the central lizard motif by deeper colouring.

The presence of these paintings raises hopes of a new series of painted shelters along the Red Rock Creek similar to those of Cultivation Creek and Deep Creek, but so far our search of the area has failed to reveal any interesting finds in the almost inaccessible country through which the Red Rock Creek makes its way.

However, a deep rock well was found nearby, which would furnish a constant water supply even when the little Red Rock Creek itself was dry. This was similar to other rock wells known to have been used by the aborigines.

In order to be consistent with the method of identification of the shelters in the Cultivation Creek area, it is suggested that this shelter should be called the Red Rock Creek Shelter. If, as I hope, other shelters are found in the area, this would become Red Rock Creek Shelter No. I.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Eastern Spinebills

This interesting note comes from Mr. Jacobs of Narre Warren North.

There is no doubt that the Eastern Spinebill (*Acanthorhyncus tenuirostris*) is a handsome bird, and once identified is not easily mistaken again. The first time I saw the species was at Eildon in January of this year. The single bird was feeding on the flowers of mistletoe. The next day we saw another bathing in a lucid pool at the headwaters of Snob's Creek.

During Easter at the Grampians, the first days were overcast and stormy, but nevertheless we braved the walk from the circular roundabout to the Pinnacles. We had it to ourselves and were surprised at the number of plants flowering. The predominant ones were Correa, Green Groundberry (*Acrotritche serulata*) and Cranberry Heath (*Astroloma humifusum*). Eastern Spinebills were busy on them too; so busy in fact that one of them continued feeding not four feet from the toe of my shoe. Perhaps this preoccupation is not so surprising when one considers the number of sips of nectar required to make a satisfying meal. Next morning I saw more of them north of Hall's Gap weaving in and out of the same plants as they fed.

On 18 May, while walking along the drain at the high side of Churchill National Park, and noting how popular this water was with the birds, four of these Spinebills perched on the pink and white heaths and fed for a time. I remember remarking to Simone: "We have a patch of heath at Narre North. If only there are a few patches of heath between here and home we might even see them on our block." I was not exactly hopeful, as two years of observations in that area had not resulted in a record of them.

On the first weekend in June the birds were particularly busy on our block. A Willy Wagtail scolded from the fence while a pair of Grey Thrushes worked in the grass. Scarlet Robins sought insects among the screenings on the drive and a flock of Brown Thornbills worked in the trees and shrubs. *Callistemon citrinus* and *Grevillea* Poorinda Beauty were, for the first time, in massed flower, and exerting a magnetic influence on the local honeyeaters. The local pair of White-plumed Honeyeaters were first to arrive. Next to appear was a single White-eared Honeyeater. While

it fed in the grevillea there was a flash of white as a bird landed in a small flower bed and probed a single stock blossom for nectar. The Eastern Spinebill had found its way to Narre Warren North. It replaced the honeyeater at the grevillea and swung there, sipping awhile, then flew directly away. It had been an exciting interlude. The rewards for planting native shrubs and trees had become vividly apparent. The future with many other species yet to blossom was equally promising.

Marsupial Mouse in the Otways?

Further to the notes from Mr. P. N. Homan of Reservoir, which appeared in the *Victorian Naturalist* of last month, Mr. N. Wakefield has clarified the position with regard to Antechinus spp., and Mr. Homan's query—

The phascogale pictured on the cover of the May 1966 issue of the *Victorian Naturalist,* and the animals dealt with in David Fleay's original article in the September 1932 issue (Vol. 49, pp. 132-4), are *Antechinus stuarti,* not *A. swainsoni.*

The specimen from the Otways, reported in the July 1966 issue (Vol. 83, p. 171), is not *A. swainsoni* as suggested. The long smooth tail "curled at the tip", the soft fur, the darker colour near nose and on feet, and the almost white under-fur, are features of the pigmy-possum, *Cercartetus nanus.* The ears of this species, large when fully extended, are folded during sleep.

Honey-eaters at Ballarat

Mr. Sheldon's note about Yellow-winged Honeyeaters has prompted Mrs. Bon Strange to write:

On April 7 this year I was watching honeyeaters in a patch of *Banksia marginata* near Enfield when I became aware of a call that was strange to me. At first glimpse the bird looked a little like the Yellow-winged; but it obligingly perched nearby in full view and I was able to study it minutely, and there was no doubt that it was the Crescent Honeyeater, a bird I'd never seen before. There were at least six of this species in the near vicinity, two males and others females or immature birds. I kept them under observation up till June 17 when there were still Banksia blooms and lots of Common Heath. I do not know if they have departed.

For many years I have encouraged honey-eaters by placing honey feeders around the garden.

These are especially popular from the beginning of April through to spring, and then the blooms on our *Paulownia* trees attract scores of honeyeaters and Red Wattle-birds and their voices fill the air with joyous sound.

Till 1965, on no occasion had I seen more than two yellow-winged but a group of nine were welcome visitors. Five Yellow-winged have been coming regularly since April 2. this year.

Yellow-faced never seem to be absent from the feeders, and their cheerful "Chick-Up, Chick-Up" call is to be heard from daylight till dark. And how they scold when they find a feeder empty.

Spinebills seem to be limited to two but they sip for twenty minutes at a time, and have no objection to sharing with the Yellow-faced. Three or four bills are often directed to the same opening.

This year a lone White-eared has been coming since April 3. At first he refused to share his feeder but a few days ago I noticed two Yellow-faced at a feeder with him. He claims the Daphne bush as his own and chases all others from it even if he is at a feeder.

On June 28, I heard a new voice and could hardly believe my eyes when I saw a Yellow-tufted sampling the ersatz nectar. I know these birds around Maryborough where they are plentiful, but have not seen one in the Ballarat district previously. This lone bird has come several times daily for fifteen days now.

Apart from the honeyeaters a group of about twenty Silver Eyes appreciate the easily obtained syrup and their squeaky notes are often heard; but only occasionally have I heard their true melodious song. Several of these little chaps are aggressive and tend to waste a lot of time chasing their companions away from the feast. They spread their wings, and quivering with rage, chatter what I'm sure is bad language in bird-land.

Fairy Shrimps in Colac

By W. Genery

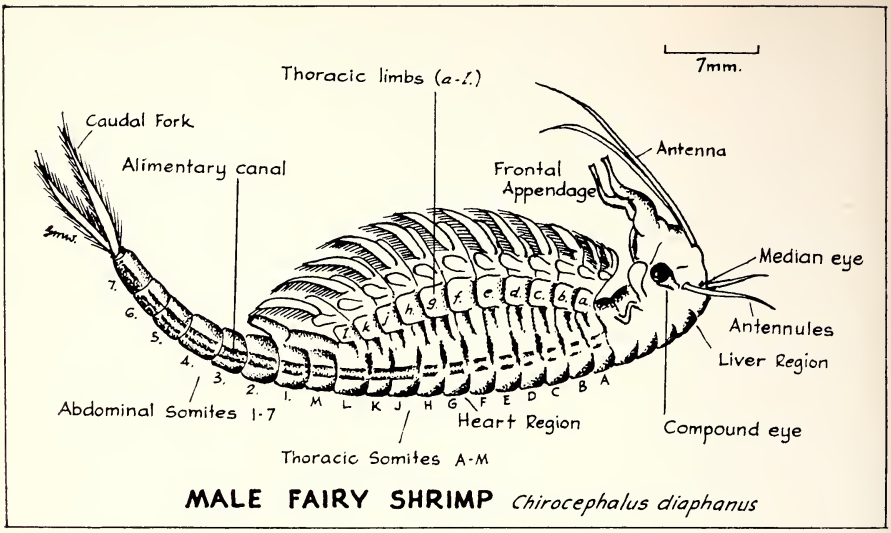
Last winter in a fresh-water pool near Lake Corangamite, I found some "Fairy Shrimp" or *Chirocephalus diaphanus*. With them I found some *Lepidurus* and some "Clam Shrimps" of the Order Conchostraca. These three groups of specimens, each belonged to a different order of the sub-class Branchiopoda; Anostraca, Notostraca and the Conchostraca, comprised the entire division of its subclass. Phyllopoda is a term not used now because of some ambiguity, but was used extensively by the early naturalists to designate the whole of the sub-class Branchiopoda, exclusive of the Cladocera. On my way home, that same day I also discovered some *Artemia salina,* or "Brine Shrimps", which belong to the same order as the above *Chirocephalus diaphanus*.

The Fairy Shrimp is considered to be one of the most primitive of our crustaceans, and very little research on it has been carried out here in Victoria, probably on account of the scarcity of specimens, the exceeding minuteness of the many complicated appendages which are attached to their thoracic segments, and the difficulty in keeping them alive. All this necessitates seeking them out and observing them on the spot, fresh from their natural habitat.

After many failures, I am now able to keep them alive, and I have been able to observe their development from the egg to the mature animal. The Fairy Shrimp has a long slender cylindrical body with no shield or carapace attached, hence the name of the Order, Anostraca (no shield). The Fairy Shrimp always swims on its back.

The head has two pair of antennae attached, the superior and inferior. The thorax is divided into eleven segments, each segment being equipped with a pair of complex appendages, whilst the abdomen consists of nine segments and ends in two lamellar appendages beset with plumose setae, the caudal appendages.

The antennae differ greatly in the male and female. In the male, the superior are straight, flexible, and composed of a number of small articulations. These antennae are about the length of the head, their origin is a little above the eyes and they point upwards. The inferior are very remarkable structures and were called by the earlier naturalists "claspers", a name by which they are still known today. These claspers are prehensile and are situated at the front of the head curving upwards towards the thorax. They are articulated half-way down; the first joint being long, curved and cylindrical with a strongly toothed process, at its base. Arising from the base there are in addition two long, flat and curved appendages which are toothed at the edges; these fold up when not in use, and are carried as a butterfly carries its proboscis. During mating these appendages are extended in a straight line and in conjunction with the claspers are used to seize and hold the female.



MALE FAIRY SHRIMP *Chirocephalus diaphanus*

In the female the superior antennae resemble those of the male whilst the inferior are more simple in construction, and consist of two short, stout, and sharp horn-like bodies projecting forwards and downwards, and lacking any of the appendages present in the male. The very large, convex and oval shaped eyes consist of a number of lenses. They are situated at the sides of the head and, being located on moving peduncles, the animal has vision in all directions. Between these eyes is a black, triangular, sessile eye-spot, which is the remains of the cyclopean eye from the nauplius stage of the animal. The mouth consists of a lip, one pair of mandibles and the jaws. The lip is articulated and is able to open and close alternately. The mandibles are very large and are furnished with numerous fine teeth.

The thorax is cylindrical and is composed of eleven segments each united to its fellow by a membrane, thus allowing sufficient movement to permit the animal to curve its body into a circle, a position which it assumes frequently whilst swimming around in the water. The first segment is the largest; the others diminish in size towards the abdomen.

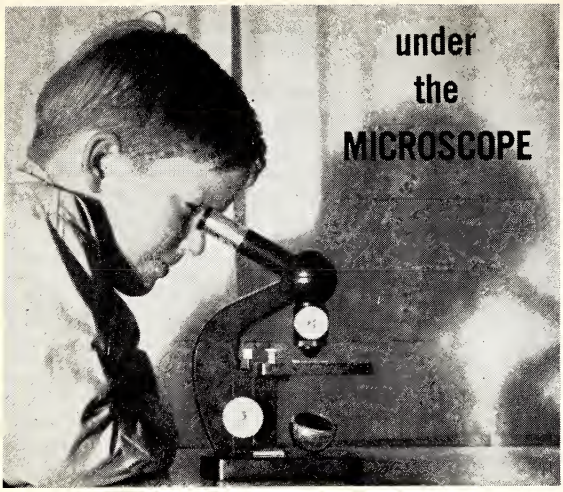
Attached to each of these segments is a pair of branchial feet, which are broad and foliaceous and consist of three segments. The first segment is the largest and has on its lower edge a semi-circular branchial plate from which arise about forty plumose hairs. The second segment has on its inner edge three projections each with long hairs. The third segment is long and narrow and gives off numerous long plumose setae. The first pair of appendages is the smallest, and the others increase in size until one reaches the tenth pair. The eleventh branchial appendages are much smaller than the preceding pair.

The abdomen consists of nine segments of which the first two are the largest, the rest gradually diminishing in size to the tail, which consists of two lamellae beset around their edges

with beautiful plumose setae. Between the first and the second abdominal segment of the male, the organs of generation are to be seen. In the female the external "ovary" or oviferous sac, which is very large, extends from behind the first abdominal segment to the fifth. It is conical in shape and pointed at the vulvae end. The interval oviducts can be seen situated on each side of the alimentary canal and leading to the oviferous sac. Often about forty ovae, in varying stages of development, can be detected in the oviducts, whilst in the oviferous sac, groups of about twenty dark and ripe ova can be seen ready to be expelled.

Earlier writers (Shrank and Prevost), insist that the male has two penes. I have seen one male where this is correct, and I have seen this also with the Brine Shrimp, *Artemia salina.* Fertilization is achieved during the apposition of the ventral surfaces of the two sexes. The ripened ova are deposited loose in the water in groups of about forty, perhaps once per week for one month; but during hot weather this period is much shorter. After a period varying from days to weeks the ova hatch. The young are quite unlike the adults; they consist of two nearly equal oval portions, head and body. The cephalic portion possesses two large antennae and two pairs of large natatory feet, the second pair being much larger than the first and furnished along their lower edge with a number of setae. The single sessile eye is situated in the middle of the head between the antennae. Shortly after birth (the period depending on the temperature) the young shrimp moults for the first time and one sees for the first time the lateral eyes. The body is increased in size and the divisions of the body into segments with knobs or projections, which are the rudiments of other feet, are to be seen. After moulting again, the first pair of feet have become movable and foliaceous, and the eyes pedunculated. With subsequent moults we see the conformation gradually approached that of the adult; the branchial feet become better developed, the eyes more perfect, whilst the large natatory feet gradually become converted into the prehensile antennae of the male or the cephalic horns of the female. The shrimp still continues to moult frequently as it approaches maturity and were it not able to change its skin it might be destroyed by the numbers of vorticellae that attach themselves to its body, and by a fungus that attacks the abdominal segments. This latter which forms a white mass, often proves fatal before the animal can moult again and rid itself of its unwelcome visitants.

Chirocephalus is found in temporary pools. After being present in a locality for several years they may disappear altogether to appear miles away. They are not destructive to other aquatic life. They feed by swallowing any detritus which comes their way. They fall an easy prey to fish, frogs and dytisci, which probably accounts for their being scarce and very hard to find. No other aquatic animal can display the elegance of form, the ease and grace when gliding through the water with its waving undulating branchial filiments in a state of perpetual motion; sometimes diving, surfacing, turning over, springing forward, circling now horizontally, now perpendicularly, turning around and delivering itself to countless bizarre and capricious gambols as are exhibited by the "Fairy Shrimps".



No. 2

The Hydra

By E. LeMaistre

Nature sometimes seems cruel, and we get the impression that the major rule is "survival of the fittest". Generally, however, if left alone, Nature maintains a balance and it is the changes brought about by mankind which affect this balance, sometimes with very detrimental results.

To achieve this equilibrium there must be food for all, and the Water Fleas, which were featured last month, provide the staple diet for Hydra, which in turn have specific means at their disposal for catching their prey.

A member of the phylum Coelenterata, and therefore a cousin of the Jelly Fish, the Hydra has a body like a hollow sac with a base or foot end, and at the other end a mouth-opening surrounded by tentacles just like those of an octopus on a very small scale. The tentacles, which wave about in the water, are abundantly covered with Cnidoblasts, specialized stinging cells which shoot out a barbed thread when the trigger mechanism is touched off. The threads, being sticky, hold the prey, but also the cells contain a fluid which enters the body of the captured animal and paralyses it.

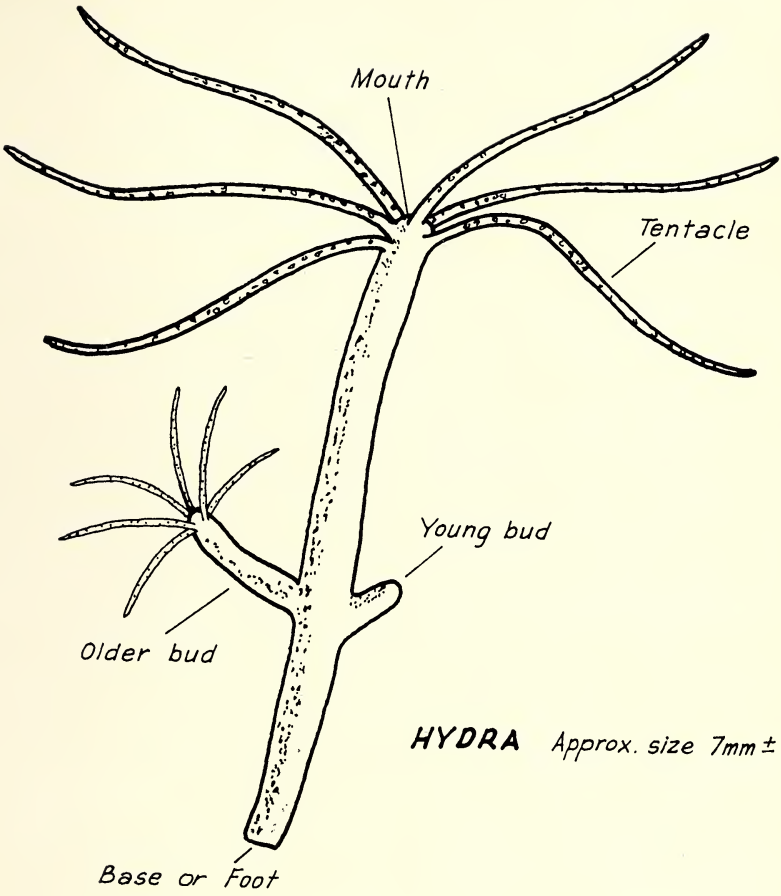
When the meal-to-be is enmeshed, the tentacles close and push it into the mouth cavity and thence into the body sac where its juices are absorbed and any indigestible remains ejected.

Normally Hydra tend to live attached to plants or some other support but they are capable of moving slowly by attaching themselves by the foot end and bending over, adhering with the tentacles, and thus somersaulting along the plant.

As a means of protection, Hydra are capable of contracting the whole of their body and tentacles into a small knob and so when searching for them, the material collected should be allowed to stand undisturbed in which case they will then expand to their full length, hanging from aquatic plants or the glass sides of the collecting bottle.

As well as reproducing sexually, the Hydra reproduce by budding (a much more common procedure) and can then be seen with a young smaller edition sprouting from the body of the parent from which it eventually breaks away to become a separate individual.

Hydra are best studied in a petri dish, or something similar, under low power, and if a few water fleas are added to the water the viewer may be lucky enough to see the Hydra make a meal of one.



HYDRA *Approx. size 7mm ±*

Victoria's Two Bower-Birds

By Roy Wheeler

It is fitting that in this issue, we present an article written by Mr. Roy Wheeler, the recipient of the 1965 Natural History Medallion.

Only two species of Bower-bird occur in Victoria, the Spotted Bower-bird *Chlamydera maculata* of the extreme north-west, and the Satin Bower-bird *Ptilonorhynchus violaceus* of the Otways and Eastern Victoria. The first named can be regarded as rare, whilst the Satin ranges from rather-rare to moderately common. Herewith are some notes on both species.

Male Spotted Bower-bird
Displaying

Photo: *J. Ramsay per R.A.O.U.*

The Spotted Bower-bird is found in the drier parts of the interior of Eastern Australia and its range from north-western Victoria includes western New South Wales and Queensland. It is very rare and possibly extinct in South Australia. This bird is just short of 12 inches in length, the upper plumage dark brown and spotted in rich buff, under surface a greyish white, tail and primaries tipped white and the flanks marked with light brown lines, whilst at the back of the neck particularly in the male bird, is a lovely collar of light rose pink. This can only be seen to advantage when the bird is displaying or stretching. The female is reputed to have much smaller neck plumes which become more in evidence as the bird grows older. The nest is a saucer-shaped structure made of twigs and fine grass and usually placed in a bushy tree at varying heights up to 20 feet. The two eggs are green-tinted yellow with beautiful traceries of strange markings in purple and brown. The playground or bower for which all bower-birds are famous is constructed of twigs and tall grasses and so put together as to form an archway of up to three feet in length.

Female
Satin
Bower-bird

Photo: *per*
Courtesy R.A.O.U.

Scattered in and about the bower are bleached bones and shells, pieces of glass and other bright objects, seed cases and the like. Some birds may use a bower for many years, whilst others have several bowers in the vicinity. The Spotted Bower-bird is an accomplished mimic as are most of the species.

My first experience with this bird was early one morning in October 1939, when camped on Lake Brockie, in what is now known as the Hattah Lakes National Park in north-west Victoria. Hearing a scolding note I peeped out of my one-man tent to see a bird eyeing me inquisitively from about 6 feet away in a Black Box. As it leaned closer I could see the lilac collar quite distinctly as the bird called with harsh chattering notes. My second sighting of the species was in the same area—this time at The Peppers at Lake Mournpool on March 3, 1943. There were eight separate birds feeding on the ripe pepper-corns on these giant trees and they were mimicking the Spiny-cheeked and Striped Honeyeaters which were also feeding in the trees, and a Kookaburra. One of the bower-birds was a youngster and was being fed most of the time I was there. My companion, Mr Jack Jones, and I had lunch under the shade of the largest tree as it was hot, and there we found a partly built bower with sides about nine inches in height and made of pepper tree twigs, and some charcoal and glass were strewn about the bower. The following day we saw birds again at the Isle of the Dead on the Murray River at the Kulkyne homestead. My next experience with them was in the same area in September 1947 when I again saw two birds at the "Peppers" at Lake Mournpool and another pair were seen again at the Isle of the Dead. That same day I visited a disused bower under a hakea bush beside the remains of an old hut and stockyard, opposite the then standing school at Gayfield. This bower which had been in recent use, judging from its appearance, was strewn with broken glass, bottle tops, hakea pods and

pieces of paper. It is indeed good to know that of recent years reports have been given of birds being seen in the same area, Hattah Lakes National Park, and near the Kulkyne Homestead. The bower at the homestead has been photographed by several naturalists. The *Emu* has records dating back to 1892 and the Spotted Bower-bird has been recorded at Lake Boga, Benjeroop, Piangil, Mildura, Karadoc, Nangiloc, Colignan, Hattah, Annuello, Nyah and Kulkyne. The *Victorian Naturalist* records them at Lake Charm, Hopetoun, Pine Plains, Wyperfeld, Kulkyne and Hattah Lakes National Park. It appears that this spieces once common along the Murray River Valley from Kerang to South Australia, still survives in isolated pockets such as at Kulkyne and the Hattah Lakes National Park and possibly between Mystic Park and the Murray River where they were reported seen recently.

The Satin Bower-bird inhabits the rain forests of Eastern Australia from North Queensland to the Otways in western Victoria. This species is slightly over 12 inches in length and the adult male bird has a lovely deep shining blue-black plumage, a striking light blue eye, a bluish horn-coloured bill and yellow-white legs. The female has a green-grey upper plumage with brownish wings and tail; the under surface has green-tinted yellow wash with dark brown crescent shaped extremities to the feathers to give it a scaly appearance. The eye is a deeper blue than the male and the bill is dark horn. The young males resemble the females but have more greenish underparts with more markings and the bill is a olive-black. The nest is a shallow open structure composed of fine twigs and lined with leaves, and as with the Spotted Bower-bird is built in a bushy tree, usually in a fork from 10 to 60 feet from the ground. The two eggs are a dark cream colour with brown spots. The bower is usually built in a cleared place in the scrub, which is covered with sticks and twigs to the depth of some inches. The two parallel walls of thin twigs are built to a height of about 12 inches and are about two feet in length. This is decorated with snail shells, flowers, and berries. Blue in particular is most favoured, and blue flowers, blue paper, blue feathers, and blue objects of various nature, are strewn about the bower and its platform. Bernard O'Reilly at "Greenmountains" on the Lamington Plateau in south-east Queensland once pointed out to me a blue toothbrush that had been taken from bower to bower for over 20 years. The species has several call notes and one is a harsh hiss that gives the first indication that the bird is about. It is of course, like its kind, a splendid mimic. The food of both the Spotted and the Satin Bowerbirds is wild and cultivated fruit and berries, insects and seeds. It once inhabited the Dandenong Ranges but of recent years they have only been reported occasionally. In April 1966, Mrs. Vasey of Ferny Creek had a couple of "green" birds visit her bird table for a short while. They occur at the Maroondah Dam near Healesville and in the Marysville district. In East Gippsland they are in greatest numbers and in the autumn flocks of up to 40 birds are common in some areas. In the Otways the birds are rather rare, although some years ago a friend of mine used to have up to 23 birds in his garden at Forrest. In 1939 a bird built a bower in the New Zealand section of the Royal Botanic Gardens, and in 1956 another visited a garden at Malvern. But the strangest occurrence is that of a female that took up residence at Springmount, near Creswick, in January 1963 and is still there.

Butterfly Migration Studies in Australia

The study of long-distance butterfly migration is in its infancy in Australia. With the co-operation of interested persons in various parts of Australia a study of this type of behaviour is being made.

Two lines of investigation are being used:

(a) Observation and recording of flight direction of individuals and massed flights.

(b) Marking and release of specimens.

At present, voluntary co-operators are being asked to report on flights of certain species and are marking and releasing specimens. In particular, Wanderer and Caper White butterflies are recommended for marking, but there is no restriction on species being marked and released. When a marked specimen is recaptured the marker is informed. From time to time reports on progress in the work are sent to the co-operators and we are now building up a picture of the movements of some species.

Every specimen is POTENTIALLY IMPORTANT. The more we mark and release the better. Marking is easily carried out, and several school teachers in N.S.W. are helping in the scheme and find this a useful practical exercise for the children.

Anyone interested in assisting us in marking and releasing butterflies can obtain further information from Mr. C. N. Smithers, Australian Museum, College Street, Sydney, who will be very pleased to answer any enquiries.

C. N. Smithers,
Curator of Insects.

Notice to Contributors

Material for publication should be typed, preferably on foolscap-sized plain paper, *double-spaced,* with plenty of margin on the left side. Abbreviations should not be used, and there should be no underlining of headings or other items in the manuscript.

In general, contributors should familiarize themselves with the format used in the *Naturalist* (in writing dates and figures, use of quotation marks, indication of references, etc.). Manuscripts conforming to this pattern need very little editorial attention and can therefore be put into the printers' hands immediately.

Field Naturalists Club of Victoria

F.N.C.V. General Meeting—11th July, 1966

The Herbarium hall was full to capacity and the President, Mr. M. K. Houghton, welcomed Mr. W. Roy Wheeler and his family to the meeting.

Members were asked to stand for a minute in silence in respect of the memory of Mr. A. Brunton who died recently. In the past, Mr. Brunton had contributed articles to the *Naturalist.*

Minutes of the previous meeting were taken as read and confirmed on the motion of Mr. E. S. Hanks and Mr. J. Strong. The President explained the significance of the Natural History Medallion which is awarded each year to one who has made an outstanding contribution to Natural History.

Nominations are from over one hundred societies all over Australia and the award is made by an Award Committee. Mr. Houghton expressed the pleasure of the F.N.C.V. in congratulating Mr. Roy Wheeler who was awarded the Club's medallion for 1965.

In presenting the medallion to Mr. Wheeler, Mr. E. S. Hanks outlined some of the work Mr. Wheeler had done with the Royal Australian Ornithological Union as a council member, vice-president, president and secretary, and with the Bird Observers' Club as vice-president, president and secretary. He has written numerous articles for the *Bird Observer* and *Bird Lover* and was convener of a scientific study group on an Altona survey between 1950-1962, and his paper, with Miss Ina Watson, on the Silver Gull is referred to all over the world. In 1951 he worked on recording the movements of swifts. He is the author of a Hand List of birds of Victoria published by Melbourne University Press. He has done a great deal for children as a member on the committee of the Gould League and as vice-president.

In all Australian and New Zealand societies concerned with birds he has taken an active part and has been chairman of the International Council of Bird Preservation. He has worked in association with the Fisheries and Wildlife Department and conducted Adult Education Groups at Mount Beauty.

Mr. Wheeler in responding, thanked the Award Committee for the honour given to him.

He recalled previous memorable occasions in the Herbarium, one in 1951 at the R.A.O.U. Congress in the presence of Sir Dallas Brooks when he had to give a talk on the Altona Survey illustrated by passing around the birds' diet of worms and such messes; another occasion at last year's R.A.O.U. Congress when he was given a birthday party; and this night was for him the third great occasion in the Herbarium.

Mr. V. Miller, a past president of the F.N.C.V. and of the Bird Observers' Club spoke in appreciation of Mr. Wheeler and presented Mrs. Wheeler with a handy bag for their journeys into the country.

A request from a scientific research source in Holland for information on fungi, especially Beenakia was received by the secretary.

Mr. Roy Wheeler gave a talk on "Bird Wonders of Australia" illustrated by superb colour slides taken by B.O.C. and R.A.O.U. members from all over Australia. These were projected by Miss Ina Watson.

Tape recordings, made by Mr. D. Knight, of many songs of birds were heard while the pictures of the same birds were shown. These included the reed warbler, lyre bird, grey thrush, crested bell bird, golden whistler, rufous whistler and olive backed oriole.

Habitats and nests with young of many of the birds were shown ranging from the Kimberleys with the black tailed tree creeper, Palm Valley with a turquoise wren to Sydney's rock warbler and Macquarie Island with the wandering albatross and colonies of royal penguins.

The President thanked Mr. Wheeler for the memorable evening and also those who had lent the beautiful slides.

Seven new members whose names appear in the July *Naturalist* were elected.

Exhibits shown included a big flower head of *Doryanthes excelsa* (gigantic lily) from near Sydney and exhibited by M. Lester.

Kauri gum from North Auckland, N.Z. and Hay's flat coiled snail (*Pedinogyra hayi*) from Queensland by Mrs. North.

Birds' nest fern leaf by Mrs. Matches.

Lerp insect under the microscope by Mr. A. J. Swaby.

Mr. Swaby reported that the lerp was defoliating thousands of red gum trees in the Mansfield area. The bugs suck the sap and undigested food is exuded in the form of a protective cover. He noticed that only the upright trees were affected, the weeping type being untouched.

He saw near the No. 1 Murray Power Station Currawongs and Satin Bowerbirds in droves competing for workmen's lunch scraps.

Mr. J. H. Willis reported that a yellow box tree near the Herbarium is infected by lerps causing leaf fall.

The journal of the Hawthorn juniors was exhibited.

Mr. R. Riordan showed an American Magazine "Sunset" containing a fine article on about fifty species of Eucalypts illustrated with colour pictures.

The President said goodbye to Mr. and Mrs. R. Hudson and expressed the regret of the Club at losing them.

Mr. Hudson has helped generously in his work as Assistant Secretary and as Editor of the *Naturalist* and Mrs. Hudson has always assisted at the Nature Shows. They will be greatly missed.

The good wishes of the Field Naturalists go with them on their return to England.

Mr. Hudson said they were sorry to leave and they had enjoyed the association with the Club and the Bird Observers.

Geology Group Meeting—6th July

Thirty-two members and visitors were in attendance with Mr. Dodds in the chair. Mr. McInnes reported on the excursion, which he led, along the old Sydney road. The object was to study the newer Volcanic Vents occurring in that area. The leader with the aid of a map explained these vents and the order in which they erupted. Stops were made at several vantage points en route which gave splendid views of these vents. The party continued along a ridge of Silurian bedrock to "Pretty Sally" and returned via the Woodstock road passing Hayes Hill, the vent responsible for much of the Basalt to be seen at Collingwood and Richmond. This well conducted excursion was appreciated by all who attended.

Mr. Box reported on the Queen's Birthday weekend excursion to Stawell. He said the most outstanding feature of the trip was the overwhelming hospitality given by the Stawell Club. He said many places of interest were visited including Mt. Difficult, where sandstone is quarried. This sandstone was used in Parliament House, Melbourne. On the Saturday evening Mr. Davidson gave a talk on gem-stones and showed a fine collection of his own gems to support his lecture. Mr. I. McCann responded on the following night with a selection of slides. His expert photography was appreciated by the visitors. The Stawell Club is to be complimented for their effort. As this meeting was a members' night a varied program was given, several members contributing. Firstly, discussion on several Geological questions took place. Then Mr. Heath showed a selection of slides from North and Central Australia. Finally Mr. Skopakou showed a movie taken on several of the club's excursions.

Exhibits—

Mr. Dodds: Rhodenite, Galena, Galena with Garnets, Broken Hill Mica Crystal, Orthaclase Crystal, Beryl Halloysite, Broken Hill area.

Mr. Gunn: Chiastilite, Olary; Fossil Starfish; Yarra Glen. Siderite; Thakeringa.

Mr. Wigmore: Galena, Rhodenite, Stauralite in Honsfels; Broken Hill area.

Mrs. Salau: Quartz Crystal Group, Heathcote.

Group Meeting—7th September.

Mr. R. Dodds: Talk on his visit to Broken Hill.

Marine Biology and Entomology Group Meeting—July 4th, 1966

The meeting was chaired by Mr. R. Condron, 16 members being in attendance.

Nominations for the offices of Chairman and Secretary were called for. Mr. R. Condron was nominated as Chairman and Mr. J. Strong as Secretary. As there were no further nominations, Mr. R. Condron was re-elected as Chairman and Mr. J. Strong as Secretary.

Mr. Paul Genery showed a picture from the C.S.I.R.O. relating to the misuse of insecticides and which he suggested might be used as part of the display in the forthcoming Nature Show.

Mr. McInnes suggested that we have the display put on a board and Mr. Condron offered to help Mr. Genery with it.

Mr. E. Coghill read a letter which he had received from the National Museum, Sydney, in connection with the migration of butterflies and the tagging of same and asked for the assistance of members interested. Mr. Condron offered to write to the Museum and ask for more information on this matter.

Mr. Condron then introduced the speaker for the evening, Mr. J. Barnes, Quarantine Officer, Department of Agriculture. Mr. Barnes' subject was "Some Aspects of Quarantine".

This talk proved to be very interesting and informative: it dealt with the problems that quarantine officers come up against, such as the prevention of the introduction of viruses and bacteria in plants from overseas.

Mr. Barnes said that different types of virus could be introduced by sucking insects and bees, and that some forms of virus had not yet been seen through the electron microscope. He described the method of fumigation of imported seed and the sterilization of seed beds.

At the conclusion of his talk members realized what an exacting job a quarantine officer performed, and many questions were asked. A vote of thanks was moved by Mr. P. Genery.

Exhibits

Mr. R. Condron showed a species of scale insect which he thought was the white wax scale *Ceroplastes destructor,* a common coccid in gardens.

N.B. There will be no meeting of this Group in September.

Report of the Microscopical Group Meetings for April and May 1966

April—

Over thirty members and visitors attended this meeting which was chaired by Mr. J. Daws. A great number of those present were public school boys who showed a great deal of interest in the proceedings of the evening.

The subject for the night was "Instant Slides", and the speaker, Mr. K. Trotter, gave those present a most entertaining evening. He spoke about most aspects of microscopy including the history of slide making from the days when they were made of pieces of ivory to the present day standardized mass produced ones. With those of the former type, the specimens were sandwiched between two discs of mica which were then merely placed in holes in the ivory slips, hence the title of the lecture, "Instant Slides"!

Around the turn of last century microscopy was a most popular and entertaining pastime for all who could afford it. A microscope, and a box of slides on various subjects were the object of many presentations to those going into retirement.

To add further interest to the subject the speaker re-created a slide such as was made 100 years ago; unfortunately many of these have broken down with the passing of so many years. This is not surprising when we consider the type of mountant used; sometimes even honey and egg albumen!

Slides made then and now are: temporary slides, permanent slides, show slides, dry slides and fluid slides etc.

Unfortunately, of the countless slides in the club library, which must represent thousands of hours of labour, many have broken down and are quite useless.

He then gave the group a simplified version of the explanation of "refractive index", and described the making of various type of slides, ringing, the various mountants and the problem of bubbles.

All present expressed their gratitude and thanked the speaker for the amount of work he had put into the preparation of the talk.

Slides on exhibition were: Fowl mite, green hydra, radiolaria, a moth proboscis caught in the vice-like apparatus of a carnivorous plant, meteorites from Port Phillip Bay, anchors and plates, diatoms, slide of brownian movement and some paedastrum.

May—

Seventeen members and visitors attended this meeting which was chaired by Mr. J. Daws.

Mr. D. McInnes advised members that there will be a slide making exhibit at the September Nature Show and it was decided that Mr. K. Trotter be put in charge of it.

The Secretary was asked to contact Esso Oil Exploration with the view of obtaining if possible some specimens of the core from the drilling operations taking place in the Bay; members felt that this could be a possible source of some very interesting forms of marine life.

Mr. K. Trotter displayed to those present a very useful microscope lamp which he said was obtainable for $31. He also suggested and offered to supply, a notice board on which could be posted information regarding the source of microscopical books and equipment etc. All agreed that this would be a great help.

Mr. P. Genery projected through his micro-projector a very large number of slides of prepared and stained marine specimens. Mr. D. McInnes discussed each slide and pointed out various interesting structures which could be seen.

The slides consisted mainly of hydrazoans, brittle stars, medusa and various marine worms.

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

GENERAL MEETINGS

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

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "The Fly Problem"—H. B. Wilson.
4. Election of New Members.

Ordinary:

Crome, Francis H. J.. 50 Panoramic Gve., Glen Waverley. Interest—Entomology.
Jack, Miss Dorothy A., 10/576 Glenferrie Rd., Hawthorn E2. Interest—Fauna.
McGregor, Ian F., 26 Bayles St., Parkville. Interest—Fauna Survey.
Morrison, G. C., c/- A.W.B. Dept of Civil Aviation, GPO Box 1839 Q, Melbourne. Interests—Microscopy, Botany, Marine Biology.

Country:

Burton, Mrs. Patricia, Lot 9 Griffiths Rd., Upwey, Vic. Interests—Geology, Anthropology.
Smith, Colin. 44 Ahearn Rd., Pakenham East. Interest—Botany. Introduced by Miss Galbraith.

Junior:

Master Bruce Burton, 11 yrs., Lot 9 Griffiths Rd., Upwey, Vic. Interest—Microscopy.

5. General Business.
6. Nature Notes and Exhibits.

Monday, September 12—Land Forms and Vegetation of Bass Strait—J. B. Willis.

GROUP MEETINGS

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

Thursday, August 11—Botany Group. Speaker, Mrs. E. Webb-Ware—"Ferns".

Wednesday, August 17—Microscopical Group. Subject, "Phase Contrast Microscopy"—Mr. H. Mueller.

Friday, August 26—Hawthorn Junior F.N.C. at Hawthorn Town Hall. Subject: Birthday Night—Members' Exhibits.

September 5, 6, 7—Nature Show at Melbourne Town Hall, 10 a.m. to 10 p.m.

Monday, September 5—Marine Biology and Entomology Group. **No meeting shall be held this month.**

Wednesday, September 7—Geology Group.

Thursday, September 1—Mammal Survey Group, at Fisheries and Wildlife Department Library, Flinders Street Extension, at 7.45 p.m.

Thursday, September 8—Botany Group. Subject, "Casuarinas"—J. R. Garnet.

Friday, September 9—Preston Junior F.N.C. at Rechabite Hall, Preston.

F.N.C.V. EXCURSIONS

Sunday, August 21—"Wattle Excursion" to Mt. Hickey; leader, Mr. J. R. Garnet. The coach will leave Batman Avenue at 9 a.m. Fare, $1.60. Bookings with Excursion Secretary. Bring one meal and snack.

September 17 to October 2—Queensland. The remaining cost of this excursion should be paid by the August 8 meeting ($220.00 less deposit already paid). Transport to Essendon Airport will leave T.A.A. Terminal, 452 Elizabeth Street, at 7.15 a.m. on Saturday, September 17.
Itinerary of trip will be provided for each member of party.

December 26, 1966, to January 2, 1967—Details of this excursion will appear in the next issue of *Victorian Naturalist*.

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, 1966

President:

MR. M. K. HOUGHTON
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: MR. A. J. H. FAIRHALL, MR. T. SAULT

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. A. G. HOOKE, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg N22.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MRS. P. E. MATCHES, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: MR. R. BOX, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: MR. P. GENERY, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

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The Victorian Naturalist

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Editorial

This editorial is not directed towards members, but we **can** be instrumental in publicising to others some of its contents.

With the conclusion of Saturday sporting activities, Sunday brings the opportunity for families to enjoy the beauties of the closer countryside; to hold their barbecues and picnics; and to examine the bush-land generally, provided it involves not too much walking.

The left-overs of their enjoyment are obvious, if one is to wander through these parts during the days that follow a weekend.

One such popular spot is Sherbrooke Forest, no doubt due to the ease with which the lyre-bird may be seen. However, not only is it seen, but its diet is supplemented with portions of cheese sandwiches, unwanted cakes and small buttered scones; a great deal of which are thrown towards the bird as it performs on its display mound. These mounds, if not trampled flat, are quite often left decorated with empty potato-chip packets and soft-drink cans.

All these offerings is no way encourage the bird to perform more dramatically, but merely add the burden of cleaning to the already onerous task of the Forest Ranger. The food scraps may also encourage possums to expose themselves unnecessarily to the danger of the feral cats.

To the average person, the call of the lyrebird should be fairly obvious, and once the direction from which it comes is established, a quiet and careful approach is often rewarded by the sight of the "display". This should be observed in silence, and when it is finished, the exit should be quiet and unhurried. There is no need for any throwing of tit-bits or the shouts of excitement.

Another area which I have had occasion to visit recently is an area of forest not far from Noojee. On my last visit I was dismayed to find that a small grotto, on the floor of which grow many ferns including the attractive Lance Waterfern, had been used not only as a receptacle for lunch bags and papers, but that the flora had been trampled down, presumably by some unthinking plant-hunter.

All this is so unnecessary, and if we can help prevent these things, we will have fulfilled at least part of the aim of our Club.

Front Cover:

The animal pictured here is often confused in name with the Tasmanian Tiger, which was featured last month. It is of course the Tasmanian Devil, *Sarcophilus harrisi*, and is quite dissimilar in appearance.

References to it have appeared in recent weeks due to attacks on snared possums in Tasmania, its only region of distribution today; although previously it occurred on the mainland.

Fortunately, the struggle for survival of this species is not as critical as that of the "Tiger", and for those interested, it may be seen at the Sir Colin Mackenzie Sanctuary near Healesville.

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F.N.C.V.

September 12, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

A Regeneration Study in the Victorian Mallee

G. Ross Cochrane* and N. H. Eric McDonald†

Abstract

Numbers of species and total biomass on mallee dunes were both higher on a regeneration plot than on adjacent open country. Faecal counts and evidence from kangaroo tracks indicated a similar density of grazing by indigenous herbivores in both areas. The differences were due essentially to a reduced feral rabbit population within the regeneration plot.

Introduction

The Hattah Lakes National Park, within the Kulkyne State Forest, is part of the Mallee Region (Central Planning Authority 1952, Rowan and Downes 1963) found in the arid northwest of Victoria. At Hattah Lakes mean annual rainfall is about 11·5 and very erratic. Yearly totals of rainfall range from under 6 in. to over 20 in. Percentage variability is about 26. Summers are hot and dry. Average summer maximum and minimum temperatures are 89°F and 60°F respectively. Temperatures frequently exceed 90°F, and above-century temperatures are common during November to February. Winters are mild and generally moist. Potential evaporation is approximately 60 in. per annum. Growing season, based on soil moisture availability (Leeper 1950), is normally restricted to the three winter months. Although numerous plant communities occur throughout the Mallee Region, a unique plant formation of multi-stemmed *Eucalyptus,* known as mallee (Wood 1929, Burbidge 1952) predominates, particularly on the east-west trending longitudinal dunes occurring throughout most of the Region.

Much of the mallee has been cleared for cereal production and sheep grazing. Wind erosion on a vast scale has been a severe problem and still occurs widely as most of the soil parent materials are unconsolidated eolian strata, which range in texture from sand to clay (Zimmer 1946, Butler 1956, 1959). In addition to complete clearing for agriculture, interference with the vegetation by introduced browsing and grazing mammals results in rapid change.

The present note compares species present and biomass measurements on open range and on a regeneration plot in June, 1965.

Study Area

The study area is located on a large dune and adjacent plain (lake floor) flanking the northwest end of Lake Hattah in the Hattah Lakes National Park. The general area was formerly covered with Mallee (notably *Eucalyptus oleosa, E. dumosa, E. gracilis, E. calycogona, E. incrassata, E. angulosa* and *E. oleosa* var. *glauca*). Savanna mallee, *Eucalyptus* spp. with porcupine grass (*Triodia irritans*), was probably present on some dune crests. It is present on similar undisturbed sites. Scattered woodland of *Callitris glauca* (Murray pine) and *Casuarina leuhmanni* (buloke) occurred on local areas of more fertile red sands similar to the regeneration

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† Ranger, Hattah Lakes National Park, Victoria, Australia

area dune. Where there has been ingress by livestock and feral rabbits this has caused the death of the mallee, pines and buloke and has induced an essentially herbaceous cover. *Stipa* spp. (spear grasses) and wallaby grass (*Danthonia* spp.) are the main indigenous grasses but exotic weeds, particularly composites and grasses are important.

The original cover of the dune in the regeneration plot was

> ". . . trees and plants independent of flood and surviving on low rainfall—pine, belah (?), buloke, *Pittosporum,* conspicuous in colour and shape as individuals, small groups and sometimes as open forest. . . . Once it was thick forest, mainly of pine, largely fallen to add to grazing acres, and without succession because stock and rabbits ate each year's (season's) seedlings . . ." (Victorian National Parks Association 1959).

Soils on the low-lying embayment flanking Hattah Lake (Fig. 1) are subject to frequent periodic flooding. They are coarsely structured, heavy, grey clays supporting scattered large trees of *Eucalyptus camaldulensis* (red gum). On slightly higher levels that are occasionally flooded, shallow sandy loam overlying heavy grey clays support a woodland of *E. largiflorens* (black box). There is an abrupt transition to the dune soils which are deep, loose reddish-yellow sands overlying a compact, sandy clay loam subsoil rich in lime. These supported mallee in undisturbed areas and depauperate grassland in disturbed areas.

FIG. 1—The low weed mat, bare sand and dead stalks of *Rapistrum rugosum* of the open range (foreground) contrast clearly with the grass sward, *Swainsonia phacoides* (left) and bushes of *Psoralea eriantha* on the dune crest within the regeneration plot. The tree canopy of *Eucalyptus largiflorens* and *E. camaldulensis* growing on the lakeside flat is visible beyond the dune.

Methods

A plot of approximately 4 hectares of dune, including a small area of flat flanking Lake Hattah, and bounded on the east by the lake, was completely enclosed by a fence on the 7th September, 1963. The three wire, 4·5 ft high fence also had a 2 inch mesh wire netting 3 ft above the ground and buried 9 in. below ground. Despite this, rabbits gained entry on several occasions so that more than sixty of them were destroyed inside the plot, the last of these on the 10th June, 1965.

Three hundred and fifty native pine (*Callitris glauca*) were planted at the time the regeneration plot was enclosed. These were inspected for browsing damage from rabbits and for percentage mortality.

Following the extermination of the rabbits, species counts and biomass measurements were taken within the regeneration plot and outside on the open range. Species counts were taken along transects and within six quadrats, 1 m^2 in size. Clip quadrats of standing biomass and ground litter were then taken from these same quadrats. Wet weights were recorded in the field. Dry weights were measured after the harvested materials had been dried to a constant weight. Spoor and faecal counts of kangaroos (Macropodidae) were taken along six transects each 400 metres long. Three of these were within the regeneration plot: three outside it. Soil pH and profile characteristics were tested at each clip quadrat site.

Results and Discussion

A list of species present along transects and within quadrats is shown in Table I. Thirty-nine different species were found within the regeneration plot: 22 outside it. Of the 17 species not found on the open range, all are indigenous. Seven species, *Psoralea eriantha, Swainsonia microphylla, S. phacoides, Lotus australis, Calotis erinacea, Anguillaria dioica,* and *Stipa variabilis* were plentiful and growing vigorously following enclosure and reduction in feral rabbit population. *P. eriantha* had increased much more remarkably than any other species within the plot (Table II). The first four species (all legumes) are subject to heavy selective grazing by rabbits and rapidly disappear without protection.

Four herbs (*Wahlenbergia bicolor, Morgania glabra, Goodenia affinis* and *Senecio glossanthus*) and two climbers (*Convolvulus erubuscens* and *Thysanotis tuberosus*) also responded to reduced grazing pressure, being found only inside the regeneration plot. A shrub, *Acacia ligulata,* which is readily killed by rabbits stripping the bark, was reappearing also. A single individual of *Glycorrhiza acanthocarpa* was observed within the plot on the Lake Hattah flat. An unidentified sedge was also found only within the regeneration plot.

One of the plants growing within the plot is an as-yet-undescribed *Sida.* Willis (1966) states that this particular plant has never been scientifically described but that the eminent botanist, F. von Mueller, had a specimen of it from South Australia and put a sheet of notepaper with it bearing the name *"Sida ammophila",* but never published it. The National Herbarium, Melbourne, is now going to publish a scientific description of this species for Willis based on the specimens from the Hattah Lake regeneration plot.

Of the 22 species found on the open range, the seven common ones were all exotics. Apart from *Bromus* grass the others were the weeds, *Hypochoeris radicata, Chondrilla juncea, Silene gallica, S. nocturna, Silybum marianum, Marrubium vulgare,* and *Rapistrum rugosum. Danthonia semiannu-*

laris (*Notodanthonia semiannularis*) and *Ajuga australis* were also frequent. The former is a xerophytic, fibrous grass: the latter herb colonises bare dune areas. Some plants recorded as present on the range (Table I) were very rare.

In contradistinction to the higher number of species present within the regeneration plot, the total number of individuals was consistently higher on the range. This resulted from the dense "sward" of weed seedlings that alternated with frequent bare sand on the range. Except after rains, when weed seed germination is rapid and usually short-lived, bare areas are widespread on the range. A more uniform cover of larger plants was present inside the plot (Fig. 1). Average densities of plants along transects were 36·2 per metre on the range

TABLE I

Species List for Range and Regeneration Plot

Species	Regeneration Plot		Open Range	
	Frequent	Present	Frequent	Present
Swainsonia microphylla	X			
S. phacoides	X			
Lotus australis	X			
Calotis erinacea	X			X
Psoralea eriantha	X			
Dianella revoluta		X		
Anguillaria dioca	X			
Stipa variabilis	X			X
**Bromus* sp.	X			X
**Hypochoeris radicata*	X		X	
**Chondrilla juncea*		X	X	
**Rapistrum rugosum*	X		X	
**Silene nocturna*	X		X	
**S. gallica*	X		X	
**Solanum nigrum*		X		X
Eucalyptus camaldulensis		X		X
E. largiflorens		X		X
Callitris robusta (*C. glauca*) (mostly planted)		X		
Acacia ligulata		X		
Dodonaea attenuata		X		X
Nicotiana velutina		X		X
**N. glauca*		X		X
Myriocephalus stuartii		X		X
Wahlenbergia bicolor		X		
Morgania glabra		X		
Convolvulus erubuscens		X		
Glycorrhiza acanthocarpa		X		
Thysanotis tuberosus		X		
T. pattersonii		(?)		X
Cyperaceae		X		
Goodenia affinis (?)		X		
Ajuga australia		X	X	
Danthonia semi-annularis		X	X	
Scleranthus minusculus		X		X
Senecio glossanthus		X		
Sida ammophila (New species)		X		
**Silybum marianum*		X	X	
**Inula graveolens*		X		X
**Cirsium vulgare*		X		X
**Marrubium vulgare*		X	X	

* Exotic species.

compared with only 7·2 per metre on the regeneration plot. However, the percentage cover along transects was 37·6 and 85·7, on the range and the plot respectively (Fig. 1). Many small plants on the range contributed but little towards total ground cover and biomass.

Biomass measurements (dry weight) of all above ground plants and ground litter from six 1m² quadrats are shown in Table II. Four of these were taken from the regeneration plot but only from the open range where the vegetation was consistently uniform over wide areas. Biomass averaged 460 gm per sq metre within the plot but fluctuated widely from 1269 gm to 145 gm compared with an average of only 118 gm per sq metre and negligible variation on the range.

The wider range of species and greater volume of biomass developed in the period of 21 months following reduced grazing by rabbits. Complete protection was never achieved as some rabbits had been present up until the recording of the field measurements. Field evidence (see later) and continuous observations by N. H. E. McD. clearly show that kangaroos

TABLE II

Biomass Measurements from Clip Quadrats, Hattah

Species (*Exotics)	Quadrat:	1	2	3	4	5	6
	Aspect:	W.(265°)	E.(085°)	S.(210°)	N.(005°)	W.(264°)	E.(089°)
	Slope:	2°	1°	1°	1°	2°	5°
	Dry weight (gm):	gm	gm	gm	gm	gm	gm
Psoralea eriantha		889	11	230			
Psoralea eriantha, Seed and leaf litter		306	1	84			
Psoralea eriantha, Woody litter		32	5	38	20		
Swainsonia phacoides		5		0·5			
S. microphylla				1·0			
Anguillaria dicica		3	5	1·4	5		
Thysanotis tuberosus		2·5			1		
Senecio glossanthus		4					
Scleranthus minusculus		3	22				
Wahlenbergia bicolor			0·1	0·5			
Goodenia affinis			0·2	0·4			
Dianella revoluta (?)					2·5		
Lotus australis			6		1		
Calotis erinacea			2				
Myriocephalus stuartii				0·5			
Convolvulus erubuscens					3		
Nicotiana velutina							2
Ajuga australis							3
Danthonia semi-annularis		2	8	6		40	50
Stipa variabilis			30		10		
**Bromus*		6	15		40		
Grass litter (*Bromus/Danthonia*)			40		25		
**Rapistrum rugosum*		9	7		28	16	12
**Hypochoeris radicata*		8	20	18	6	50	40
**Silene gallica/S. nocturna*			7	5	4	3	6
**Silybum marianum*							2·5
**Chondrilla juncea*						1	1
**Marrubium vulgare*							2
Woody litter							8
Total Biomass		1269·5	179·3	394·9	145·5	118	118·5

Quadrats 5 and 6 open range; others, regeneration plot.

grazed more or less freely over both areas. Substantial reduction in rabbit population within the regeneration plot resulted in the rapid change in vegetation.

Rabbits had caused considerable damage to the 350 *Callitris glauca* seedlings planted in the plot in 1963 by eating the growing tips. This killed many and caused other tree seedlings to become shrubby and deformed particularly where growth conditions were difficult on crests. In June, 1965 only 216 were still living including four self sown specimens. Rabbits, rather than climate, were probably responsible for the 42 per cent mortality recorded for *Callitris* seedlings. Most dead tree seedlings showed damage from rabbit grazing.

Callitris seedling growth was considerably better in the hollows rather than on the ridges of the dune area of the regeneration plot. Many seedlings had died in the northern ridge area and the remaining 65 were mostly small, stunted and deformed from rabbit grazing. Good growth was present in the central hollow, although sixty seedlings had died from rabbit damage and numerous of the 48 others were deformed. Growth was again poor on the southern ridge and moderate on the southern slope. Mature trees of *Eucalyptus largiflorens* and *E. camaldulensis* on the small lake flat were undisturbed by any browsing.

No differences in soil characteristics were recorded at the quadrat sites. Similarly, no differences were noted in the deep red-yellow sands of the crests and hollows within the plot.

Six 400 metre line transects were taken to count kangaroo spoor inside and outside the regeneration plot. Faecal counts in a one metre-wide belt along transects were taken at the same time. Table III summarizes the information collected.

Movement of kangaroos across both areas seemed commonplace. the rabbit-proof fence proved a negligible obstacle to kangaroos. More spoor were recorded outside (160) than inside (122) probably because tracks were less obvious in the better vegetation cover inside, rather than differences in kangaroo density. Indeed, on sandy areas spoor density appeared similar inside and outside the plot.

Faecal count was higher (36) within the regeneration plot than on the open range (26). This possibly reflects more abundant forage inside the plot so than animals do not have to move so frequently for grazing. Well defined, frequently used tracks led up to the fence and continued across the regeneration area clearly showing that the indigenous herbivores regularly grazed inside and out. Some damage to fences resulted from the frequent movement of kangaroos. If damage was not quickly repaired rabbits soon penetrated through the openings into the plot.

TABLE III

Spoor and Faeces Count, Hattah

Open Range			Regeneration Plot		
Transect	Spoor Count	Faeces Count	Transect	Spoor Count	Faeces Count
1	103	11	4	7	26
2	34	2	5	72	9
3	23	13	6	43	1
Total	160	26		122	36

Conclusions

The attempted exclusion of rabbits from open range by fencing, trapping and poisoning, and by the deep ploughing of warrens led to a marked reduction in their numbers. This in turn resulted in almost an eighty per cent increase in plant species and a 280 per cent increase in total biomass over a period of only 21 months. Very marked differences are readily apparent over areas commonly grazed by kangaroos but where rabbits are excluded or where they are free. Following complete extermination of rabbits within the regeneration plot differences between this and open range should become even more apparent, leading gradually to a return to shrubs, mallee, and pines.

Acknowledgments

The authors wish to thank Joan Williams, Jeannie Harvey and Peter Reimuth, 1964 Geography III Science students of Melbourne University for field assistance, and Mr. J. H. Willis, National Herbarium, Melbourne for assistance with plant identification.

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VICTORIAN ORCHIDS — No. 8

by C. E. Gray

Gnat Orchid

A number of our native terrestrial orchids go unnoticed for no other reason than their size. When these tiny flowers are found and examined, often with the aid of a magnifying glass, they are miniature gems, displaying a beauty of colour and form which is adequate reward for the task of finding them.

The gnat orchid, *Acianthus exsertus,* is one of our miniatures. Except in some areas of Gippsland where much taller specimens may be found, the flower stem rarely reaches six inches in height. Each stem carries a number of flowers which resemble an insect in flight.

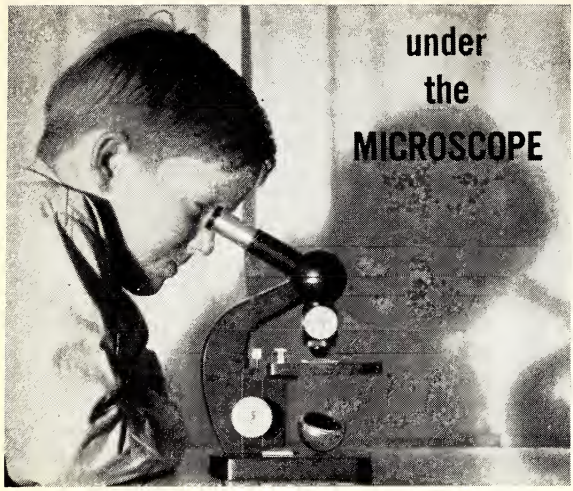
As it grows among the debris of the forest floor, the light fawn to mauvish colour of the flowers and stem provide a good camouflage, which is increased by the general dampness prevailing in its flowering season between May and July.

The column is strongly arched and the dorsal sepal bends forward over it. The small labellum is often darker than the other floral segments and rests on the lateral sepals. The petals on either side of the flower are small and turn backwards against the flower stalk, giving the "insect-in-flight" appearance.

Each plant has a single leaf, round to heart-shaped; dark dull-green on the upper surface, and purple underneath. If there is a flower stem, the leaf clasps it just above ground level. Carpets of gnat orchid leaves are sometimes found.

This orchid is widespread throughout the State, usually in light forest areas.

Acianthus exsertus
Gnat orchid.
Photo: *C. E. Gray*



No. 3

EUGLENA

By E. LeMaistre

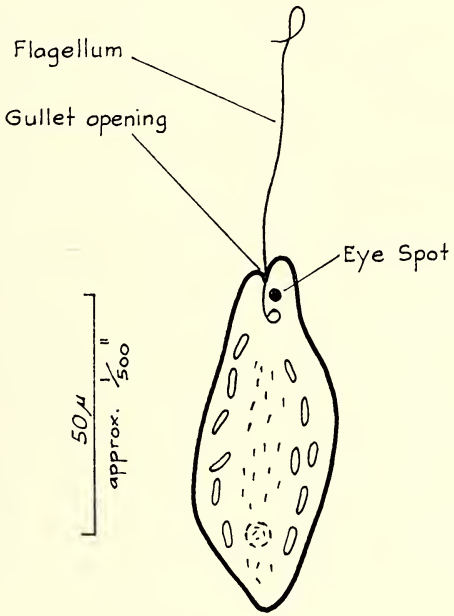
Remember the old guessing game—Animal, Vegetable or Mineral? Mineral presents no problem, but in the microscopic world of pond life the differentiation between animal and plant life can be a difficult matter. Take for instance an organism which is free swimming, contains chlorophyll and can therefore live by means of photosynthesis, but at the same time is capable of absorbing or ingesting its nutriment from the water which is its environment—Animal or Vegetable?

Such an organism is Euglena, generally classified as a Flagellate, a subdivision of the Protozoa; but one which created quite a difference of opinion between the Botanists and Biologists.

Euglena exhibits the characteristics of a typical flagellate, having a whip-like flagellum at the anterior end of the body which, when vibrated with a complex action, pulls the Euglena forward through the water. The body can change its shape, appearing leaf like when swimming and more pear-shaped when at rest; and it turns and twists with remarkable dexterity. Also at the anterior end is a reddish coloured "eye spot" which is apparently sensitive to light; and beside this, an opening leading into a gullet. Books are a little contradictory on the use of the gullet, some state that it is used for excretion of fluids, from a nearby contractile vacuole, with the food substances absorbed through the body skin; whilst others say that if a substance such as carmine be added to the water, it has been observed being drawn into the gullet.

On the other side of the argument however, *Euglena viridis,* one of the commonist in pond water, is richly endowed with green chloroplast which promote photosynthesis, a chemical action using the effect of light upon chlorophyll to produce sugars, glucoses, starches, etc. enabling the organism to live independent of the amount of nutriment dissolved in the water. If however the water becomes rich and somewhat putrid and less light filters through, the chloroplasts fade and the Euglena lives by absorption or ingestion as above.

Whilst Euglena are quite small, as can be seen by the accompanying diagram, they can however be seen under an F.N.C.V. microscope using about 100 magnifications.



EUGLENA sp.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

A Brush in the Bushes with the Editor

This amusing note comes from Mr. Ken Simpson, who has spent the last 12 months or so on Macquarie Is., with an Antarctic Research Group. Members may remember some of his photographs of penguins at the July General Meeting; in fact he spent so much time with the penguins that he was almost accepted as a member of the rookery.

I was very pleased to observe that an old friend, Mr. Griff. M. Ward, has lately become Editor of the *Victorian Naturalist*. There are not many people who know how and under what circumstances the Editor became a member of this club. The time seems ripe for revelation.

In *essence,* this is a true story. Only the dramatic manner in which the whole thing is written is false.

It began when a pair of Scaly-breasted Lorikeets were seen about the houses in Heidelberg, Victoria, and commenced roosting at night in trees in and near a small, one hundred year old and disused graveyard near my home. (An account of this Lorikeet visitation may be read in *The Bird Observer,* No. 311, for October, 1957.)

Late on a cold night after a B.O.C. General Meeting, I persuaded Len Robinson to accompany me to the cemetry in hope of locating and photographing the Lorikeets at roost. Loaded with camera gear, we stole into the little graveyard soon after midnight and commenced playing the beam of a 6-volt portable spot-light around the dank and gloomy trees. Even if the majority of the local residents saw this eerie display of phantom light among the tombstones, they prudently remained with their "hotties" in bed and gave no sign.

But there was one who saw and was not afraid. The lights in the house immediately adjacent flashed on; a door banged. A moment later, an irate citizen nearly clad in a dressing-gown and floral pyjamas* burst into a dew-drenched glade between a boxthorn, a cypress tree and a frilly-edged tombstone to confront us.

We frisked him with the spot-light to see if he was carrying weapons. He was "clean". Then we projected the light lazily into his eyes. This brought forth a jumble of phrases that included words resembling "ghouls", "grave-robbers", "trespassers", "police" and the like.

At the time, I don't think that he had ever heard of the F.N.C.V., or B.O.C., or any other group of their ilk, but his inherent interest in natural history eventually showed itself after we had calmed him down and removed the light from his eyes.

So then and there, as he stood shivering in his vertically-striped floral pyjamas in the middle of a cold, old, Scaly-breasted Lorikeet-infested graveyard, under a full moon, with a dog hooting and a Boobook Owl howling distantly, Len and I hooked, played, and landed him.

A month later, Griff. joined the B.O.C., and subsequently, the F.N.C.V. This year, he became the Honorary Editor of this journal.

A large number of morals and conclusions could be drawn from this little adventure, but chief among them would be these:

1. If you find occasion to be in a graveyard after midnight—have a good yarn ready to spin. You're going to need it.
2. Carry some Membership Application forms—you could sign a new member at any moment.

Editor's Note: This story is untrue—I have never ever worn vertical striped or floral pyjamas.

* It could have been vertical stripes—I really don't remember.

More on Cuckoo-shrikes

Miss Jean Galbraith of Tyers was prompted to write this note after reading a "brush" in the *Naturalist* for July 1966.

Mr. Jacob's notes on Little Cuckoo-shrikes, *Coracina robusta* interested me especially, because I too, have noticed their silence compared with the frequent calls of *C. novae-hollandiae*.

I have seen them only twice at Tyers, as visitors only, and years ago; but they were numerous at Mooloolaba in Queensland in 1962, and every morning we watched them feeding on Moreton Bay Figs. Several perched on a telephone wire and, one after another (although often two were in the air at once) they would dive to the tree, flying in a smooth semi-circle from the wire to the tree and back to the wire a yard or so farther on. Each time, with no pause or falter in the line of flight, they would snatch a fig in open beak and carry it with them to the wire where it was no sooner eaten than the manoeuvre was repeated.

The round little figs are about one inch in diameter, full of sharp seeds like grains of sand, and the small amount of soft pulp seemed tasteless to me, if not to the birds.

I do not remember hearing them call once, nor is there any reference to a call in my notes.

Mrs. J. A. Denney of Lavers Hill also writes:—

In the July copy of the *Victorian Naturalist* I noted a reference to the Little Cuckoo Shrike being seen by Mr. Jacobs of Narre Warren, on an Easter trip this year.

He asks if it is rare, and has any reader seen it.

When travelling from the R.A.O.U. camp out at Mt. Beauty, I came by a circuitous route through the Snowy Mountains, and home via Gippsland. At Bulga Park I saw a small flock of five or six of these birds, in the canopy of a eucalypt. They were my first sighting in this state, and I am fairly conversant with its avifauna.

Bird Notes from Eildon

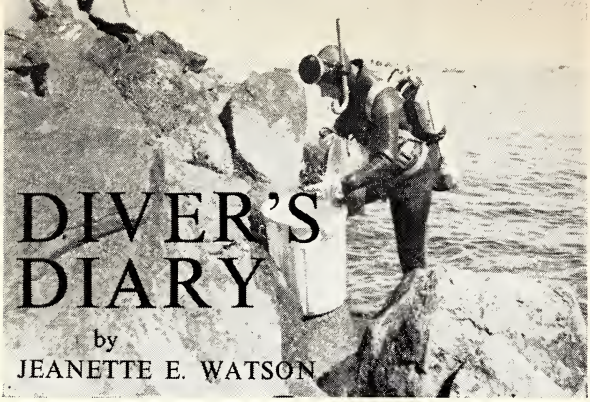
These early-morning observations of bird life come from Mr. V. Jacobs of Narre Warren North:

15th January, 1966, 5.30 a.m.—A cool morning with some alto-cumulus and stratus clouds about: I left the caravan park where we were camped looking at the Black Swans and Black Ducks which floated nearby on the full pondage. Yesterday morning it had been nearly empty and a pair of Black-fronted Dotterels were running over "their" gravelly bank. This morning the bank was quite submerged; ideal for the tourists but hardly so for the dotterels. A White-faced Heron took off as I walked towards the road and some Yellow-tailed Tom Tits were feeding on the paths near the store.

My walk took me from the caravan park to the boat harbour and I had the road and its margins to myself but for two boat-towing vehicles. They passed without disturbing the birds very much. The roadside was well covered with trees, some large, but mostly newly grown since the road was made. Three Yellow Robins perched characteristically on a small tree trunk whilst a large family of Blue Wrens worked busily in some thick Tea-tree. A Grey Thrush sang fluidly from a Silver Wattle but an English Blackbird hurtled out full of alarm. Crimson Rosellas were seen, every hundred yards or so, always in pairs and always very vocal as they fled through the foliage.

A Silver Wattle wore a large, colourful mistletoe which served as a breakfast table for a number of species of feathered travellers. The first I saw were two Yellow-winged Honeyeaters. While they fed, a flock of Grey-backed Silver-eyes worked over the branches. The first honeyeaters left, to be replaced by three White-naped Honeyeaters and one Eastern Spinebill.

A Dusky Swallow was performing aerobatics and returning to the vantage point of a power pole. A distinctive but new call to me came from the dense scrub. A sparrow-sized bird flew from the scrub into the roadside trees and back again before I could identify it. This occurred a dozen times before I had gathered enough details for a certain identification. It was the migrant White-winged Triller and a pleasant note on which to end the morning's excursion.



DIVER'S DIARY

by
JEANETTE E. WATSON

No 3.
Portland Pier

This month I am going to take you to one of my favourite diving haunts, a most unlikely place, but because of its strange and interesting fauna, one to which I return again and again.

Although the time we divers have spent at Portland over a number of years must add to a considerable total, my friends and I are far better acquainted with the geography of the harbour bottom, (with which we are as familiar as our own backyards) than the plan of the town, which we hardly know at all! The compelling attraction for divers is the local pier, added to which are the ministrations of the local camping park manager, who does not seem to find anything strange in the ways of skindivers, cheerfully providing endless quantities of hot showers to restore frigid bodies to normal after a cold winter dive.

Every pier has a character of its own, depending on its size, construction, and geographical locality. Always there is endless fascination for the diver. The biologically inclined may find delight in the wealth of marine biota on the piles; the salvage minded may pick up such goodies as degenerate Tilley lanterns, fishing rods, an endless variety of knives which have gone overboard, and hopefully investigate, in clouds of evil black mud, the contents of old tins and boxes, which surely, one day, must yield "treasure".

The pier at Portland is a monumental structure, overshadowing all other Victorian piers in the majesty of its dimensions. Known as the Ocean Pier, when built in 1902, it was over three thousand feet long, passing well out into open water, but has now been shortened, and is enclosed on either side by the new oil and grain wharves.

A veritable forest of massive piles rises from the silty sea floor at thirty-three feet depth, to carry a heavy decking and extensive cargo sheds, which are used at present for wool storage. This multiplicity of piles effectively dissipates any wave motion, resulting in an all pervading stillness in the water, normally found only in depths in excess of one hundred feet.

Direct penetration of sunlight is prevented by the ceiling of decking overhead, making green and rather eerie the world below, lit only here and there by silvery light shafting down to glowingly bathe a cluster of pink sponges drooping from a pile.

Marine algae, like all plants, need sunlight to manufacture chlorophyll. Thus only the outer row of piles supports asparse flora of the brown algae, commonest of which is the kelp *Phyllospora.* The remainder of the piles from low water mark to the sea floor is smothered in a crowding profusion of those invertebrates which can manage to exist on very little light at all.

Portland Bay during early stages of construction of new harbour installations. Ocean Pier at centre.

Photo: *Portland Harbour Trust*

Ascidians:

The fauna is dominated by ascidians. Dakin has stated that "the Australian coasts seem almost to be the world's headquarters for ascidians". If this is so, then Portland must certainly be their capital. The variety of species seems endless—compound, encrusting, and solitary: blue, mauve, purple, green and yellow. The solitary forms literally compel the eye with their bulbous enormity, their bagpipe shape, and delicately coloured trumpet-like siphons—easily recognisable even when draped in vestments of sponge. The two commonest forms are *Ascidia obesa* and *Ascidia sydneiensis*. Most beautiful of the compound forms, and perhaps one of the prettiest growths to be seen in local waters, *Sycozoa cerebritiformis* can be found rooted to the rough upper surface of a bryozoan, thrusting its pink toadstool head clear of the tangled growth.

Although so common in our seas, the group is little known apart from the unlovely sea squirt or cunjevoi, a well-known littoral form in the intertidal zone from New South Wales to Wilson's Promontory in Victoria, and the related species *Pyura pachydermatins* which is frequently found washed up on ocean beaches after storms. Except for minute calcareous spicules secreted by some species, ascidians contain no hard skeletal parts, so that by the time a detached specimen is washed ashore, it is no more than a shapeless decaying mass, showing nothing of its former delicacy of structure and colouration.

The Order Ascidea is placed in the Phylum Chordats, and is interesting in

Solitary Ascidian

View into Syphon.

Depth 20 ft. x $\frac{1}{4}$

Photo: *R. Bricker*

Solitary Ascidian

Sponge encrusted.

Depth 25 ft. x 1/16

Photo: *R. Bricker*

several respects. The larva, in its free swimming "tadpole" stage is a definite, although primitive vertebrate, possessing a notochord, and neural tube. After a short planktonic existence, it attaches by its anterior end, loses notochord and neural tube by resorption, develops buccal and atrial siphons, and settles down to the sedentary life of the adult form. A thick, tough translucent outer coat encloses and protects the body, hence the name Tunicate often applied to the order. Water is drawn into the sac-like body by the siphon, food being strained out on the pharynx. The heart, which is open, and capable of reversing beat, pumps a blood which is unique in the animal kingdom, containing a high concentration of vanadium secreted from the sea water, in solution in hydrosulphuric acid.

Molluscs:

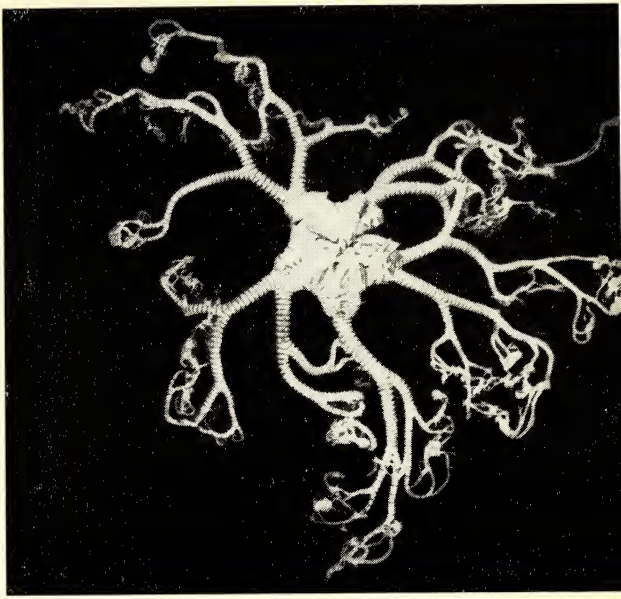
Quiet water, and a range in substrate conditions, seem to be suitable to the development of a variety of molluscs, some species of which are abundant. The piles about low water mark bear the normal association of littoral limpets and barnacles. Careful searching around the base of the piles will reveal large specimens of *Monoplex australasiae*, hairy brown epidermis merging well with the background. Thousands of the small crypt dwelling pelecypod *Hiatella australis* have discovered that the outer mantle of the solitary ascidians are an easier proposition for boring operations than rock, or wood of the piles, and have extensively parasitised these forms.

Infrequent, difficult to see, but well worth the search, the egg yolk yellow of mantle an excellent camouflage, the small cowrie *Notocypraea comptoni* lurks deep within the lacy convolutions of the bryozoan colonies. Swimming about the piles, one is often attracted by a small row of brilliant iridescent blue eye spots staring unwinkingly from a mass of growth. Dig down, and prize out the pretty little fan shell *Chlamys asperrimus,* covered in its powder puff coat of bright orange sponge.

Nudibranchs are fairly common, including the ubiquitous *Tambja verconis, Aplysia,* and *Ceratosoma brevicaudatus,* the short tailed slug, which, for some reason, perhaps associated with depth, is purplish instead of the usual pink.

Bovine and unheeding, the pleurobranch *Oscanius hilli* ploughs labouriously across the uninvitingly muddy bottom. This is the largest and probably least well known of all the sea slugs of our southern coastal waters, only a few reports of its existence (from Western Port) having been made this century. The adult animal is about four hundred mm long; the dark plum coloured humped dorsal surface is covered in warty conical protuberances, and deeply notched in front to expose a pair of rhinophores. When the slug is brought to the surface, the slippery structureless flesh immediately collapses, speading slowly out across the container like a half set jelly. As if to compensate for the rather repulsive appearance of the parent, the egg collar, occasionally

found attached to the lower parts of the piles, is an object of great beauty—a large delicate pure white lacy spiral, remarkably flower like in form.



Gorgonocephalus Approx. x 1/3

Photo: *J. Talent*

Gorgonia:

In the ghostly green wooden peace of the piles, there has been ample time for the growth of huge gorgonian corals. The red lacquered arborescent growth, hung with the tiny crowded blossoms of the polyps, are vaguely reminescent of the stiff flat trees of a Japanese painting. Sometimes, the small grey and white striped crinoid *Antedon incommoda* may be found perching bird-like among the branches, the hard surface of the gorgonian offering an attractive foothold for the small clawed cirri to grasp. Once, I found a prize indeed—a rare deep water basket star *Gorgonocephalus,* so aptly named, its repeatedly branching arms inextricably entwined in the coralline mesh.

Gorgonian x 1/5

Photo: *J. Talent*

Crustacea:

Crabs, particularly hermits, are always to be found beneath a pier; no doubt the prospect of easy pickings in the concentration of marine life is the lure. Smaller, hidden from casual observation, but more interesting, are the numerous crustacean colonies adapted to life within the tunnelled protection of sponges and bryozoa. Commonest residents are tiny spider crabs, pink rotund Xanthids resembling a ripe strawberry, and the green liveried snapping shrimps of the genus *Synalpheus,* raising an enlarged claw when alarmed, to produce a loud clinking, like the sound of cracking glass.

Any cleft, hollow pile, old tyre, or sheet of roofing iron fallen from the sheds above provides a safe haven for juvenile crayfish at a vunerable stage of their development. It is always amusing to be confronted by a row

Leptomithrax australiensis Depth 30 ft. x $\frac{1}{5}$
Photo: *R. Bricker*

of terrified antennae agitatedly sensing the approaching danger. Should the diver gently lift an edge of the shelter the row shuffles backwards deeper into the refuge, legs tangling, in the style of second rate musical hall comedies of long ago; the last, and smallest member of the line invariably falling out into the open, to swim and scuttle off backwards in frantic search for a hiding place.

Seasonal changes take place with such predictable regularity in the sea that the diving naturalist comes to accept them without comment. Sometimes, however, the changes are so marked as to force themselves on one's attention. One such occasion was in the year 1963, when vast numbers of the spider crab *Leptomithrax australiensis* suddenly appeared in embayments along much of the Victorian coastline, including Portland Bay, swarming in thousands across the bottom. Some carried an effective camouflage of ascidians, sponge and algae, growing on the spiny carapace; others were free of growth, showing the normal pinkish colouration of young specimens.

The unexpected bonanza had attracted in, probably from deeper waters, a number of octopus. One particularly large visitor, at least five feet across the arms, was eating its way systematically along each pile. Two arms extended ahead, were gently feeling out and seizing the crabs, which, seemingly mesmerised, made no move to avoid the oncoming death. The empty shells, abdominal meat gone, rolled out behind as the octopus advanced, to fall on an incredibly large heap at the bottom, testimony to the prodigious appetite of the beast.

It would be a happy conclusion to this article to be able to predict that this domain of ascidian, gorgonian, and pleurobranch would be left to flourish undisturbed in the future, as it has for the last sixty years. Sadly, the pier is doomed to demolition in the march of progress to improve the efficiency of the new harbour. With its removal will pass a remarkable fauna, unique to our southern coastline.

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The Tailed Spider

By Densey Clyne

The autumn of 1966 proved conducive to spider activity in my garden, perhaps because no poison sprays have been used and a minimum of clearing and pruning done.

An interesting new find was one of the tailed spiders, although for all I know this species has lived in the garden for years and I have not been observant enough to notice it.

While cracking open cylinders of fallen bluegum bark looking for a huntsman spider to photograph, I noticed a string of debris, about three inches long, hanging on some web in an azalea bush.

The whole thing was light brown and inconspicuous amongst the fallen leaves and twigs, but it had a hint of symmetry about it which caught my eye.

We have all had the experience where something that seems to belong to one kind of pattern is suddenly recognized, by a sort of perceptual *volte face,* as belonging to or forming quite a different kind of pattern. A twig among twigs becomes a stick-insect with the familiar pattern of insect form; a waterlily bud becomes the head of a basking tortoise, and a lily-leaf its carapace; a fragment of the pattern of leaf and sky overhead becomes a brilliantly plumaged bird. You wonder how on earth you failed to see what is now so obvious.

So it was with my bit of debris. Once having seen symmetry, I found the whole pattern suddenly staring me in the face. The string of light-brown, elongated lumps, patched and disguised with fragments of dry leaf, consisted of egg-sacs, deliberately placed along the central upper spoke of a spider's web.

The sections of the web immediately to right and left of this upper spoke were free of the spiral thread of the web, except at the hub, where the spiral was complete for a few rounds.

What appeared to be the lowest of the eight egg-sacs rested against the spiral portion at the centre of the web. A closer look revealed, however, that this was the spider herself, hanging upside down, her legs gathered close against her cephalothorax. From the front of her web, her underside appeared much the same shape and colour as the egg-sacs. But from behind, her body could be seen to be elongated into a tail, which she held extended halfway up the lowest egg-sac and curled outward a little. The spinnerets were approximately halfway along the body.

The tail had a black tip formed into several blunt processes. The rest of the spider was much the same neutral tint as the egg-sacs, though

Tailed Spider constructing web
Photo: *Author*

with some variation in colour and a suggestion of lighter transverse bands. The front of the dorsal part of the abdomen, just above and behind the much darker cephalothorax, was notched in a deep V. There was a faint pencilling of fine lines down the back extending from this notch. From the side, the spider looked like a tiny, curled leaf, only 21 mm. long, the black tail-tip forming the petiole.

Later I found another spider, this time without egg-sacs. Her web was slung across the gap in a twin-trunked gumtree which had rough, red bark.

This spider had attractive salmon red sides and a touch of the same colour on her legs. The back of the abdomen was creamy, with lighter transverse brands which grew further apart and more noticeable towards the tail-tip, and the last section of the tail was white. The tip of the tail, with four short protuberances, was salmon-red. The underside of the spider was light brown.

Every morning she rebuilt her tattered web, in which specks of red bark from the gumtree were often caught. Once I found that her new web, though otherwise free of these specks, had a row of them irregularly placed in the central upper radial line. From now on, she left this line intact, and perhaps she had always done so, as I had only observed her attaching the spiral line itself. Other radial lines were obviously replaced, as the web was inclined in a different plane on some mornings, and because of this the upper spoke occasionally ended up at a slight angle to the vertical.

More and more tiny fragments and slivers appeared on the line, and then one night I found her making her first egg-sac, on the inner fifth of the line, close to the centre of the web. First she made a furred, or felted, strip about 10 mm. long, by moving up and down and thrusting her spinnerets as she moved against the relevant portion of the web. In each new position she swung her abdomen outward at about 45°, drawing out the thread before fixing it in place, presumably as a loop. Her tail always remained at a slight angle to the rest of her body, bending just behind the spinnerets.

She attached web in this way between 30 and 35 times every minute initially, but later slowed down to about 20. She moved irregularly up and down and around. After a while, she rested for a minute or two against the mat of felted web, then she began to lay her eggs upon it.

To do this she made the same kind of thrusting motion but much more slowly. This took two or three minutes, and the eggs came out in one piece as a creamy globule. When finished, she immediately started to cover it with felted web as before, moving up and down the side of the mat on which the eggs were laid.

She continued for forty minutes, from 9.20 p.m. until 10 p.m., and by then she had slowed down again, but she was also placing some of the web along the spoke just above the cocoon, that is, further from the centre of the web. She had now manufactured a light brown cocoon about the length of her own body. By 10.30 she was resting on a different part of the web.

Five days later, I found that she had made another cocoon above the first.

She was losing her red colour, and becoming more like the original spider with the completed egg-sacs, during this period, and she also appeared to be growing.

One very windy night I watched her moving about rapidly demolishing part of the broken web. During this operation she came across a tiny speck of red bark. She pressed her spinnerets against it so that it adhered to her body, carefully cut the threads of web which held it, and hurried to the upper cocoon, to which she attached it. The cocoon was already partly camouflaged with similar fragments.

During a week of rain and wind, the spider did not rebuild her web, merely leaving the supporting lines and the spoke containing the cocoons intact. Twelve days later she had made another cocoon.

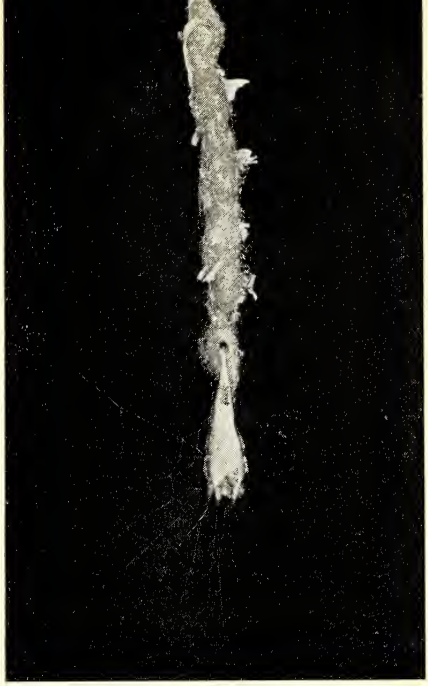
The three cocoons and the radial spoke to which they were attached were by now very well camouflaged, mainly with slivers and fragments of bark. One of the tree trunks is constantly scratched by climbing possums, and no doubt they are responsible for much of the debris that falls so handily into the web.

Only once did I see wrapped prey in the web, and this was shortly after the first cocoon was made. The spider occasionally jerks the web to shake some tiny insects out of it.

After a twelve-day absence from home, I found she now had four cocoons. She had lost all her red coloration, and measured 17 mm. The individual cocoons were quite hidden within their untidy camouflage, which was a contrast to the neat nursery of the first mentioned spider.

Since these observations, perhaps because my eyes had become more accustomed to the shape, I found four more of these spiders. Spiders, like people, are individuals, and it is interesting to note the differences.

The first one is a dark velvety red with some salmon red on the back. She is 11 mm. long and rests at the centre of a few radial lines attached to a rough triangle of silk. There is no spiral web.



Tailed Spider with egg sacs
Photo: *Author*

The second, only a foot away from the first, is creamy yellow, 9 mm. long, and rests in a perfect little web about three inches across, perfect, that is, in the sense that it has no clear segments on either side of the central upper spoke. The web is built on an almost horizontal plane a foot from the ground.

The third spider, again salmon-red, also has a three-inch web, but this had the characteristic clear segments, and also it already has a few specks of camouflaging debris along the central upper spoke. The spider is 10 mm. long.

The fourth spider, a mere 5 mm. long, has a similar web, though smaller, and it also has some camouflage. This spider, too, is dark red.

All these spiders are at a different stage of development, and I shall compare their progress with interest.

Book Review:

Australian Wild Life

By Alec H. Chisholm, 8¼ in. x 6 in., 64 pp., illustrated;
Nelson Doubleday (Australia) Pty. Ltd., 1966. Price 75c.
(This is the second of a series of 36 books, all by Australian authors in the "Around Australia Program")

To the young Australian enthusiast, or the new Australian "settler" who may show an interest in Australian fauna, the availability of accurate low priced books dealing with this subject is limited.

With the publishing of "Australian Wild Life", this situation has been relieved to some extent. This book, by a well known and highly respected author, provides a brief but authentic guide to the characteristics of the furred animals of Australia; together with a comprehensive section on a number of species from our wealth of bird life. Add to these a most interesting commentary on the prehistoric animals of, and their migration to Australia, and we have a most worthwhile publication.

Unfortunately, the pictorial section does not measure up to the standard of the text, particularly with regard to the colour photographs. These are bound as three double sheets in the centre of the book for ease of removal, and are perforated to enable the pictures to be separated and pasted in "appropriate" spaces within the text. However these spaces are not always appropriately placed with the relevant text, nor are the plate numbers in consecutive order which seems a little unthoughtful. The colour of the animals in a number of these plates is untrue, and I think it would have been far better had black and white illustrations been used throughout, as those that have been used are most satisfactory. Although even here, they are not always placed as well as they might be with regard to the text.

However, this small book can be highly recommended as an excellent purchase, and is certainly an ideal book for the interested young nature-lover; indeed for any nature-lover.

G. M. WARD

A Request for Flagellata:

A letter was recently received from a botanist, B. V. Skvortzov, requesting Australian contacts with a particular interest in Flagellata.

During the last four years, B. V. Skvortzov has spent more than one thousand hours with an E. Leitz microscope studying Brazilian Flagellata. At present he is studying Flagellata from other tropical and subtropical regions such as Africa, Malaysia, and Japan; and he would like very much to have material for his cultures from Australia. He wishes to obtain for his cultures quantities (2 ozs. or 50 grams) of dry water plants, mud from polluted or dirty streams and lakes, and samples of mosses grown on soil, water, or bark of trees. These should be sent, in open envelopes, as "Botanical Specimens of no Commercial Value", to:

B. V. Skvortzov,
Instituto de Botanica,
Caixa Postal, 4005-Sao Paulo,
Estado de Sao Paulo, Brazil.

Ewart's "Flora of Victoria"

The Sunraysia F.N.C., which has its own herbarium collection, is making a census of local flora.

To help with this program, Mr. T. Henshall, the President, is anxious to obtain (at reasonable cost), a copy of Ewart's "Flora of Victoria".

Anybody who can help in this matter may contact Mr. T. Henshall at:—
Box 451, Red Cliffs, Victoria.

Field Naturalists Club of Victoria

General Meeting —8th August, 1966

About ninety members and friends attended the meeting which was chaired by the President, Mr. M. K. Houghton.

The minutes of the meeting of 11th July 1966 were taken as read and confirmed on the motion of Mr. J. W. H. Strong and Mr. A. J. Swaby. The Secretary, Mr. E. H. Coghill, announced that a gift of £100 was received from the estate of Miss Ida Knox.

He reminded members of the appeal for books and support for the Bookfair in the Melbourne Town Hall on 22nd October 1966 in aid of Janet Clarke Hall and St. Hilda's. He asked for a volunteer delegate to attend a meeting to join in the fight to allow access to streams and rivers fenced off by private property owners.

Mr. D. McInnes asked for volunteers to help in getting ready for the Nature Show. Leaflets, show cards and car stickers for the show were distributed. Mr. H. B. Wilson gave a talk on "The Fly Problem" and his work as Entomologist on The Fly Control Committee of the Health Department during the upsurge of the Bush fly population from 1960 to 1965. He recalled that Bush flies in Australia were first mentioned by Dampier, and later by Sturt in Central Australia, who said they were a torment to man and beast, and a paper report in 1850 complained of the fly menace. Tom Collins in "Such is Life" mentions them.

The sudden upsurge in 1960 extended throughout Australia from moist tropical areas, dry sandy almost desert, to alpine and temperate situations. The Australian Bush fly was formerly named *Musca vetutissima,* but in 1960 the fly was identified as *M. sorbens* with a wide distribution through Europe, Asia, Africa, Australia and islands between but not in the New World.

Mr. Wilson illustrated by diagrams the distinguishing four long vertical dark bands on the thorax of the common housefly, *M. domestica* (probably introduced) and two broad dark vertical bands with a blunt fork at one end of each band on the thorax of the Bush fly, which is a smaller fly and found outside in the sun, unlike the House fly which is attracted to shade and indoors.

Mr. Wilson explained experiments he had conducted to try to combat the Bush fly pest. These included pyrethrum fog over areas at Half Moon Bay and Werribee, but no diminution of the pest was seen, even after 100 acres of grass were also burnt.

Other chemicals also proved useless and, so far, no method of control has been found. The numbers are too great for attempting using radiation for sterilizing males, as in the classic successful American experiment on the Screw worm fly.

The breeding habits and material used are a mystery not yet solved. The House fly pest is, on the other hand, a man made problem, as this quickest breeding insect breeds on animal matter and animal refuse and can spread from a centre up to a mile in radius. In answer to a question Mr. Wilson criticized the disposal of such matter in Australia where many people are too careless.

Mr. Wilson was thanked by the President for his most interesting talk.

Exhibits included bulbils from the mother spleenwort (*Asplenium bulbiferum*) brought by Mr. J. R. Garnet to give to any interested members.

Mrs. North showed a collection of jaspar, agate and other stones from Western Australia. Mr. A. J. Swaby exhibited *Grevillea confertifolia,* which occurs only in the Grampians and in the hills of north-east Victoria; *Grevillea lanigera, Acacia enterocarpa* found only in a small area of the Little Desert and only recently discovered. A fasciated branch of this was also shown. Mr. J. H. Willis brought a very large stick insect from Mulga, 40 miles south of Coober Pedy, and the bark, bean and red seeds of *Erythrina vespertilio* from Mt. Liebig. A "powder puff" puff ball (*Podaxis pistillaris*) with sooty purple black powder used by the aborigines for decoration was also shown.

Mr. Willis also showed beautiful jaspar with pink, grey, purple and white flecks from Wintinna Ck., and fossilized ripple marks from Kings Canyon.

Mr. J. Baines commented on the discovery in Patagonia of the remains of an extinct animal like *Thylacine.*

Miss J. Woollard showed colour slides of native flowering plants in her garden, and made an appeal to members to grow native plants for honey and insects for birds to provide corridors for their movement from place to place, and for their shelter and breeding.

Mr. D. McInnes showed slides of the geological model being made for the nature show.

Mrs. North announced that a wild flower show is being held in Albany on 24th September, 1966.

Eleven new members, the names of seven of whom appear in the August Naturalist were elected. The additional four were Miss Joyce Davies, Heidelberg; Neville Scarlett, Parkville; Kenneth Pettit, Melbourne; Keith Outhred, Blackburn.

Botany Group

Mr. Rex Filson occupied the chair, with nineteen members present.

Mrs. Webb-Ware was our speaker for the evening, and her subject "Ferns". She gave an account of the alternation of generations in the fern plant, with a diagram showing the transition stages from the fern plant, or *Sporophyte* generation, as we see it growing, with the spores, contained in sori on the back of fertile leaves, to the *Gametophyte* generation (the *Prothallus*) which is the second generation. The fern plant or *Sporophyte* generation produces asexual spores, which after falling to the ground develop into an independent plant (the *Gametophyte* generation). This plant is called a *Prothallus* and is very tiny, usually well under half an inch across. This plant produces sexual gametes, male and female, and is thicker in the middle than at the edges. The female cell is situated in the thicker part and after being united with a male cell forms a *zygote* which starts growing, sending down a foot into the tissue of the *prothallus,* from which it draws its nourishment until it forms adventitious roots of its own, and grows into an independent fern plant.

The description of fern generations was followed by a series of slides; a few, of the botanical structure of sori with *sporangia, prothallus,* and germinating *zygote.* The rest of the slides were taken and kindly lent by Miss Madge Lester. These were of live *prothalli,* section of tree fern trunk, and various ferns in their natural habitat, and "close ups" of the under side of fronds to show sori etc.

After this there was an exhibit of pressed specimens of all the fern families, also fresh specimens of the small free-floating fern, *Azolla*; of common hardoo, kindly donated by Mr. Swaby, and an example of Filmy ferns. The number of pressed specimens shown, contained many unusual varieties of ferns, and was most interesting. We were all very grateful to Mrs. Webb-Ware for her most interesting and helpful talk. A vote of thanks was carried.

Marine Biology and Entomology Group Meeting—August 1st, 1966.

Mr. R. Condron chaired the meeting which was attended by 16 members.

Mr. R. Condron reported having written to the Sydney Museum for further information re the tagging of butterflies, and is awaiting a reply.

Further discussion took place regarding the September nature show; Mr. R. Condron and Mr. P. Genery are working on a display concerning pesticides. Mr. D. McInnes reported good progress in the completion of exhibits from the Hawthorn Juniors..

Mr. R. Condron read a letter which he had received from Mr. S. Mould, who is writing a monograph of the Lepidoptera *Helias;* and he would like any information that the Group could let him have on this family of butterflies. Mr. R. Condron will reply.

Speaker for the evening was Dr. Ian Bailey, lecturer in zoology, Monash University; his subject being "Zooplankton". Dr. Bailey gave a very interesting talk on this subject which was one in which many Group members are interested. Many questions were asked, during the course of his talk. Dr. Bailey gave a brief summary of the discovery of plankton in 1844 by J. Müller and stated that an Englishman, J. Thompson, was first to describe the larval stage of the crab and barnacle. The talk was illustrated by many beautiful coloured slides. At the conclusion, Mr. P. Kelly moved a vote of thanks.

Exhibits

Mr. P. Genery displayed some species of the crustacean Lepidurus, and stated that they go through a period of dessication before the eggs hatch. He said that he had never seen a male, and that the females could reproduce for years.

Microscopical Group Meetings for June and July, 1966.

June:

23 members and visitors attended this meeting which was chaired by Mr. J. Daws.

Mr. McInnes announced that the club library now has a copy of the latest edition of Ware and Whipple's *"Freshwater Biology"* as well as two copies of the older edition and it was suggested that one of the latter be auctioned off: but it was decided instead to present Mr. W. Genery with the book in question, along with the compliments of those present, as a mark of recognition for the stirling work he has been carrying out on some Crustacea.

The evening was a "gadget night" and on the bench was a vast array of microscopical accessories as well as a number of interesting specimens under microscopes.

Mr. W. Woollard demonstrated his stereo binocular microscope, made from two M19 gunsights, purchased for $1.75 each, along with its carrying case. In addition he displayed a home made stage turntable, a viewing trough made from several pieces of glass and clip-on aluminium sides, an erecting prism suitable for use along with the club microscope, and his micro-projector using the quartz iodide cold light. He questioned the latter term as he had a painful experience while testing the heat of its light.

Mr. Bill Evans exhibited his stereo-binocular microscope also made from the previously mentioned gun-sights. He explained that this instrument was by far the most important tool he had for his study of pond life. He also demonstrated how he used various coloured strips of material in the sub-stage to get the most exciting effects.

Mr. Ken Trotter demonstrated how he used a piece of polythene tube attached to the side of his microscope, and pointed out how during the process of diatom slide making it was necessary to breath on the gum smeared slide to fix the diatoms in place. Normally for this it was necessary to remove the slide from the stage but this tube enabled the operation to be carried out in situ. He also displayed a rotating slide for the arrangement of diatoms on the cover-glass, a prism to fit a microscope ocular which enabled the projection of an image on to some paper, thus facilitating its drawing, and also a very useful turn-table for the ringing of slides. His young friend Paul demonstrated the simplicity of ringing using the above.

Mr. P. Genery demonstrated his gear for the taking of 8 mm movies through the microscope. Later in the evening he projected some of the colour film he has made. Specimens displayed under 10 microscopes were:—

A section of the *castoroil plant*, Karl Meyer.
Stars of the Sea, Mr. W. Woollard.
A collection of *Pond Life*, Mr. Bill Evans.
Diatoms, arranged; (Narvicular), Mr. Ken Trotter.
Brine Shrimp; (Alive!), Mr. W. Genery.

JULY:

The meeting was attended by 18 members and visitors. Mr. J. Daws was chairman.

Mr. J. Strong reported the death of Mr. E. Matthaei and all present expressed regrets at the loss of a very great microscopist.

The micro-projector made many years ago by the late F. E. J. Ockenden was discussed and the secretary was asked to make enquiries at the University as to its whereabouts.

Mr. Ken Trotter spoke about the ignorance of the general public of the Group's existence and suggested that a small card be printed with both an invitation to attend the monthly meeting, and the relevant information about its aims and objectives. It was decided to seek permission from the council for this.

The theme for the evening was "Crystals under polarized Light". Mr. E. Snell projected a great number of prepared microscopical slides of crystals, through his micro-projector which he has recently redesigned, substituting a quartz iodide projector globe for the old fashioned type. A polaroid analyser and polarizer were inserted into the optical train with most spectacular results.

The slides projected were partly those from the club slide library and those made by Messrs. Snell, Genery and Nance. Those made from hippuric acid, santonin, salicin and D.D.T. were the most colourful, but many others made from simpler and more readily obtainable substances such as copper sulphate, citric acid, borax, etc., were almost as interesting. A series made out of tartaric acid, gelatin and a little sodium bicarbonate, made under a variety of conditions produced spectacular effects.

Members remarked about the quality of the image produced by this micro-projector and congratulated Mr. Snell on his improvement of the instrument.

F.N.C.V. Library Booklist No. 8

The following books have recently been acquired by the library and are now available to members for borrowing.

Geology Section

G. A. Joplin—A Petrography of Australian Igneous Rocks.
K. J. Buchester—The Australian Gemhunters Guide.
Bill James—Collecting Australian Gemstones.
J. Child—Australian Rocks and Minerals.
J. C. Liddy—Australian Economic Metals.
E. S. Hills—Elements of Structural Geology.
H. H. Read and J. Watson—Introduction to Geology.
P. F. Kerr—Optical Mineralogy.
W. L. Ramsey and R. A. Burckley—Modern Earth Science.
W. D. Thornbury—Principles of Geomorphology.
J. F. Kirkaldy—General Principles of Geology.
E. H. Weiss—Geology for N.S.W. Schools.
F. H. Day—The Chemical Elements in Nature.

Botany Section

R. E. Hutchins—Strange Plants and Their Ways.
N. T. Burbidge—Dictionary of Australian Plant Genera.
C. N. Debenham—The Language of Botany.
B. D. Jackson—A Glossary of Botanic Terms.
J. Ros Garnet—The Vegetation of Wyperfeld National Park.
A. E. Brooks—Tree Wonders of Australia.

Invertebrate Zoology Section

J. Child—Australian Insects.
J. Child—Australian Seashore Life.
J. Child—Australian Seashells.
I. O. Evans—Sea and Seashore.
H. S. Zim and L. Ingle—Seashores.
R. T. Abbott and H. S. Zim—Seashells of the World.
R. Jeannel—Introduction to Entomology.
D. J. Borror and D. M. Delong—An Introduction to the Study of Insects.
K. G. Brown—The Insects of Heard Island.
J. R. de la Torre-Bueno—A Glossary of Entomology.
A. D. Imms—A General Textbook of Entomology.
N. V. Dobrotworsky—The Mosquitoes of Victoria.
H. B. Ward and G. C. Whipple—Fresh Water Biology.

Vertebrate Zoology Section

H. R. Officer—Australian Honeyeaters.
C. A. Villee—Biology.
A. R. Main—Frogs of Southern Western Australia.
A. H. Chisholm—Bird Wonders of Australia.
K. Immelmann—Australian Finches.

Microscopy Section

A. L. Wells—The Microscope Made Easy.
A. L. E. Barron—Using the Microscope.

General Section

G. W. Lithgow—Mootwingee.
L. O. Williams—Homage to Standley.
G. F. J. Bergman—Gustav Weindorfer of Cradle Mountain.
I. Boss-Walker—Peaks and High Places.

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

GENERAL MEETINGS

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

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Land forms and Vegetation of Bass Strait"—J. H. Willis.
4. Election of New Members.
   (a) *Ordinary*
   Hester, A. J., 87 Bealiba Rd., South Caulfield (Joint with Mrs. Hester, already a member). (Interest: Conservation.)
   Jaslen, Florence (Mrs.), 28W Toorak Rd., South Yarra, S.E.1.
   Wilson, Harry Banks, 9 Elm Court, Surrey Hills E.10. (Interest: Insects, Plants.)
   Wohlers, C. P., 11 Cooraminta Street, Brunswick.
   (b) *Junior*
   Shiels, Ian, 16 Grange Road, Carnegie. (Interest: Botany.)
5. General Business.
6. Nature Notes and Exhibits.

Monday, October 10—"Native Mice of the Mallee", N. A. Wakefield.

Monday, November 14—Members' Night.

GROUP MEETINGS

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

Wednesday, September 21—Microscopical Group. Lecture "Micro-Fungi"—Mr. Peter Kelly.

Saturday, September 24—Hawthorn junior—Excursion, 2 p.m. Maranoa Gardens.

Friday, September 30—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, October 3—Entomology and Marine Biology Group. This group meets at 8 p.m. in Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of House.

Wednesday, October 5—Geology Group.

Thursday, October 6—Mammal Survey Group—Fisheries and Wildlife Dept. Library, 7.45 p.m.

Friday, October 7—Preston junior meeting at Rechabite Hall, Preston.

Thursday, October 13—Botany Group—"Orchid flowers and their Pollination"—Mr. Fuhrer.

F.N.C.V. EXCURSIONS

Saturday, September 17 to October 2—Queensland, details in earlier Naturalists. The coach to the airport leaves TAA Terminal at 7.15 a.m. to connect with plane. Tickets should be ready by the September general meeting.

Sunday, September 18—Mornington Peninsula. Leader: Mr. J. Sault. The coach will leave Batman Avenue at 9 a.m. and will stop in Frankston on the way down. Fare $1.80, bring one meal and a snack.

Preliminary Notice:

December 26, 1966, to January 2, 1967—Wangaratta. The party will leave Melbourne by coach on Boxing Day for Wangaratta, where motel accommodation is available for coach party. Trips will be made to places, such as Mt. Buffalo and Beechworth. Inclusive fare $12.00, bookings with the excursion 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, 1966

President:

Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg N22.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

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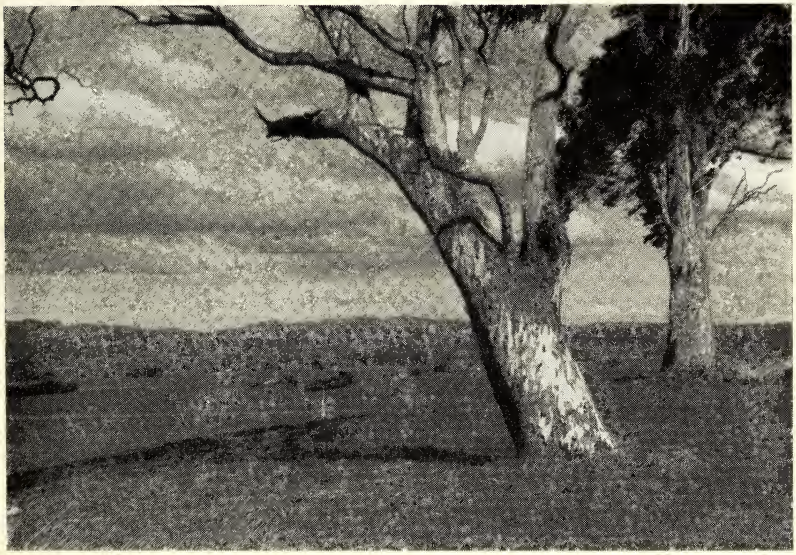

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A fine photograph of one of the Kookaburras being studied by Miss K. Parry, near Sherbrooke Forest. It was taken by Mr. A. Owens.

Cover Picture: A typical Gippsland landscape near Churchill, in Victoria. The Candlebark *Euc. rubida* is in the foreground. Photo: *V. Jernakov*

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October 6, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Editorial

At this particular time, when the past, irresponsible acts of man against our native flora and fauna are often laid before us, and "conservation and preservation" is a commonly used expression, it perhaps seems strange to even suggest a renaissance has taken place among our native wild life.

However, if we think back over the past five years or so, it is not so strange; indeed it is true.

It began in April 1961, with the rediscovery of Leadbeater's Possum near Marysville in Victoria. Fifty years had elapsed between this and the previous sighting.

In September of the same year, four members of the Bird Observers Club located two adults, the nest, and two young of the Eyrian Grass-Wren, in an area north of Lake Eyre. This bird had remained virtually unknown since about 1880.

Just three months later, Mr. H. Webster, a school teacher and keen naturalist, heard the call of the Noisy Scrub-Bird near Two People Bay, east of Albany in Western Australia. More of these birds were later found, and ended the fears, which had been held since 1890, that the bird was extinct.

Another bird, of which little had been seen for ninety years previous to 1933, was the Black-throated Whipbird. A restricted colony was then found in north-west Victoria, and in 1965, more were found on Yorke Peninsula, in South Australia.

From the Grampians came proof within the last few years, that two of our Native Mice still survive. One of these is the Smoky Mouse.

The most recent part of this happy revival story occurred quite recently in a hut near the top of Mt. Hotham, in Victoria. The details of this find, of course, have still to be unfolded to us.

We can see from the above, that the old adage that "opportunity only knocks once", is not quite correct, for we have been given a second opportunity to study and preserve these six species mentioned, and it behoves each one of us to make sure that this second chance is not wasted, because I cannot imagine "opportunity knocking any more than twice".

Prawn-trawling and Sea-slugs

By Robert Burn

One of the highlights of a holiday to Coolangatta, in southern Queensland, during August-September 1963, was an all-night trip to sea on one of the Tweed River fleet of prawn-trawling boats. The purpose of the trip, naturally enough, was in pursuit of the writer's special interest of *opisthobranch* molluscs, more commonly known as sea-slugs.

The prawn boats work the seas north and south of the Queensland-New South Wales border. Overnight trips by the boats mean that they are working rather close to the home port and in depths down to 30 fathoms. Trips of longer duration, three days to a week or more, involve long distances and/or depths down to 100 fathoms and more. Many marine animals other than prawns are brought to the surface in each trawl. Fish of all kinds, colours, and sizes, sharks and rays of various shapes, and crabs and other crustaceans of every sort, tumble on to the sorting tray. Everything that has some commercial value is stored in baskets and bins, the rest thrown and swept overboard.

Molluscs are present in large quantities. The fairly large mesh of the trawl-net allows only the bigger specimens to arrive at the boat. Many species of volutes, cones, helmets, a few cowries, assorted bivalves plus numerous squirming squid, cuttlefish and octopods were seen on the writer's trip. As a ready market exists for Australian deep-water shells, most were kept by the boat crew for later sale to collectors and dealers.

In the course of the night, four trawls of three hours duration were drawn aboard. The depth was 25-28 fathoms, the bottom sandy with broken shell, and the location off Brunswick Heads, northern New South Wales. Three species of *opisthobranchs* were present in each trawl. Surprisingly, each species was exceedingly common. The species involved were *Philine angasi* (Crosse and Fischer, 1865), *Euselenops luniceps* (Cuvier, 1830) and *Kalinga ornata* Alder and Hancock (1864). Each is worthy of brief comment:

Philine angasi. Suborder Philinacea.

This species is very common on littoral mud-flats and in shallow depths along the whole southern coastline of Australia, from southern Western Australia to southern Queensland (Burn, 1966). The large loosely-coiled opaque white shell is often washed ashore in sheltered bays. The animal grows three to four inches in length, is oval in shape, milky white in colour, and slimy to touch. The shell is wholly internal and very fragile. In Port Phillip Bay, it has been dredged in depths to 10 fathoms, which from the literature appears to be its maximum. This record from 25-28 fathoms considerably extends the bathymetric range.

Euselenops luniceps. Suborder Pleurobranchacea.

This species grows to about three inches in length, is very soft and flabby, and the colour buff or pale mauve with many dark brown or purple spots, extends all over the dorsal surface and the upper sides of the projecting foot. The underside of the head veil bears numerous fleshy filaments, and a delicate gill is attached to the right side of the body. Allan (1950: 207, fig. 4),

gives a line drawing of the species, and Baba (1955: pl. 4, fig. 12), an excellant coloured figure.

The species is recorded from New South Wales (Allan, 1950), northern Queensland, and Western Australia. This new record shows the species to be particularly common on a sandy bottom in 25-28 fathoms.

Kalinga ornata. Suborder Doridacea.

This magnificent species grows three or four inches in length and is most ornately coloured with large red and yellow processes along the dorsal margin, and smaller red, yellow, and white papillae in the body sides. The animal is very soft, its foot is very large, and the five or six gills project from the rear of the back. The tricuspidate radular teeth are most peculiar in that they closely resemble a three-tined fork. Baba (1955: pl. 6-7) gives two beautifully coloured figures of the species.

The species is already recorded from Miami and southern Queensland (Kenny, 1960: 224). There are more specimens in the Queensland Museum, Brisbane, from other localities. This record of it is the first report of the species from New South Wales. There are large specimens of *K. ornata* in the Australian Museum, Sydney, trawled by prawn-boats in 19-20 fathoms off Ballina, some 30 miles south of Brunswick Heads.

In conclusion, it is of some interest to note that of the three species collected, two (*E. luniceps* and *K. ornata*) have an extensive range throughout the Indo-West Pacific tropical seas. The third species (*P. angasi*) is confined to Australia and New Zealand. In each case, a considerable bathymetric extension to known range is indicated.

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Notes on some Gippsland Fungi

By Ellen Lyndon

This seems to be one of those particularly good years for fungi—rain in February, followed by more, well spread over the following months of autumn, with a few warm days between.

Our first find just before the new year was *Aseröe rubra,* one of the Stinkhorns, or Starfish fungi, in the high plains country. (*Victorian Naturalist,* March '66.) It is always a thrill to discover for oneself some unusual thing, or indeed, any species for the first time. It makes little difference that it is common in other parts of the country. To us it is new and wonderful.

On May 11th, during a period of very cold and wet weather, there came up in a Leongatha backyard, a colony of the very showy *Anthurus archeri,* another of the Starfish type even more exciting than the first. It was growing in a fowlyard well trampled by muscovy ducks, on a dark patch where rubbish had once been regularly burned. There was some weed growth, mainly selfsown pyrethrum. The brittle red arms of four mature fungi had been broken in pieces and lay scattered around like the aftermath of a crayfish supper. The vase-shaped bases that had supported the arms still stood, each attached to the bottom of its gelatinous cup.

This striking member of the *Gasteromycetes* begins as a soft grey fungal body the size and shape of a bantam's egg set just below the surface of the soil. As it develops the "egg" cracks and the long starfish arms unfold, probably with some force. After a search, an immature specimen was unearthed and set up in some damp moss in the hope that it might continue its development and provide us with a perfect example which could be photographed. We had achieved this very successfully with *Aseröe,* but in the case of *Anthurus,* the top of the sac was bruised and partly ruptured. However, some thirty-six hours later the plant did unfold, at some time when we were not watching. The six tentacles had unfolded but were too brittle to support their own weight. When straightened, one of these measured 5½ inches. Blotches of dark brown ill-smelling mucus stained its elegant redness and reminded us

forcibly that this was indeed one of the Stinkhorns.

About mid-March, in wet scrubland on Twofold Bay, near Eden, we found *Nidula candida,* the Bird's Nest fungus, clustering on old cow manure. We had never met with it before but how could it be anything else? The tiny tough grey cups were wineglass shaped, some still covered at the top but others wide open and filled with the dark brown spore cases that suggest at once a nest with eggs.

At Easter, with members of the Latrobe Valley Field Naturalists, we looked for treasures in one of the last remnants of the great forests of Gippsland. At Darlimurla we came across several interesting and colourful plants. The first resembled brilliant bits of orange peel under a rotting log by the creekside. It seems to correspond perfectly with *Aleuria aurantica** of other lands, which is said to puff out clouds of spores with an audible hiss when conditions are right. We actually saw another species doing this very thing; the white explosion came from a large specimen of *Amanita muscaria* growing in moist humid conditions under some pine trees.

Calostoma fuscum also intrigued us. These brownish "pressure-pak" puffballs were growing on the side of a gravelly stump hole. Each sprang from a rubbery basal cup below the soil surface and was made of coarse brown openwork fibres, surmounted by the box containing the spores. In the centre top of this fruiting body was a six-pointed star device bright orange in colour. From

* Synonymous with *Peziza aurantica.*

Bird's Nest Fungus, *Nidula candida.*

Photo: *Author*

the apex of this the spore powder was fired at the slightest pressure on the cap. On examination it was found that the orange star was repeated on the inside centre of the basal cup. The fibrous stalk evidently acts as a spring to force the spore case up to the light. Before setting a mature specimen to dry I made an attempt to puff all the spores out where they might do most good. To my surprise not only did the spores depart but the little bladder that had evidently contained them blew completely inside out, being attached only to the star device on the outside of the cap.

From the somewhat bewildering array of gilled fungi in dense timber and fern gully came a gloriously coloured toadstool with a cap of glowing colour, midway between orange and apricot; smooth, yet with a depth of colour like velvet. It shone like a light from the broken sticks and leaf-mould and in clearing the immediate area we found another one. They were fairly mature specimens of *Cantharellus cibarius,* variety *Australiensis,* known as the Chanterelle and highly praised as an edible species by overseas writers. We did not actually put this to the test for often eye appeal is on guarantee of palatability. The caps were irregularly funnel-shaped due to the turning up of the edges so that the thick wavy gills appeared markedly decurrent, with cap and stem continuous. Both gills and stem were of uniform colour, slightly paler than the caps. There was no particular smell, nor at first, taste, but the raw gills when chewed left a hot and peppery aftertaste.

Calostoma fuscum

Photo: *Author*

Tricholoma rutilans is another bushland gem. It is a large thick toadstool of rich chrome yellow, the cap evenly covered with coarse purple-brown hairs, clumped like the wet hair of a dog to reveal the clear skin colour beneath. The edges of the cap are fringed with the same hairs that contrast sharply with the bold yellow of the gills. The yellow stem is also overlaid with a purple network of scales. This is a most distinctive plant, often huge in the forest but small and flat on the wet peaty plains. It is reputed to be poisonous.

The *Tricholomas* are listed in numbers in European handbooks, one at least appears to be well known as a food item and one as a source of blue dye. In mid-May, under old oaks in Mossvale Park, I found *T. nudum,* the Wood Blewit, sometimes cultivated in Europe as is the common mushroom. This firm clean plant is a clear blue tinted lilac throughout, the cap taking on fawn or reddish tints as it ages, convex at first with an inrolled margin that never completely straightens, but flat when mature. Stems are silvery with fibrils, somewhat swollen at the base. They were not clumped but occasionally two stems would be fused at ground level by a pale violet cottony mycelium that had picked up and compacted dry leaves and twigs. Spore powder was dusty pink. Identification and reputation seemingly beyond question, we cooked them in various ways without becoming very enthusiastic about either texture or flavour. Set out on a tray, however, with stems cut off ready for cooking this variety looks most attractive and appetising.

There is a particularly good spot for fungi on the South Gippsland plains near Stony Creek. It is a ridge elevated slightly above the surrounding heathland covered with a low woodland of Messmate-Peppermint-Mallee association, with a dense understory of Manuka and Scented Paperbark. There is Wiregrass, Screwfern and Selaginella with a little Heath and Bauera. The conditions on the southern slope seem to encourage the growth of moss on the gnarled Stringybarks, for horizontal limbs and any hollows in the trunks bear thick and verdant pads of several of the commoner mosses.

Gilled fungi were scarce at this particular time except for a few tiny colourful Russulas and the Honey Fungus. One can always be sure of finding here a few specimens of the special *Hygrophorus* of the coastal plains, *H. lewellinae.* They are easy to identify with their glistening mauve caps with darker central boss, long shining stalks and violet gills. The delightful little *Craterellus,* (its name has now been changed to *Podoserpula*), is another not so common one that seems to prefer this spot. It grows tier like leaves up a single stem, the upturned caps marked with yellowish rings and striations. Pale flesh pink folds or wrinkles take the place of gills. It appears throughout the autumn quite plentifully on this small hillock.

A most outstanding plant is the Flame Fungus, *Clavulinopsis miniata,* growing here and there and everywhere; licking through the grey-brown ground debris like tongues of fire, with thick flattened straps, some much branched at the tips in staghorn fashion, growing to five and six inches in height. As the fungus ages the coarse strands grow pale and twisted. They lay about the ground like hanks of rope. Whole troupes of another pale buff toadstool tinted with pink, kept

them company. This was one of the *Hydnums* or Hedgehog fungi, which bear their spores on small spines instead of gills or tubes. These brittle spines vary in length and suggest a cheap plastic hairbrush in miniature. The caps are dry and easily cracked and all parts stain bright orange when broken. Some of the *Hydnums* are reputed to be edible when in the young and tender stage. This one is quite pleasant to look at and to smell, and the raw taste is mild.

To the beginner, the study of toadstools at first seems hopeless, the gilled fungi quite bewildering in their legions of differing forms, shades and tints. Try first the "off-beat" types, the distinctive ones where the identification will be easier. Memorise them and list them; the Puff-balls, the Lattice; Stinkhorns and Starfish and other strange things that emerge from vegetable eggs; the beautiful Coral fungi, Cup fungi, Brackets, and not the least of them, the weird Vegetable Caterpillars. For those with eyes to see, the sober autumn and winter bushland is as full of pleasure and interest as it is in the months of spring.

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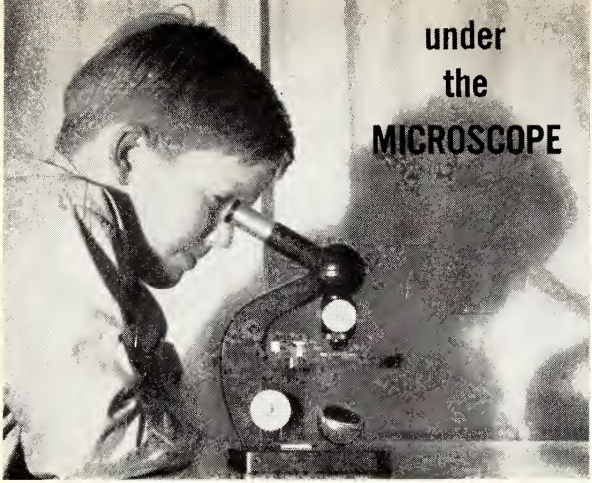


No. 4
Rotifers

By E. LeMaistre

Some 200 years ago, when microscopy was in its infancy, the "Wheel Animalcules", or little animals with wheels, attracted the interest of the first microscopists and indeed, that interest is just as absorbing today as it was then.

The very name "Rotifer" comes from the Latin roots—to bear a wheel—and as fantastic as it may sound for an animal to have wheels in its head, the rhythmical action of a ring of cilia looks so much like a rotating wheel that the literal interpretation is readily understood.

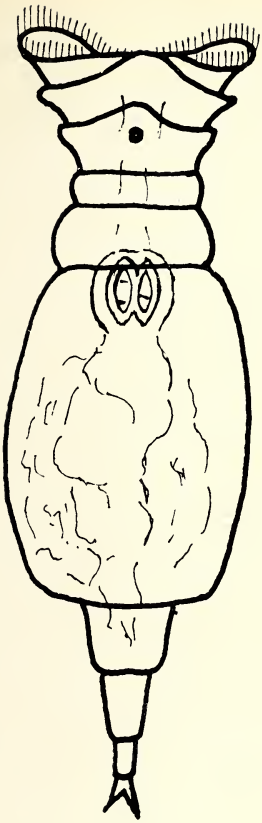
The Rotifera is a very large family with a great variety of genera which can be very dissimilar; long or short, fat or thin, free swimming or of fixed abode, and it would take many articles to really do them justice, but a brief description of some forms will help the reader appreciate yet another of Nature's surprises.

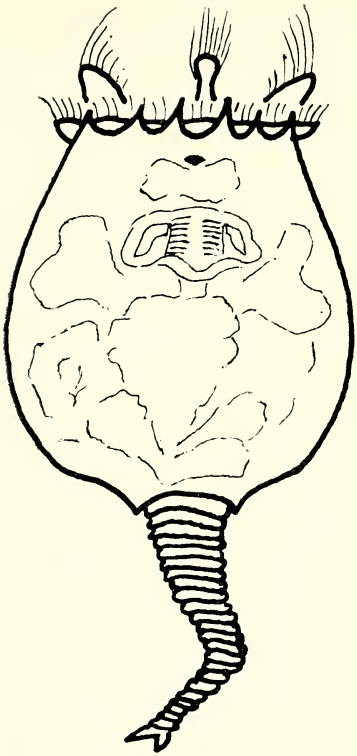
Practically any pond water will provide the collector with some of the free swimming types which, when studied under the microscope, exhibit at least the main features shown in the accompanying diagram. Starting from the head or anterior end of the body, the feeding and locomotor organ, called the Corona, consists of cilia arranged mainly in rings which, when they vibrate, cause a current of water containing items of food to flow towards the mouth and at the same time draw the animal through the water.

From the mouth, an alimentary canal leads to the stomach, the food first passing through a specialized crushing organ called the mastax containing sets of trophi or jaws (see diagram) which can be observed opening and shutting, thence after digestion the waste products pass to the cloacal opening just above the foot.

Most of the Rotifera have one or two red "eyes" situated near the brain at the anterior end of the body but here again as with other microscopic animals the eye is probably just a light sensitive centre, rather than an organ capable of actually sending a sight picture to the brain.

The free swimming Rotifers are mostly very active and therefore difficult to study (a little gum tragacanth in solution added to the water may help to slow them down), but the action of their "wheels" and their antics in the water will keep the viewer intrigued, and the time spent will be repaid with a greater appreciation of the wonders of Nature.

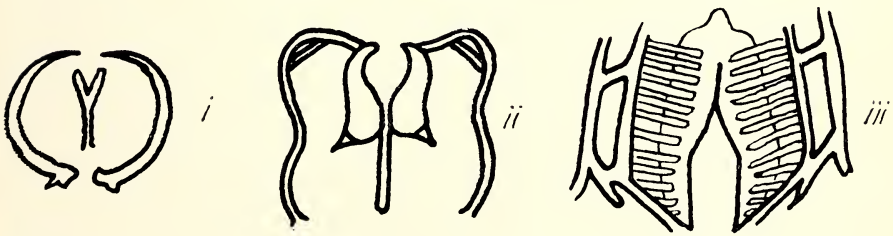




Philodina *Brachionus*

(Approx. Size 0·5 mm. ±)

Different types of Mastax.



The Parrots of Australia

by William R. Eastman, Jun., and Alexander C. Hunt.

(Angus & Robertson; $10)

This book is a mixture of good and bad. The layout of the pages is excellent, most of the written information is extremely good but the illustrations generally are only average and in some cases very poor.

It seems a pity that possibly the most attractive group of Australian birds had not received better attention as far as illustrations are concerned. This may not be altogether the fault of the artist, Mr. Eastman, as the publishers could well be to blame. If you look at the colours of the Twenty-eight and the Port Lincoln Parrots on page 121 and compare them with the same birds on the back page of the dust cover, the birds on the dust cover reveal the true ringneck greens. The poorly produced habitat shots throughout the book again could be the fault of the printers. The colour illustrations suffer most in the Polyteline, Psephotus and Neophema groups. However the drawings of the feeding attitudes of the brush-tongues are excellent.

The maps on distribution are on the whole well done, but Victoria suffers considerably in the case of the Western District, where three of their common species, the Red-backed Parrot, Eastern Rosella, and Slender-billed Corella, are not shown. The authors have relied too much on published information by unreliable observers, instead of consulting distribution experts who live in the various states. Other species that show incorrect distribution in Victoria, are the Regent (Rock Pebbler), Little Corella, Red-tailed Black Cockatoo and the Glossy (Leach's) Black Cockatoo, King Parrot, and the Blue-winged Parrot. The use of such names as Buln Buln, Barraband, Rock Pebbler and Pileated, makes it rather confusing for the field observer who knows them better as Mallee Ringneck, Superb, Regent and Red-capped.

For its written information alone this book has contributed greatly to Australian ornithology, but personally I think, and I am not alone in this, Angus and Robertson could have spent the money better by revising Cayley's "Australian Parrots" in similar fashion to the finches.

W. Roy Wheeler

Trees of Victoria

(An Illustrated Field Guide)

by L. F. Costermans.

Glossy cover, 5½" x 4½" approx., 80 pages, illustrated with half-tone plates and line drawings. Price—50c.

To review this book is rather like being asked to endorse the remarks of an eloquent speaker—there is very little left to say.

The proof of this lies in the fact that, almost within a week of release to the booksellers, stocks had become very low; until now, there are but few of this edition left.

The amount of information, covering 40 odd eucalypts, 6 wattles, and a group of other trees and shrubs often seen, is worthy of a much larger volume; but here, it is fitted between two pocket-sized covers in a remarkable manner. The sketches of the growth pattern of the trees, although quite small, are very helpful. Some space is even provided at the bottom of each page for the observer's own notes on each eucalypt.

Altogether, this is a most impressive publication, and to add anything to what has already been said in other reviews, would be trite.

I would suggest only one thing—to those who have acquired a copy of this book, look after it; and to those who have not, look out for it.

Four Seasons at Narre Warren North

[Part 1]

By Victor Jacobs

About one hundred yards from our house is the corner of a wood (Map Ref. 360165 on Map 7922-11, Monbulk. Ed. 1. Series R754.) which covers roughly fifty acres. Maximum elevation: 500 ft. It seems to be an ideal spot for convenient and regular observation, and its fence affords protection from all stock except a few Aberdeen Angus cattle which roam over it at times.

The land slopes from A'Beckett Road to the south and west, and reaches it lowest point in a patch of marsh where an intermittent stream has eroded some miniature gorges and some tiny waterfalls.

The trees are scattered, being mainly Long-leaf Box *Eucalyptus goniocalyx* and Common Peppermint *E. radiata,* with the former in the majority. The peppermints are by far the largest and oldest, which puzzled me until I found that some years ago, the trees had been used as a source of firewood, and the peppermint had been ignored as being inferior for the purpose. The regeneration of the Box is responsible for the present less mature stand of trees. There are Cherry Ballarts *Exocarpus cupressiformis,* and some Black Sheokes *Casuarina suberosa,* together with a few Black Wattles *Acacia mollissima* of mature age. No doubt cattle and rabbits have accounted for seedlings for many years.

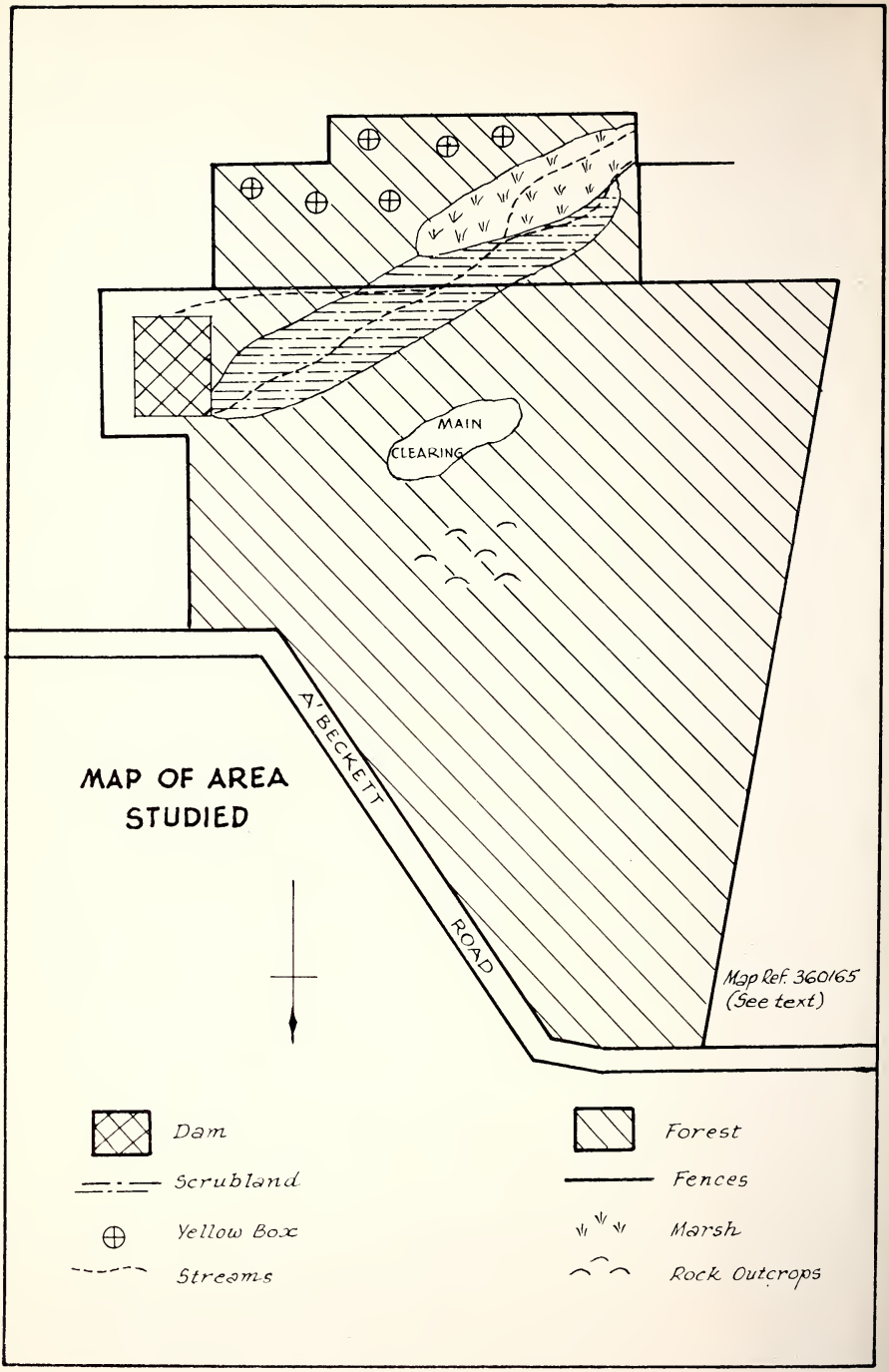
In the shrub layer are Hedge Acacia *Acacia armata,* Prickly Moses *Acacia verticillata,* Sweet Bursaria *Bursaria spinosa,* and Tea Tree *Leptospermum* sp. These shrubs are well scattered, only forming a dense cover in a few spots. This is particularly true of the Tea Tree, which are rarely more than three feet high.

Here and there, the underlying granite projects hump-like, from the surface. One of these smooth humps, some five feet high and about sixteen feet in diameter, has a small horizontal crack a foot from the top. This is the well-guarded entrance to a bull-ant's nest, and it called to mind the lama-series of the Tibetans perched inaccessibly on the crags of the Himalayas.

September

A pair of Scarlet Robins *Petroica multicolor* flew from the wood into the garden and sought food. I was aware of their vertical migration from the lowlands to the hills in the spring and their opposite movement in the autumn and wondered how far they would move before selecting a nesting site.

In the wood, the diminutive tea trees are massed so heavily with white blossom that the stems are completely hidden. The spring mantle of fresh grasses is so dense that rarely can a bare patch be seen. Tall Sundew *Drosera auriculata* is particularly abundant. Cut-leaf Cranesbill *Geranium pilosum,* Dwarf Rice-flower *Pimelea humilis,* and Early Nancy *Anguillaria dioica,* are common too. Less common or locally restricted plants are Common Hovea *Hovea heterophylla,* Leopard Orchid *Diuris maculata,* Yellow Star *Hypoxis glabella,* Milkmaids *Burchardia umbellata,* Mouse-ear Chickweed *Cerastium glomeratum,* Blue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Dam
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Yellow Box
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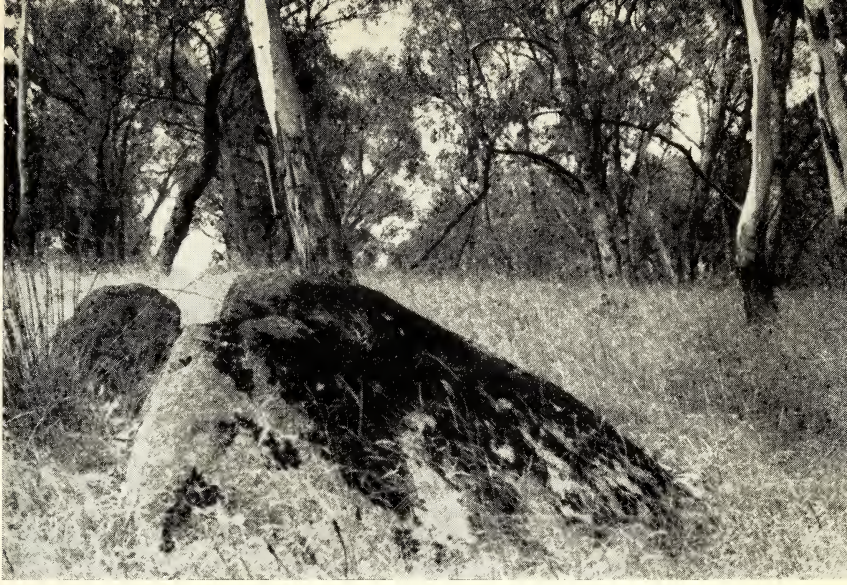
Forest
Fences
Marsh
Rock Outcrops



Rock Outcrops at Narre Warren North

Photo: *Author*

Stars *Chamaescilla corymbosa* and Trailing Guinea-flower *Hibbertia ovata*. I found just four plants of Grass Trigger-plant *Stylidium graminifolium*. Towards the streamlet in the damper situation there is a massed, entwined clump of Common Hovea against a background of Common Maidenhair *Adantium aethiopicum*. Amidst the Bracken there is a colourful tracery of Creeping Bossea *Bossiaea prostrata* and Golden Bush-Pea *Pultenaea gunnii*. Here too is a small colony of Creamy Stackhousia *Stackhousia monogyna*.

Some small brown birds busy shredding bark from a dead branch are Brown Thornbills *Acanthiza pusilla* though some of them have the throat stripes more in keeping with Cayley's illustration of the Striated Thornbill *A. lineata*. Yellow-tailed Thornbills moved in the same trees.

October

The birds in the wood seem gregarious. At one time there are none, and then a procession passes the silent watcher. Are they like greedy children, who race after each other hoping that the leaders will lead them to some secret hidden store of delectable titbits?

The now familiar call of the Grey Fantail sounded. A couple of dozen small birds began a minute examination of trunk and branches spiralling downwards. The bright flash on their wings identified them as Orange-wing Sitellas *Neositta chrysopteris*. A pair of Scarlet Robins sat side by side and the red breast of the male was clear to see. The full throated cadence of a Rufous Whistler *Pachycephala rufiventris* delighted me as I left the wood.

Today two Black-faced Cuckoo Shrikes flew nervously across the wood near tree-top level. Yesterday I saw them hovering, kestrel-like, in the paddocks where they seemed more at ease.

In the middle of the month, the Scarlet Robins, seen often in the wood, were collecting food on our lawn. Were they the ones seen a month ago? If so, they could have been nesting in the area. That evening, two males of this species, sat watching from the

fence as a female, with lowered wings, postured before them.

A patch of Scarlet Coral-pea *Kennedya prostata* blooms, and Chocolate Lilies *Dichopogon strictus,* scattered through the area, are opening their first flowers. Moving into a dense patch of Hedge Acacia near the south-west corner, I saw the first seedling Black Wattle. It was apparently protected by the encircling prickles of the last named, but so distorted and attenuated that it could hardly grow into a normal tree. The Acacia had a few flowers remaining, but was mainly covered with immature pods. Under a hand lens they glistened like green and brown millipedes with silver legs.

I was bending to select a specimen of Field Woodrush *Luzula campestris,* growing beside the few rare samples of Horny Conebush *Isopogon ceratophyllus,* when a sharp click and a flurry of wings over my head surprised me. I had a glimpse of a medium-sized bird, perching in a tree top, but lost it when I attempted to use the binoculars. I was still looking when the click and the flurry was repeated. I was being attacked by a bird, which so subtly and rapidly changed its direction of attack, that identification proved difficult. The only time I had a clear view was when it attacked Nipper, the dog, instead of myself. The Grey Butcher-bird *Cracticus torquatus* was certainly determined that I should leave.

A few days later a family of Scarlet Robins sat on the fence. The parents busied themselves feeding the three fledglings, which must have been nestlings quite recently. These fluffy youngsters appeared to have been hatched close by, which suggests that Scarlet Robins do halt their vertical migration in spring, to raise a family before reaching their summer haunts.

(To be continued)

It was with deep sorrow that we learned of the death last month, of Mr. W. McColl Say, President of the Benalla F.N.C.

The Benalla Field Naturalists Club was formed in the spring of 1961, and Mr. Say was elected inaugural president and has been our president until his death in August this year.

He was a former mayor of Benalla, and was largely responsible for obtaining for the City of Benalla its excellent water supply from the Loombah weir.

Mr. Say was known widely in Victoria for his untiring work for conservation, and was a man of remarkable energy and ability.

His great interest in education and his knowledge and love of our Australian heritage made a great impact on us all.

R. R. Barber,
Secretary
Benalla Field Naturalist Club.

Bush Brushes

The fox's brush was the traditional trophy of the chase. The Field Naturalist usually returns from an excursion into the bush with a different sort of "tale". If you have one worth mounting and preserving send it to the Assistant Editor, "Victorian Naturalist", 262 Nepean Street, Greensborough.

Bower-birds in Winter

These observations come from Miss Jean Galbraith of Tyers, in Gippsland.

It would be interesting to know whether Satin Bower Birds are as abundant in other places as here.

Every year they come to the farms and gardens around Tyers township about May, and leave (going up into the hills to nest) in October. They are most abundant in those gardens where there are pittosporums which, being untrimmed, bear fruit. To one garden (where there is a great variety of other species also) up to 20 birds, some mature blue plumaged males (though they are relatively rare and shy) come every winter. This is on a farm where birds are encouraged and protected, and where there is a plantation containing a number of pittosporum trees.

One house on the edge of the township was visited this year by 4 birds which went into a shelter to eat pumpkins, which had to be covered; and 4 live in an orchard a mile away, eating fallen (and mostly bad) apples. I have a few regular visitors, usually from 2 to 5, but this year 8 are constantly about the garden. This probably include the 4 that attacked the pumpkins only the width of a paddock away. They have various mannerisms and a definite "peck order". In normal weather only one feeds at the bird table (attached to the outside of the livingroom window) at a time; the largest and fattest (a visitor over many years) always coming first, and the smallest last—whether it is last because smallest, or smallest because last, I couldn't guess. Noisy Miners usually have to come after the last Bower bird, but a few irrepressibles dash in and snatch mouthfuls while the big birds are still feeding—one often darting down while the Bower bird is dealing with another on the opposite side.

I'm not sure whether an occasional alarm note from the Miners is a deliberate rouse or not, but it is certain that after a sudden clamour from a Miner the Bower bird "in occupation", and the 6 or so awaiting their turn, all disappear into the shrubbery (for perhaps half a minute) and the Miners all descend on the bird table and eat as much as can possibly be gobbled up before a Bower bird with an angry "Karr" and a wide-open beak, hunts them away.

However, during the very cold wet days following July 12th the birds were too hungry to even stop to chase each other. As soon as they knew I was about (usually when I put on the 7.45 a.m. news broadcast) they clustered round the bird table, waiting, and, if I did not at once put out food, Miners would cling to a wire window and shout at me. As soon as food was put out birds descended on the bird table, eating as fast as they could without stopping to chase each other, though there was much coming and going of individual birds as one would push another off. Nine (if most were Bower-birds) seemed to be as many as could feed at once. One morning there were eight Bower-birds and one Noisy Miner on the small tray—another time six Bower-birds and three Miners, and once twelve miners (four more than the usual maximum number of Miners frequently the garden).

Bread soaked with sugar and water is the main food—and all apple peelings and cores disappear rapidly; but they eat anything sweet—nothing savoury so far as can be seen. Miners are almost omnivorous.

The Bower-bird's diet, in so far as the bird-table supplies it, consists mainly of carbohydrates, balanced by pittosporum berries and rose hips, and a great many leaves (grass, forget-me-not, etc.).

When a bird can eat no more, it often spends some time stripping off and playing with loose bark on a tree fuchsia, or posturing and displaying with outspread wings and tail. The arrival of another bird, of whatever kind, at the bird-table, usually means the game is interrupted just long enough to chase it away.

Once only, so far as I know, was any playground made. I think I recorded this at the time. It was not a Bower but merely a heap of fragments of blue plastic, glass, etc.

Recently, expecting a visitor who might have wanted to photograph the birds, I removed the two lowest louvres from the window and stood an old camera on the table immediately inside it, thinking they might become used to the sight of it. There was no indication that they even noticed it, but it was not practicable to keep the window open—after putting excited Bower-birds out of the living-room four times in a few hours I closed it.

The Bower-birds go to roost early, usually before 5 p.m. I always know the time as the whole flock of Noisy Miners follow them with excited scolding. Miners come to the bird table much later; usually until is is almost dark.

The Red-tipped Pardalote

This interesting and seasonal note comes from Mr. Keith Rogers, of Wulgulmerang, near Buchan in Victoria.

As young children, early in 1903, we came with our parents to live at Black Mountain, which is on a tableland of around 3000 ft. elevation, 40 miles north of Buchan. The long established homestead was then in three separate buildings that enclosed a gravel yard on three sides. On the fourth side a garden bed was soon established, protected by a wire fence.

Attached to the newer portion of the house, were two very substantial stone chimneys. These had been made from rough stone, hewn from the local rock, and the spaces apparently filled with mud, or a weak mortar, which had become somewhat friable, leaving crevices between the stones.

These gaps proved ideal places for Pardalotes to drill their nesting burrows, which soon increased in number. The fence wires, and later, garden shrubs as they grew up, became the favourite resting places of these small birds. We could be busy in the garden, and the friendly little Pardalotes would perch and spread out their wings only a few feet from us. They appeared to enjoy our company, whilst the whole quadrangle seemed filled with their eager calls.

Not then knowing what these little friends of the family were, I remember sending their description to the popular "Nature Notes and Queries" column of "The Argus", by Donald Macdonald, and the reply that our bird was the Red-tipped Diamond Bird—now called Pardalote, *Pardalotus ornatus*.

The old chimneys have recently been pulled down, but to my knowledge, the Pardalotes nested in one of them continuously for 60 years.

Over 30 years ago, when the place was sold, we built our weatherboaord home about half a mile away. On the dry north-east side of the house there is a verandah, and it was not long before Pardalotes started nesting here also. They squeeze up under the roof, through the very small space left by each corrugation where the roofing iron of the verandah abuts onto the wall. These entrances are so small, the birds often drop their piece of nesting material on entering.

At first there was only one nesting spot, but soon these increased in number, until it has become somewhat embarrassing, what with the incessant noise of nestlings being fed and the constant singing out of the adults and litter of grass on the verandah floor in the breeding season.

Several birds appear to attend one nesting place, and the nesting season lasts from about late September through to January. However, the charm of these birds when coming and going to their nests, or waiting their turn in the adjacent rose bush, whilst spreading out their wings as if to attract attention, far more than atones for any slight annoyances.

In winter here, nothing is seen or heard of the Pardolotes, during early September, these very common birds are heard again with their familiar call of "pick-it-up", either around the house, or in the paddocks. There the Pardalotes nest chiefly in small holes in dead trees or stumps. When this occurs, spring is certainly on the way.

Aboriginal Rock Carvings at Turondale

By P. J. Gresser

Recently I was informed by Mr. Ian MacArtney of Bathurst, who had spent his boyhood days at Turondale, a small hamlet about twenty-eight miles from Bathurst, that near Turondale were Aborigine rock carvings. These carvings are small ovals and circles on a cliff face. Mr. MacArtney informed me that his first visit to the site was when the Turondale school teacher, on a nature study excursion, took the pupils to see these Aborigine carvings. The older residents of the locality looked upon them as being the work of the Aborigines without question.

A few days ago Mr. MacArtney guided me to the site. In a small narrow canyon approximately a mile and a half south of the Turon River, and about twenty-eight miles north of Bathurst, are a number of small ovals and circles pecked into the rock face. This small canyon is approximately thirty yards in length, twelve feet in width at the widest end, and narrowing to a width of eight feet at the other end. The rock walls on both sides reach to a height of twenty-five or thirty feet. A small gully flows through it, which is a tributary of Nuggetty Gully; which in turn is a tributary of the Turon River. At the end of the small canyon there is a waterfall, at the foot of which is a pool of water. The country here is hilly and of sedimentary rock formation; mud stone, and ancient Silurian.

Distant about fifty yards down the gully after it leaves the small canyon, there is a footprint on a sloping rock surface. This is probably a natural formation. It is eleven inches in length, five inches in greatest width across the toes and about an inch in greatest depth. The toes are not distinct, being merged one into the other. The resemblance to a large footprint in loose sand or mud is unmistakable, and it has for many years been known to the local residents as the "Footprint".

On a level portion of the cliff face on the eastern side of the small canyon, and a few yards from the entrance, are three ovals pecked into the rock face. The largest is seven and a half inches in legth and five and a half inches in width. Distant four and a half inches is a smaller oval four and a half inches by three and a half inches. Above this one and five and a half inches from the larger one is another oval three inches by one and three quarter inches. The positions of these three are thus:

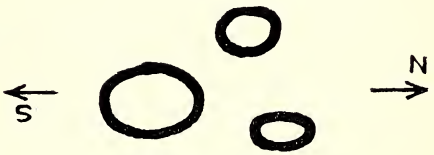


Fig. 1

The inner surface of the larger one is weather worn, but within the oval there are markings that may have been a picked design, thus: U

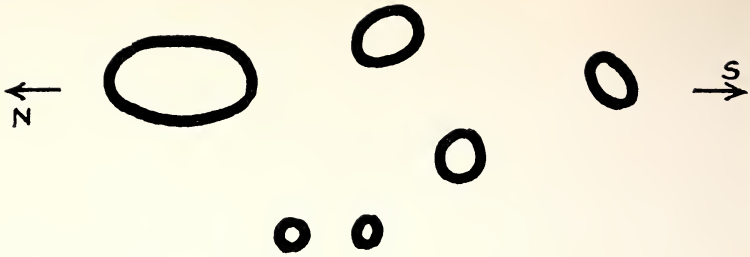


Fig. 2

Distant approximately twelve feet from these on another level portion of the cliff face are another series. The largest of these is an oval ten inches in length and six inches in width. Thirty-nine inches in a horizontal line from this oval is one much smaller, four inches in length and three inches in width. Below this and distant twenty-six inches from the large oval is a circle three inches in diameter. Above is another small oval distant eighteen inches from the large oval. Below these are two markings on the rock face which appear to be two small circles. The position of this series is as in Fig. 2.

Some of the ovals and circles are more or less weather worn but others are in perfect state of preservation and show unmistakably that they have been picked into the rock face to a depth of about a quarter of an inch and a width of about half an inch.

Mr. MacArtney stated that when he had formerly visited the site, which was on a number of occasions, there were more ovals, circles and other markings showing than are discernible at the present time. The abnormally wet seasons during the past fifteen or twenty years have caused water to seep through from crevices above, and give rise to the formation of slime over much of the level rock surfaces. On drying out, a mineral deposit has been left on the rock face. This is evident over much of the level rock surface in the vicinity of the carvings now to be seen. There may have been a slight movement in the strata brought about by the periods of excessive rains. Other markings on the cliff face are to be seen that appear to have been carvings, almost obliterated due to being coated over with a dirty grey substance—minerals dissolved in the water and left behind on the rock surfaces as the water evaporated.

No other rock engravings are known of in the Bathurst district, the nearest being in the Burragorang Valley, in the Blue Mountains, about eighty miles away.

The Vegetation of Wyperfeld National Park

Theatre and concert-goers, almost without exception, buy programs covering the evening performance; visitors to historic houses normally purchase brochures describing the buildings and their history. Without these pieces of information, the visits are not satisfyingly complete.

So it should be, when a visit is made to any of our National Parks. To know the history of, and to be able to identify the things around us, makes the visit so much more enjoyable.

Fortunately, there is such a book available, dealing with Victoria's largest and one of its most interesting National Parks—Wyperfeld.

There are ninety-five good reasons why every visitor to this park should possess a copy of J. Ros Garnet's book, "The Vegetation of Wyperfeld National Park". These are the 95 pages of information and illustrations packed between its covers, as well as an excellent map of the area.

With the season of spring upon us, and summer to follow, it is likely that many people will be visiting Wyperfeld during the next few months. It would therefore be most opportune to publicise the availability of this book among our friends, and to all who may be visiting the area in the future.

The price is \$1.50, *and is available from booksellers; or alternatively, members of the F.N.C.V. or V.N.P.A., may purchase copies for* \$1.25 (+ 7*c. postage*) *from their respective sales officers.*

Field Naturalists Club of Victoria

General Meeting—12th September, 1966

The Herbarium Hall was full to capacity with members and friends for the meeting, the chairman being the president, Mr. M. K. Houghton. He announced that the Nature Show had an attendance of 5,788, which was 1200 more than the last year. The publications stand took \$580. He thanked Mr. D. McInnes, Mr. J. Begley and the Committee for their fine work in organizing and conducting the show, and the Hawthorn Juniors for their splendid exhibit.

Mr. F. Zirkler moved and Mr. W. Woollard seconded a vote of thanks to the Committee for the months of preparation for what had been described the "most finished" Nature Show. Mr. D. McInnes responded.

The secretary, Mr. E. H. Coghill, announced that the Town Hall had been booked for the last week in August 1967 for next year's show.

He asked for a delegate to the A.N.Z.A.A.S. Congress from January 16 to 20, 1967. He announced a Tourist Bureau excursion from 8 to 14 October through Ballarat and Mt. Gambier and back along the coast, and a C.A.Z. Spring School at Mount Beauty in October. He reminded members of the National Parks Association meeting on 14th August, when Mr. Charles McCubbin will speak on South-west Tasmania. The Field Naturalists, like the National Parks Association, are concerned to prevent further development in that area until a suitable authority with representatives of scientific organizations be set up for conservation in the area. The F.N.C.V. has written to the Premier of Tasmania expressing its own view. Mr. J. Ros Garnet emphasized this concern.

The speaker for the evening was Mr. J. H. Willis, his topic being "Land Forms and Vegetation of Bass Strait". He said that there was no more exciting and rewarding study than in this turbulent stretch of sea in which 52 maritime disasters occurred from early 1800's to 1920.

On the islands there are 600 known plants, rare birds, and other animals, all exciting to naturalists and ecologists. Tasmania and Victoria show a startling disparity. One in six plants in Tasmania are confined to Tasmania but not one in thirty in Victoria are confined to Victoria.

Questions posed include: Why were Tasmanian aborigines the Negrito race? Why are the Tasmanian tiger and devil not in Victoria? Why no mistletoes in Tasmania and about a dozen in Victoria? Why are there eight genera of plants occurring in New South Wales and Tasmania, but which are missing from Victoria; an example being Blandfordia? The solution apparently lies in the fact that the land, now under the turbulent waters separating the two states, once formed an efficient barrier to the transport of seed. Mr. Willis outlined the geological history of the Straits and gave a brief history of the people who had landed on, and examined the plants of various islands. They included George Bass and Matthew Flinders, Robert Brown, Commander Lord Stokes, Dr. Byeno and Dr. Gillam. John Winray, a local fisherman, has added a considerable amount to the plant research, and the F.N.C.V. did a great deal of work in the 1890's.

A well prepared chart showed the soundings at depths up to 40 fathoms, at which depth, the present island linked up to extend from Tasmania to Victoria, leaving what may have been a freshwater lake in the midst.

Excellent colour slides were shown, which depicted the vegetation types of the southern coast of Victoria, across the intervening islands, to the north coast of Tasmania including Cape Grim and "The Nut". The remarkable Fossil Bluff at Wynyard shows a clear succession of geological formations, and is famous for the early marsupial fossil, Wynyardia.

Mr. Willis also mentioned the former existence of the Celery-top Pine on King Island, but which no longer grows there. However, there had been an unconfirmed report that two seedlings had been found.

Some beautiful hand tinted photographs of native flowers taken by Herbert Reeves were brought by Mr. Willis. The President thanked Mr. Willis for the most enjoyable address.

Mrs. M. North exhibited shells (*Paphia laterata*) from Dirk Hartog Island.

Mr. E. S. Hanks brought an original bird feeding stage which he had made. Mr. J. Baines read a cutting from the *Bendigo Advertiser* pointing out the threat to the Whipstick area, and other cuttings telling of a sanctuary at Mt. Roland (Tasmania), and the City or Frankston's plan for an Australian plantation of 218 acres at Seaford.

Five new members whose names appear in the September *Naturalist* were elected.

Geology Group Meetings August and September, 1966

August

32 members and visitors attended with Mr. Dodds in the Chair.

Exhibits

Mr. Hammond. Schist, Wagga. Granite, Albury. Garnets, King Island. Phosphatic Rock, Nauru. Grano-diorite, Mount Teneriffe near Avenel. Granite, Euroa.

Mr. Davidson. Assorted Rocks, Gemstones including Amethyst, Chalcedony, Aventurine Quartz, Rutilated Quartz, Prase, Obsidian and Blood Stone.

Mr. Zirkler. West Aust. Jaspers and Agates and other gemstones collected by

Mr. and Mrs. North and polished by Mr. Zirkler.

Miss Pertinac. Cephalopod, Mt. Matlock. Chertified Rock thought to contain a Fossil Sponge, Esperance Bay, W.A.

Miss Bennett. Slate containing dendrites, Stawell, Vic.

The subject for the evening was a talk given by Mr. M. A. H. Marsden, Lecturer in Geology at Melbourne University. He spoke on his recent trip to India where he attended the International Geological Congress. The speaker chose the Himalayan region for his talk, and began by saying that India is divided into several distinct physiographic and structural regions—Peninsular India, the Indo-Gangetic plain, the outer Himalayas, lesser Himalayas, inner Himalayas and the Tibetan plateau. He said a geosyncline existed in Palaeozoic times to the north of the Precambrian shield areas of Peninsular India, the folded sediments of the geosyncline now being found in the area of the Tibetan plateau.

Of great interest is a thick sequence of younger rocks which have been affected by the tectonic movements which caused the uplift of the main Himalayan chain. They are terrestrial and were deposited by rivers in a major downwarp which developed along the front of the rising Himalayan mountain chain during the Tertiary. These sediments form the Siwalik Formation and were derived from erosion of the upthrust Precambriain and Palaeozoic rocks of the Himalayan ranges. The formation is upwards of 16,000 feet thick and was deposited between the Middle Miocene and the Lower Pleistocene, a comparatively short time geologically. Folding and thrust faulting on a grand scale occurred in a series of pulses from the mid-Tertiary to the Pleistocene (and Recent), resulting in successive elevations of the older rocks of the main Himalayan chain and also folding and faulting of the Silwalik Formation to form the outer Himalayas. The pressure was caused by movement of the shield area of Peninsular India towards the N.N.E., and major nappe structure and recumbent folding have brought older rocks into positions overlying younger rocks. He went on to say that much of the Siwalik Formation consisted of poorly sorted conglomerates which give evidence of rapid deposition by rivers of very high gradient. This indicated that the deposition was initiated by, and kept pace with the rising of the Himalayas. The speaker gave some interesting facts regarding the present drainage system of the Himalayas. Two large rivers the Brahmaputra and the Indus, with their catchment in the north, flow south-easterly and north-westerly respectively along the grain of the Himalayan chain. They then break through the chain to flow in a more southerly direction. On the other hand several other rivers with their head waters in the north have maintained their original southerly course and have kept pace with the uplift by cutting deep gorges.

The speaker showed many splendid slides of the region he visited, clearly showing the ruggedness of the terrain. He also used several maps and diagramatic sections to drive home the point.

Many questions were asked by an enthusiastic audience and the president, Mr. Dodds, thanked Mr. Marsden for his very interesting and informative talk.

September

Twenty members and visitors attended with Mr. Dodds in the chair. The speaker on this occasion was Mr. Dodds himself. He spoke on a visit he made to Broken Hill earlier in the year accompanied by Mr. Wigmore. Before giving an account of the places visited Mr. Dodds described the Geological Structure of the Barrier Ranges and of the Lode area within. The Barrier Range is thirty miles long and twenty miles wide. The rocks themselves are of Archean Age which represents some of the oldest rocks in Australia. The Lode is four and a half miles long and is on the sidie of a Syncline. There are two theories on the origin of the lode:

(1) Hydro-thermal origin and

(2) Sedimentary origin.

Whatever the cause, it has been done on a grand scale. The speaker said the lode is divided into many zones. The top zone consists of the secondary minerals, Limonite and Haematite. This crust is called a Gossan (Iron Hat by locals). Lower down is the rich Carbonate Zone. Here minerals such as Siderite, Malachite, Azurite, Cerrusite and Smithsonite are found. It was in this zone the first mining took place. Below this is the Complex Sulphide Zone, also very rich. This zone has minerals such as Argentite, Galena, Sphaelerite, Chalcocite, Stannite and Cassiterite. Treatment of minerals from this zone caused a problem in the early days until the Flotation Method became

known. Below this zone is another known as the Primary Sulphide Zone, the minerals here have a high water content. This zone is about 2000 ft. below the surface. The speaker said that about 100 million tons of ore had been treated since 1880, with the present rate of about 1½ million tons per year. Many fine slides taken by Mr. Wigmore were shown and Mr. Dodds spoke of these to some extent. Places visited included the Broken Hill North Mine, the Broken Hill South Mine, The Zinc Corp Mine, the Egebek Feldspar Quarry, the Triple Chance Mine, a mine in the Parnell Hills and another at Byjerkerno. Other places visited included Rockwell, Thackaringa, Silverton and Mootwingee. Mr. Box thanked Mr. Dodds on behalf of those present for his excellent talk.

Exhibits:

Mr. Wigmore. A collection of minerals from the Broken Hill area. These include Galena, Sphaelerite, Rhodenite, Cassiterite, Quartz and Feldspar, Sillimanite, Beryl, Microline, Asbestos, Stauralites in Schist, Pyrite, and a pebble from Conglomerate at Mootwingee.

Miss Holmes. Prehnite, Ord River.

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

GENERAL MEETINGS

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

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Native Mice of the Mallee"—Mr. N. A. Wakefield.
4. Election of New Members.

(a) *Ordinary*:
Margaret S. Anderson, 52 Lansell Rd., Toorak S.E.2 (Interest: Botany).
Garry Alan Dyer, Lot 4 Macintosh Rd., Glen Waverley (Interest: Marine Biology).
Colin F. Hutchinson, 6 Daisy St., Murrumbeena.
Dr. Brian J. Smith, 8 Huntsford Ave., Westerfield, via Clayton (Interest: Microscopy).
Joint:
Mr. and Mrs. Burnley Naylor, Cardinia Rd., Officer, Victoria (Interest: Ornithology, Botany).
Mr. and Mrs. B. J. Angus, 31 Yeneda St., North Balwyn E.9.

(b) *Junior*:
Miss Susan E. Fisher, 16 yrs., 30 Sanday St., Glen Waverley. (Introduced by Mr. J. Cato.)
Miss Helen M. Godfrey, 9 yrs., 10 Donaldson St., Ivanhoe.
Master Ian B. Godfrey, 10 yrs., 10 Donaldson St., Ivanhoe.
Master Andrew S. Gourlay, 12 yrs., 5 Pellew St., Sandringham. (Interest: Reptiles.)

5. General Business.
6. Nature Notes and Exhibits.

Monday, November 14—Members' Night.

Monday, December 12—Miss Ina Watson.

GROUP MEETINGS

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

Thursday, October 13—Botany Group; "Orchids and their Pollination"—Mr. Fuhrer.

Wednesday, October 19—Microscopical Group. Section Cutting and Staining of Animal Tissue. By Paul Genery.

Friday, October 28—Junior Meeting at 8 p.m. at the Hawthorn Town Hall.

Wednesday, November 2—Geology Group.

Thursday, November 3—Mammal Survey Group, Fisheries and Wild Life Dept. Library at 7.45 p.m.

Friday, November 4—Junior Meeting at Rechabite Hall, Preston, at 8 p.m.

Monday, November 7—Marine Biology and Entomology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of house.

Thursday, November 10—Botany Group; "100 yards from the Sea"—Miss A. Hooke.

F.N.C.V. EXCURSIONS

Sunday, October 16—Whipstick Scrub, Bendigo. Leaders: Bendigo Field Naturalist Club. The bus will leave Batman Avenue at 9 a.m. Fare $2.00, bookings with the excursion-secretary. Bring two meals. Members going direct may join party at Bendigo Post Office approximately 11.45 a.m.

Tuesday, November 1, Cup Day—President's Picnic, Brisbane Ranges. The coach will leave Batman Avenue at 9 a.m. Fare $1.80. Bring two meals.

December 26, 1966, to January 2, 1967—Wangaratta. The party will leave Melbourne by coach on Boxing Day for Wangaratta where motel accommodation is available for coach party. Day trips will be made to places of interest such as Mt. Buffalo and Beechworth. Fare, including day trips $12.00. Bookings with excursion secretary. The fare should be paid by the November General Meeting.

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, 1966

President:
Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg N22.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

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A Crisis?

More than twelve months ago, our Treasurer Mr. Hooke, and his assistant, Miss Butchart, indicated their desire to be relieved of their duties as from the Annual Meeting in April of this year.

Despite requests made at each monthly meeting since this time, not one person has indicated the willingness to take over these necessary duties.

Surely, after more than twenty years of valuable service to the F.N.C.V. in the capacity of either Treasurer or Auditor, Mr. Hooke is entitled to be granted this release. Miss Butchart, also, has given of her time willingly over the past 15 years.

From among the 200 members who regularly attend the General Meetings, it is inconceivable that not one is capable of at least some help in this field of office.

In similar situations, it is a common thought among many of us, I know, that "something will turn up, and everything shall be all right"; but when a rescue rope has been uncoiled, and paid out to its limit, and the objective has not been reached, then things are critical.

This is the state of affairs within our Club right now!

Mr. Hooke and Miss Butchart have allowed their services to run on, at great inconvenience to themselves, for nine months, "paying out extra rope". But now the "coil of rope" is exhausted—their formal resignations have been tendered to the F.N.C.V. Council, and as from January 1967, the Club will have no Treasurer or Assistant, unless some members realize the gravity of the position, and prevent a crisis from taking place.

1966 Crosbie Morrison Memorial Lecture

On the 14th of October last, in the Public Lecture Theatre at the University of Melbourne, "Australia's Wildlife Treasure" was unfolded before some 600 people, who filled all available seats; and it was most fitting to have the lecture delivered by a person who, in his secondary schooldays, was a devoted disciple of the late Philip Crosbie Morrison, and who is now endeavouring to keep before us, the values of nature as taught us by that famous person.

Graham Pizzey was the person to whom this honour was given, and by use of his noted talent as an animal photographer, together with a well presented commentary, he showed and described our animals and birds ranging from the seals of Seal Rocks, off the southern coast of Victoria, through those of the rain forest and mallee areas of Victoria, to those met with in the course of his recent 10,000 mile safari into the northern areas of the continent. Even the fish of the Great Barrier Reef were not forgotten.

Indeed, those in attendance could not have failed to leave, the richer in knowledge of Australia's wildlife, and with a greater appreciation of the reasons why we must preserve it at all costs.

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November 10, 1966

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

CONTENTS

Front Cover: This photograph by David Flcay shows the female moth and eggs of the "Woolly-bear" Caterpillar, *Anthela nicothoe*. It is very likely the caterpillar stage of the life cycle, with which most of us are familiar. The cocoon, shown in this picture, can be seen to be covered with fine hairs. These are larval hairs, which, if they come into contact with the skin, can cause an irritating itch. The wing span of the female is approximately $3\frac{3}{4}$ inches.

Notes on the Artificial Incubation of Eggs of Victorian Chelid Tortoises

By John Goode

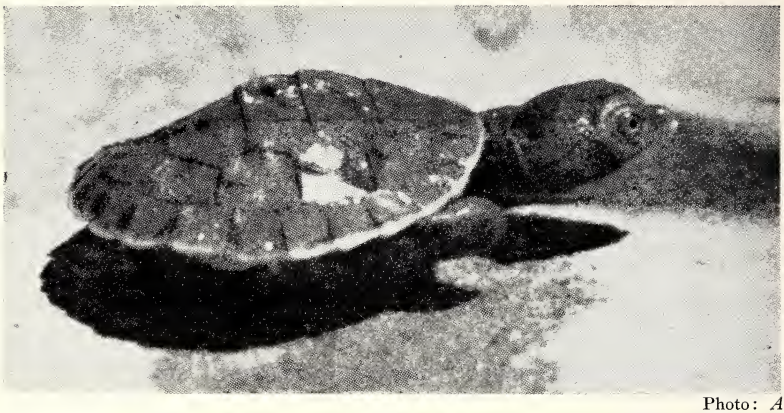


Photo: *Author*

Newly hatched *Emydura macquari* artificially incubated by the author.

This is an account of techniques which were used to incubate artificially, in a Melbourne home, the eggs of the freshwater tortoise *Emydura macquari* and two other species.

While freshwater tortoises nest naturally and incubate under normal outside conditions in the River Murray area of Northern Victoria, and in Gippsland, the mean ground temperatures in the Melbourne area are too cold to permit natural incubation of freshwater tortoise eggs.

Investigations into the nesting habits of freshwater tortoises in the Murray area began in 1964 and were initially described by this author (Goode 1965[1]). It was intended that observations made in the field would be supplemented by comparative tests under controlled conditions*, and in 1965, a field trip was made, not only to mark newly deposited nests of the tortoise *E. macquari* but also to obtain eggs for an attempt at artificial incubation. This trip was successful, largely due to the help received by Messrs. Dawes and Russell who began collecting eggs from November 5. These were augmented by others collected personally later in the month.

Altogether 106 eggs were brought back to Melbourne, all but seven being of the short necked species *E. macquari*. Six eggs only were obtained of the snake necked tortoise *C. longicollis*. There was also an egg from the larger long necked species *C. expansa* taken from a nest deposited on April 10, 1965. This nest was opened on November 29, 1965 and two eggs were removed from the uppermost layer. The nest was then resealed and covered with protective netting. Otherwise it was undisturbed.

One of the two *C. expansa* eggs was opened in the field to reveal a small embryo in an egg which had then been in the ground for 233 days, but much of this period had been during the months of the Australian winter. The egg opened showed a live embryo with

* These are now continuing with the assistance of a Grant from the CSIRO Science and Industry Endowment Fund.

the form clearly discernible but with the eyes not yet pigmented. It was at the approximate stage of a hen's egg between 35 and 45 hours incubation. This illustrated that the phenomenon known as "overwintering", which Carr (1952) records occurring with early and advanced embryos of freshwater tortoises in eggs laid late in summer in the United States, also occurs with the autumn laid eggs of *C. expansa.*

Unfortunately, the eggs collected of *E. macquari* were not kept in separate containers and were undated except for the fact that they had been acquired between November 5 and 29, 1965. There was a surprising discrepancy in the size and shape of the eggs of *E. macquari.* Some eggs were of the cylindrical form and size described by myself (Goode 1965[1]). Others were considerably shorter and were pointed at one end, similar to those of a bird.

It was assumed that the size of the eggs was determined by the size of the female.

After collection, and before being placed in the incubator, the eggs had been placed in a plastic bucket filled with soil from the original nesting sites. The bucket was stored in a cool shed.

However, there was no information as to whether the temperature in the shed had been sufficient to permit incubation to continue in the Murray area before the eggs were moved to Melbourne.

Method of Incubation

During 1965, a copy of a paper by Hausmann (1964) was obtained. This described the artificial incubation of the eggs of the South American chelid tortoise Matamata (*Chelus fimbriatus*). Correspondence with Mr. Hausmann provided further details and an incubator was constructed in the following manner.

A ready-made aquarium was used, 15 inches long, 9 inches wide and 12 inches deep.

Heating was provided with a standard, low-priced aquarium heater (150 watts) with thermostat in-built.

Hausmann incubated Matamata eggs at 27 degrees C. (80 degrees F.). They had taken 200 to 208 days to hatch. He suggested in his paper that by increasing the temperature to 30 degrees C., incubation time could be reduced to 180 days.

Subsequent discussions with Dr Hughes, Zoology Department, Australian National University revealed that in his Department eggs of the green turtle (*Chelonia mydas*) had been artificially incubated in 63 days at a mean temperature of 31 degrees C. On this basis the incubator was rigged. Deep preserving jars filled with water to simulate weight were inserted in the incubator, filled with water to an inch below the top of the "nest" jars. Glass covers were placed over the top to maintain a more even temperature, to prevent loss of heat and excessive evaporation.

In a dummy run before the collecting trip, the incubator was maintained at a constant temperature of 32 degrees C. However, on return, when incubation began, it was found that the temperature averaged 29·5 degrees C, with a variation of plus or minus 0.5 degrees.

Loth to carry out adjustments once incubation had begun, the incubator was allowed to run at this temperature throughout the following experiments.

While, at that time, nest temperatures could not be obtained from the collecting area, it seemed logical to assume that cloacal bladder water might in some way protect eggs. For this reason, eggs were collected with soil from the nest in which they were

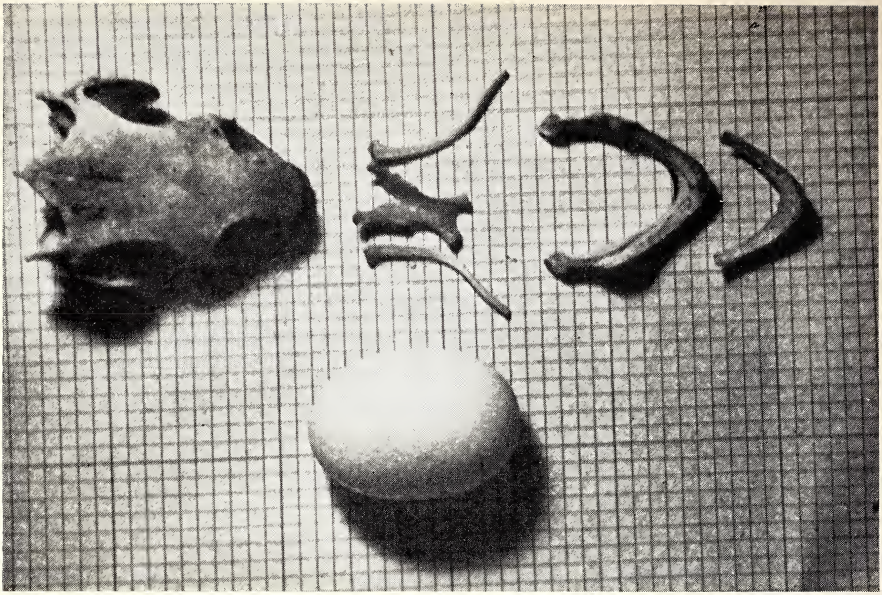


Photo: *Author*

Egg and skull of medium sized *E. macquari*. Each square of graph paper is a tenth of an inch square; i.e. 100 small squares to the square inch.

deposited, and this soil was placed in the jars below, around, and above the eggs.

(Hausmann had used jars in which eggs were placed on open beds of moistened peat. In this case, the intention was to simulate as closely as possible, those of a natural nest.)

When the time came for incubation, the eggs of *C. longicollis* were still covered with clay mud which results from the puddling applied to eggs as they are deposited. They were placed in a container on their own.

The eggs of *E. macquari,* found in sand, were placed in two containers. One contained 20 eggs (the complement of a single large nest) the others in various parts and at various depths of a large preserving jar, seven inches in diameter.

Each container was filled with soil from the nest location. In the larger jar, eggs near the side were left exposed against the glass to permit observation.

Problems During Incubation

Fungus. Within 48 hours of the eggs being placed in the incubator, fungus was noticed on the surface of the soil. Inquiries resulted in the proposal that the only effective way this could be combated, without possible damage to the eggs (which might happen if a fungicide was used) was by sterilization of the soil. This was achieved in a domestic oven. Fortunately the night was warm with an air temperature of 26 degrees C. and the eggs were left out while the soil was placed in flat baking dishes and heated for 90 minutes at 550 degrees F.

After cooling, the soil was moistened with sterile water with quantities determined by comparison of friability with some of the original unsterilized soil. The jars were also sterilized and the eggs, and soil replaced.

No further fungus growth occurred after sterilization.

Excessive moisture in nests. How-

ever, a day or two later, condensation droplets from the aquarium cover seemed to be excessively moistening the soil above each nest. To prevent this, two layers of cloth (cotton sheeting) were placed under the cover glass which held them in place.

The cloth became quite damp and once a week, was thoroughly dried. Evaporation was fairly high, and each week-end, about two pints of water at incubation temperature needed to be added to maintain the correct depth.

In later experiments, for convenience, eggs were placed in a jar without a covering of soil. Results were successful for four weeks, but in the fifth week, dehydration occurred in all eggs and embryos died. Reptile eggs need to absorb moisture (Cunningham and Hurwitz 1936, Cunningham and Huene 1938) and from this dehydration, it is assumed that with tortoises of the Chelidae, this moisture must be absorbed by direct contact through soil or a similar substance.

Buoyant containers. After it was decided to remove eggs to exract embryos, the removal of some soil and eggs from one of the containers brought problems of buoyancy in the jars. They tended to float, and worse still, to lose their vertical position. Future containers have been previously weighted with sterile pebbles at the bottom of the jar to rectify this, and to ensure nest buoyancy, even when empty.

Progress of Incubation

Originally it was intended to open one or two eggs every seven days to assess how incubation was progressing. After the seventh and fourteenth days of incubation, it was discovered that not only was incubation progressing rapidly, but that although the eggs collected before my arrival at the Murray had been stored together, in a bucket of soil in a cool shed, development of some was far more advanced than anticipated. Similar observations were noted by Tuge (1931) who assumed that embryological development in freshwater tortoises often begins in the oviduct.

Development of the embryos of Australian tortoises will be the subject of a subsequent paper.

Opening of Eggs

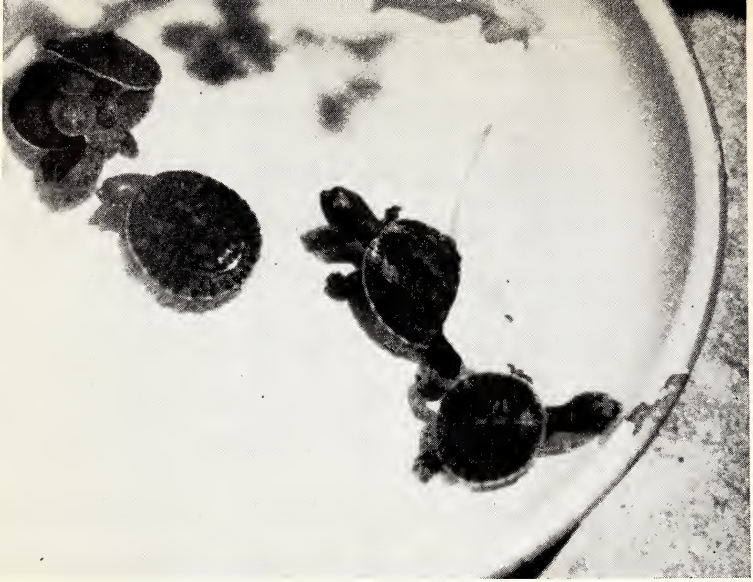
It was discovered that the most effective means of opening the egg of chelid tortoises was to use fine scissors to remove the top (or cap) of the shell above the air sac. This was easily visible on fertile eggs. Eggs which were infertile often developed a series of fine, dark spots as incubation progressed.

Before the cap was removed, the location of the embryo was obtained by "candling" with a 25 watt lamp projected through a box in which a hole had been cut, somewhat smaller than the size of the smallest egg.

The shell was then cut carefully along the axis opposite to but parallel to the embryo. In all except the earliest embryonic forms (i.e. even before blood was visible) the embryo was quite closely associated with the shell. Unlike a hen's egg the embryo did not float above the yolk and when the egg is rotated, a tortoise embryo does not rise to the top but remains in the same position on the shell.

In time, removal of embryos could be achieved without breaking any of the enclosing sacs. If the yolk sac was broken, the embryo was cleaned with weak saline solution at room temperature.

Live embryos, at room temperature (about 70 degrees F.) seemed to stay alive, even when very small, for about 15 to 30 minutes, even after the yolk was drained and they had been



e. Newly incubated baby short neck tortoises (*E. macquari*). Note difference in size of babies—they ranged from carapace lengths of 24 to 33 mm depending on sizes of the eggs containing them.

Photo: *Author*

douched with cold saline. Larger embryos, with shell fully formed, and placed in a 10 per cent formalin solution, maintained movement for half an hour after immersion.

Survival of Embryos

On January 2, 1966 (33 days after the eggs were placed in the incubator and a maximum of 58 days after the egg could have been deposited) two eggs were opened.

On one, the yolk sac was about 15 mm long and this specimen was killed and preserved. On the second, the yolk sac was no larger than a pea and the eyelids of the embryo opened and closed. The eyes, behind the sacs, were clear and bright.

An attempt was made to devise a "humi-crib" in which an attempt was to be made to "help" the second embryo survive. The embryo with all sacs intact, was placed in a petrie dish. Water from the incubator was placed in the dish to a depth of an eighth of an inch and a light weight plastic cover was placed over the dish and its contents. The dish was then placed above one of the "nests" and the incubator closed.

The embryo was examined at half hourly intervals for the next two hours and remained alive and alert, though motionless. Unfortunately it could not be observed again for another 13 hours. When the incubator was then opened, the plastic top of the petrie dish could not be seen, and the tortoise embryo was also not visible.

The dish was found in the bottom of the incubator and the embryo, now a tortoise, was found swimming actively in the incubator water, its yolk sac reduced to half the size it was when the egg was opened.

This specimen was kept in the incubator for a further 24 hours by which time its yolk sac had gone and the umbilical opening in the plastron had begun to close. It was then placed in a brooder tank at 24 degrees C. (75 degrees F.) and after two weeks, was removed to a tank of water at room temperature. It survives to this day, and at the time of writing, is five months old.

Later attempts with early opened embryos showed that using this "humi-crib" technique, they seem to be able to survive with yolk sacs as long as 12 mm. With sacs larger than this,

death eventually occurred. In some cases, it was necessary to remove some membrane covering the front legs to enable the tortoise to make initial movements.

It should be added that embryos of *E. macquari, C. expansa* and *C. longicollis* were all successfully reared after similar premature opening.

Hatching

The first "natural" hatching of eggs incubated artificially by the author occurred on January 6, 1966. This was 39 days after the eggs had been placed in the incubator and 62 days after the earliest eggs were collected.

The first juveniles to hatch were found on the surface of the soil in the containers and on the first day, 8 hatched. A further 11 hatched between the morning of January 7 and the evening of January 8.

Because some of the newly hatched babies were beneath a large number of obviously later deposited eggs, the nests had to be emptied, the hatched and hatching juveniles removed, and the remaining eggs returned to the incubator. Others hatched on January 19.

With *E. macquari,* the maximum period of time elapsed from egg deposition to first hatching was 62 days. Nests marked in the field took 78 days to incubate.

With *C. longicollis,* only two of the seven eggs brought back were fertile. Both these were opened prematurely on January 19 and both survived.

The single egg of *C. expansa* was opened what is now known to be particularly early, on January 28. This specimen had a yolk sac as long as its plastron. Nevertheless, with some membrane removed from the forelegs, in the "nursery" tanks, this tortoise also survived and is still alive.

Incubation Period

Close observations of the incubation period of eggs of the three species of tortoises described above coupled with more intensive field observations showed that the estimated incubation periods given in the paper (Goode 1965[1]) were considerably at variance with the facts of the matter during 1965-66.

The information so far obtained on the nests marked is as yet too sparse to permit further details to be published. These will be revealed when corroborated or compared with nesting periods obtained of nests now marked, and of eggs now being incubated.

It is sufficient to state now that in Northern Victoria, the incubation period of eggs of the species

b. Plastron of newly hatched *E. macquari* (Murray short necked tortoise) showing remains of egg sac, 24 hours after emergence. Photo: *Author*

E. macquari is the shortest; that of *C. longicollis* is longer and tortoises from the eggs of *C. expansa,* as well as overwintering, actually emerge later than tortoises from the eggs of the two other species which were deposited six or seven months after those of *C. expansa.*

Positions of embryos in shell.

Left: embryo of *Emydura macquari,* with yolk sac removed, showing vertebrae parallel to long axis of egg. *Right*: *Chelodina longicollis,* yolk sac attached, lying with vertebrae at right angles to long axis of egg.

Photo: *Author*

Acknowledgements

The author is particularly grateful to Mr. George Dawes for aid in obtaining eggs for incubation and especially to Mr. Jim Russell, whose observations, accurate records and many other forms of assistance are making this whole project possible. Thanks must also be given to the Trustees of the CSIRO Science and Industry Endowment Fund whose generous assistance is enabling this project to continue and extend and with far better equipment than that which was first used. Dr. Bernice Stratford of the Pathology Department, University of Melbourne, offered most useful advice on the elimination of fungus.

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No 4
Crawfish Rock

Compared to other areas of our coastline, Westernport, with the exception of San Remo, Cowes, and Flinders jetties, is not much visited by divers. This is because, in most places, particularly the northern parts of Westernport, the water can only be approached across stretches of mangrove studded mud — a practice not to be recommended when clad in full diving gear! On the tidal flats, the seabound diver is then faced with seemingly endless *Zostera* meadows, shallow sandbanks, and shell beds, abounding in the toad fish *Sphaeroides glaber*.

What a different vista awaits the diver lucky enough to dive from a boat a mile from shore! Here, the diver finds deep water, and a fauna unlike any other to be seen along the Australian coastline. The arm of Westernport to the north of a line between Sandy Point and Tortoise Head, bounded to the west by the Stony Point-Hastings coastline, and to the east, by French Island, is a sheet of water mostly bordered by tidal flats, and is a maze of shallow sandbanks, and deep, fast flowing tideways, in places up to eighty feet deep.

Twenty thousand years ago, Westernport was dry land (Keble 1950), the present channels being the expression of the old drainage system. The submergence of this already ancient river system by the Postglacial sea, compounded with possible oscillation of the Koo-wee-rup fault, produced the northern arm of Westernport as it is today.

Some of the fauna of this northern arm in many respects seems to be relict from the Mesozoic. How, and why this fauna remains in the area, surviving several inundations and regressions of the sea, is a mystery. Perhaps tidal, temperature, and other unknown factors, have combined to provide a suitable contemporary environment in which these forms can survive locally.

Beset by swift currents, streaming a plume of sandbanks southward, Crawfish Rock bisects the tideway at the entrance to Bagge Harbour, the stretch of deep water at the northernmost end of Westernport. The rock is an outlier of the brown lateritic Baxter Sandstone of late Tertiary age, which caps large areas of the Mornington Peninsula to the west. Uncovered at half tide, the rock falls away below sea level in sharp escarpments to a sandy bottom at depths varying from eighty to one hundred and twenty feet. The rocky, undercut ledges of the steeply sloping sides support a fauna which, though more limited in generic range than most marine localities, is unsurpassed in southern waters for the variety of species and size of its sponge population.

Somehow, even on the sunniest of days, when the ocean is a sparkling invitation to the diver, the waters of this area never take on the blueness of the open sea. Until one comes to know the area well, there is never the same sense of excitement in donning one's gear in preparation for a dive. Rather, the silently flowing dark silk water, rising here and there into peaks where the currents meet, has a decidedly forbidding aspect. Below, in the shelter of a tiny cove, the diver finds a flowing green-ness, twisting strands of algae, flashing fragments of shell, and the amorphous bric-a-brac of the sea passing in purposeful silent procession past the window of the face-mask.

Immediately below low water mark, the rock shelves out in a short, flat shoulder, to a depth of about fifteen feet. This relatively horizontal area supports a luxuriant growth of the small kelp *Eklonia.* Many other species of algae-red, brown, and green, crowd in profusion across the eroded rocky surface. This is the home of one of the most colourful and comical fish to be seen in southern waters, the Cow Fish *Aracana aurita.* Small rotund body encased in a stiff carapace, brilliant in a coat of orange, yellow, and blue stripes, tiny mouth pursed in an expression of deep contemplation, this little fellow is capable of only the slowest speed, and is easily outswum and captured. When overtaken, he will often hide only his head behind the nearest frond of seaweed, apparently acting on the assumption that if he cannot see the diver, then the diver will not, therefore, be able to see him!

Across the ledge, the rock falls away steeply. One's first impression, looking down, is of a delightfully landscaped garden in full bloom, tumbling away to a soft green emptiness in every direction. The "plants" of the garden are the sponges of bright red, and yellow, splashed over rocky surfaces, and large flesh coloured sponges in a woven basket-like mesh—home for a myriad of shrimps. There are bathtub shapes in purple and brown, large enough to sit in; grey classical Greek urns straining in the current, and yard long ghostly fingers beckoning the diver even further down.

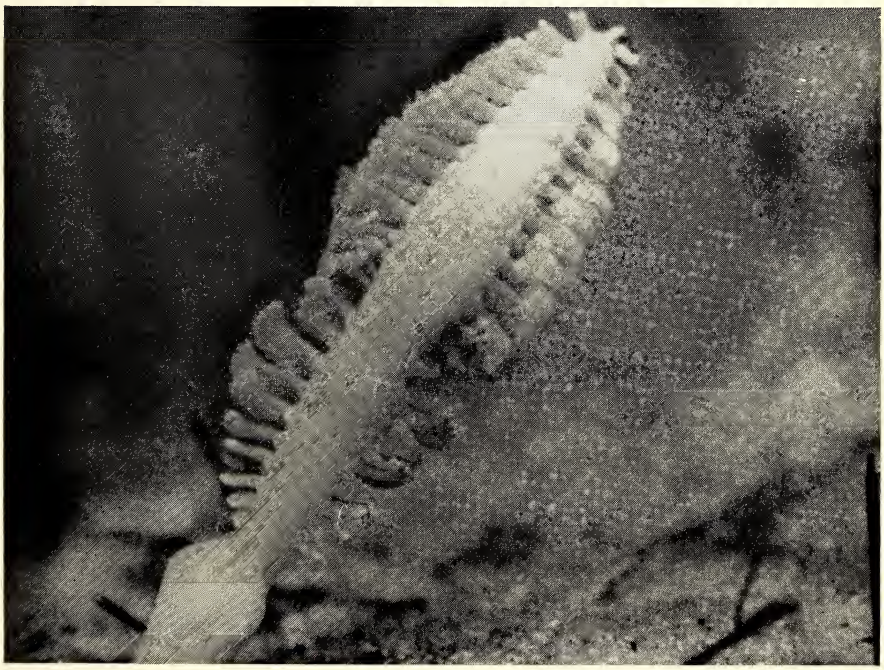
I have never attempted to count the number of species in this sponge fauna. Sponges are a difficult group, and identifications are usually beyond the capabilities of anyone but a specialist. One very interesting form—easily the most unattractive in appearance—a round overlarge plum pudding, growing in deeper water, is a siliceous sponge of the Class Demospongia. Fleshy, and lacking in the normal cellular sponge texture, the inner core is a mass of minute needle shaped (monaxon) spicules, enclosed in a tough outer skin, like the rind of an orange. The more porous sponges are home to a host of small crustacea, particularly amphipods of the genus *Leucothoe,* which abandon their shelter in swarms when the sponge is brought to the surface. Other residents which prefer to remain hidden in the pores of the sponge, until forcibly ejected, are the small isopods *Cymodoce* sp.

In crevices and ledges shunned by the current loving sponges, families of the sea urchin, *Heliocidaris erythrogramma* nestle below curiously tangled small growths of yellow and orange gorgonia. Tiny irridescent fish, brilliant enough to belong to tropical waters, flaunt their colours in the rocky holes. With much wriggling and flipper-waving, a search under ledges may produce an occasional crayfish. This place was once well known among amateur fishermen for its crays, and presumably, this is how the name

derives. These days, it is extremely rare to find even a small specimen. It is strange that these crustaceans should be here at all, in an environment so utterly unlike their normal ocean habitat. Probably larvae, juveniles, or undersized specimens thrown overboard from fishing boats, have been swept here from the ocean, the only rocky substrate in many miles of channel.

Small to microscopic molluscs are abundant. Some burrow in the rivulets of sand which funnel down from the slopes above. Others live in the sponges, and in the shallower water, among the holdfasts of the algae. Despite a seeming lack of larger gastropods, there are innumerable small hermit crabs ensconced in old and battered *Dicathais* and *Pleuroploca* shells, obviously handed down in legacy through generations of hermits. I have only found one abalone here, a large specimen of *Schismotis laevigata,* clinging rather forlornly to a small rock on the bottom at seventy feet. That it was far removed from its normal food supply was evident, as examination of the stomach contents revealed a diet of the weed, *Zostera.*

Next to the sponges, the most interesting group are the small (and thus easily passed over) hydroids. They are the most plant-like in appearance of all the marine invertebrates, some resembling miniature trees, others flowers, and some are pinnately arranged, like feathers. It was not until the middle of last century that the animal nature of this group was recognized, but the compromise name Zoophyte (animal-plant) persisted for many years. Their basic structure is akin to the sea anemone, thus placing them in the Phylum Coelenterata. The Or-



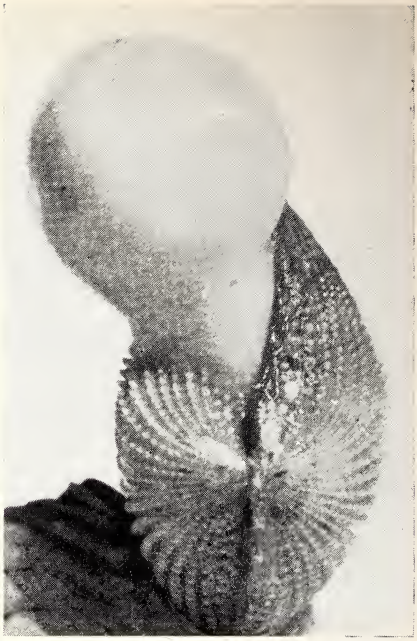
Sea Pen × 1 Photo: *J. R. Watt*

der is an ancient one, ranging from Cambrian to recent times. As the delicate chitinous perisarcal sheath is not suitable for preservation except under the most favourable conditions, the fossil record is sparse.

Several of the larger species of hydroids grow profusely among the deeper sponge beds of Crawfish Rock. Here and there, the smaller, and aptly named plumularian colonies flourish, thread-like stolons winding over sponge and ascidians to secure an anchorage for the fronds above. Most graceful are the almost transparent green inch long fronds of *Plumularia setaceoides,* providing contrast to the brilliant crimson, but little larger, *Plumularia buskii.* Both these are cosmopolitan forms, ranging Australian and Pacific waters. The egg capsules of *Plumularia buskii* are comparatively large masses, about 1 mm, attached to the central shoot. Careful examination will reveal leggy red pycnogonids ranging over the colonies. These peculiar animals, the "sea spiders" dine on hydroid eggs, thrusting a long proboscis deep into the gonosome, and sucking out the contents.

Away from the rock, on the deep sandy patches, where cold fingers of

Plumularian Hydroid Colony × ¼
Photo: *J. Talent*



Neotrigonia margaritacea × 1½
Showing both valves, and sponge growth.
Photo: *J. Talent*

the current begin to tug at mask and gear, is the home of the sea pen. So sadly bedraggled when taken from the water, this undescribed species of alcyonarian coral is a great beauty in its own domain, lacy pink ballerina skirts fluttering in the tide. The mechanism developed by the sea pen for remaining in loose sand and heavy currents, is remarkable. The slightly hooked hollow stalk of the colony is thrust down into the sand, and inflated in a series of slow pulsations, so that a bulbous collar forms just below sand level, anchoring the sea pen securely.

Here, too, is the home of the pelecypod *Neotrigonia margaritacea.* A dull brown ribbed exterior hides a softly glowing purple nacre on the inside of each valve. With its highly developed foot, this bivalve burrows in the sandbanks, unseen, except when bearing a round, yellow blob of epizoal sponge,

which marks its presence. Associated with *Neotrigonia* are two other pelecypods, *Eucrassatella kingicola,* and *Solen vaginoides.*

Wherever a stray pebble has lodged firmly enough to offer a foothold, there is a nestling colony of the brachiopod *Magellania flavescens.* The pinkish yellow shell stands erect on a movable muscular pedicle, passing out through an opening, the foramen, on the end of the larger valve. The pedicle is usually about an inch long, and is firmly attached to the substrate by its other end. These are the last survivors of a once flourishing phylum, common in the Palaeozoic oceans, now in retreat in a few isolated communities. The occasional specimen washed inshore on Westernport beaches often puzzles the unwary collector who tries to fit it into the molluscan classification!

This, then, is the underwater scene in the upper reaches of Westernport, so completely different from Port Phillip, just to the west across the Mornington Peninsula. Only a short drive from suburbia, Westernport, with its bird life and marine fauna, has until now, escaped the industrialisation and pollution which has plagued and denuded its neighbouring bay. But civilization has now arrived in the form of an oil refinery, and the inevitable increase in population. We should, in this modern age, have sufficient national conscience, and knowledge of conservation techniques, to prevent the indigenous faunas of this area succumbing to "progress" as has been the unhappy history of the last century in Port Phillip.

Magellania flavescens × 1½
Showing both valves, and pedicle opening (foramen) Photo: *J. Talent*

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ROTIFERS

[Continued]

By E. LeMaistre

"I'll build my house of bricks"—so went the old nursery story, but nature had already evolved the story of the three little pigs some hundreds, thousands or perhaps even millions of years ago, except that in her case they were not pigs, but some of the microscopic forms of life.

Some of the worms, aquatic larvae, and rotifers, build houses of gelatinous material, mud, sticks, and yes, even bricks, in which they live, poking their heads out to feed and retreating into safety if any strange disturbance occurs in their environment.

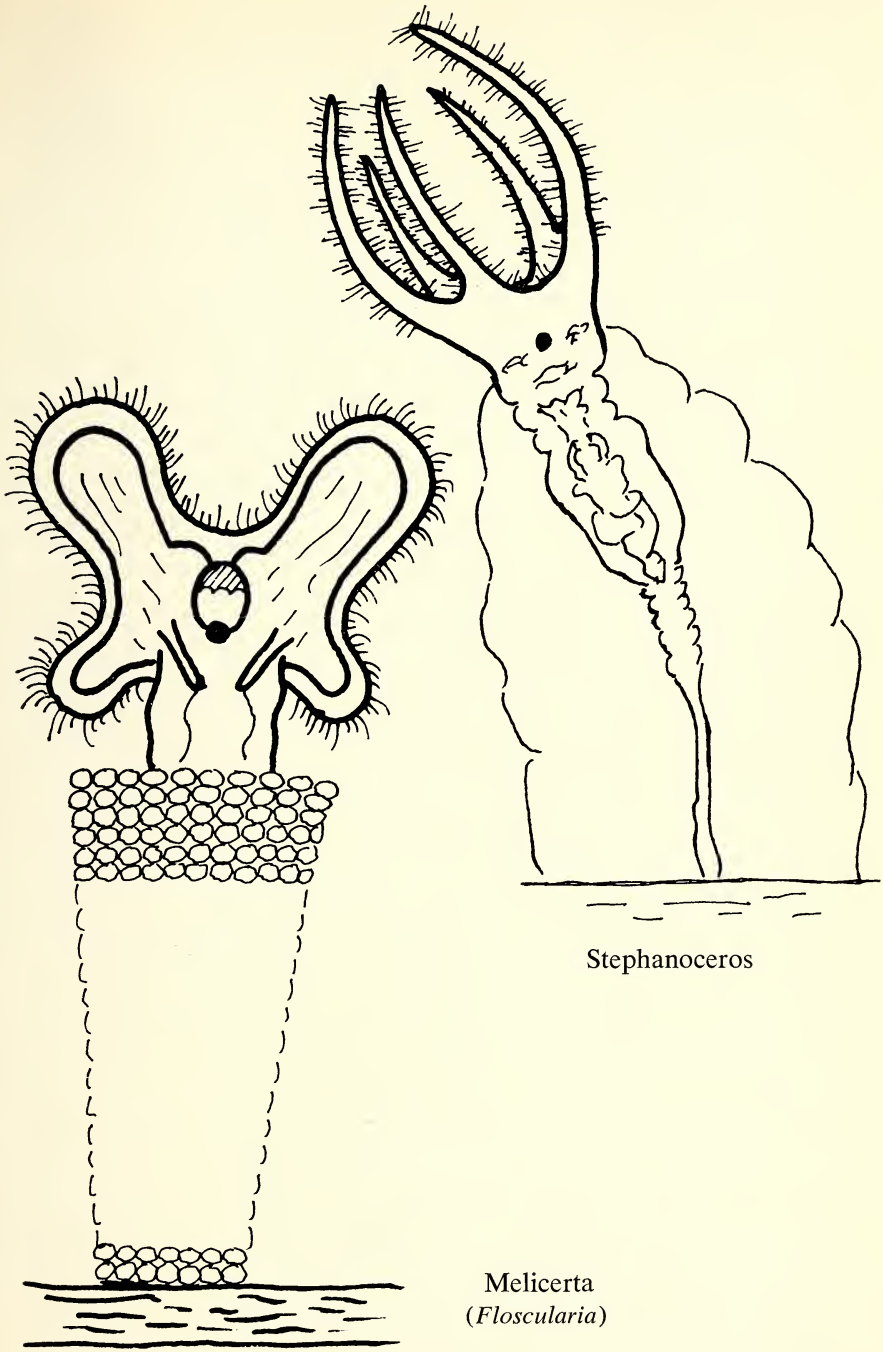
Of these, the Rotifers featured in the accompanying diagram are among the most interesting. Stephanoceros, for example, exudes a mucillaginous substance which jells in the water and affords protection for the soft bodied animal. The other Rotifer, Melicerta (International Code Name—*Floscularia*) is a most interesting form with a brick making and laying process incorporated in its anatomy.

Melicerta extracts a minute particle from the water and secretes around it a substance until it has formed a roughly spherical pellet. The rotifer then bends over and puts this "brick" in position, continuing the process until it has built a tubular home rather like a chimney stack, somewhat orange in colour, in which it spends its life.

The shapes of the corona in both these forms are very distinctive, and if the microscopist has the good fortune to find them (they are always attached to stems of plants, pieces of debris, or other algae), they will be amongst the most beautiful objects yet studied, particularly if they are viewed using dark ground illumination, which shows their ciliary action and general form to the best advantage.

As mentioned in the previous article there are many different types to be found in the Rotifera; some whose bodies are telescopic, some which use their foot as a rudder enabling the animal to swim in a spiral course or glide round in circles, some which have a stiffened outer skin covering called a lorica, others which have spines called skipping appendages which enable the rotifer to literally skip through the water at great speed, and then the types shown in this article which practically spend their whole lives in the one place.

If the reader has found any interest from these articles, the author would strongly recommend obtaining a book which includes a chapter on Rotifers, and then trying to find how many of the different families can be found—believe me, it can be fun.



Stephanoceros

Melicerta
(*Floscularia*)

A note on the Vegetation of Big Green Island, Furneaux Group, Tasmania

By F. I. Norman*

Introduction

The author is engaged upon a study of the effects of introduced mammals on the breeding success of the Tasmanian mutton-bird, *Puffinus tenuirostris* (Temminck). Since it was thought desirable that identification of plant remains in the stomach contents of *Rattus rattus* Linn., which occurs on the island, could produce a clearer picture of the effect of this particular mammal, the island was surveyed during the period 7th-14th October, 1965, and specimens collected, supplemented with others taken at a later date. A list of species is given in Appendix I.

The island, some 240 acres in area, with a maximum height of 100 feet in the centre, lies three miles to the west of Whitemark, Flinders Island, and has a bed rock of Devonian granite, with some quartzite and slate on the north-east corner (Blake, 1935). In places there is an overlay of dune limestone, as is present on Flinders (see Dimmock, 1957). This, together with eroded granite, has contributed to the formation of a sand beach along the eastern side which is sheltered. Whilst the granite forms outcrops over most of the island, in some cases reaching two or three feet above the surface, the majority of the limestone is exposed only along the south-east corner though some is found along the central ridge. The southern portion of the island has a sand soil which is also found to a lesser extent along the western side of the island.

The climate affecting the island is considered to be similar to that of Whitemark, the average rainfall being about 29 inches, though "summer droughts of two months' duration may be expected in one year in about five" (Dimmock, 1957). Wind records available show the predominance of westerlies (Guiler *et al,* 1958), though their influence may be slightly modified by the shelter provided by Kangaroo Island which lies to the west, and Chappel Island to the south-west.

Division of the vegetation

The island's vegetation can be conveniently discussed under three headings; viz. coastal, grassland and rookery-associated flora.

(a) *Coastal flora*

The coastal flora is composed of a dominant *Poa poiformis* stand which is common to almost all Bass Strait islands, see Gillham (1961), Norman (1966). The stand covers about 60 acres. However, it is of note that the eastern side is almost devoid of *Poa,* due no doubt to constant firing in the past, since at present, small tussocks are extending their range. In many areas the tussock grows down almost to the splash zone, as does *Spinifex* on the south-east corner. A typical strand flora is lacking on the island, although along the sand beach at the north-east of the island, small communities of *Cakile maritima, Salicornia australis,* and *Crassula sieberiana,*

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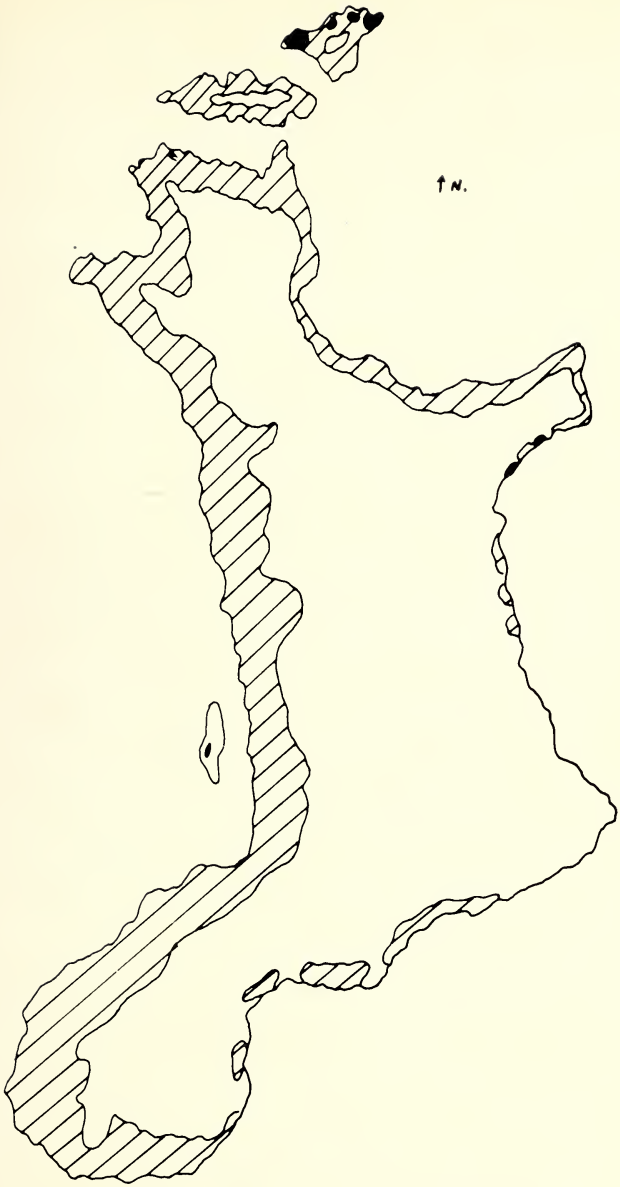

Plate I.

Map of Big Green Island showing the distribution of the floras described above. Open areas = grassland; shaded areas = *Poa*, and solid areas = *Atriplex cinerea*.

border the *Poa,* which in turn, as over the island, gives way to a grassland flora. This however is often replaced by the introduced shrub, *Lycium ferocissimum*. Along the west side, clumps of *Disphyma australe, Carpobrotus rossii,* and *Cotula coronopifolia* are found, as are small stands of *Atriplex cinerea*; this saltbush being more profuse at the north and above the sand beach on the eastern side, as well as on the small islands to the north. The *Poa* stand is often backed with dense communities of *Distichlis distichophylla.* In crevices provided by eroded limestone, species such as *Plantago varia, Oxalis corniculata* and *Parietaria debilis* occur, protected from grazing.

(b) *Grassland flora*

The majority of the island, some 180 acres, is covered with a grassland or pasture flora as a result of a long history of stock grazing and associater clearing and improvement. Green Island has been a stock station since sheep were first introduced around 1832 (Backhouse, 1843), though these were removed for a period (Thomas, 1861).

Since 1861 the island has always carried a high number of sheep in relation to the available acreage. During the period of collection, over a thousand sheep were present, the average usually lying between 700 and 800 (H. B. Blundstone, per. comm.).

Backhouse (1843) mentions that the surface of Green Island was "covered with thick grass . . . with nettles, sow thistles and treemallows, breast high, or with spreading barilla-bushes (*Atriplex cinerea*) of three feet". The only stand of tree mallow now present (*Lavatera plebeia*), is found on the two small reefs to the north of the island; these are never grazed. Hall (1866) mentions that "there is not such a thing as a bush on the island, but it is covered with stinging nettles and thistles". Clearly the scrub flora if it were ever present, could not have been extensive. The largest and most widespread shrub, *Lycium ferocissimum,* has considerably extended its range on the island since introduction as a windbreak around the old house and garden. It is now found along the coast all over the island, spread possibly by birds, such as Starling, *Sturnus vulgaris* Linn., or Silver Gull, *Larus novae-hollandiae* Stephens, which feed on the berries, but more certainly by rats which feed on the seeds and leaves as shown by stomach analysis. Comparison of the present distribution with an aerial photograph taken in 1951, shows that the spread during the intervening period has been mainly to the south.

The grassland area resembles closely the pastures of Flinders Island, i.e. the typical species are introduced. Almost all of the dominant grasses are alien (*Bromus, Holcus,* etc.) as are the three species of *Trifolium*. The thistle, *Carduus tenuifloris,* is found along the east side and is apparently spreading.

(c) *Rookery flora*

The island has some acres in which muttonbirds and Fairy Penguins *Eudyptula minor* (Forster), burrow. Dense growths of *Artotheca calendula* are found particularly on the west side, and *Bulbine semibarbata,* which is not completely restricted to the rookery areas, produces a more vigorous growth form within them. *Urtica urens* is common throughout the rookeries, mainly around old, collapsed burrows, presumably associated with the high nitrogen content of the soil derived from the birds' excreta.

Discussion

The human influence on the vegetation has been marked, mainly through the introduction of stock and correlated improvements to pasture, with the eventual reduction of rookery areas. Campbell (1900) reports that the stock had reduced the rookeries. This is confirmed by Lord (1908). Man was responsible for the introduction of rabbits at an early date, for Thomas (1861) mentions that the island "is most valuable as a rabbit warren". These, together with burning and the effects of stock, presumably tended to reduce the number of plant species remaining on the island.

As Willis has pointed out, in Guiler *et al* (1957), the literature concerned with the flora of Bass Strait islands is limited. Gillham (1960, 1961) has reported on several of the Victorian islands, but few of the Tasmanian ones have been studied. Fisher Island has been extensively examined (see Gillham, 1965) and makes for interesting comparison with Green Island.

Comparison of the five major families on Big Green Island and Fisher Island

(Totals for Fisher within brackets)

Family	*Native*	*Alien*	*Total*
Graminae	5(7)	6(11)	11(18)
Compositae	4(9)	4 (4)	10(13)
Chenopodiaceae	6(5)	(1)	7 (6)
Caryophyllaceae	2(3)	3 (7)	5(10)
Papilionaceae	—(—)	4(10)	4(10)

Fisher Island carries some 95 species, compared with 71 found on Green Island (during the collection period), of 31 and 28 families respectively. On both islands shrubs are almost completely absent. It would seem that, apart from *Lavatera* and *Atriplex,* they were never extensive on Green Island. Gillham (1965) considers that the exposure to wind and spray has contributed to the lack of shrubs but, compared with Green Island, Fisher is sheltered: it is more likely that denudation by the burrowing birds and periodic burning has played an important part. At the same time, the impoverished flora of Green Island must have been reduced further by the extensive cleaning associated with the introduction of stock on to the island. Fisher Island, being only two acres in size, has no history of grazing by stock.

Alien species are well represented on both islands, there being 41% introduced species on Fisher, compared with 47% on Green. Reasons given by Gillham (1965) for the high alien content on Fisher Island, are considered not to have influenced the flora of Green to the same extent. Thus, though Gillham (1965) states, that the constant traffic of humans and their firewood, etc., together with introductions as the result of muttonbird exploitation has been responsible for much of the alien population on Fisher; the traffic over to Green Island, which is more regular, has not noticeably increased the alien content. Indeed it is likely that most of the aliens on Green were introduced along with the European grasses which constitute the grassland flora.

Thus, though both islands have common factors which depress the species total, Green Island, with the additional action of grazing and the more intensive burning and intentional seeding of aliens has suffered, if not a reduction of species, then a limitation on those which have been able to colonise the island.

Summary

The vegetation of Big Green Island, Furneaux Group, Tasmania, is briefly discussed with some comments on the distribution and possible reasons for the comparatively impoverished flora which has only 71 recorded species.

Acknowledgements

The author is indebted to Miss H. Aston, National Herbarium, Melbourne, for identification of plant specimens, and to Dr. D. F. Dorward for critical reading of the manuscript.

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Appendix

List of plant species recorded from Big Green Island, Furneaux Group, Tasmania.

Bryophytes

Tortula princeps
Bryum campylothecium billardieri
Barbula australiae

Gymnospermae

Cupressaceae
Cupressus spp.

Monocotyledoneae

Graminae
Spinifex hirsutus
Distichlis distichophylla
Bromus diandrus mollis
Briza minor
Poa poiformis
Lagurus ovatus
Stipa teretifolia
Holcus lanatus
Parapholis strigosa
Hordeum leporinum

Cyperaceae
Scirpus nodosus

Liliaceae
Bulbine semibarbata

Dicotyledoneae

Urticaceae
Urtica urens incisa
Parietaria debilis

Polygonaceae
Rumex acetosella obtusifolius
Muehlenbeckia adpressa

Chenopodiaceae
Atriplex cinerea palludosa
Rhagodia buccata
Sueda maritima
Salicornia australis
Arthrocnemum spp.
Chenopodium murale

Aizoaceae
Disphyma australe
Carpobrotus rossii
Tetragonia implexicoma

Portulacaceae
Calandrinia calyptrata

Caryophyllaceae
Cerastium glomeratum
Sagina apetala
Spergularia rubra
Polycarpon tetraphyllum
Silene anglica

Cruciferae
- Cakile maritima
- Capsella bursapastoris

Crassulaceae
- Crassula sieberiana

Papilionaceae
- Medicago arabica
- Trifolium cernuum
  dubium
  subterraneum

Geraniaceae
- Geranium molle
  pilosum
- Erodium moschatum

Oxalidaceae
- Oxalis corniculata

Malvaceae
- Lavatera plebeia
- Malva parviflora

Onagraceae
- Epilobium junceum

Araliaceae
- Hedera helix

Primulaceae
- Samolus repens

Convolvulaceae
- Dichondra repens

Solanaceae
- Lycium ferocissimum
- Solanum nigrum

Scrophulariaceae
- Mimulus repens

Myoporaceae
- Myoporum insulare

Labiateae
- Marrubium vulgare

Plantaginaceae
- Plantago varia

Rubiaceae
- Galium australe
- Asperula spp.

Compositae
- Gnaphalium candidissimum
  luteo-album
- Cutola coronopifolia
  australis
- Senecio hispiduus
  glomerata
- Artotheca calendula
- Carduus tenuiflorus
- Hypochaeris glabra
- Sonchus oleraceus

Total number of vascular species—71.
% aliens —47
% native —53

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Four Seasons at Narre Warren North

(Part 2)

By Victor Jacobs

Bracken Fern which protected the Orchids. Photo: *Author*

November

Early in the month I found frequent specimens of Greencomb Spider Orchid *Caladenia dilatata.* On the heavy blossom of the black Wattle, a few Brown-headed Honeyeaters *Melithreptus brevirostris* fed. From a distance of ten yards, I watched two Grey Fantails with their young one. A twittering conversation ensued, but when the young bird came lower in the tree, it was chased higher again. Two Yellow-faced Honeyeaters *Meliphaga chrysops,* feeding on Long-leaf Box, chased and caught a large moth. An occasional Stubble Quail *Coturnix pectorallis* fled from under my feet. Starlings, House Sparrows, and Indian Mynas live in trees at the edge of the wood, but never enter it. At times they cross it, but always hurriedly and with no stops.

Yorkshire Fog *Holcus lanatus* in purple and green was but one of many grasses now knee-deep. French Catchfly *Silene gallica,* common on the roadside verge, was only growing on disturbed ground in the wood.

The ringing call of some bird plagued my curiosity. After much tedious stalking, I sighted it against the bright sun, and such a view of a thrush-like bird, spotted below, was not enough for identification.

The tea-tree had finished flowering, but only the oldest capsules had turned from green to chocolate. Bidgee-Widgee was in bud, and Austral Bluebells were very common.

For days, each time I visited the wood, I heard the ringing tones of the unidentified bird. Easy to hear, but hard to see. At last I did have a clear look, with the sun behind me. Its back was green and the breast spots were not round and black but green and oval. It was the Olive-backed Oriole *Oriolus sagittatus.*

December

Spider Orchids were still flowering but overshadowed by the yellow daisy, Cat's Ear *Hypochoeris radicata.* Damsel flies were abundant. A small bird chasing moths, called incessantly, and was difficult to keep in sight. As it called, the feathers on the head rose and vibrated—a temporary crest. It was the male Satin Flycatcher *Myiagra cyanoleuca.*

The taller grasses were now waist high and in full flower. The slender dainty *Poa australis,* a stout long-awned Brome, native Kangaroo and Wallaby grasses, and occasionally a patch of misty pink that was Silvery Hair Grass. There were many more.*

The ground was thick in many places with Small Trifolium *Trifolium dubium,* and the Common Fringe Lily *Thysanotus tuberosus,* was frequent and not localized as was Purple Cudweed. Common Hovea was still in bloom, and in a clearing in the upper wood, were Clustered Clover *Trifolium glomeratum,* Small St. John's Wort *Hypericum gramineum,* and *Bartsia viscosa.* Near to the western boundary, one of a colony of promising Small Grass-trees *Xanthorrhoea minor* had a healthy spike.

The Orange-wing Sitellas were seen on each visit. Towards the end of December some of the peppermint buds had shed their operculi, and showed the white fringe of stamens.

Now, the earlier lush green, was showing a tinge of brown, for the season was advancing. Then a few hot days made a change. Heads of *Sonchus asper* were swelling with ripening seed, blackberry petals dropped, strawberry sepals assumed a rosy hue, while the tea tree capsules that looked quite brown, disclosed their sappy interior when the surface was scratched. Above the eastern gully and clear of the scrub was one tiny group of *Gompholobium huegelii,* whose brilliant yellow petals contrasted sharply with the dark hirsute sepals. In the nearby tangled scrub a fossicking group of Blue Wrens twittered excitedly. Heading homeward I made my usual cautious approach to the Cherry Ballarts, where birds were invariably seen. The Satin Flycatcher was there, and the most bedraggled Rufous Whistler that I have ever seen. Stubble Quail were nearby too.

On Christmas eve at dusk, I noticed a swarm of Cockchafers *Cericesthis geminata* Bois. flying around and settling on trees in the wood, as well as on the younger eucalypts on our block. They actively fed on the new growth and effectively pruned it as fast as it appeared. They ignored the Yate *E. cornuta* and Tuart Gum *E. gomphocephala,* but fed on Blue, Mahogany and Gippsland Bog Gums. This selection was varied during the few nights that I watched them, and as this was not the season for early bedtime, I took another look at midnight. Activity had ceased, and torpid beetles clung im-

* See Appendix I

mobile to the twigs. A hand on the trunk, a vigorous shake, and a rain of beetles fell to the ground to lie still. Next morning, by daylight, they had gone. I tried shaking the trees at dusk and just after darkness, but when I did this, the disturbed beetles flew back to the same tree or to another. I was not happy to see the healthy new growth disappearing inside these insects, and was rather happy when the depredations ceased some weeks later. As a matter of fact the trees are none the worse for the attacks, and have produced new growth.

January

A gap in observation occurred while we were away for two weeks on vacation.

The day of return saw me in the wood. In the scrub gully a flock of Red-browed Finches *Aegintha temporalis* were feeding from the ground, while nearby a young Yellow Robin was calling from a leafy sapling, thus putting pressure on his parents to maintain the food supplies. I approached and disturbed the youngster, which flew a dozen yards to be attended at once by both parents. Surprisingly, a Red-browed Finch joined the trio for a few seconds before resuming its feeding at ground level. Perhaps my proximity disturbed the behaviour pattern of the finch to the extent that it responded to the behaviour of the young one of a different family.

In the hills to the extreme south of the area is a stand of Yellow Box *Eucalyptus leucoxylon*. These trees stand like giants above even the largest of their nearest generic relatives. The largest girth measurements are between eighteen and a half, and twenty feet. They have some descendents half their size, but no seedlings were found. It is the most southerly stand of the species in the state. The leafy crowns and high upper branches made bird watching difficult, but I saw Red Wattle-birds and Brown Thornbills on the tree, with Welcome Swallows swooping around the tops, feeding. Walking backwards to position myself, I nearly trod on five Stubble Quail, which took fright, and landed close by. This gave me the opportunity to try and see through their camouflage, but I could not.

The grasses were generally dry, but held their seed well. The rain from the thunderstorms of early January had given a light green cover to the ground. Rose Hips were reddening, and Bursaria was in flower. The Spear Thistles *Cirsium lanceolatum* attracted some Goldfinches, and the single plant of Syrian Thistle *C. Syriacum* stood fearsomely alone.

The Damsel Flies *Lestes* sp. flew up from their grassy resting places with every step I took. A very casual check, based on a count of two of the insects per square yard, would have given the population of damsel flies as 300,000 for the whole wood. Most of these insects were brown, but I did see some blue ones.

I learned not to walk between any trees closer than 8 feet apart. Such trees were used quite commonly as the supports for the webs of Spiny Spiders, and the unwary, walking through, was certain to be unwillingly veiled.

February

I was in the wood by 7.30, watching some White-plumed Honeyeaters feeding on the Black Wattle, when the aerial acrobatics of a dozen birds attracted my attention, and held it for half an hour. They were Dusky Wood-Swallows *Artamus cyanopterus*. A Pallid Cuckoo escalated vocally. A Grey Thrush fed its young, while the rare rabbit eluded "Nipper". The resident flock of Orange-winged Sitellas swept past twittering, followed by a

solitary White-throated Tree Creeper *Climacteris leucophaea,* which ascended to a Long-leaf Box.

The common butterflies of the wood were the Common Brown *Heteronympha merope merope* Fab., Klugs Butterfly *Xenica klugii* Guer., the Ringed Xenica, *Xenica acantha* Dn., and the Common Cabbage-White *Pieris brassica.* I never saw them before the sun had warmed the air, but then they were common. Where the *Xenicas* spend the night, I do not know, but by chance I found the Common Brown resting, when I picked some Hedge Acacia pods. The jerk caused two of the butterflies to fly, and another shake sent another five aloft. Each of the successive plants that I came to was given this treatment, and each had resting butterflies upon it. Although expecting them, I was unable to detect them before they moved.

As expected the wood contained a wide range of insect life*, from a species of Bush Cockroach and the round beetle collected from beneath a rotting log, to the more mobile beetles, wasps, butterflies, and moths. Many of those listed were not collected in the wood at all, for our home is so close to it, that they are able to wing their way across and beat a frenzied tattoo on the window panes until allowed entry and subsequent mounting. All diurnal ones were collected in the wood itself.

* See Appendix II.

(To be continued)

Field Naturalists Club of Victoria

General Meeting, Monday Oct. 10, 1966

Mr. M. K. Houghton presided, and the Herbarium hall was filled for the meeting.

The Secretary, Mr. E. H. Coghill, read a letter from the Premier of Tasmania in reply to the letter sent from the F.N.C.V., requesting consideration before destruction of the Lake Pedder area.

In reply, the Premier said that the Government had every intention to harness the waters for Electricity and it was getting $5,000,000 for roads to the site from the Commonwealth Government to develop it in the general interest of the State.

The subject for the evening was entitled "Native Mice of the Mallee" and the lecturer was Mr. N. A. Wakefield. He commented on the native rats and mice of the Australian region, gave details of the species originally native in Victoria, and those that are known to survive today.

A summary was given of the discovery both of Mitchell's Hopping Mouse (*Notomys mitchelli*) and the silky southern mouse (*Gyomys apodemoides*) and their present distribution.

The speaker described the methods these mice have of making burrows, and outlined their habits, both in breeding season and other times.

These points were illustrated with a series of colour slides, showing the animals, the type of country they inhabit, and their burrows.

At the conclusion of the talk, members asked a number of questions and these were discussed by the speaker.

The president thanked Mr. Wakefield for the most interesting and all too short talk.

Exhibits included the fruit of the black bean *Castanospermum australe* found by the Field Naturalists in Queensland, and an interesting fossil, *Archaecyathus* in Lower Cambrian limestone, from Brachina Gorge; brought by Dr. Beadnell who explained that it was one of the earliest fossils, and thought to be a "mis-

sing link" ancestor of both sponges and corals. The suggested name for the class is Pleospongia.

Mr. A. Webb brought native plant specimens including *Pimelea linifolia, Tetratheca ciliata, Eriostemon Verrucosa, Grevillea alpestre, Daviesia corymbosa, Brachyloma daphnoides,* and others.

Twelve new members whose names appear in the October Naturalist were elected.

Geology Group Meeting—October 5th.

29 members and visitors attended with Mr. Dodds occupying the chair.

Mr. Dodds reported that he had visited Coimadai, and found the Permian Glacial pavements were being mapped prior to inundation of the area by a dam to be built there. Mr. Dodds also spoke of a request by the Editor for articles of a Geological Nature for publication in the *Naturalist*. Mr. Box introduced plans for a week-end excursion to Dunolly, Bealiba, Moliagul and Rheola; Nov. 26-27th. Members wishing to attend should contact Mr. Box for details.

This meeting was a members' night. Much discussion took place on the large number of exhibits. Of interest were theories on Opalescence, brought forward by Miss Pertinac and Mr Davidson, including the latest one, The Spheric Molecular Theory. (Spherical molecules of different sizes have varying light refractions). Mr. Davidson then gave the origin of several Thunder eggs exhibited. These are pebbles of acid lava, in which a gas cavity within, has been filled with Chalcedonic material. To conclude the evening, Mr. McCay showed some very fine slides of rock formations in Central Australia, including Ayres Rock, the Olgas, Palm Valley, and many other places in that area.

Exhibits—

Miss Pertinac—Fossilized wood, Lightning Ridge and Bellata; including some chips tumbled and polished.

Mr. Davidson—Brecciated Jaspar, Heathcote; Spotted Hornfels, Maldon; Fossil Cephalopod, Thunder eggs, Brazil; (some cut and polished). Jaspars and Agates, Heathcote.

Miss Keady—Opals, Lightning Ridge; polished.

Mrs. Skapakow—Jaspers and Cherts, Coomera; Spherulitic Rhyolite, (Perlite) Springalerook; (presented by Mrs. Cheslin). Thunder eggs, Doon-Doon; Turquoise, Kepple Sands; Common Opal, Petrified Wood.

Mr. Lee—Fossil Echinoid (Micraster).

Mr. Box—Pegmatite, Rheola; Quartz Crystals, Bealiba; Jaspar, Heathcote; Mica Schist, Mt. Direction.

Mr. Dangerfield—Stichtite, Dundas, Tas.; Serpentine with Fibrous Chrysotile. Dundas, Tas.

Meeting Nov. 2nd—Film Night.

Marine Biology and Entomology Group Meeting—October 3rd, 1966.

Fourteen members attended the Meeting which was chaired by Mr. R. Condron.

Mr. M. Houghton gave a short talk on the recent Nature Show, which he said was regarded as the best ever held. Attendance was very much higher than last year, and various comments were passed by Interstate visitors on the general high standard maintained.

Guest Speaker was Dr. G. Ettershank, Lecturer in Zoology, Monash University, his subject being "Chemical communication between ants, and some other animals". Dr. Ettershank's talk opened up a new field of thought for naturalists. He traced the early history of the discovery of this chemical communication with particular reference to chemical signals laid down by insects called Pheromones, first discovered in 1959. He said that ten pheromones probably sufficed, only two of which had as yet been analysed. He stated that they could act to alter the physiology of an insect, and that termites can be altered to any type; this was not the case with ants. At the conclusion of this most absorbing talk, many questions were asked, and a vote of thanks was moved by Mr. P. Genery.

Exhibits—

Mr. M. Harrison displayed several species of foreign sea-shells, and gave a short talk on them.

Mr. P. Genery showed some live species of *Branchopoda, Lepidurus,* and *Conchostraca.* He explained that both these crustaceans occur in temporary pools. Mr. Genery also showed under low microscopic power, some transverse sections of *Lapidurus.*

Miss M. McLaren showed the larvae of a Scarab beetle.

Mr. J. Strong showed some eggs of the Common Imperial Blue butterfly, *Jalmenus evagorus evagorus,* under low microscopic power.

Preston Junior Field Naturalists

The Club was inaugurated in March, 1965, and meets every first Friday of the month in the Rechabite Hall, 251 High St., Preston (just past Bell Street) at 8 p.m.

Organizers:

Mrs. Z. Lee (President), 197 Edwardes St., Reservoir
Mr. P. Kelly (Library)
Dennis Walsh (Treasurer)
Mr. M. Houghton
Barry Cooper

Meetings 1966:

January: No meeting.
February 11th: Mrs. J. Strong—"Sea Shells".
March 11th: Miss M. Lester—"Cicadas".
April 1st: Mr. D. Woodruff—"Frogs".
May 6th: Mr. R. Dodds—"Geology of Melbourne".
June 3rd: Mr. Fanning—"Botany—"The Photographers' Nightmare".
July 1st: Mr. E. Rotheram—"Reptiles".
August 5th: Miss V. Balaam—"Introduced Birds".
September 2nd: Mr. J. Seebeck (Fisheries and Wild Life Dept.)—Aust. Native Animals.

(Prior to the April Meeting, meetings were held on second Friday of the month.)

Membership:

In March 1966, a subscription of 60c. per annum was introduced for membership and by September the Club had 16 financial members.

"The Junior Naturalist"

All financial members received "The Junior Naturalist", the monthly publication of the Hawthorn Junior F.N.C., which also includes reports and notices for the Preston Club. Members are encouraged to write articles for the paper and one on "The Dingo" by Noel Rieusset has already been published.

Library:

Mr. P. Kelly attends meetings of the club and brings a number of F.N.C.V. Library books for lending to Members until the following meeting.

Nature Exhibit:

The Preston Historical Society organized an Exhibition in the Preston Town Hall on July 13th-15th, 1966. The Club had individual projects on show, including Howard Geary and Noel Rieusset (Geological Exhibits). Also, Butterflies were exhibited by Mr. R. Condron and an enlarged photograph on bird distribution by Mrs. Lee.

The Governor, Sir Rohan Delacombe, visited the Exhibition on Thursday and spoke to Howard Geary, who kept an eye on our exhibit and stayed there, when possible.

Excursions:

Members have been invited to the excursions held by the Hawthorn Juniors and a number have attended.

The Club at present is fairly small with attendances of about 25 members and friends, whose enthusiasm make the task of organization gratifying. At meetings, members are encouraged to bring Nature exhibits and to speak on any interesting things in natural history they have observed. On occasions, when there is time to spare, Mrs. Lee shows some of her excellent collections of Natural History colour slides.

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

GENERAL MEETINGS

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

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: Members' Night.
4. Election of New Members.

(a) *Ordinary:*
Mrs. Jane J. Calder, 343 Beach Road, Black Rock (Interest: Geology and Botany). Introduced by T. Sault.
Mr. R. G. Coveny, 4 Churchill Cres., Concord, N.S.W. (Interest. Botany.)
Mrs. Lola E. Cuthbertson, 23 Stanley Street, Black Rock. S.9.
Mrs. Edna Beryl King, 5/77 Chapman St., North Melbourne (Interest: Native Flora).
Mr. Ross G. McDonald, 24 Baker Pde., Ashburton. S.E. 11 (Interest: Flora.).
Messrs. A. W. and M. Marr, 96 Napier Cres., Essendon. W.5. (Interest: Botany).
Mr. David Munro, "Plum Tree Cottage", Grove St., Eltham (Interest: Geology and Botany).
Mr. James T. Snipe, 116 Prospect Hill Road, Canterbury (Interest: Botany and Marine Biology).
Mr. Douglas Wade, 21 Armadale St., Armadale. S.E.3.
Mrs. Bella Wiener, 46 Cluden St., East Brighton.

(b) *Country:*
Mr. Ronald K. Rowe, 17 Brody St., Wangaratta. Introduced by J. McCann.
Mr. Neil Weatherill, C/- Children's School Camp, Coolart Rd., Somers, Vic.

5. General Business.
6. Nature Notes and Exhibits.
7. Future Meetings:

December 12—Miss Ina Watson.

January 9—Members' Night.

GROUP MEETINGS

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

Wednesday, November 16—Microscopical Group. Mr. B. C. Marger will give talk on "Use of Radio-active Calcium in the investigation of Plant Nutrition".

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

Thursday, December 1—Mammal Survey Group, Fisheries and Wildlife Dept. Library at 7.45 p.m.

Friday, December 2—Junior meeting at Rechabite Hall, Preston, at 8 p.m.

Monday, December 5—Entomology and Marine Biology Group meets at Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of House.

Wednesday, December 7—Geology Group.

Thursday, December 8—Botany Group: "Australian Food Plants"—Mr. K. Kleinecke plus member's slides. Supper.

F.N.C.V. EXCURSIONS

Sunday, November 20—Shoreham. Leaders: Marine Biology Group. The coach will leave Batman Avenue at 9 a.m. Fare $1.60. Bring two meals.

Sunday, December 4—Glen Nayook and Tooronga Falls. Leader: Miss J. Blackburn. The coach will leave Batman Avenue at 9 a.m. Fare $1.80. Bring two meals.

December 26, 1966 to January 2, 1967—Wangaratta. The party will leave Melbourne by coach on Boxing Day for Wangaratta where motel accommodation is available for coach party on a dinner, bed and breakfast basis for $6.00 per day. Day trips will be made to places of interest such as Mt. Buffalo and Beechworth; fare including day trips $12.00. The coach fare should be paid by the November general meeting to the Excursion Secretary, accommodation to be paid direct to motel. Bookings for all excursions should be made with the Excursion 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, 1966

President:
Mr. M. K. Houghton
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. D. E. McInnes

Hon. Secretary: Mr. E. H. Coghill, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: Mr. A. G. Hooke, 65 William Street, Melbourne, C.1 (62 3807; after hours 83 5080).

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg N22.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

Brown, Prior, Anderson Pty. Ltd., 5 Evans Street, Burwood, E.13.

The Victorian Naturalist

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Editorial

With this, the final issue for 1966, I feel it is my duty to express my thanks to the many members and non-members, who have contributed articles for publication.

When I accepted the position as editor, some nine months ago, I was not particularly confident in my ability to cope with it.

In fact, I still doubt my ability, for the reason that the *Naturalist* has continued to be successful, has been due to you, the contributors. This was proven by the fact, that the hope expressed for each issue to contain thirty-two pages, was fulfilled.

Now, with the year almost at an end, it is natural to wonder about the future, but I am sure that the same willingness, as was shown in the past, shall continue; and I shall endeavour to work to the best of my ability.

I also take this opportunity, together with the members of the Council, of extending to all readers and their families, the very best wishes for a happy and peaceful Christmas, and a bright and healthful New Year.

Australian Fauna and Flora Lectures

Mrs. L. Dowel, a member of both the Society for Growing Australian Plants, and the F.N.C.V., is producing, with the help of Mr. G. Albers, from A.B.C. Television, a series of lectures on Australian Fauna and Flora. These lectures shall be shown to schools, Youth Clubs and other interested parties; and will eventually be sent overseas.

The first lecture of the series is of the Labertouche-Powelltown area; and a list of animals, birds and orchids most likely to be found in this area, will appear in the February issue of *The Naturalist,* 1967.

If any member is able and willing to help in the matter of donating, loaning or securing any colour slides from this list, both Mrs. Dowel and Mr. Albers will be most grateful. Those slides which have been obtained will be shown in italics.

In the event of duplication of the subject shown on the slides, these shall be returned with the lecturers' thanks.

Information may be obtained from Mr. G. Albers, tel. 53 8181, ext. 380. 9 a.m.-5 p.m.

Mrs. L. Dowel, 150 Gladstone Road, Dandenong.

Vol. 83, No. 12 December 8, 1966

The Victorian Naturalist

Editor: G. M. WARD

Assistant Editor: R. H. J. McQUEEN, B.Sc., Dip.Ed.

CONTENTS

Front Cover:

Here is shown one of our many types of Gecko, which occur in many parts of Australia. H. W. Davey took this photograph which appeared in the *Victorian Naturalist*, **61** September 1944.

A Key to the Anuran Eggs of the Melbourne Area, and an Addition to the Anuran Fauna

By A. A. Martin, M. J. Littlejohn, and P. A. Rawlinson*

Littlejohn (1963) and Martin (1965) listed eleven species of anurans as occurring within a 25 mile radius of the Melbourne G.P.O., and described general aspects of their adult and larval morphology, habitat, and breeding biology. It has since become possible to identify with certainty the eggs of these eleven species; and, in addition, a twelfth form, *Hyla lesueuri* Dumeril and Bibron, has been found to occur in the Melbourne area. Accordingly, this paper contains:

1. a key to the anuran eggs of the Melbourne area; and
2. a brief diagnosis and description of *Hyla lesueuri*.

I. IDENTIFICATION OF THE ANURAN EGGS OF THE MELBOURNE AREA

The following key should facilitate identification of the eggs of the anurans occurring in the Melbourne area, with the exception of *H. lesueuri*, whose eggs are unknown. The key is based mainly on the form of the egg mass, but approximate egg diameters are also given as an additional guide. It should be noted that the diameter given is of the egg itself, not of the surrounding jelly capsule. The figures for egg diameters are from Littlejohn and Martin (1964, 1965), Martin and Littlejohn (in press), and Martin (unpublished); and some of the other data for the key are drawn from Littlejohn (1963).

KEY

(The numbers in parentheses are approximate egg diameters in mm)

1. Eggs on land in low-lying areas; usually in concealed positions in litter, among grass, or under logs; restricted to autumn - - - 2
   Eggs floating on water or submerged in water - - - - - - 3
2. Eggs adhere to each other in short, thick "ropes"; egg capsules clear (3.1) - - - - - - - - - - - - - - *Crinia victoriana*
   Eggs in loose clumps and capsules separate; egg capsules often appear muddy (2.4) - - - *Pseudophryne bibroni* and *P. semimarmorata*
3. Eggs in foamy, floating masses - - - - - - - - - - - 4
   Eggs not in foamy masses - - - - - - - - - - - - 6
4. Eggs unpigmented (creamy white); egg masses in concealed sites (1.6) - - - - - - - - - - - - *Limnodynastes peroni*
   Eggs pigmented (black or grey) - - - - - - - - - - 5
5. Egg mass 12-18 cm in diameter; usually in concealed sites (1.7) *Limnodynastes dorsalis*
   Egg mass 5-8 cm in diameter; usually in open water (1.5) *Limnodynastes tasmaniensis*

* Zoology Department, University of Melbourne.

6. Eggs attached to vegetation - - - - - - - - - - - 7
   Eggs not attached (floating mat which later sinks) (1.3) *Hyla aurea*
7. Eggs with firm, distinct capsules (1.4) - - - - - *Crinia signifera*
   Eggs in watery jelly without distinct capsules - - - - - - - 8
8. Eggs in compact masses resembling bunches of grapes, around submerged stems (1.7) - - - - - *Hyla ewingi* and *H. verreauxi*
   Eggs in long strands among submerged vegetation (2.2) *Neobatrachus pictus*

2. *HYLA LESUEURI* DUMERIL AND BIBRON

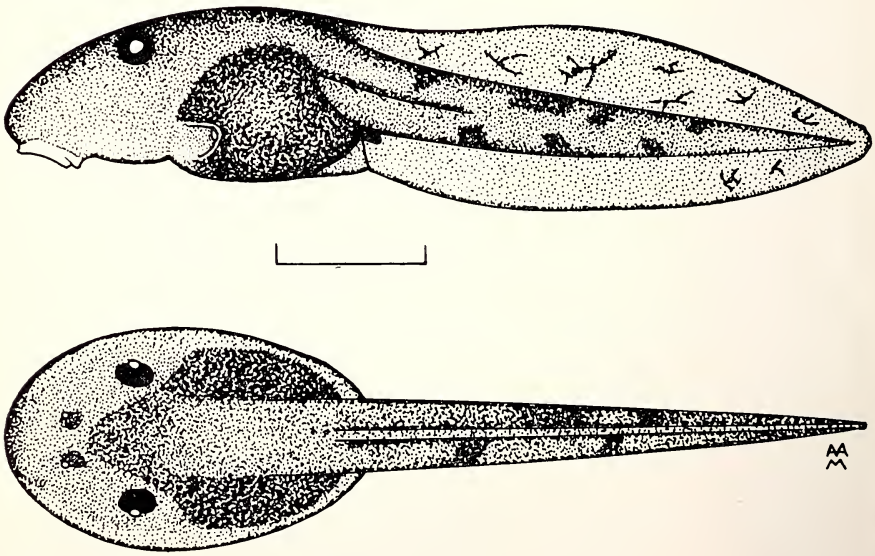
Collections made by Miss B. Smith and Mr. G. Watson in the Riddell area, and containing specimens of *H. lesueuri,* indicated that this species must almost certainly enter the Melbourne area along Jackson's Creek and the Maribyrnong River. This was confirmed by P.A.R. on 26 February, 1966, when one adult and four juvenile specimens were collected at Bulla. Within the Melbourne area, *H. lesueuri* appears to be restricted to the creeks and rivers of the northwestern part.

Adult: A long-legged species with a broad head and short, pointed snout. The dorsal colouration is light brown, often with darker brown spots or irregular mottling. A dark line runs from the snout through the eye to just behind the tympanum, which is distinct. The most striking and characteristic marking is a purplish-brown patch with white spots, extending along the posterior edge of the thigh. The ventral surface is white and has a granular texture. The toes are fairly extensively webbed, and both fingers and toes terminate in expanded pads. Breeding males have brown pigmented patches on the first finger.

Adult male *Hyla lesueuri*

Size:
Females: 51·6 mm (range 43·3-61·0)
Males: 34·8 mm (range 28·3-41·4)
Habitat: Found near flowing water. At night individuals are commonly seen on rocks along the edges of streams, and they may occasionally be seen basking on rocks by day. When disturbed they usually escape into the water by powerful leaps, often emitting a copious jet of urine at the same time. They are strong swimmers.
Breeding season: Probably extends from October to February.
Mating call: A very soft, low trill, which is rarely heard. Males call from conspicuous positions on rocks near the water.
Eggs: The ovarian eggs are pigmented, and have a diameter of about 1·5 mm, but the site of oviposition and the form of the egg mass are unknown.
Tadpole: A highly characteristic tadpole which is adapted to life in flowing water. The anus is dextral and the spiracle sinistral and not visible from above. The eyes are dorsolateral. The body is elongated and flattened and the tail thick and muscular, with low fins. The mouth is relatively very large, and is completely surrounded by numerous small papillae. There are five entire rows of labial teeth, two in the upper labium and three in the lower. The horny jaws are notched, giving the mouth opening a characteristic diamond shape.

The dorsal colour is light brown, often with dark brown patches. The intestinal mass appears darker than the general body colour, and has a coppery layer over its ventral surface. The tail musculature is mottled with dark brown spots, and there are scattered pigment patches in the fins.
Size: Tadpoles at stages 30-36 (Gosner, 1960) vary in total length from 27·8 to 36·4 mm, and have a mouth width of 3·6 to 5·2 mm. The maximum length attained is 45 mm.

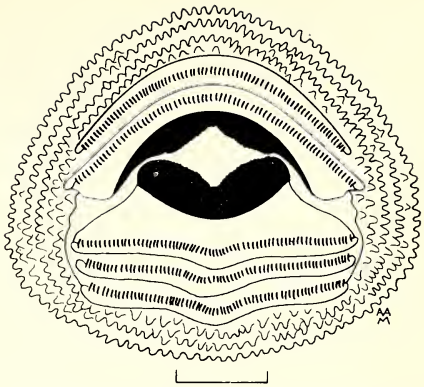


Hyla lesueuri tadpole at stage 30
(the bar represents 5 mm.)

Habitat: Found in flowing streams, usually clinging to rocks by means of the powerful sucking mouth.

Metamorphosis: Newly metamorphosed juveniles have been taken in January through April, and have a body length of 11·3 to 15·4 mm.

Diagnosis of H. lesueuri: In Littlejohn's (1963) key to frogs, *H. lesueuri* will key out in couplet 3, with *H. ewingi* and *H. verreauxi*. It may be distinguished from these species by its broader head, longer legs, and characteristic thigh markings. In Martin's (1965) key to tadpoles, *H. lesueuri* will key out in couplet 2, with the Hylidae and Myobatrachinae. It may be further identified by its labial papillae; it is the only tadpole in the Melbourne area possessing an unbroken papillary border. Its mouth disc is also unique in the area in having all its labial tooth rows entire. Finally, *H. lesueuri* is the only tadpole in the area specifically adapted to life in flowing water, and its general body form is therefore also diagnostic.



Mouth disc of *Hyla lesueuri* tadpole at stage 30

(the bar represents 1 mm.)

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Eucalyptus sieberi Goes West

PATRICIA M. CAROLAN

Eucalyptus sieberi (Silvertop), which has previously been recorded only from the eastern half of Victoria, has been found, in all stages of growth, in the Pyrete Ranges, about midway between Gisborne and Bacchus Marsh, some 30 miles north-west of Melbourne.

These ranges are composed of Ordovician sediments, deeply dissected by the headwaters of Pyrites (Coimadai) and Djerriwarrh Creeks, and it is on the ridges between these valleys that the *E. sieberi* grows. In many places the general height of the vegetation would be only about ten feet and in these areas the *sieberi* stand up 10-20 ft. higher so that they can be picked out on various ridges from half a mile or so away. The whole area is extremely interesting botanically. Of the eucalypts, probably the commonest is *E. dives* (broad-leaved peppermint) which is usually a dwarf tree. There are also *E. macrorhyncha* (red stringbark), *goniocalyx* (long-leaved box) and *sideroxylon* (ironbark), the last-named sometimes identifiable only by its fruit when its thin stems are gum-barked.

The exact area of *sieberi* distribution is not yet known but it certainly extends for several miles along the jeep track running north-east from near the Sugarloaf (Sunbury Military Map ref. 575662). The general altitude is about 1500 ft. It is interesting to note that it is only about 7 miles distant from the mallee (*E. behriana*) further down these same creeks, but the altitude there is over 1000 ft. lower and it is reasonable to assume that the average annual rainfall would be 8-10 in. less (Melton averages 19 in., Gisborne 30 in.) which would account for the almost complete difference in eucalypt species.

This occurrence of *E. sieberi* is one of many interesting examples of isolated plant communities. The Pyrete Ranges are approximately 55 miles from the nearest known occurrence of *E. sieberi* at Kalorama. Between is a wide expanse of flat to undulating country largely covered by basalt flows. The ranges themselves are separated from the Lerderderg Ranges on the west by the lava flow from Mt. Bullengarook, are bounded on the east by flows from Mt. Gisborne, and to the south slope abruptly down to the Melton Plains. Thus they are isolated from other forest areas.

Although not restricted to sandy soils, *sieberi* do very often occur on them (or on sandstone with very little soil) and in this respect the Pyrete Ranges from a typical habitat as in the Ordovician formation here sandstone is unusually dominant with numerous outcrops of solid bedrock, and the incipient soil is almost pure sand. The general appearance of the vegetation is reminiscent of parts of the sandstone tablelands of N.S.W. where, although most plant species would be quite different, *sieberi* again form a sceond storey above the general vegetation level.

Now that *sieberi* has been recognized as not solely an eastern species, it is interesting to speculate whether

they may extend further west in Victoria. The first step would be to investigate similar situations above the Lerderderg River. It would be difficult to image a more perfect habitat than the dipping sandstone slopes of the Grampians, so, despite the distance, it may be worth watching for them there.

A mallee, appropriately named *E. remota*, apparently closely related to *E. sieberi*, has been recorded from Kangaroo Island, S.A.—some 400 miles further west! (See Blakely, *A Key to the Eucalypts*, No. 375.)

E. sieberi is an easy tree to identify from diagrams and description in "Trees of Victoria". One unusual feature is the complete change of bark with age. In young trees it is pinkish-brown and tesselated, and can be broken by hand into paper-thin flakes. As trees age, the bark becomes stringy and deeply furrowed on trunk with ribbon bark hanging from smooth gum-barked branches, hence the name (in Victoria) "Silvertop".

The Aboriginals as Wild Life Conservators

By Aldo Massola

Conflicting opinions and statements regarding the relationship that once existed between the aborigines in their primitive state, and the wild life around them, have prompted this article.

Many people believe that the aborigine acted as a kind of game warden, and that while availing himself of all that nature offered in making his material possessions and in satisfying his appetite, he nevertheless consciously strived to safeguard the continuity of the species. Nothing is more erroneous, and the balance of nature that did exist before the coming of the white man was due to the usual natural co-ordination, by which a species

Yarra tribe family in mia-mia.
Shelter, weapons, string-bags, baskets, obtained from the vegetal world; fur cloaks from animal world.

was limited in numbers and in distribution, on the one hand by the amount of food it could obtain, and on the other hand, to what extent it served as food for another species. Naturally, habitat played a big part, since in certain localities the particular food, or water, needed by any given species was not available, and consequently, the species could not exist there.

It is generally stated that, with the exception of the dingo and the native cat, man had no rivals in his hunt for flesh. However, since the aborigines were omnivorous, they, in fact, had to compete against all animated nature, birds, reptiles, and marsupials, for their food.

It is also asserted that the aborigines had nothing to fear from the animal world, since there were no ferocious, man-eating animals in this country. Nevertheless, early records make frequent mention of natives dying as a result of snake-bite, against which they apparently had no antidote. Nature also took her toll of man in other ways. Although the aborigines knew which berries were poisonous and which were safe, no doubt children did perish through eating the wrong kind of fruit when unobserved by their parents.

Our aborigines knew the ways of animals; they knew, for instance, that the snake's poison was in the head, and that once the reptile was decapitated, the body was good food. On the other hand they did not eat mushrooms, apparently deeming them all poisonous. The aborigines were, therefore, diffident about certain natural products and, in some respects, did not know nature as well as we do.

The way nature, and not the aborigines, maintained a proper balance is perhaps best illustrated by the Bogong moth (*Agrotis infusca*). This insect is a typical cutworm, and must have caused a great deal of damage to native grasses and shrubs, since, in favourable seasons, it appears in countless millions. The Bogong was kept in check by the crows, dingoes, native cats, and aborigines, who all gathered on the mountain tops to feast upon them. The aborigines, the dingoes, and the cats ate the crows as well as the moths, and the aborigines also hunted the dingoes and the native cats, which ate each other, or, at least, each other's young. Today, in the absence of their enemies, the number of crows feeding upon the moths is so large, that when disturbed they rise into the air like a cloud. Nature has thus re-established a balance, since it is easy to visualize the damage the moths could cause the crops, if the crows were destroyed.

The Aborigines and the Plant World

Living in such close association with nature, and depending entirely upon natural products for subsistence, the aborigines were naturally destructive to the plant world. The greater proportion of their material culture consisted of objects fashioned from wood. These objects included water buckets, seed and tuber containers, fire tongs, lancets for extracting thorns, offensive and defensive weapons, hafts for stone axes, hooks for extracting witchetty grubs from tree-trunks, nails for pegging out animal skins and sheets of bark on which to dry them, larger sheets of bark for making shelters and canoes. These are only a few of the uses they had for timber.

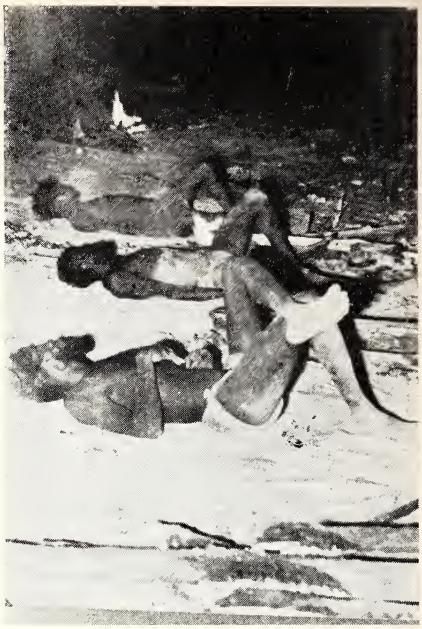
This list is by no means exhaustive: bark also supplied fibres with which to make string, from which carrying bags and nets for fishing and hunting were made. Nets, string, and baskets were also made from certain grass fibres. Reeds made drinking tubes to suck water from yabbie holes and crevices in trees during droughts; and when the reeds were cut into short

pieces they could be threaded into ornamental necklaces. Certain grasses were also uprooted for edible purposes, and grass seeds supplied the flour for making a rough kind of "bread". Many tubers and roots were eaten, as well as berries and nuts.

It must be remembered that in all cases it was the living shrub or tree which supplied food and timber. Boomerangs, for instance, were made by cutting down a branch, roughly of the right shape, while clubs were made by pulling up saplings, the roots of which made the head of the weapon, and shields were cut out of the inner bark of living trees. A great number of trees were thus destroyed, and others badly scarred, and witnessed by the many canoe trees still in existence.

Dead timber was too hard to work with stone tools, nor was it easily bent to the right shape by smoking it over a fire, as had to be done when axe hafts were made. Dead timber, of course, was used for burning in camp fires, of which each family made several, believing as they did, that by lighting small fires all around themselves, they kept warm, while the lighting of only one large fire, in the manner of Europeans, would bake them on one side and chill them on the other. Small fires lit with dry wood were also a precaution, since the smoke from green wood would reveal their whereabouts to the enemy. This safety measure, however, did not apply when the tribes were congregated for corroborees, as they then felt secure because of their numbers, and hugh fires were the order of the day (or night), as they illuminated the "corps de ballet". If, by chance, a whole tree went up in flames, it was all the better, since it would then act as a huge torch. Bushfires were sometimes started that way.

While on the subject of bushfires we must examine a controversial question: one school of thought has it



Modern Aborigines using a fire between each person.

that before the advent of the white man bushfires were a rare occurrence in this country. The other school believes that, because of aboriginal carelessness, the country was continually swept by bushfires. Both schools are right; there have always been bushfires. It is the forests that have changed.

Judging by the records of the explorers and of the early colonists, there appears to be little doubt that most forests were then very open and carpeted with grass. In fact, they had the appearance of parklands. Only occasional patches of undergrowth existed, and these could easily be skirted by the traveller, who, even though often encumbered with drays, had no difficulty in continuing his journey through the forest.

The forests of the present day are of a wholly different character, and trees at all stages of growth appear to

emerge from a solid mass of tangled undergrowth, with no grass present.

It is believed that this change in the nature of the forests is due to the cessation of the former continual burning off by the aborigines, who lost no opportunity of setting the scrub alight. Not only were they notoriously careless about fire, but they used it as a convenient tool for driving game to pre-arranged spots where the hunters were waiting, or where the nets had been placed. Fire was also used to clear the area around camping sites, to guard against surprise attacks, and were often lit to drive off approaching enemies, a mode of warfare which was experienced by almost every explorer.

At the beginning of settlement the colonists also kept the country clear by burning, but when their shacks took on a more permanent aspect they discontinued the practice for safety reasons and soon after public pressure and Government action put a total stop to the practice. The build up of both living and dead undergrowth, as a consequence of non-burning off, has now reached the level where every small outbreak can become a violent conflagration.

The Aborigines and the Animal World

The aborigines were hunters and food gatherers, and nothing which had any food value was overlooked. Animals of all kinds, reptiles and insects, certain species of ants, tadpoles, birds' eggs in all stages of incubation, all manner of fish and marine life, were all food to them.

As well as food, animals also supplied many everyday necessities. Bone could be made into implements, such as spear-barbs, spear-thrower hooks, fish hooks and gorges, pins to fasten fur cloaks, and nose and ear ornaments. Teeth could be used as gravers for incising decorative designs on wooden implements, as well as used for necklaces and forehead ornaments. Sinews, especially those from the tail of kangaroos and wallabies, became strong twine. Skins were made into cloaks and carry-alls, or, by tying the leg and neck holes, were converted into portable water bags, while the hair was spun into string. Mussel shells were used as knives and spokeshaves, and dried shark skin was used as a rasp.

However, in spite of their dependance upon animals, it appears that no attempt was made by the aborigines to actively help the increase of any species. It is true that ceremonies, especially those connected with the totems, were performed with the express purpose of totem-animal increase; but these ceremonies did not help the species concerned, although, no doubt, the aborigines believed they did. Also, it must be remembered that except in very unusual circumstances, no aborigine would kill or harm his totem-animal.

Our natives had huge appetites, and eye witnesses have expressed amazement at the amount of food which they consumed at the end of a successful hunt. But they have also been descibed as being wasteful, for instance killing a whole brood of newly hatched emu chicks, and thereby obtaining a few ounces of meat, when, in two or three years, each of the chicks could have yielded a hundredweight of flesh; or when, in drawing their nets, they left hundreds of the fry to die on the bank, instead of shaking their nets upon the water, and letting the fry drop back into their element.

Yet, at least one legend (see *Victorian Naturalist* Vol. 78, p. 238, 1961) has come down to us, which could argue the fact that they were aware of the necessity of not wasting food. In the legend one of two brothers

was killed by a Bun-yip, because he was too greedy, and had taken more black swan eggs than he needed.

The fry may have been, in their eyes, too small or insignificant to worry about; this is waste. But the killing of the emu chicks must be viewed in a different light. In the Australian bush food is difficult enough to procure, and if the natives were hungry when they came upon the chicks they obviously could not afford to wait until they grew up.

Whenever opportunity offered they killed any animal for food, regardless of age and sex. Thus the female bird sitting on its nest, and the eggs therein contained, would all find room in the aborigine's stomach. But there was not the same wanton and senseless destruction of life which is caused by some of our young men when armed with a rifle.

Occasionally young animals were spared by the aborigines, and taken back to the camp as pets for the children. Native children, like our own children, were fond of animals, and also like our own children, they would offer them whatever food was handy, regardless of the animal's natural diet, with the result that, in a short time, the pet starved to death.

An unusual procedure was sometimes adopted by groups of youths, upon the discovery of a cockatoo's nest containing fledglings. These were held by the feet, and shaken vigorously, in order to make them disgorge the partly digested food which had just been given them by the parent birds. The fledglings were then replaced in the nest, and taken out again as soon as they had received more food. The food thus procured from the birds was considered a delicacy, it being sour-sweet in taste; but the effect this food-robbing and shaking had upon the young birds can be imagined.

All these acts, performed at the expense of the animal world, would suggest that the aborigines were cruel and heartless as far as nature was concerned. Perhaps they were, but nature was pitiless towards them, and they were part of nature. After all, humanity has still not progressed very far in this direction, at witness the need, amongst ourselves, for Societies for the Prevention of Cruelty to Animals, and the necessity of Laws to Protect Wild Life. The aborigines were concerned with their own existence, and food was essential. Moreover, they did have Sanctuaries, although not quite for the same reason we have.

Each of the Totems which made up a tribe had a totem centre, in which the Spirit of the Totem Ancestor lived. This "home" of the Totem could be a mountain, a water-hole or lake, a valley, or any other natural feature in the tribe's territory. This "home" was sacred, and uninitiated members, women, and children, were not allowed to even approach it. Since hunting was forbidden there, any pursued animal which chanced to run that way was spared, and it would be safe as long as it remained there. Thus there were many small "sanctuaries" scattered throughout the length and breadth of the country, in which the animals who happened to live there, would continue the species, unmolested by man.

Four Seasons at Narre Warren North

[Conclusion]

By Victor Jacobs

March

I realized suddenly one day, that I was not seeing the usual abundance of damsel-flies. A count for an hour showed just how their numbers had dropped. In that time I counted four blue ones and none of the browns. There was an autumn chill in the air. A yellow soldier beetle with green glowing wings and a lemon band behind its head allowed me to examine it but defied capture.

I saw a pair of Scarlet Robins and Goldfinches were congregating in flocks. I counted sixty in one group that wheeled and settled in the marginal trees. Starlings were following the same pattern. The heat and drought had had its effect. Very few of the grasses retain their seeds.

A few dragonflies were seen hawking above the various clearings, but now, none of their slim relatives were seen. I heard and saw the Grey Butcher Bird once again.

Heavy rain was falling on the 12th. A group of Yellow-tailed Black Cockatoos and two Spoonbills then flew over the wood with legs hanging ungainly. The latter turned from west to south and flew coastwards as far as I could see. It was a cold day with scudding grey clouds bringing rain from the west. The ground was wet.

Leptospermums—typical of the wood.

A few Common Browns braved the unfavourable weather. Scarlet Rose Hips contrasted with the withering recently-sprayed blackberries. The stream was alive again. A flock of Spine-tailed Swifts fed as they headed south-west. From a tangle of tea tree sprang a fox, and "Nipper", who had not seen one before, gave chase. He got near enough for a bite of tail, but thought better of it and turned away. Some Long-leaf Box trees had been uprooted by the wind funnelling through the gully.

The Hedge Acacia was a favourite resting place just now for the Ichneumon Wasps *Lissopimpla excelsa.* As I watched for the birds who were still active, I inhaled the fragrance of eucalyptus. Grey Fantails, Sitellas, Tree Creepers, Brown Thornbills, White-plumed Honeyeaters, Pallid Cuckoos and Stubble Quail were seen or heard. I counted up to one hundred Goldfinches in a flock, but the total exceeded this.

April

Two Black-faced Cuckoo Shrikes flew jerkily and noisily overhead, as a flock of Welcome Swallows rose from the fence and telephone wires to circle and reland. The Scarlet Robins were to be seen each time I visited the wood. The sunshine illuminated the occasional butterfly, but none was to be seen in the shade. The new grass was now four inches high. Today I sighted a newcomer; a greyish whistler-like bird, that had a rufous or chestnut patch on its wings. I consulted both Cayley and Leach in vain, but I did recognize the White-eared Honeyeater *Meliphaga leucotis,* and the Spotted Pardalote *Pardalotus punctatus.* The former was the most striking bird that I had seen about that time, and performed aerial gyrations as it chased its mate. Grey Thrushes feeding on the side of the road, flew into the wood when cars approached, but came back again, diligently searching before the sound of the motors had died away. In the open wood, Rufous Whistlers sang, while Yellow Robins fed. A White-throated Tree Creeper took to one of the Sitella flock that he met while circling a trunk.

After three inches of rain had fallen, the lower clearing was damp and green, while in scrubland, the Red-browed Finches were ever busy feeding in that safe zone. A few Brown Flycatchers *Microeca Fascinans* made the wood their home with the advent of autumn. In the local paddocks, very large flocks of Eastern Rosellas *Platycercus eximius,* and a few Sulphur-crested Cockatoos worked day after day, but they come to the wood only in transit. Once again I flushed three quail. Not once have I seen them before they have seen me. The unknown, chestnut-winged bird, was seen often.

May

The occasional Field Mushroom was gastronomically collected and the edible Parasol Fungus *Lepiota gracilenta* with its brown scaled cap should have been treated similarly but I was too prudent to eat my own determinations.

It was quite safe now to walk beneath the trees. The spiders were not active there but gossamer webs were everywhere on the grass, made visible by the dew.

I flushed a pair of Diamond Doves *Geopelia cuneata* in the clearing, while a small group of Blue Wrens took no notice of me. All five of them were immature, but the blue tails of two showed their masculinity.

June

Near the centre of the wood, is a gnarled old peppermint, with torn limbs and many holes. Faintly I could see the shadowy head of a Brush-tail Possum, but could not entice him out.

A friend climbed the tree to have a closer look, but was not able to reach. However, he did disturb some other possums in a hole, further up. Out they came; one adult, and three young Ring-tailed possums. Along the branches to the springy twigs, and across to the next tree, a taller gum, and here, high up, they clung swaying.

One afternoon, in the south-west corner of the wood, a dark bird was flushed and flew to a low branch. His immobility while I made a quick sketch was most obliging, for other visits later, to see him again, were fruitless. Dark brown above, with a distinctly dark edge to the feathers and buff below with similar edges and a light crescent above the eye, with yellowish legs, made it easy to identify as the Ground Thrush *Oreocincla luneata.*

Between rainy spells the ants turretted their entances. Trees and grasses still made good growth. Long-leaf Box was in flower, and the White-eared Honeyeaters fed on the blossoms.

July

Inclement weather, shorter days, with the resultant loss of daylight, cut down my visits to the wood during this month.

In one spot, just beside the source of the tiny stream, I saw these birds without moving more than a few inches: Scarlet Robins, Eastern Shrike-Tit, Kookaburra, Grey Fantail, Brown Flycatcher, Grey Thrushes, Orange-wing Sitellas, White-plumed and White-eared Honeyeaters, a Black-faced Cuckoo Shrike, Brown Thornbills, and a White-throated Tree Creeper which spiralled past a Yellow Robin, almost grazing it as it moved. The Eastern Shrike Tit was seen regularly during this month. So was the chestnut-winged bird. A visit to the National Museum was not helpful, until Mr. McEvey showed me some skins of Golden Whistlers. Even they were not what I had seen. Then some skins collected in N.S.W. were produced, and they matched. My bird was a female, or an immature, chestnut-winged Golden Whistler *Pachycephala pectoralis.*

A haze of Self Heal edged the running stream, and all the lower clearing was a marsh, with two clear pools in which Wiry Buttons *Leporrhyncus tenuifolius* are growing apace.

August

The Sweet Bursaria, heavy with fruit, still had a sprinkling of flowers. Pink and White Heath was in flower, the granite outcrops had donned their seasonal grey lichens, brightened by splashes of vivid green mosses. Birds were as usual, vociferous and prolific. The woody "cwock-cwocking" of the Red Wattle-birds was heard as they landed near enough for their red wattles to be seen through the binoculars. The female Golden Whistler appeared to be wintering there. One young Grey Fantail in its usual tree, the Cherry Ballart, was still being beak fed.

At 4.30 p.m., the bright dipping sun illuminated the western trees, and attracted many of the birds to this section. I had just visited the swamp, where seedlings of Prickly Mosses, Tea Tree, and Peppermint, were colonizing the open space along the edge of the small creek. This was my seventy-fifth visit to the area, and the last record I made was of the pair of White-eared Honeyeaters chasing each other.

Knowing the attitude of the owner of the wood, I feel that its denizens will be there to be enjoyed for many years; but as nothing is quite certain, I trust that this record will give some pleasure to those who read it.

APPENDIX I

GRAMINAE:

Kangaroo Grass	*Themeda australis*	f.
Golden Crown Grass	*Paspalum dilatatum* L.	o.
Scented Vernal Grass	*Anthroxanthum odoratum* L.	a.
Rough Dog's Tail	*Cynosurus echinatus* L.	f.
Tall Fescue	*Festuca arundinaceae* Schreb.	a.
Prairie Grass	*Bromus stamineus*	o.
Soft Brome	*Bromus mollis* L.	a.
Shell Grass	*Briza maxima* L.	a.
Shivery Grass	*Briza minor* L.	f.
Reed Bent Grass	*Deyeuxia quadriseta*	o.
	Poa australis sp.agg.	a.
Tall Spear Grass	*Stipa pubescens* R.Br.	f.
Indian Rat's Tail Grass	*Sporobolus indicus* R.Br.	f.
Yorkshire Fog	*Holcus lanatus* L.	f.
Silvery Hair Grass	*Aira caryophyllea* L.	l.d.
Wallaby Grass	*Danthonia laevis*	f.
Wallaby Grass	*Danthonia pilosa* R.Br.	f.
Perennial Rye Grass	*Lolium prerenne* L.	f.
Great Brome	*Bromus diandrus* Roth.	f.

APPENDIX II

INSECTA.

Orthoptera			
Grasshopper	*Anisoptera laetum* Redd.	a.	D (Diurnal)
Bush Cockroach	*Laxta granicollis*	f.	N (Nocturnal)
Odonata			
Damsel Fly	*Lestes* sp.	a.	D.
Dragon Fly	*Aescluna brevistyla*	o.	D.
Lepidoptera			
Skipper Butterfly	*Dispar compacta* Bull.	f.	D.
Coleophoridae Moth	*Coleophora deuratella* Zell.	a.	N.
Pyrauscidae Moth	*Heliothera drosera* Meyr	a.	N.
Bogong Moth	*Agrostis infuca* Borsch	a.	N.
Xylaryclidae Moth	*Maroga unipunctata* Don	r.	N.
Oenochromid Moth	*Epidesmia tryxaria* Gn.	f.	D.
Ringed Xenica Butterfly	*Xenica acantha* Don.	o.	D.
Klugs Butterfly	*Xenica klugii* Guer.	a.	D.
Cabbage White Butterfly	*Rapae brassica* Linn.	o.	D.
Common Brown Butterfly	*Heteronympha merope merope* Fab.	a.	D.
Coleoptera			
Click Beetle	*Conoderus* sp.	a.	N.
Scarab Beetle	*Phyllosocus Macleayi* Risch.	f.	N.
Scarab Beetle	*Sericesthis geminata* Bois.	a.	N.
Carabidae Beetle	*Notonomus gravis* Chand.	o.	N.
Hymenoptera			
Ant	*Chalioponera* sp.	l.a.	D.
Ichneumon Wasp	*Lissopimpla excelsa* Costa.	r.to.f.	D.N. (spasmodic)
Winged Ant	*Tridomyrmex* sp.	a.	D.
Bull Ant	*Mycromecia pyriformis*	o.	D.

Diptera

Muscidae Fly	*Musca* sp.	f.	D.
Hover Fly	*Syrphus* sp.	o.	D.
Fly	*Helina* sp.	f.	D.
March Fly	*Tahanus* sp.	f.	D.
Green Blow Fly	*Lucilia cuprina* Mug.	f.	D.
Blow Fly	*Caliphora tibialis*. Macq.	f.	D.
Blow Fly	*Anastellorhina stygia* Fab.	f.	D.

APPENDIX III

Birds seen during the year.

(i) *Permanent Residents.*

Brown Thornbill, Grey Fantail, Orange-wing Sitellas, Indian Myna, Starling, House Sparrow, Grey Thrush, Kookaburra, White-throated Tree Creeper, White-plumed Honeyeater, White-eared Honeyeater and Blue Wren.

(ii) *Winter Residents.*

Scarlet Robin, Yellow Robin, Immature Golden Whistler, Brown Flycatcher and Yellow-tailed Thornbills.

(iii) *Summer Residents.*

Stubble Quail, Satin Flycatcher and Red-browed Finch.

(iv) *Nomadic species that probably moved in for food.*

Noisy Miner, Diamond Doves, Black-faced Cuckoo Shrike, Yellow-faced Honeyeater, Brown-headed Honeyeater, Olive-backed Oriole, Dusky Wood Swallow, Ground Thrush, Eastern Shrike-Tit and Red Wattle-bird.

(v) *Intended to nest but did not stay.*

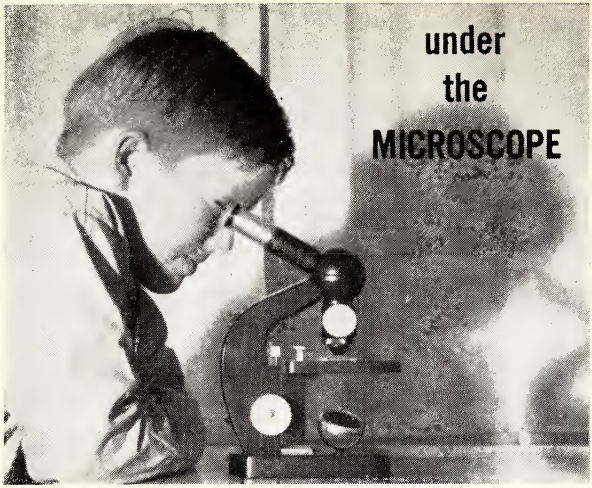
Grey Butcher Bird.

(vi) *Birds of passage over or through the wood.*

Goldfinch, Yellow-billed Spoonbill, Sulphur-crested Cockatoo, Yellow-tailed Black Cockatoo, and Eastern Rosella.

Appreciations.

To Councillor A. G. Robinson for his permission to wander at will in the wood.
To the National Herbarium for plant determinations.
To Mr. McEvey of the National Museum for valuable help with the birds.



No. 5
CYCLOPS

Proper names in the realm of the naturalist are derived from Latin or Greek, and generally give an abbreviated description of the subject. Some of the names, however, are quite fanciful, being so named because of a distinguishing characteristic, such as the Cyclops, a member of the Crustacea, which like the monster in ancient mythology, has a single eye in the middle of its forehead.

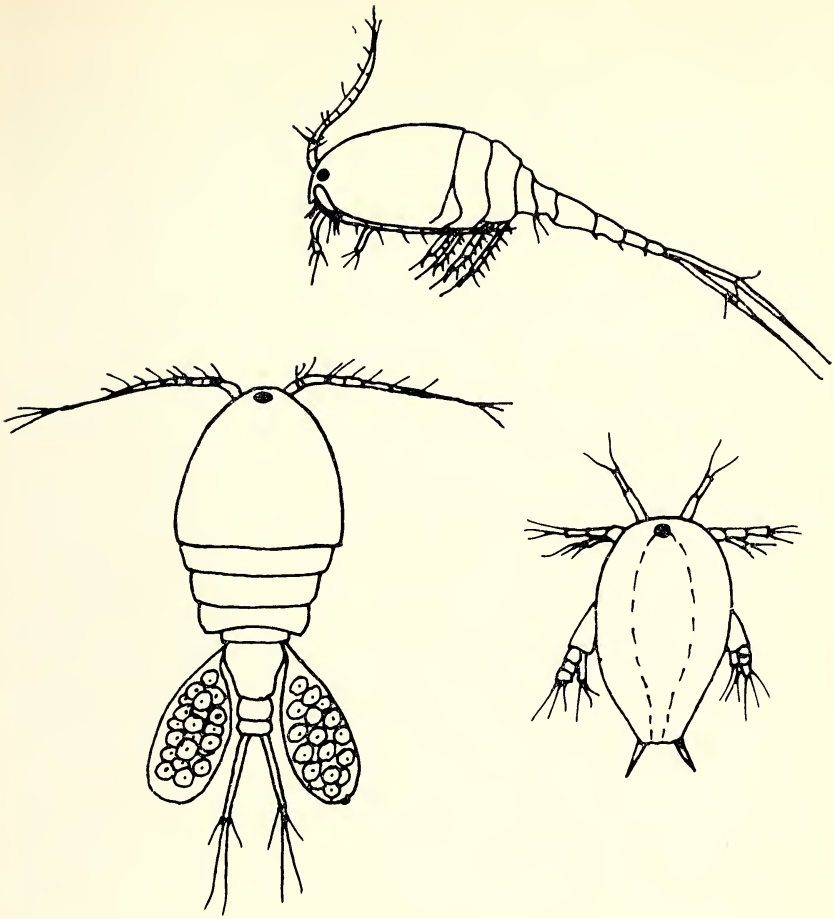
Together with the Water Fleas, Cyclops would be among the commonest organisms to be found in fresh water lagoons, but because of their fast-moving capabilities, are a little difficult to study under the microscope. The accompanying diagrams show the general anatomy and should enable the microscopist to identify them without difficulty.

The two powerful first antennae, when used in conjunction with the thoracic limbs, enable a Cyclops to dart across the viewing field of the microscope with astonishing rapidity; but if filamentous plant forms or strands of cotton wool are placed in the water, with a cover glass added, viewing is made much easier.

Perhaps one of the most amazing things about Cyclops, is that females are often seen carrying two egg sacs (see fig.); and if they are kept in a jar or petri dish for a few days with a close watch being kept, it will be seen that the egg sacs have ruptured, and the water is swarming with literally hundreds of small crab-like creatures, which seem to bear no resemblance to the parent, being very small, (about a tenth of a millimetre long), but with the single eye quite conspicuous. This is understandable when it is realized, that among the Crustacea, a number of the groups (including Cyclops) produce a Nauplius larva, which goes through a series of moults before it becomes fully adult, and it is these Nauplii which appear in large numbers.

The time elapsing between hatching and adulthood varies according to environmental conditions, but is in the region of three weeks; during which time ten or more skins may have been shed. When fully adult, the Cyclops would be approximately one millimetre long.

A close relative of the Cyclops called Diaptomus, often to be found in the same pools, is slightly longer and thinner; but the first antennae are much longer, being almost as long as the body, whereas those of Cyclops are only about half the body length.



CYCLOPS

Top—Side View

Left—Dorsal View Right—Nauplius

Wanderers at Box Hill North

By R. Condron

It was early November, 1965, when I first noticed them; tiny dome shaped eggs on the Swan plants in our garden. These I believed to be Wanderer Butterfly eggs, and as they had not occurred for 3 years, I was very pleased to see them. Although they were slightly smaller than usual, it was not until the young larvae hatched a few days later, that I realized on examination of these under a hand lens, that they were the larvae of the Lesser Wanderer (*Danaus chrysippus petilia*). It was fairly easy to distinguish these from the Wanderer (*Danaus plexippus*) larvae, as they are equipped with six fleshy spines, two at either end, and another pair approximately in the centre; instead of a total of four, as in the Wanderer. I brought three larvae indoors and placed them in a breeding cage for closer examination, and to obtain specimens for recording in my collection. The larvae are differently marked from the Wanderer larvae, being less boldly striped and having two rows of creamy spots along their back. These three larvae duly pupated, and the chrysalids were the same in appearance as in the Wanderer, being jade green in colour, with golden spots, but slightly smaller in size. The adult butterflies emerges on 23rd and 24th December, 1965, and were all perfect specimens, although they were all males. This gave the time of complete metamorphosis at about six weeks. This is the first time the Lesser Wanderer has occurred in my garden, although I have seen an occasional specimen flying. The Lesser Wanderer is a widely distributed butterfly, ranging from Australia to the Islands, India, and Africa. It has many geographical races, *D.c. petilia* being the Australian race.

This past season, 1965/66, has been a very good one for the Wanderer Butterfly; a female was also captured in my garden on 15th Jan., and on observation of the plants, I discovered eggs had been deposited. I reared some eggs through to adult butterflies which emerged on 23rd February, giving the time of the complete life cycle at 39 days, if these were laid by the captured specimen. The larvae I had brought indoors and placed in a breeding cage, developed quicker than those remaining outside, due possibly to the better type of food being available, and having no interference from the weather or other insects. The accompanying photos show the two species for comparison.

Above: *Danaus chrysippus petilia* (Lesser Wanderer)

Below: *Danaus plexippus* (Wanderer)

Photo: *R. Lee*

← Lesser Wanderer

Danaus chrysippus petilia

Top—Upperside

Lower—Underside

Wanderer →

Danaus plexippus

Top—Upperside

Lower—Underside

Field Naturalists Club of Victoria

F.N.C.V. General Meeting, 14th November, 1966.

About one hundred and ten members were present, and Mr. M. K. Houghton presided. He announced that Mr. W. C. Woolard, who is ill in hospital, is making good progress. Congratulations had been extended to Mr. Vic Miller, on his 92nd birthday by members who had visited him.

The secretary, Mr. E. H. Coghill, brought to notice the coloured pictures on the table, being part of "A Biology of Birds" by B. D. Heather, which is a reprint of two chapters from a New Zealand biology book for senior students. He also reminded members of the Queensland production of "Wild Life in Australia", copies of which were on sale at the meeting. He read a letter from Mrs. Dowel, telling of a project to produce educational lectures promoting Australian flora and fauna, by Mr. Albers of ABC TV-studios. The letter appealed for help from members who could give (or sell) slides of certain native plants, birds, reptiles and other native animals—a list of which was enclosed.

He also read from a letter from Mr. R. Hudson—former editor of the "Naturalist" who is now living in England. The subject for the evening was "Members' Night".

Mr. R. Riordan showed very fine colour slides of fungi he had taken, mostly in the Dandenongs and Frankston.

Mr. Lloyd Williams showed pictures of the Albany area of W.A., and adjacent islands; and pointed out the intermingling of history and nature, stressing the importance of preservation of our natural and historical heritage. He recalled the naming of Rottnest Islands by the Dutch in 1691, because of the presence of the ratlike wallabies-quokras; Captain Vancouver's raising of the flag in 1791 at the Cape; the association with Flinders and the "Investigator". and Sir Richard Spencer, the friend of Nelson, who commanded a ship at the Battle of Cape St. Vincent, and who built Strawberry Hill Farmhouse in 1835.

The commercial importance of the resin had destroyed most of the grass trees on Kangaroo Island. The whales also, in adjacent waters, were in danger of extinction.

Miss W. Holdsworth brought slides from American National Parks—the Olympic National Park being 1400 sq. miles and with mountains rising to 8,000 ft. Some strange and beautiful flowers were shown.

Miss Pat Carolin showed views of New South Wales, including Durras North, with numerous kangaroos on cleared country, and spotted-gum forests, with macrozamia. She pointed out that south of Shoalhaven, there is a complete sanctuary where it is illegal to carry a gun, and voluntary rangers (40,000 of them in N.S.W.) do fine work for conservation. She showed views of native flowers and birds.

Mr. A. Morrison showed an interesting series of beautiful colour slides of the fruits of many native plants. Mr. J. Morrison showed fine photographs of spiders, insects, frogs, a tree cricket and a beard orchid with three beards. Mr. A. J. Swaby explained that some desert and semidesert formations of Victoria and Australia generally, often showed flat tops, could be due to alternation of hot and moist, and very dry seasons. He illustrated by slides the capping of laterite on several formations from Darwin, and below Alice Springs.

Mr. J. Strong showed pictures of *Diuris pedunculata,* a *Patersonia* species, three gulls eggs at Fisherman's Bend, and two gull chicks; as well as a view of Werribee Gorge.

Mrs. M. North exhibited a specimen of native passion flower *Passiflora herbertiana,* a piece of Christmas Bush in flower, *Prostanthera lasianthos,* and some quartz containing gold, from Walhalla.

Mr. J. R. Garnet brought some stinging

ants—a green Victorian one, and a huge inch ant (*Myrmeia forcipata*) from Adelaide.

Mr. A. J. Swaby showed a species of Nardoo from between Penola and Narracoorte.

Mr. R. Condron brought pupae of the Imperial-white butterfly, *Delias parpalyce*.

Mr. Lewis reported that Eriostemon was flowering in the snow on Lake Mountain.

Thirteen new members whose names appear in the November *Naturalist* were elected.

Botany Group Meeting 10/11/66

Eleven members were present with Mr. B. Fuhrer in the Chair. Mr. Kleinecke was our speaker, and his subject "Edible Plants". Mr. Kleinecke asked us to imagine ourselves lost in the scrub country without food or water, in searing heat. How would we fare?

He then told us of various plants that would yield water, food, or both; and listed some of each.

Those that supply us with water: The roots of Hakea, Banksia, Coastal Acacia, Geraldton Wax, and Grevillea; when cut up, will yield water, and it will also drip from young saplings of Eucalyptus and Leptospermum, if cut, and hung upside down. The fleshy leaves of Pig-face, crushed, will supply juice, which will help to allay our thirst. Even though it has a sickly, metallic taste, it is harmless. On no account must one drink any liquid with a bitter, burning taste, or of that with a milky appearance; as these are mostly poisonous.

Food Plants: Many rushes and sedges have edible rhizomes or tubers; also Ipomea roots, which are like sweet potatoes. If one is really starving, all the common orchids have edible roots. The Bullrush rhizomes can be roasted; the roots of the Common Reed, when ground, make a floury paste. The leaves can next be looked to; and the young shoots of Hibiscus; the heart cut from young Grass Trees, when boiled, tastes like asparagus. The young tips of grasses are nourishing and palatable. Milk thistles and nettles are also good. Seeds and fruits of numerous plants may be eaten too. A few of these are the wild raspberry, the fruits of all heathy plants, especially Flame Heath. and Coastal Beard Heath; the wild cherry and Plum Pine. The kernels of some of the fruit stones are nourishing; such as that of the Quandong, which may still be eaten after lying on the ground for a considerable time. Many of the wattle seeds have toxic properties, so should be avoided.

Mr. Fuhrer thanked Mr. Kleinecke for his interesting talk. We were then shown some colour slides of flowers by Mr. Fuhrer. On the 23rd October the Botany Group made an excursion to St. Andrews, Hurstbridge and Cottle's Creek. There were 14 members on the trip, and a great number of plants were identified.

Geology Report—2nd November 1966

21 members and visitors attended, with Mr. Dodds in the chair. Mr. Dodds reported on the Group's October excursion to Bacchus Marsh, led by Mr. Myers, on whose property the excursion took place.

Tillite, of Permian Age, underlying Older Basalt of Oligocene, was first examined. Some Ice Scratched Pebbles were found. At another locality, Tertiary leaf beds were examined. Members had little difficulty in collecting fine specimens. From this locality, Mr. Myers later displayed a specimen showing moulds of fossil fruits and nuts. This specimen was to be taken to the Museum. The next area to be visited was of the Older Basalt flows, in places vesicular, where members examined inclusions of Calcite and Zeolites. In this area (Morton's Gully), were a few healthy native pines, *Callitris sp.*, which gave evidence of a more Arid climate, in recent Geological history. Mr. Dodds thanked Mr. Myers on behalf of the group, for a well organized excursion.

After the business of the evening, slides were shown by Miss Pertinac, of Lightning Ridge and environs, during a recent visit there. These included various Opal diggings, methods of puddling (wet and dry), and equipment used by the gougers. Mr. Sault showed slides of the Geology Exhibit at the last four Nature Shows; and finally, Mr. Whatmough showed slides of the craters in the Tower Hill caldera and the tuff-beds there. Slides of the Port Campbell coastline, showing in places the Tertiary marine limestone underlying the Pleistocene dune limestone, were also shown.

Exhibits:

Miss Pertinac—Jaspars, fossil wood, Opalized coral—polished.

Mr. Wigmore—Turquoise, Whitfield; Molybdenum, Wyndham; Wavellite, Mansfield; Talc, Panbula, N.S.W.; Rhyolite, Panbula.

Mr. Whatmough—Marine Sandstone, Childers Cove, Warranambool; Volcanic Tuff, Tower Hill; scratched ice pebbles, Bacchus Marsh.

Mr. Angoir—Fossil wood, Mount Poole, S.A.; fossils, Brachina Gorge, S.A.

Mr. Rivett—Jaspar and Chert, Inverell, N.S.W.; Rhodenite, Inverell.

Mr. Box—Fossil Echinoid, Fyansford; Polished Granite, from the great Pyramids of Cheops.

Mr. McInnes—Sand from Birra Burra, Qld., under microscope showing doubly terminated quartz crystals; Thunder Egg, cut and polished, Qld.; Perlite, Qld.; Basalt with vesicle containing chalcedony core, surrounded by calcite.

Mammal Survey Group

Darlimurle Survey. (Progress Report)

Four weekend trips have been made to the survey area at Darlimurla so far, at approximate six-weeks intervals, with from 5 to 12 members attending. On two occasions, a few of the party have left on Friday afternoon, so that two nights trapping and spotlighting could be fitted into the weekend. The afternoons are spent selecting sites and setting the wire mesh box traps; the evenings by covering the area with spotlights; and the following morning collecting the traps and recording results. It is hoped that during the summer, some members may be able to stay until Monday morning, and so fit in a third night's work.

The area being surveyed is covered with messmate, peppermint, and grey gum forest. The undergrowth varies from light heathy cover on the ridges, to heavy undergrowth in the gully which runs through the area. A variety of habitats is therefore encompassed by the survey. To date results have been fairly satisfactory. Thirteen species of mammal have been observed or collected, and signs of two other species have been found. Several more species may be recorded before the survey is completed.

As the group equipment is at present rather limited, the assistance of the Fisheries and Wildlife Department, in providing traps and spotlights is greatly appreciated. It is hoped that the group will be able to obtain further equipment in the near future.

Marine Biology and Entomology Group 7th November, 1966.

19 members attended this meeting, which was chaired by Mr. R. Condron.

As Mr. and Mrs. J. Strong will be on holidays next February, it was decided to hold the meeting which would have been in that month, on 23rd January, 1967.

Mr. R. Condron reported that he now had all the data in connection with the tagging of butterflies, and asked any member who sees the Wanderer butterfly, to let him know, and he will make arrangements to tag them.

Mrs. Z. Lee announced that the Preston Junior Field Naturalists' Club, (of which she is President), are holding their final meeting for the year on Friday 2nd December, in the Rechabites' Hall, Preston, and asked as many members as possible to attend. Mr. W. G. Nicholls will be showing excellent movie films on various aspects of nature.

Guest speaker for the evening was Mr. A. J. Gilmour, Marine Biologist, Fisheries and Wildlife Department; his subject being "Marine Research in Westernport Bay."

Members listened with great interest to Mr. Gilmour who spoke, among other things, of the growth of fish, which was measured by the growth of their scales; of the method and apparatus which was used to carry out a Benthic Survey; and the methods used to gauge the amount of oil pollution in the water. All the above were illustrated by excellent 35 mm. slides.

At the conclusion of his lecture, Mr. Gilmour invited questions, and members showed the interest they had taken earlier, by asking many. A vote of thanks on behalf of the Group was moved by the Group Chairman, Mr. R. Condron.

Exhibits:

Mrs. J. Strong showed a gastropod—the false Trumpet Shell, *Syrinx aruanas,* taken at Broome, Western Australia. She explained that this was the largest living gastropod, specimens being taken up to 2 feet in length. Also shown was a relatively large limpet, *Patella barbara,* from Port Alfred, South Africa. One of the most beautiful of the family Patellidae.

Mr. R. Condron showed some *Delias harpalyce* pupae, which unfortunately had been parasitized, and were therefore all dead. He also showed a specimen of *Delias harpalyce,* and two species of jewel beetles, all collected at Tynong, near Berwick.

Mrs. M. Pinches showed some silkworm larvae, and explained how relatively quickly they pupate, and emerge as adult insects.

Mrs. D. McInnes showed some land-snail shells taken at Binna Burra, North Queensland.

Miss M. Butchart showed a Crusader bug, *Mictis profana,* regarded as the most handsome of this group of bugs.

Mrs. Z. Lee displayed a water beetle larva of the Dytiscidae family. These are carnivorous larvae.

Mr. J. Strong showed, under low microscopic power, the stinging spines of one of the Cup-moth larva (the Chinese-junk larva), probably *Doratifera vulnerans.* These were in plague proportions in the vicinity of Eppalock Weir. Contact with these spines produces a very painful sting, as Mrs. J. Strong can testify.

Microscopical Group Meetings for August, September and October, 1966.

August—Eighteen members attended this meeting which was chaired by Mr. J. Daws.

The guest speaker, Mr. H. Mueller, was the Australian representative of the firm of Carl Zeiss Jena. He gave the group a most informed talk on "Phase Contrast Microscopy".

He explained that the use of this technique enabled the examination of very transparent, delicate living things, whose structure is brought out in sharp contrast, without the usual fixing and staining. This is brought about by changing phase differences, which are usually invisible, into amplitude differences, which are visible. To do this, an annular stop is inserted in the first focal plane of the substage condenser; thus the object is illuminated by a hollow cone of light. In the second focal plane of the objective, an annulus is inserted. This annulus exactly matches the natural dimensions of the condenser annulus. The condenser annulus is designed to introduce a phase difference of $\frac{1}{4}$ of the wavelength of green light.

The object is illuminated by a hollow cone of light, which is diffracted by the object, and passes through the area of the back aperture of the objective, not covered by the annulus. Direct light from the condenser annulus passes through the objective annulus. These separate wave trains, because of their coherency, cause interference; and differences of phase of such waves, cause additive or subtractive interference.

Kohler illumination, using green light 5510 A°, is used in the Zeiss system.

The inventor of phase contrast, Frits Zernike, died in March of this year. He was a Nobel Prize winner.

Mr. Mueller was questioned by most members present, and he went to a great deal of trouble to make clear a number of points which were difficult to understand. A section of an insect eye seen through the speaker's microscope, under phase contrast, was most impressive.

Mr. J. Strong passed a vote of thanks on behalf of all present for a most interesting lecture.

September—Twenty members and visitors attended this meeting, which was chaired by Mr. J. Daws.

Mr. Ken Trotter reported that the microscopical exhibit of the Nature Show was a great success. Mr. Woollard added his observations which included some comments of praise by an interstate school-teacher. All of the club microscopes were sold, and there were numerous requests for more.

Mr. Peter Kelly gave those present a most interesting talk on Micro-fungi.

He began by explaining that he had first become interested in fungi through his work as a textile chemist. Frequently he was confronted with the damage done to various materials by fungi and mildew, and as a consequence, he found it necessary to set up some routine for the testing of the numerous fungicides available commercially.

He then went on and described most lucidly how simply these fungi can be grown or cultured. These very primitive "plants" can be grown in soil or chemical food. Of course at first, the garden must be "weeded"; this is done by sterilizing or heating in a saucepan or pressure-cooker. These plates, tubes, etc., are then inoculated and kept in an incubator, or more simply, in some warm place.

Mr. Kelly displayed a most impressive array of colonies in petri dishes; colonies of all shapes, sizes, and colours.

Also illustrated was a systematic classification of fungi, based upon the appearance of their fruiting bodies. He also described the difficulties of making permanent slides of these, and finally, a way to overcome these difficulties.

Mr. J. Strong passed a vote of thanks on behalf of all members present, and congratulated Mr. Kelly upon the way in which he had created interest in the subject.

Members finally circulated around the 14 microscope exhibition of the speaker's prepared slides, and examined at close quarters, the petri dish colonies.

October—21 members and visitors attended this meeting which was chaired by Mr. C. Daws. The group leader welcomed all visitors present.

Mr. P. Genery had a considerable amount of equipment arranged on the bench in order to demonstrate the lecture, which was on the subject of "Making Paraffin Sections of Animal Tissue".

At the commencement, he outlined the role of the fixing agent, and pointed out that the choice for the formulae used, very often determined the way in which the sections would cut, and will even effect the staining reactions of sections.

The speaker took the listeners step by step through the various stages of dehydration, clearing, and infiltration with wax; the latter being carried out in an incubator of simple home-made design.

He then demonstrated the cutting of serial sections in ribbon form, their fixation to slides, de-waxing. The theory and practice of staining and counter staining was explained and demonstrated.

A particular point of interest was in regard to the final step of slide making; that of adding the mountant and coverglass, without introducing air bubbles—the bane of slide making. The speaker maintained that a considerable amount of trouble can be avoided by the simple expedient of reversing the process; that is, letting the inverted slide with object and mountant underneath, come into contact with the cover.

Mr. Genery answered a number of questions about this well tried, but nevertheless still useful, technique of section cutting.

Correction

In *Vict. Nat.* **83**: 272 (Oct. 1966), under report on lecture by J. H. Willis, amend the 5th and 4th last line of 1st column from "Lord Stokes, Dr. Byeno and Dr. Gillam. John Winray . . ." to read—Lort Stokes, Dr. Bynoe and Dr. Mary Gillham. John Whinray.

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

GENERAL MEETING

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

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: Lecture—Miss I. Watson.
4. Election of New Members.

(a) *Ordinary:*

Mr. and Mrs. R. Armitage, 32 Larkspur Rd., Doncaster (Interest:Microscopy).
Mr. Desmond Hackett, 8 Orana St., Blackburn. (Interest: Mammals).
Mr. Mark J. Lindsey, 24 Ferncroft Ave., East Malvern S.E.5 (Interest: Zoology).

(b) *Junior:*

Carl Phillip Meyer, 14 yrs., 36 Milroy St., E. Brighton S.6 (Interest: Microscopy).
Ashley Bennett-Post, 12 yrs., 3 Mountain View Rd., Highett.

5. General Business.
6. Nature Notes and Exhibits.
7. Future Meetings:

January 9—Members' Night.

GROUP MEETINGS

The Microscopical Group does not meet in December; and the Botany and Geology Groups do not meet in January. Marine Biology and Entomology Group—See report in this issue of the *Naturalist*.

F.N.C.V. EXCURSIONS

December 26 to January 2—Wangaratta, with day trips to places such as Beechworth, Mt. Buffalo, Warby Ranges, etc. The party will leave by coach from Flinders Street, opposite the Gas and Fuel Corporation at 9.15 a.m. on Boxing Day. Bring a picnic lunch. The party will be staying at Maximus Motel, Wangaratta. At present, there are a few vacancies left, but bookings should be made by the December meeting.

January 15—Marysville area. Bus leaves Batman Ave. at 9.00 a.m. Bring two meals.

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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Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

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 for January-December 1966 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 83 of the *Victorian Naturalist* is from January to December, 1966.

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